1953

IRE DIRECTORY

A YEARBOOK CONTAINING

- A RADIO ENGINEERS' DIRECTORY
- A LIST OF FIRMS AND PRODUCTS

Published by

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CONTENTS

IRE OFFICERS 4
- Board of Directors 4
- Executive Committee 4
- Administrative Staff 4

THE INSTITUTE 5
- General 5
- Membership 5
- Committees 5
- Sections 5
- Professional Groups 5
- Publications of the Institute 6
- Membership Requirements and Dues 6
- Standards 7
- Awards 8

CONSTITUTION OF THE INSTITUTE 11
- Bylaws 13

MEMBERSHIP LISTS 19
- Note 19
- Biographies of Fellows 20
- Membership Roster 47
- Geographical Listing of Membership 402

ADVERTISING SECTION

GUIDE TO ADVERTISING INDEX i
ALPHABETICAL DIRECTORY OF MANUFACTURING FIRMS 3
PRODUCT INDEX 97
CATALOGUE SECTION 361
INDEX TO ADVERTISERS Facing Back Cover

THE INSTITUTE OF RADIO ENGINEERS
1953

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THE INSTITUTE

GENERAL

THOUSANDS of persons today are engaged in furthering the art of radio, television, and the many fields ancillary thereto. Yet, of all important technical developments, few have as good a case as radio in tracing its origin to one individual. It is true that Clerk Maxwell, in the middle of the nineteenth century, drew upon the experiences of Faraday and Oersted; but the conception of electromagnetic waves was distinctly new and was due solely to that first director of the now celebrated Cavendish Laboratory. It remained for Heinrich Hertz, at Karlsruhe, to demonstrate experimentally for the first time the transmission and reception of electromagnetic waves generated by an oscillating circuit.

Alert to the significance of this phenomenon, Marconi, Poulsen, Alexanderson, Fessenden, and other engineers at home and abroad developed equipment by which messages in code could be transmitted without wires and over long distances. With the advent of the vacuum tube, wireless telegraphy gave way to wireless telephony and, later, to radio broadcasting. Today radio in all its ramifications stands as a superb tribute to the combined developmental genius of many thousands of engineers skilled in electricity, acoustics, and electronics.

In May, 1912, a small group of far-seeing engineers recognized in wireless of that day an infant industry which, through scientific research and engineering development, could be brought to magnificent fruition for the benefit of mankind. The growth and success of radio development were then clearly seen to rest not alone upon international co-operation, but also upon collaboration in allied fields of science and engineering. It was against this background that A. N. Goldsmith, J. V. L. Hogan, and R. H. Marriott founded, through the merger of two small professional societies, The Institute of Radio Engineers. Starting with fewer than fifty members in 1912, the Institute today embraces some 35,000 members from every corner of the earth.

Today, The Institute of Radio Engineers, located at 1 East 79th Street, is an incorporated, nonprofit organization having as its object the advancement of the theory and practice of radio and electronics, including allied branches of engineering and all related arts and sciences. To this end, the Institute prepares technical papers, reports, and general information of interest to radio engineers. It holds meetings and discussions throughout the United States and Canada. It maintains committees for collating and standardizing the results of technical research and development. Among the fields covered in these activities are radio communication, sound broadcasting, television, marine and aerial guidance, electron tubes, radio-frequency measurements, engineering education, electron optics, sound and picture electrical recording and reproduction, power and manufacturing applications of radio-and-electronic technique, industrial electronic control and processes, and medical electrical research and applications.

MEMBERSHIP

Membership in the Institute is distributed among various grades representative of experience and achievement in radio engineering and allied fields. The grade of Fellow is one of distinction, and appointment thereto by the Board of Directors is made on the basis of eminence and distinguished service. The grade of Special Member similarly is conferred by invitation only. Other grades—Senior Member, Member, Associate, and Student—are filled from applicants whose age, experience, and attainments conform to the respective requirements set forth in the Constitution.

COMMITTEES*

To promote the arts and techniques incident to radio development, the Institute has established some twenty-three technical committees covering fields of current activity in radio engineering and composed of persons of demonstrated ability in their respective fields. Through the Institute, these committees publish standards whose object is to set forth, partly in collaboration with technical committees of other engineering societies, accepted definitions of terms, and methods of measurements of physical quantities used in radio engineering practices. These committees are listed in the June and October issues of PROCEEDINGS OF THE I.R.E.

SECTIONS**

The Institute holds, at least once a year, a technical meeting for its entire membership. At this annual meeting, manufacturers exhibit equipment of recent design and interest to radio engineers. It is believed that by this means mutual benefit accrues to both engineer and manufacturer through first-hand acquaintance with the activities of one another. To facilitate interim meetings, Sections have been established throughout the United States, Canada, Territory of Hawaii, and Argentina, to hold meetings under the aegis of the Institute.

PROFESSIONAL GROUPS**

To serve special fields of interest, Professional Groups have been formed in each of several technical fields on an Institute-wide basis. These Groups organize meetings and conferences on subjects of special interest to their members, and issue technical publi-

* A list of Committees appears in the June and October issues of PROCEEDINGS of the I.R.E.

** A list of Sections and Professional Groups and their officers appears bi-monthly in PROCEEDINGS of the I.R.E.

cations, called TRANSACTIONS, for distribution to their memberships. In addition, the Groups provide a means for ensuring proper coverage of their fields in the publications of the Institute and for promoting recognition of their leaders among the Institute membership at large. A list of Sections and Professional Groups appears bi-monthly in the PROCEEDINGS OF THE I.R.E.

The management of The Institute of Radio Engineers resides in a Board of Directors, selected from the body of Fellows and Senior Members, acting through an Executive Committee and the officers of the Institute. The Sections of the Institute are grouped into eight Regions, and each Region is represented on the Board of Directors by a Regional Director elected biannually from, and by, the membership of the respective Region. The President and Vice-President are elected annually from the body of Fellows and Senior Members.

PUBLICATIONS OF THE INSTITUTE

PROCEEDINGS OF THE I.R.E.

Perhaps the most important single activity of the Institute is the publication of a technical journal. The first issue of the PROCEEDINGS OF THE INSTITUTE OF RADIO ENGINEERS appeared in 1913. Established first as a quarterly and later a bimonthly, the PROCEEDINGS for the last twenty-six years has been published in twelve numbers annually. In 1939, the name of this technical organ of the Institute was shortened to PROCEEDINGS OF THE I.R.E.

The PROCEEDINGS OF THE I.R.E. is the official publication of The Institute of Radio Engineers, and in it are published technical papers, discussions, and communications approved by the Papers Review Committee, Board of Editors, and Administrative Committee of the Board of Editors of the Institute, as well as IRE Standards prepared by Institute technical committees. Over 4,600 papers have been published in the PROCEEDINGS dealing with advanced research topics, mathematico-physical analyses of engineering problems, current engineering developments of equipment and methods, and commercial applications of engineering methods and products, historical papers, and tutorial papers covering specific aspects of radio and electronic engineering. In addition, space is devoted to organizational and membership news, book reviews, announcements of new products, and abstracts of papers published in technical publications the world over. Of late years an increasing volume of nontechnical material in its pages has proved of interest to members. The PROCEEDINGS OF THE I.R.E. is mailed gratis to all members; subscription price to nonmembers is $18.00 per year, $19.00 to foreign destinations.

MEMBERSHIP REQUIREMENTS AND DUES

GRADE	AGE	EXPERIENCE* AND REFERENCES	ENTRANCE FEE	ANNUAL DUES
FELLOW	32	Awarded only. No application permitted.	$3.00	$15.00
SENIOR MEMBER	28	a. Radio engineer or scientist—eight years of active practice and important technical radio or allied work and shall have performed or taken responsibility for important engineering or scientific work in these fields for at least three of these years. b. College teacher for eight years and in responsible charge of radio or allied subjects for at least three years. c. Eight years of active practice, with contributions to radio or allied engineering fields. d. Executive for eight years with direct supervision of important radio engineering or allied work. e. A person regularly employed in radio or allied technical work for at least sixteen years, who, by experience and education, has attained a standing equivalent to that required for Senior Member under paragraph "a" and shall have performed or taken responsibility for important technical work in these fields for at least six years. REFERENCES: Five Fellows, Senior Members, or other responsible individuals.	3.00	15.00
SPECIAL MEMBER	32	Conferred only by invitation of the Board of Directors.	3.00	15.00
MEMBER	24	a. Radio engineer or scientist—professionally competent and in active practice for three years. b. College teacher of radio or allied subjects for three years. c. A person regularly employed in radio or allied work for at least three years, who, by invention or by contribution to the advancement of engineering or science in radio or allied fields, or to the technical literature thereof, has attained a standing equivalent to that required for Member under paragraph "a." d. An executive who, for at least six years, has had under his direction important technical, engineering, or research work in radio or allied fields. e. A person regularly employed in radio or allied technical work for at least six years, who, by experience and education, has attained a standing equivalent to that required for Member under paragraph "a." REFERENCES: Four Fellows, Senior Members, Members, or other responsible individuals.	3.00	15.00
ASSOCIATE	18	Interest in radio engineering or allied field. REFERENCES: Three Fellows, Senior Members, Members, Associates, or other responsible individuals.	3.00	15.00 and 10.00[1]
STUDENT[2]	—	College student pursuing regular 4-year engineering or science course leading to degree, or student enrolled in an approved technical institute. REFERENCE: College Faculty Member.	—	5.00

* For more detailed information, see Bylaws, Sec. 1-5, p. 12.

[1] $10.00 for each year that is within the first five years of Associate membership, starting January 1, 1948. After five years the dues shall automatically be increased from $10.00 to $15.00. The five years are retroactive from January 1, 1948, and are based on either consecutive or intermittent membership.

[2] A special application blank is required for this grade. Upon the expiration of student status no entrance fee is required if immediate transfer is made to Associate grade.

STANDARDS

Standardization reports have been issued since 1913. The early reports were confined to the definition of technical terms and presentation of standard graphical symbols. The more recent reports include methods of testing certain items of equipment and measuring quantities associated with the radio art, and letter symbols and mathematical notation. Starting in 1949, IRE Standards have been published in the PROCEEDINGS, rather than as separate reports, in order that they might be available to all members at no extra charge. They are also available in reprint form as follows:

CIRCUITS:

Definitions of Terms in Network Topology, 1950.

ELECTROACOUSTICS:

Definitions of Terms, 1951.

ELECTRON TUBES:

Definitions of Terms, 1950.
Methods of Testing, 1950.
Standards on Magnetrons: Definitions of Terms, 1952.
Gas-filled Radiation Counter-Tubes; Methods of Testing, 1952.
Gas-filled Radiation Counter-Tubes; Definitions of Terms, 1952.

ELECTRONIC COMPUTERS:

Definitions of Terms, 1950.

FACSIMILE:

Definitions of Terms, 1942.
Temporary Test Standards, 1943.

PIEZOELECTRIC CRYSTALS:

Recommended Terminology, 1945.
Standards on Piezoelectric Crystals, 1949.

PULSES:

Definitions of Terms, Part I, 1951.
Definitions of Terms, Part II, 1952.

RADIO RECEIVERS:

Methods of Testing Frequency-Modulation Broadcast Receivers, 1947.
Methods of Testing Amplitude-Modulation Broadcast Receivers, 1948.
Tests for Effects of Mistuning and for Downward Modulation, 1949.
Open Field Method of Measurement of Spurious Radiation from Frequency-Modulation and Television Broadcast Receivers, 1951.
Definitions of Terms, 1952.

RADIO AIDS TO NAVIGATION:

Definitions of Terms, 1949.

RAILROAD AND VEHICULAR COMMUNICATIONS:

Methods of Testing, 1949.

SYMBOLS:

Abbreviations, Graphical Symbols, Letter Symbols, and Mathematical Signs, 1948.
Designations for Electrical, Electronic, and Mechanical Parts and their Symbols, 1949.
Abbreviations of Radio-Electronic Terms, 1951.

AMERICAN STANDARDS:

The Institute of Radio Engineers sponsored the publication of two standards of the American Standards Association, as follows:

Loudspeaker Testing. (ASA C16.4–1942.)
Volume Measurements of Electrical Speech and Program Waves. (ASA C16.5–1942.)

TELEVISION:

Methods of Testing Television Transmitters, 1947.
Methods of Testing Television Receivers, 1948.
Definitions of Terms, 1948.
Methods of Measurement of Television Signal Levels, Resolution, and Timing of Video Switching Systems, 1950.
Methods of Measurement of Time of Rise, Pulse Width, and Pulse Timing of Video Pulses in Television, 1950.
Methods of Measurement of Electronically Regulated Power Supplies, 1950.

TRANSDUCERS:

Definitions of Terms, 1951.

TRANSMITTERS AND ANTENNAS:

Antennas, Modulation Systems, and Transmitters: Definitions of Terms, 1948.
Standards on Antennas: Methods of Testing, 1948.

WAVE PROPAGATION:

Definitions of Terms Relating to Guided Waves, 1945.
Definitions of Terms, 1950.

Yearbooks and Directories

The first Yearbook was published in 1914, the second in 1916 and then annually between 1926 and 1932. Yearbooks were then published in 1937, 1942, and 1946. With the 1948 Yearbook, annual publication was resumed. In 1950 its name was changed to "Directory."

AWARDS

The Institute bestows seven awards, six annual and one non-annual, in recognition of outstanding technical and administrative achievements in the field of radio communication.

Medal of Honor

The Medal of Honor is given annually in recognition of outstanding scientific or engineering achievements in the fields of activity of the Institute. The recipient is named by the Board of Directors upon the recommendation of the Awards Committee.

RECIPIENTS OF THE MEDAL OF HONOR

E. H. Armstrong	1917	G. A. Campbell	1936
E. F. W. Alexanderson	1919	Melville Eastham	1937
Guglielmo Marconi	1920	J. H. Dellinger	1938
R. A. Fessenden	1921	A. G. Lee	1939
Lee deForest	1922	Lloyd Espenschied	1940
John Stone Stone	1923	A. N. Goldsmith	1941
M. I. Pupin	1924	A. H. Taylor	1942
G. W. Pickard	1926	William Wilson	1943
L. W. Austin	1927	Haraden Pratt	1944
Jonathan Zenneck	1928	H. H. Beverage	1945
G. W. Pierce	1929	R. V. L. Hartley	1946
P. O. Pedersen	1930	L. C. F. Horle	1948
G. A. Ferrié	1931	Ralph Bown	1949
A. E. Kennelly	1932	F. E. Terman	1950
J. A. Fleming	1933	V. K. Zworykin	1951
S. C. Hooper	1934	W. R. G. Baker	1952
Balth. van der Pol	1935	John M. Miller	1953

Founders' Award

The Founders' Award is bestowed only on special occasions and not annually. It is given for outstanding leadership in the planning and administration of important technical developments. The recipient is named by the Board of Directors upon the recommendation of the Awards Committee.

David Sarnoff 1953

Vladimir K. Zworykin Television Prize

The Vladimir K. Zworykin Television Prize will be awarded annually for twenty (20) times beginning in 1952 to that member who shall have made either the most important technical contribution to electronic television during the preceding calendar year, or the importance of whose contribution to electronic television shall have been realized during the preceding calendar year.

The award consists of a citation and a check for $500 drawn from a fund of $10,000 donated to the Institute by Vladimir K. Zworykin to encourage outstanding technical developments in fully electronic television. The recipient of this award is named by the Board of Directors upon the recommendation of the Awards Committee.

B. D. Loughlin . . . . 1952 Frank Gray 1953

Morris Liebmann Memorial Prize

The Morris Liebmann Memorial Prize carries a monetary award of varying amount, derived from the income of a $10,000 endowment fund. The fund was donated by E. J. Simon to preserve the memory of Colonel Morris N. Liebmann, who gave his life in the first World War. This prize is given annually to a member of the Institute who, in the opinion of the Board of Directors, upon the recommendation of the Awards Committee, shall have made an important contribution to the radio art.

RECIPIENTS OF THE MORRIS LIEBMANN MEMORIAL PRIZE

L. F. Fuller	1919	B. J. Thompson	1936
R. A. Weagant	1920	W. H. Doherty	1937
R. A. Heising	1921	G. C. Southworth	1938
C. S. Franklin	1922	H. T. Friis	1939
H. H. Beverage	1923	H. A. Wheeler	1940
J. R. Carson	1924	P. T. Farnsworth	1941
Frank Conrad	1925	S. A. Schelkunoff	1942
Ralph Bown	1926	W. L. Barrow	1943
A. H. Taylor	1927	W. H. Hansen	1944
W. G. Cady	1928	P. C. Goldmark	1945
E. V. Appleton	1929	Albert Rose	1946
A. W. Hull	1930	J. R. Pierce	1947
Stuart Ballantine	1931	S. W. Seeley	1948
Edmond Bruce	1932	C. E. Shannon	1949
Heinrich Barkhausen	1933	O. H. Schade	1950
V. K. Zworykin	1934	R. B. Dome	1951
F. B. Llewellyn	1935	William Shockley	1952
John A. Pierce			1953

Browder J. Thompson Memorial Prize

The Browder J. Thompson Memorial Prize, established in 1945, is given annually to the author or joint authors under thirty years of age at date of submission of original manuscript for that paper of sound merit recently published in the technical publications of The Institute of Radio Engineers, and which, in the opinion of the Board of Directors, upon the recommendation of the Awards Committee, constitutes the best combination of technical contribution to the field of radio and electronics and presentation of the subject.

The award comprises the income from a fund established by voluntary contributions to preserve the memory of Browder J. Thompson, a Director of the Institute killed in action in World War II while on a special mission for the Secretary of War.

RECIPIENTS OF THE BROWDER J. THOMPSON MEMORIAL PRIZE

G. M. Lee	1946	J. F. Hull and A. W. Randalls	1950
C. L. Dolph	1947	A. B. Macnee	1951
W. H. Huggins	1948	H. W. Welch, Jr.	1952
R. V. Pound	1949	Richard C. Booton, Jr.	1953

Harry Diamond Memorial Award

The Harry Diamond Memorial Award, established in 1949, is given annually to a person or persons in the Government service for outstanding contributions in the field of radio or electronics, as evidenced by publication in professional society journals such as the Proceedings of the I.R.E., or journals of similar standing. The award consists of a certificate provided for from the proceeds of a fund established by friends of Harry Diamond, a Fellow of the Institute, who felt that his professional life exemplified the highest type of scientific effort in government service. The recipient of the award is named by the Board of Directors upon recommendation of the Awards Committee.

RECIPIENTS OF THE HARRY DIAMOND MEMORIAL AWARD

A. W. Haeff	1950	Newbern Smith	1952
M. J. E. Golay	1951	Robert M. Page	1953

Editor's Award

The Editor's Award, established in 1948 by the Board of Directors to stimulate the use of good English in technical writing, recognizes that author who, in the opinion of the Editor of the Proceedings of the I.R.E., and upon the recommendation of the Awards Committee and the Board of Directors, submitted an outstanding paper from the standpoint of good presentation in general. It is administered by a subcommittee of the Awards Committee which functions as an advisory group to the Editor.

RECIPIENTS OF THE EDITOR'S AWARD

E. J. Barlow	1950	Jerome Freedman	1952
W. W. Harman	1951	E. O. Johnson	1953
W. M. Webster			1953

OFFICERS AND DIRECTORS, 1912-1953

Name	Office held
Akerman, Ben	Bd. of Dir., 1949–50.
Alexanderson, E. F. W.	Bd. of Dir., 1917–23; Pres., 1921; V. Pres., 1920.
Appleton, E. V.	Bd. of Dir., 1932; V. Pres., 1932.
Armstrong, E. H.	Bd. of Dir., 1916–22; 1936–38.
Ashbridge, Sir Noel	Bd. of Dir., 1947; V. Pres., 1947.
*Austin, L. W.	Bd. of Dir., 1914–17; Pres., 1914.
Bailey, Austin	Bd. of Dir., 1940–42.
Bailey, S. L.	Bd. of Dir., 1943–53; Pres., 1949; Treas., 1948.
Baker, W. R. G.	Bd. of Dir., 1940; 1946–53; Pres., 1947; Treas., 1951–53.
*Ballantine, Stuart	Bd. of Dir., 1935–37; Pres., 1935.
Barkhausen, G. Heinrich	Bd. of Dir., 1935; V. Pres., 1935.
Barrow, W. L.	Bd. of Dir., 1943–45.
Barton, F. S.	Bd. of Dir., 1943; V. Pres., 1943.
Batcheller, Arthur	Bd. of Dir., 1928–32; 1934–36.
Batsel, M. C.	Bd. of Dir., 1933.
*Bennett, E. M.	Bd. of Dir., 1923–25.
Bennett, R. D.	Bd. of Dir., 1953.
Beverage, H. H.	Bd. of Dir., 1936–39; Pres., 1937.
Black, K. C.	Bd. of Dir., 1952.
Bown, Ralph	Bd. of Dir., 1926–29; 1937–39; Pres., 1927; V. Pres., 1926.
Brown, J. E.	Bd. of Dir., 1938; 1947.
Browning, G. H.	Bd. of Dir., 1952–53.
*Bullard, W. H. G.	Bd. of Dir., 1920–21.
Cady, W. G.	Bd. of Dir., 1928–29; 1932–34; Pres., 1932; Editor, 1929.
Caldwell, O. H.	Bd. of Dir., 1932–35.
Carter, E. F.	Bd. of Dir., 1943–45.
Chaffee, E. L.	Bd. of Dir., 1922; V. Pres., 1922.
Chamberlain, A. B.	Bd. of Dir., 1941–44.
Chambers, C. C.	Bd. of Dir., 1942.
Clark, T. H.	Bd. of Dir., 1950.
Clayton, J. M.	Bd. of Dir., 1928–29; Secty., 1928–29.
Clement, L. M.	Bd. of Dir., 1945.
Coggeshall, I. S.	Bd. of Dir., 1941–44; 1951–53; Pres., 1951.
Coleman, J. B.	Bd. of Dir., 1948–49.
*Colpitts, E. H.	Bd. of Dir., 1921–23.
*Conrad, Frank	Bd. of Dir., 1927; V. Pres., 1927.
Cosentino, A. T.	Bd. of Dir., 1941; V. Pres., 1941.
Craven, T. A. M.	Bd. of Dir., 1937.
Crosby, M. G.	Bd. of Dir., 1947–49.
Cullum, A. E., Jr.	Bd. of Dir., 1948.
Cunningham, F. W.	Bd. of Dir., 1938–40.
Cutting, R. F.	Bd. of Dir., 1920–24; Pres., 1922; V. Pres., 1921.
Dart, H. F.	Bd. of Dir., 1951–52.
*Davis, G. S.	Bd. of Dir., 1915; 1917–19.
deForest, Lee	Bd. of Dir., 1930–32; Pres., 1930.
Dellinger, J. H.	Bd. of Dir., 1924–31; Pres., 1925; V. Pres., 1924.
Deloraine, E. M.	Bd. of Dir., 1946; V. Pres., 1946.
Doherty, W. H.	Bd. of Dir., 1951–53.
Eastham, Melville	Bd. of Dir., 1922–41; Treas., 1927–40.
Eastman, A. V.	Bd. of Dir., 1950–51.
Eckersley, P. P.	Bd. of Dir., 1937; V. Pres., 1937.
Edwards, C. P.	Bd. of Dir., 1931; V. Pres., 1931.
Engstrom, E. W.	Bd. of Dir., 1949.
Espenschied, Lloyd	Bd. of Dir., 1912–13; 1915–26; 1931.
Everitt, W. L.	Bd. of Dir., 1942–47; 1949–51; Pres., 1945.
Fay, Frank	Bd. of Dir., 1912.
Fink, D. G.	Bd. of Dir., 1949–51.
Fisk, E. T.	Bd. of Dir., 1938; V. Pres., 1938.
Forbes, E. D.	Bd. of Dir., 1912; Treas., 1912.
*Forbes, H. C.	Bd. of Dir., 1940.
Friis, H. T.	Bd. of Dir., 1941–43.
Fuller, L. F.	Bd. of Dir., 1928.
Goldsmith, Alfred N.	Bd. of Dir., 1912–1953; Pres., 1928; Secty., 1918–27; Editor, 1912–28; 1930–53.
Graf, A. W.	Bd. of Dir., 1952–53.
Graham, Virgil M.	Bd. of Dir., 1935–41; 1946–48.
*Grebe, A. H.	Bd. of Dir., 1924–26; 1928.
Gustafson, G. E.	Bd. of Dir., 1943.
Guy, R. F.	Bd. of Dir., 1944–48; 1950–52; Pres., 1950; Treas., 1947.
Hackbusch, R. A.	Bd. of Dir., 1938; 1944–46; V. Pres., 1944.
Hamburger, F., Jr.	Bd. of Dir., 1950–51.

*DECEASED.

Name	Office held
Hammond, J. H., Jr.	Bd. of Dir., 1912–17; Treas., 1913–14.
Hanson, O. B.	Bd. of Dir., 1938–43.
Hazeltine, Alan	Bd. of Dir., 1923–28; 1936–39; Pres., 1936.
Heising, R. A.	Bd. of Dir., 1927–31; 1933–35; 1939–41; 1943–45; 1947–49; Pres., 1939; Treas., 1943–45.
Henderson, J. T.	Bd. of Dir., 1953.
Henney, Keith	Bd. of Dir., 1945–48.
Hewlett, W. R.	Bd. of Dir., 1950–53.
*Hill, Guy	Bd. of Dir., 1914–16; 1918–20.
Hogan, J. V. L.	Bd. of Dir., 1912–36; 1948–50; Pres., 1920; V. Pres., 1916–19.
Hoover, P. L.	Bd. of Dir., 1951–52.
*Horle, L. C. F.	Bd. of Dir., 1934; 1936–42; 1944–46; Pres., 1940.
Horn, C. W.	Bd. of Dir., 1933–34.
Houck, H. W.	Bd. of Dir., 1931–32.
Howes, F. S.	Bd. of Dir., 1948.
*Hubley, Warren	Bd. of Dir., 1915–27; Treas., 1915–16; 1918–27.
Hull, L. M.	Bd. of Dir., 1929–35; Pres., 1933.
Hunter, T. A.	Bd. of Dir., 1948–50.
Hutcheson, J. A.	Bd. of Dir., 1948.
Jansky, C. M., Jr.	Bd. of Dir., 1929–42; Pres., 1934.
Jett, E. K.	Bd. of Dir., 1938.
Johnson, J. K.	Bd. of Dir., 1942.
Jolliffe, C. B.	Bd. of Dir., 1936–37; 1944.
Kaar, I. J.	Bd. of Dir., 1939; 1948.
Kantebet, S. R.	Bd. of Dir., 1953; V. Pres., 1953.
*Kennelly, A. E.	Bd. of Dir., 1916–18; Pres., 1916.
Kirke, Harold L.	Bd. of Dir., 1952; V. Pres., 1952.
*Kolster, F. A.	Bd. of Dir., 1933–35.
Kranz, H. E.	Bd. of Dir., 1949–50.
Krumm, L. R.	Bd. of Dir., 1917; 1921; Treas., 1917.
Lack, F. R.	Bd. of Dir., 1940; 1946–47.
Langmuir, Irving	Bd. of Dir., 1923–25; Pres., 1923.
Lee, A. G.	Bd. of Dir., 1930; V. Pres., 1930.
Lewis, G. H.	Bd. of Dir., 1918–19; 1923–26; 1935.
Llewellyn, F. B.	Bd. of Dir., 1939–48; Pres., 1946.
Loughren, A. V.	Bd. of Dir., 1952–53.
*Lowenstein, Fritz	Bd. of Dir., 1912; V. Pres., 1912.
Manson, R. H.	Bd. of Dir., 1927–33; Pres., 1931.
*Marriott, R. H.	Bd. of Dir., 1912–16; 1920–22; 1926–32; Pres., 1912; V. Pres., 1913.
McDonald, A. S.	Bd. of Dir., 1949; V. Pres., 1949.
McNicol, Donald	Bd. of Dir., 1919–28; Pres., 1926; V. Pres., 1925.
McRae, J. W.	Bd. of Dir., 1949–53; Pres., 1953.
Meissner, Alexander	Bd. of Dir., 1929; V. Pres., 1929.
*Morecroft, J. H.	Bd. of Dir., 1922–26; Pres., 1924; V. Pres., 1923.
Murray, A. F.	Bd. of Dir., 1936–39.
Nelson, E. L.	Bd. of Dir., 1932–36.
Nichols, H. W.	Bd. of Dir., 1924–25.
Oxley, A. B.	Bd. of Dir., 1951–52.
*Pedersen, P. O.	Bd. of Dir., 1939; V. Pres., 1939.
Pickard, G. W.	Bd. of Dir., 1912–15; Pres., 1913.
Pierce, G. W.	Bd. of Dir., 1915; 1918–21; Pres., 1918–19; V. Pres., 1915.
Piore, E. R.	Bd. of Dir., 1951.
Poppele, J. R.	Bd. of Dir., 1947.
*Poulsen, Valdemar	Bd. of Dir., 1936; V. Pres., 1936.
Pounsett, F. H. R.	Bd. of Dir., 1949–50.
Pratt, Haraden	Bd. of Dir., 1935–53; Pres., 1938; Treas., 1941–42; Secty., 1943–53.
Priest, C. A.	Bd. of Dir., 1953.
*Pupin, M. I.	Bd. of Dir., 1917–19; Pres., 1917.
Ragazzini, J. R.	Bd. of Dir., 1953.
Reich, H. J.	Bd. of Dir., 1944; 1948–51.
Reid, J. D.	Bd. of Dir., 1950–51.
Reoch, A. E.	Bd. of Dir., 1924–27.
Royden, G. T.	Bd. of Dir., 1946.
Rush, W. A.	Bd. of Dir., 1942; V. Pres., 1942.
Rust, W. M.	Bd. of Dir., 1951–52.
Rybner, Jorgen	Bd. of Dir., 1951; V. Pres., 1951.
Ryder, J. D.	Bd. of Dir., 1952–53.
Sarnoff, David	Bd. of Dir., 1915–20; Secty., 1915–17.
Shackelford, B. E.	Bd. of Dir., 1945–50; 1953; Pres., 1948.
Shepherd, J. E.	Bd. of Dir., 1948–50.
Shute, E. R.	Bd. of Dir., 1933–34.
Simon, E. J.	Bd. of Dir., 1912–15; Secty., 1912–14.
Sinclair, D. B.	Bd. of Dir., 1945–53; Pres., 1952; Treas., 1949–50.
Sink, R. L.	Bd. of Dir., 1952–53.
Smith, D. B.	Bd. of Dir., 1947.
Smith-Rose, R. L.	Bd. of Dir., 1948; V. Pres., 1948.
*Squier, G. O.	Bd. of Dir., 1918–22.
*Stone, J. S.	Bd. of Dir., 1912–19; Pres., 1915; V. Pres., 1914.
Straiton, A. W.	Bd. of Dir., 1953.
Stratton, J. A.	Bd. of Dir., 1948–51.
Swinyard, W. O.	Bd. of Dir., 1945–46.
Taylor, A. H.	Bd. of Dir., 1929–31; Pres., 1929.
Terman, F. E.	Bd. of Dir., 1940–43; 1948–49; Pres., 1941; V. Pres., 1940.
*Thompson, B. J.	Bd. of Dir., 1937–44.
Town, G. R.	Bd. of Dir., 1949; 1951–53.
Turner, H. M.	Bd. of Dir., 1933–46; Pres., 1944.
*van der Bijl, H. J.	Bd. of Dir., 1945; V. Pres., 1945.
van der Pol, Balth.	Bd. of Dir., 1934; V. Pres., 1934.
Van Dyck, A. F.	Bd. of Dir., 1930–35; 1939–44; Pres., 1942.
Watson-Watt, R. A.	Bd. of Dir., 1950; V. Pres., 1950.
*Weagant, R. A.	Bd. of Dir., 1913–17.
Weber, Ernst	Bd. of Dir., 1952–53.
Webb, W. L.	Bd. of Dir., 1946.
Webster, E. M.	Bd. of Dir., 1946.
Westman, H. P.	Bd. of Dir., 1930–42; Secty., 1930–42.
Wheeler, H. A.	Bd. of Dir., 1934; 1940–45.
Wheeler, L. P.	Bd. of Dir., 1940–45; Pres., 1943.
White, W. C.	Bd. of Dir., 1943–47; Treas., 1946.
Whittemore, L. E.	Bd. of Dir., 1926–29; 1935–37; V. Pres., 1928.
*Wilson, William	Bd. of Dir., 1932–36.
Wolff, Irving	Bd. of Dir., 1952–53.
Zahl, H. A.	Bd. of Dir., 1949.
Zenneck, Jonathan	Bd. of Dir., 1933; V. Pres., 1933.

*DECEASED.

THE INSTITUTE OF RADIO ENGINEERS

(Incorporated, August 23, 1913)

CONSTITUTION

Adopted at the First Meeting of The Institute of Radio Engineers, May 13, 1912.
Amended, November 2, 1914; December 5, 1915; October 7, 1931; March 1, 1939; November 5, 1941; September 8, 1943; November 29, 1944; May 5, 1945; December 15, 1945; June 27, 1946; July 30, 1946; and August 15, 1947.

ARTICLE I

NAME AND OBJECT

SEC. 1.—The name of this organization shall be The Institute of Radio Engineers, Incorporated.

SEC. 2—Its objects shall be scientific, literary, and educational. Its aims shall include the advancement of the theory and practice of radio, and allied branches of engineering and of the related arts and sciences, their application to human needs, and the maintenance of a high professional standing among its members. Among the means to this end shall be the holding of meetings for the reading and discussion of professional papers and the publication of papers, discussions, communications, and such other matters as may be appropriate for the fulfillment of its objects.

ARTICLE II

MEMBERSHIP

SEC. 1—The membership of the Institute shall consist of:

a. Fellows, who shall be entitled to all rights and privileges of the Institute.

b. Senior Members, who shall be entitled to all rights and privileges of the Institute.

c. Special Members, who shall be entitled to all rights and privileges of the Institute except the right to hold the offices of President and Vice President.

d. Members, who shall be entitled to all rights and privileges of the Institute except the right to hold the offices of President, Vice President, and Director.

e. Associates, who shall have such rights and privileges as are provided by the Bylaws. However, Associates who have maintained a continuous membership in this grade since March 1, 1939, shall have the right to vote and shall be entitled to all rights and privileges of the Institute except the right to hold any corporate office, the office of Director, and the chairmanships of standing Committees and of Sections.

f. Students, who shall have such rights and privileges as are provided by the Bylaws.

SEC. 2—The qualifications for the various grades of membership shall be specified in the Bylaws in accordance with the following principles:

a. Fellow is a grade of unusual professional distinction and shall be conferred only by invitation of the Board of Directors.

b. Senior Member is the highest professional grade for which application may be made and shall require experience or attainment reflecting professional maturity.

c. Special Member is a grade limited to those who have shown an interest in furthering the radio or allied arts and sciences and who have attained such position or prestige that by membership they shall advance the objectives of the Institute. This grade shall be conferred only by invitation of the Board of Directors.

d. Member is a professional grade limited to those who have demonstrated professional competence in radio or allied fields.

e. Associate grade shall be open to those interested in the theory or practice of radio engineering or the allied arts and sciences.

f. Student grade shall be open to those devoting a major part of their time as registered students in a regular course of study in engineering or science in a school of appropriate standing. Membership in this grade may extend a limited time after termination of student status.

SEC. 3—The requirements for admission, transfers, and severance of members shall be specified in the Bylaws.

SEC. 4—The term "allied" as used in this Constitution and Bylaws refers to electrical communication, electronics, and such other technical fields as are directly contributory to, or derived from radio.

SEC. 5—The terms "member" and "membership" when printed without an initial capital where used in this Constitution and Bylaws include all grades.

SEC. 6—The term "voting member" where used in this Constitution and Bylaws means a member entitled to vote on Institute matters.

ARTICLE III

DUES AND FEES

SEC. 1—Dues and fees shall be specified in the Bylaws.

SEC. 2—Under exceptional circumstances, the payment of fees and dues may be deferred or waived in whole or in part by the Board of Directors.

ARTICLE IV

OFFICERS AND DIRECTORS

SEC. 1—The governing body of the Institute shall be the Board of Directors and shall consist of the President, Vice President, Secretary, Treasurer, Editor, six Directors elected-at-large, three appointed Directors, one Regional Director elected by each Region, and the two most recent past Presidents.

SEC. 2—The Corporate Officers of the Institute shall be the President, Vice President, Secretary, Treasurer, and Editor.

SEC. 3—The terms of office for Directors elected-at-large shall be for three years; for appointed Directors, one year; for Regional Directors, two years; and for all Corporate Officers, one year, except as provided in Article VI, Section 1.

SEC. 4—Each year of a term of office established in Article IV shall begin with the assembly of the Board of Directors at its annual meeting and terminate with the assembly of the Board of Directors at its following annual meeting.

SEC. 5—No Corporate Officer or Director shall receive, directly or indirectly, any salary, traveling expenses, compensation, or emolument from the Institute, unless authorized by the Board of Directors or by the Bylaws.

SEC. 6—The United States and Canada, and other areas at the discretion of the Board of Directors, shall be divided into Regions, which shall be specified in the Bylaws. The Board of Directors shall delineate the Regions, make changes in the number of Regions, as it deems desirable, and number the Regions with consecutive numbers. The voting members of each Region shall elect one representative who shall thereby become a member of the Board of Directors and be designated a Regional Director.

ARTICLE V

MANAGEMENT

SEC 1.—The President shall be the regular presiding officer at meetings of the Board of Directors and at meetings of the Institute. He shall be an ex-officio member of each committee.

The Vice President shall assume the duties of the President in the absence or incapacity of the President.

In the event that neither the President nor the Vice President can personally act, the Board of Directors may elect a chairman from its membership who is authorized to perform the presidential duties during the period of the incapacity of the President and Vice President. The tenure of such temporary chairmen shall be at the discretion of the Board of Directors.

SEC. 2.—The Board of Directors shall manage the affairs of the Institute. An annual report on the activities and finances of the Institute shall be made to the members.

Eight members of the Board of Directors shall constitute a quorum.

SEC. 3—The Board of Directors may make, amend, or revoke Bylaws to this Constitution. The proposed changes and reasons therefore shall be mailed to all members of the Board at least twenty days before the stipulated meeting at which the vote shall be taken. Two-thirds of all votes cast at the stipulated meeting shall be required to approve any new Bylaw, amendment, or revocation.

SEC. 4.—The Secretary shall be responsible for the preparation for all meetings of the Board of Directors and all principal meetings of the Institute and the recording of the minutes of such meetings. He shall be responsible for the correspondence of the Institute and the keeping of full records thereof, and shall be responsible for the provision of such information from them as is requested by the Board of Directors.

SEC. 5—The Treasurer, under the control of the Board of Directors, shall have general supervision of the fiscal affairs of the Institute and shall be responsible for the keeping of the books of account. An annual audit of the affairs of the Institute shall be made by certified public accountants and submitted to the Board.

SEC. 6—All funds received by the Institute shall be deposited in an account requiring the signatures of at least two of the following for withdrawal: President, Vice President, Secretary, Treasurer, and Editor. Funds from this account may be deposited in other accounts authorized and limited in size by the Board of Directors. Funds from these accounts shall be withdrawable on the signatures of authorized bonded individuals for current disbursements. Before additional funds are transferred from the first-mentioned account to another account, the individuals responsible for such other accounts shall submit a statement of the disposition of the previously expended funds to the Treasurer.

SEC. 7—All committees shall be appointed by the Board of Directors or in such manner as the Board may designate.

SEC. 8—The fiscal year of the Institute shall end with the thirty-first day of December.

ARTICLE VI

NOMINATION, ELECTION, AND APPOINTMENT OF OFFICERS AND DIRECTORS

SEC. 1—On or before July first of each year, the Board of Directors shall submit to qualified voters a list of nominations containing at least one name each for the offices of President and Vice President, at least four names for the office of Director elected-at-large, the names of all nominees for the office of Regional Director, and shall entertain nominations by petition for all of the offices specified.

Nominations by petition may be made by letter to the Board of Directors setting forth the name of the proposed candidate and the office for which it is desired he be nominated. For acceptance a letter of petition must reach the Institute office before twelve o'clock noon on the last weekday prior to August fifteenth of any year and shall be signed by at least one hundred voting members qualified to vote for the office of the candidate nominated.

Each proposed nominee shall be consulted and if he so requests his name shall be withdrawn. The names of proposed nominees who are not eligible under the Constitution shall be withdrawn by the Board.

On or before September first, the Board of Directors shall submit to all voting members as of August fifteenth, a list of nominees for the offices of President, Vice President, and Director elected-at-large, and shall submit to all such voting members of each Region a list of their nominees for the office of Regional Director, the names of the nominees for each office being arranged in alphabetical order. The ballots shall carry a statement to the effect that the order of the names is alphabetical for convenience only and indicates no preference.

Voting members shall vote for the candidates whose names appear on the list of nominees, by written ballots in plain sealed envelopes, enclosed within mailing envelopes marked "Ballot" and bearing the member's written signature. No ballots within unsigned outer envelopes shall be counted. No votes by proxy shall be counted. Only ballots arriving at the Institute office before twelve o'clock noon on the last weekday prior to October twenty-fifth shall be counted. Ballots shall be checked, opened, and counted under the supervision of the Tellers Committee between October twenty-fifth and the first Wednesday in November. The result of the count shall be reported to the Board of Directors at its next succeeding meeting and the nominees for President and Vice President, the two nominees for Director elected-at-large, and the nominees for each office of Regional Director receiving the greatest number of qualified votes shall be declared elected. In the event of a tie vote the Board shall choose between the nominees involved.

Nominees for the office of Regional Director shall be members of and live in the Regions which nominate them. They shall be elected by the voting members of the Institute in the Region. The Regional Directors from even- and odd-numbered Regions shall be chosen by the Regions in even- and odd-numbered years, respectively. In placing the Regional Representation Plan into operation, or when new Regions are established, or when changes are made in Regions, candidates for the office of Regional Director may be nominated and elected for one-year terms as required to ensure representation during the period preceding their normal election years. No Regional Director shall have his term shortened by changes in Regions. Each Region shall have a Regional Committee whose duties shall include making at least one nomination for Regional Director from its Region during election years. In the event a Regional Director dies, is unable to serve, or is disqualified by removal from the Region, the Regional Committee shall appoint a Regional Director for the unexpired portion of the term. The organization and procedure of the Regional Committees for nominating candidates for Regional Director shall be specified in the Bylaws.

SEC. 2—The Secretary, Treasurer, Editor, and three appointed Directors shall be appointed by the Board of Directors at its annual meeting to serve until the next annual meeting or until their successors are appointed and accept.

SEC. 3—The Board of Directors is authorized to fill a vacancy other than Regional Director occurring in the governing body.

ARTICLE VII

MEETINGS

SEC. 1.—There shall be an annual meeting of the Board of Directors during January of each year at which newly elected officers shall begin their terms of service, and the Board shall make necessary appointments.

SEC. 2.—There shall be an annual meeting of the Institute as soon as practicable after the annual meeting of the Board of Directors at which reports of the Secretary and Treasurer shall be presented.

SEC. 3—Meetings of the Board may be held at such times as are necessary to carry out the provisions of this Constitution and shall be held at such other times as any five members of the Board may determine, but only on notice to all members of the Board. The method of calling such special meetings shall be specified in the Bylaws.

ARTICLE VIII

SECTIONS AND OTHER GROUPS

SEC. 1—The Board of Directors may authorize the establishment of Sections and other groups of members for the purpose of promoting the interests of the Institute. The Board of Directors may, at its discretion terminate the existence of any such group.

ARTICLE IX

AMENDMENTS

SEC. 1—Amendments to this Constitution may be proposed by means of a resolution adopted by the Board of Directors or by means of a petition signed by at least one hundred voting members. Such proposed amendment or amendments shall be submitted to legal counsel by the Board of Directors, and if, in the opinion of such counsel, they are in accordance with the laws under which the Institute is organized, a copy shall be mailed with a ballot to each voting member.

SEC. 2—Constitutional amendment ballots shall be mailed to the voting members at least sixty days before the date appointed for counting the ballots and the ballots shall carry a statement of the time limit for their return to the Institute office. The ballots after marking shall be placed in plain sealed envelopes, enclosed within mailing envelopes marked "Ballot" and bearing the member's written signature. Only ballots within signed outer envelopes shall be counted. No votes by proxy shall be counted. Only ballots arriving at the Institute office prior to the stated time limit shall be counted. The Tellers Committee shall count such votes and report to the Board of Directors at its next meeting. If the total vote be at least twenty per cent of the total voting membership and if at least sixty-seven per cent of all votes cast shall be favorable, the proposed amendment or amendments shall be immediately declared by the Tellers Committee to be adopted.

SEC. 3—Amendments shall take effect thirty days after their adoption but officers and officers-elect of the Institute at the time any amendment becomes effective shall continue in office until the end of the terms for which they were elected.

SEC. 4—Copies of the amendments shall be distributed to the members as soon as practicable after adoption.

SEC. 5—A complete history of amendments shall be kept in the files of the Institute.

BYLAWS

(As of May 15, 1953)

Article V, Section 3, of the Institute Constitution provides for Bylaws as follows:

"The Board of Directors may make, amend, or revoke Bylaws to this Constitution. The proposed changes and reasons therefor shall be mailed to all members of the Board at least twenty days before the stipulated meeting at which the vote shall be taken. Two-thirds of all votes cast at the stipulated meeting shall be required to approve any new Bylaw, amendment, or revocation."

MEMBERSHIP QUALIFICATIONS

SEC. 1—Fellow: The grade of Fellow shall be conferred only upon a person who is at least thirty-two years of age and who is:

a. An engineer or scientist in radio or allied fields. As such he shall have attained distinction in his profession and shall be eminently qualified to take responsible charge of important radio or allied work. He shall have been in the active practice of his profession for at least ten years, and shall have had responsible charge of important radio or allied work for at least three years, or

b. A professor of engineering or of physical science. As such he shall have attained special distinction as an expounder of the principles of engineering or of science in radio or allied fields. He shall have had at least ten years' experience as a teacher of electrical or physical subjects and shall have had responsible charge, or at least three years, of a course in radio or allied subjects in a school of recognized standing, or

c. A person who has done notable original work contributing to the advancement of engineering or science in radio or allied fields, which has given him a recognized standing at least equivalent to that required for Fellow under paragraph "a" or "b," or

d. A person regularly engaged in radio or allied work for at least ten years, who, by invention or contribution to the advancement of engineering or science in radio or allied field, or to the technical literature thereof, has attained a standing at least equivalent to that required for Fellow under paragraph "a" or "b."

SEC. 2—Senior Member: For admission or transfer to the grade of Senior Member, a candidate shall be at least twenty-eight years of age and shall be:

a. An engineer or scientist in radio or allied fields. As such he shall have been in the active practice of his profession for at least eight years, and shall have performed or taken responsibility for important engineering or scientific work in these fields for at least three of these years, or

b. A teacher of radio or allied subjects for at least eight years in a school of recognized standing. As such he shall have been in responsible charge of a major course in such subjects for at least three years, or

c. A person regularly employed in radio or allied fields for at least eight years, who, by invention or by contribution to the advancement of engineering or science in radio or allied fields, or to the technical literature thereof, has attained a standing equivalent to that required for Senior Member under paragraph "a," or

d. An executive who, for at least eight years, has had under his direction important engineering or research work in radio or allied fields and who is qualified for direct supervision of the technical or scientific features of such activities, or

e. A person regularly employed in radio or allied technical work for at least sixteen years, who, by experience and education, has attained a standing equivalent to that required for Senior Member under paragraph "a" and shall have performed or taken responsibility for important technical work in these fields for at least six years.

SEC. 2-A—Special Member: The grade of Special Member shall be conferred only upon a person who is at least thirty-two years of age and who meets the requirements of the grade set forth in the Constitution. Proposals for election to the grade, together with supporting information, may be presented by a member of the Board of Directors at any meeting of the Board. After full consideration at a Board meeting, the proposal, unless withdrawn, shall be placed on the agenda for action at the next Board meeting. A favorable vote of at least two-thirds of the members of the Board present shall be required for election.

SEC. 3—Member: For admission or transfer to the grade of Member, a candidate shall be at least twenty-four years of age and shall be either:

a. An engineer or scientist in radio or allied fields. As such he shall have demonstrated competence in engineering or scientific work of a professional character and shall have been in active practice of his profession for at least three years, or

b. A teacher of radio or allied subjects for at least three years. As such he shall have attained a professional standing equivalent to that required for Member under paragraph "a," or

c. A person regularly employed in radio or allied work for at least three years, who, by invention or by contribution to the advancement of engineering or science in radio or allied fields, or to the technical literature thereof, has attained a standing equivalent to that required for Member under paragraph "a," or

d. An executive who, for at least six years, has had under his direction important technical, engineering, or research work in radio or allied fields, or

e. A person regularly employed in radio or allied technical work for at least six years, who, by experience and education, has attained a standing equivalent to that required for Member under paragraph "a."

SEC. 4—Associate: For admission or transfer to the grade of Associate, a candidate shall be at least eighteen years of age and shall be interested in the theory or practice of radio engineering or of the allied arts and sciences.

SEC. 5—Student: For admission to the grade of Student, a candidate shall be

a. devoting a major portion of his time as a registered student in a regular course of study in engineering or science in a school of recognized standing, or

b. devoting a major portion of his time as a resident and registered student in a regular course of study in radio and electronics in a technical institute approved by the Board of Directors for Student membership purposes only.

Membership in this grade shall not extend more than six months beyond the termination of his student status as described above.

SEC. 6—The expression, "school of recognized standing," includes only schools which provide an engineering or scientific curriculum of not less than four years leading to a degree and which are designated as such by the Board of Directors.

SEC. 7—Graduation from a radio or allied curriculum in an accredited professional school shall be accepted as equivalent to two years' experience in radio or allied fields.

Graduation from a radio, arts and sciences or equivalent curriculum in an accredited non-professional school may be accepted as equivalent to two years' experience in radio or allied fields.

Graduation from an unaccredited radio or allied curriculum in a professional accredited school may be accepted as equivalent to one year's experience in radio or allied fields.

Full-time graduate work or part-time graduate work with teaching, in a radio or allied course in a school of recognized standing may be accepted as equivalent to professional experience.

SEC. 8—The time requirements for admission or transfer to any grade of membership may be satisfied by applying pro rata the experience of the candidate under the various alternative requirements for that grade.

SEC. 9—Members are authorized to assert Institute affiliation. In doing so, they should indicate their grade of membership and, if necessary, use the following abbreviations:

Fellow—Fellow I. R. E.
Senior Member—Sen. Mem. I. R. E.
Special Member—Spec. Mem. I. R. E.
Member—Mem. I. R. E.
Associate—Assoc. I. R. E.

SEC. 10—The emblem of the Institute is copyrighted and shall be reproduced only in connection with official business of the Institute.

MEMBERSHIP APPLICATIONS

SEC. 11—Applicants for membership shall furnish names of references as follows:

For Senior Member—Five Fellows or Senior Members.
For Member—Four Fellows, Senior Members, or Members.
For Associate—Three Fellows, Senior Members, Members, Associates, or other responsible individuals.
For Student—A member of the faculty of his school.

SEC. 12—When an applicant for Senior Member or Member shows that his work or location is such as to make impracticable compliance with Section 11, the names of persons who are familiar with his professional work may be substituted. The Admissions Committee shall exercise discretion in determining suitability of substitute references and waiving Section 11.

SEC. 13—Applications for admission or transfer to any grade of membership, except Fellow or Special Member, shall be addressed to the Board of Directors and submitted to the Institute office. Election or transfer of an applicant to any grade, except Fellow or Special Member, shall be made by two-thirds affirmative vote of the Board membership voting, or a two-thirds affirmative vote of a committee of Board members duly authorized in the Bylaws to act for the Board in electing members or transferring their membership grades.

SEC. 14—The Executive Committee is authorized to act for the Board of Directors in electing members or transferring their membership grades in the case of all except Fellow and Special Member grades, and may waive age, application, and reference requirements in the transfer of members in grade from Student to Associate. The Executive Committee shall handle readmissions on the basis of policies established by the Board of Directors.

SEC. 15—A reapplication for admission or transfer to a particular grade may be made by the applicant after the expiration of one year from the date of a rejection.

MEMBERSHIP PROPOSALS

SEC. 16—Admission or transfer to Fellow or Special Member grade shall be by invitation by the Board of Directors only.

SEC. 17—Each year, the Awards Committee shall recommend to the Board of Directors nominees for Fellow Grade not more than seventy-five (75) in number. A citation summarizing the accomplishments of the nominee shall be a part of each recommendation.

SEC. 18—Diplomas shall be presented to the newly-elected Fellows. If practicable, this presentation shall be made by the President at the next annual Convention.

SEC. 19—Before the election of any candidate to the grade of Special Member, the Board of Directors shall refer the proposal to the Public Relations Committee for study. The Public Relations Committee shall make its recommendations, with respect to each name so referred, directly to the Board of Directors.

SEC. 20—Admission or transfer to any grade except Fellow or Special Member may be proposed by any member acting as sponsor, or by the Membership Committee, by supplying to the Admissions Committee sufficient information and testimonials from the required number of references to satisfy the Admissions Committee as to qualifications. Such proposals shall be acted upon by the Admissions Committee, and if approved, transmitted to the Executive Committee for their action. If approved by the Executive Committee, an invitation blank shall be sent to the proposed member inviting him to accept the grade of membership proposed, which membership grade shall become effective automatically and immediately upon his supplying the biographical and professional information required, and paying the necessary dues and fees. The name of an invitee shall be placed on the mailing list for the PROCEEDINGS OF THE I.R.E. immediately upon receipt of dues and fees. The proposal and invitation blanks shall be drawn up by the Membership Committee so as to avoid unconstitutional action due to the sponsor supplying incorrect information.

SEC. 21—The Membership Committee may recommend for transfer to higher grade those members whom they think are qualified.

ADMISSIONS AND TRANSFERS

SEC. 22—The entrance fee for all grades shall be three dollars ($3) except that there shall be no entrance fee for Student grades.

SEC. 22A—No entrance fee shall be charged any non-I.R.E. member of a Joint Student Branch, who is a student member of another national engineering society which is a sponsor of the Joint Student Branch, and who applies for admission to membership in the Institute within six months of the termination of his student status.

SEC. 23—There shall be no transfer fees. A member whose grade of membership is changed during his annual dues period shall be billed pro rata for the remainder of that period.

SEC. 24—The name of every newly-admitted or transferred Senior Member, Special Member, Member, or Associate shall be published in the PROCEEDINGS OF THE I.R.E.

SEC. 25—When an applicant for membership is elected, the membership period shall be dated as of the first day of the month following election.

SEC. 26—The entrance fee and dues are payable on notification of election, and, if not received within six months from notification, the election shall be considered void.

SEC. 27—A notice of his election shall be sent to every newly admitted member together with a bill for his entrance fee and dues. If not previously paid, dues will be computed for the annual period beginning with the first day of the month following his election. His entrance fee or dues remaining unpaid, additional bills shall be sent the newly-elected member 60 days and 120 days after notification of his election, in the last instance accompanied by a warning that his election will be considered void if his entrance fee and dues are not received within six months of his notification of election.

The names of all individuals elected to membership who fail to pay entrance fees or dues within six months of notification of election, shall be turned over to the Membership Committee.

ANNUAL DUES

SEC. 28—Every member's annual dues period and the period during which he shall receive publications of the Institute shall run concurrently with his membership period. The annual dues shall be payable in advance at the beginning of the annual dues period.

SEC. 29—For annual dues periods beginning January 1, 1951, or thereafter, the annual dues for all grades shall be fifteen dollars ($15), except for Student which shall be five dollars ($5), and except for Associate which shall be ten dollars ($10) for each year which is within the first five years of membership in any grade or grades other than Student. Beginning with the Sixth such year, the annual Associate dues shall be fifteen dollars ($15).

SEC. 30—The Board, by this Bylaw, waives the dues of each and every member of the Institute who has attained the age of 65 years and has been a member of the Institute for 35 years.

BILLING

SEC. 31—A bill covering his dues for the following year shall be mailed to every member not later than one month prior to the beginning of his annual dues period. A second bill shall be mailed after a lapse of two months to every member whose dues remain unpaid. There shall be mailed with the second bill a notice that, if the member's dues remain unpaid for four months, it shall be the duty of the Executive Secretary, in accordance with the Bylaws of the Institute, to notify the member that his membership has terminated.

After a member has been in arrears four months, his membership shall terminate and his name shall be removed from the roll of membership. Every such member shall be mailed a notice to the effect that, according to the Bylaws of the Institute, his membership in the Institute has in fact terminated. Accompanying the notice of termination shall be a final bill, with the suggestion that the member pay the bill and resume his membership. A list of terminated membership shall be turned over each month to the Membership Committee.

Membership so terminated may be resumed on payment of all dues in arrears, or on payment of a new entrance fee and current dues.

SEC. 32—For purposes of Article II, Section 1-e, of the Constitution, resumption of membership as provided under Bylaws Sections 31 and 36, shall not constitute maintenance of continuous membership.

SEC. 33—The mailing of bills or statements to the last known address of a member shall be considered a valid notice of indebtedness.

SEC. 34—On resuming membership and paying dues in arrears, a member may receive available copies of the PROCEEDINGS OF THE I.R.E. during the period covered by the back dues. A rebate of 25 cents per copy will be made in lieu of copies of the PROCEEDINGS OF THE I.R.E. not available.

SEVERANCES

SEC. 35—A member in good standing may resign by submitting a written resignation to the Secretary.

SEC. 36—Subject to the approval of the Board of Directors, a resigned member may resume his membership upon payment of current dues.

SEC. 37—To initiate action toward expulsion of a member, a written complaint must be submitted to the Board of Directors, which, if it deems the reason sufficient, shall notify the accused by letter of the charges against him and of the place and date of the hearing, which shall be at least twenty days away. The accused may present his defense in person, in writing, or by an authorized representative. There shall be a majority of the members of the Board of Directors present at the hearing and the votes cast must be unanimous in order to expel. The action of the Board of Directors shall be final and conclusive.

SEC. 38—The Secretary shall, as soon as possible after the end of each year, present to the Board of Directors a report giving the number of members of each grade at the close of the year, and the gains and losses in each grade of membership during the year as a result of elections, transfers, reinstatements, debts, resignations, failure to pay dues, and all other causes. This report shall also give the number of newly-elected members whose elections become void during the year through the failure to pay entrance fee and initial dues, and the number of newly-elected members who at the end of the year have not yet paid entrance fee and initial dues but whose election is still effective as of that date.

BOARD OF DIRECTORS

SEC. 39—The annual meeting of the Board of Directors required by the Constitution to be held during January of each year, shall be held in the office of the Institute in New York, N.Y. Scheduled meetings of the Board shall be held on the first Wednesday of May and of November, the place to be determined by the Board at the annual meeting in January, subject to change as provided for in Sec. 40 of the Bylaws. At the annual meeting, the Board shall determine the time and place of other scheduled meetings to be held throughout the year, subject to change as provided in Sec. 40 of the Bylaws.

SEC. 40—The time or place of any scheduled Board meeting may be altered or the meeting cancelled only by consent of a majority of all Board members not less than twenty days before the original date or the new date set for the meeting, whichever is the earlier. Notice of such approved change shall be given all Board members by mailing notice not less than ten days before the original or the new date, whichever is the earlier.

SEC. 41—As provided in the Constitution, special meetings of the Board of Directors may be called by any five members of the Board on notice to all other members. Notice of such special meeting, giving the time and place of meeting, the purpose of the meeting, and the names of the Board members calling the meeting shall be mailed to all Board members not less than twenty days before the date set for the special meeting. The place of such special meetings may be only the Institute office in New York, N.Y., unless otherwise authorized by a majority vote of all Board members.

EXECUTIVE COMMITTEE

SEC. 42—The Board of Directors, in managing the affairs of the Institute according to the Constitution, shall appoint a committee of Officers and members of the Board of Directors called the Executive Committee, to exercise powers and assume duties of executive management, to the extent that the Board of Directors directs, and as outlined in Bylaws, subject to the following limitations: that the Board may, by a majority vote of those present at any meeting, overrule any act or decision of the Executive Committee, except insofar as any act has in fact been carried out, or suspend at any meeting any power conferred upon the Executive Committee, such suspension to remain in effect pending repeal of the Bylaw conferring such power, or direct any action or plan of the Executive Committee.

SEC. 43—The President, the Secretary, the Treasurer, the Editor, and at least two other members of the Board of Directors shall comprise the Executive Committee. The President shall be Chairman, the Treasurer shall be Vice Chairman, and the Secretary shall be Secretary of the Executive Committee. The terms of appointments of all members of the Executive Committee, except the President, shall start with the first meeting of the Committee after appointment and shall continue notwithstanding any change in status on the Board until the first meeting of the succeeding Executive Committee.

SEC. 44—The Executive Committee shall appoint, direct and co-ordinate the work of all standing committees except the Appointments, Awards, Constitution and Laws, Executive, Nominations, Policy Advisory, and Tellers Committees.

SEC. 45—The Executive Committee shall prepare, and present an annual budget to the Board of Directors for approval.

SEC. 46—The Executive Committee shall be responsible for the management of the office of the Institute, which shall include special activities, technical activities, office operations, accounting, advertising, and publications, and the setting of salaries (with the exception of Officers' salaries) in all instances in the limits of the budget. Such activities as the Executive Committee shall direct shall be administered by the Executive Secretary. The salary of the Executive Secretary shall be determined by the Executive Committee.

SEC. 47—The Executive Committee shall set dates and locations of conventions, conferences, and meetings of the Institute and shall manage them.

SEC. 48—The Executive Committee shall supervise the formation and operation of Sections, Professional Groups, and other groups of members and propose their approval to the Board of Directors.

SEC. 49—The Executive Committee shall direct and manage Institute standardization activities including relations with other organizations.

SEC. 50—The Executive Committee may divide its duties and responsibilities among its members as it sees fit and conduct its business as it finds necessary, and shall formulate a "Code of Administrative Practice."

SEC. 51—Minutes of the meetings of the Executive Committee shall be mailed to the members of the Board of Directors.

SEC. 52—In addition to its other duties, the Executive Committee is charged with broadly considering Institute policies, and making appropriate recommendations to the Board of Directors on its own initiative.

NOMINATIONS

SEC. 53—The Secretary shall circularize all Section chairmen and secretaries before March first of each year requesting the submission of suitable names to be considered by the Nominations Committee for the various elective offices.

SEC. 54—The Nominations Committee shall submit more than one name for each elective office.

SEC. 55—The Nominations Committee shall transmit its list of proposed nominees to members of the Board of Directors at least one week before the date at which the Board is expected to act upon them.

SEC. 56—When the Board of Directors has not scheduled a meeting to be held between August 14 and September 1 of each year, the Executive Committee is authorized to take any necessary actions on any petitions and to approve the ballot.

REGIONS

SEC. 57—The United States and Canada shall be divided into Regions, as follows: (1) North Atlantic, (2) North Central Atlantic, (3) Central Atlantic, (4) East Central, (5) Central, (6) Southern, (7) Pacific, (8) Canadian.

Regions which fail to maintain reasonable activity may, at the discretion of the Board of Directors, be dissolved and the Sections may be absorbed into other Regions.

SEC. 58—The Regional Committee of each Region normally shall consist of the Regional Director, the junior past Regional Director, and the chairman and junior past chairman of each Section in the Region. In addition to the duties specified in the Constitution, the Regional Committee shall be expected to participate in the development of the Institute by means of suggestions, on national matters, to the Board of Directors, and on Regional and Sectional matters, to the Sections comprising the Region. Each member of the Regional Committee shall be, ex-officio, a member of the Executive Committee of his own Section.

SEC. 59—Pending installation of the first Regional Director of each Region, the chairman of the largest Section numerically in the Region shall act as chairman pro tem, and the chairman pro tem shall appoint a secretary-treasurer pro tem who shall act until the secretary-treasurer of the Regional Committee is appointed.

The Regional Director shall be chairman of the Regional Committee and shall appoint a vice chairman from the membership of the committee. The chairman of the Regional Committee shall appoint a secretary-treasurer from members of the Region for a two year term concurrent with that of the chairman. The duties of the secretary-treasurer shall include correspondence, the keeping of the minutes of the committee meetings, mailing notices, handling of funds, the keeping of financial records and the submission of a report at the end of each year, and such other duties as are assigned to him by the chairman. The secretary-treasurer shall not be a voting member of the committee.

SEC. 60—Each Regional Committee shall submit to the Board of Directors by May first of the Regional election year, the names of at least one qualified nominee for the office of Regional Director. To qualify, each candidate shall indicate to the Regional Committee his acceptance of the nomination.

SEC. 61—Each member of the Regional Committee shall be of Member, Special Member, Senior Member, or Fellow grade in the Institute. Vacancies, except for Regional Director, shall be filled by appointment by the Executive Committee of the Section in which the vacancy exists. The term of office shall be one year concurrent with the term of office of the Section officers.

SEC. 62—The Regional Committee shall hold at least one meeting per year at which a quorum shall be necessary for the transaction of business of the Committee. A quorum shall consist of at least one-third of the members of the Committee and shall include representatives from at least half the Sections in the Region. The chairman, or in the event of his unavailability, the vice chairman of the Regional Committee, shall be responsible for calling the necessary number of Regional Committee meetings.

SECTIONS

SEC. 63—A petition for the formation of a Section shall be signed by not fewer than twenty-five (25) members, other than Students, with mailing addresses within the territorial limits proposed in the petition.

SEC. 64—The Executive Committee, upon receipt of a petition to form a Section, and after arranging for the territory to be encompassed by the new Section, may authorize its formation. After the Section is organized and a Constitution adopted, the Executive Committee may give tentative approval to its establishment pending submission to the Board of Directors for final approval.

SEC. 65—Each Section authorized by the Executive Committee, shall within not more than six months thereafter accept and conform to a Constitution provided by the Executive Committee.

SEC. 66—No Section or any officer or representative thereof shall have any authority to contract debts for, pledge the credit of, or in any way bind, the Institute.

SEC. 67—Section Secretaries shall forward to the Secretary of the Institute a report of each meeting held by the Section and its Subsections for the presentation or discussion of papers, and at the end of each fiscal year, a financial statement for that fiscal year.

SEC. 68—Local non-compulsory financial contributions may be accepted by Sections.

SEC. 69—All Sections shall be exclusively those of the Institute. No joint Section shall be recognized. However, Sections of the Institute may cooperate with other organizations in the holding of joint meetings and may invite members of such organizations and the public to their meetings.

SEC. 70—Failure of a Section to maintain the required activities which shall include the holding of at least five meetings each year and also the maintenance of a minimum membership of twenty-five (25) members, other than Students, shall place the Section on probation. All members of the Section shall be informed of the probation by the Secretary of the Institute, who shall also call to their attention the requirements for maintaining the Section.

If the delinquency continues for a second year, a second notification to the Section membership shall be made by the Institute Secretary, and the Board of Directors shall be informed of the probationary status of the Section.

If the delinquency continues for a third year, the Section shall, thereupon, automatically be dissolved. The Secretary shall so report to the Board of Directors and so inform the Section membership.

The Board of Directors is authorized to waive, in whole or in part, the application of this Bylaw for the duration of war and six months thereafter.

SEC. 70-1—For section maintenance, the Institute shall pay to each Section for each calendar year the following sums:

One dollar and ten cents ($1.10) for each member, except Students, up to and including seven hundred, and one dollar and twenty-five cents ($1.25) for each member, except Students, over seven hundred, with mailing addresses within the territory of the Section, on December 31st of the calendar year for which payment is made, plus ten dollars ($10) per meeting for not more than ten meetings of the Section within the calendar year.

SUBSECTIONS

SEC. 70-2—In conformance with the Constitution for Sections, Sections may establish Subsections, which shall be geographical subdivisions of such Sections, subject to the same limitations and control as the Section itself.

SEC. 70-3—For each Subsection which meets the following requirements, the Institute shall pay to the Section a meeting allowance of ten dollars ($10) per meeting up to a maximum of five (5) meetings per year, during the time the Subsection remains in good standing according to the Constitution for Sections:

(a) Submission to Parent Section Executive Committee of a petition signed by twenty (20) or more members other than Students, with mailing addresses within the proposed territory;

(b) Approval of the petition by the Parent Section Executive Committee;

(c) Notification of Institute Headquarters of these actions by Parent Section and its Executive Committee with a copy of the petition;

(d) Approval by the Executive Committee of the Institute.

PROFESSIONAL GROUPS

SEC. 70-A—A petition for the formation of a Professional Group shall be signed by not fewer than twenty-five (25) members, other than Students, and shall state the proposed field of interest.

SEC. 70-B—The Executive Committee, upon receipt of a petition to form a Professional Group, may authorize its formation. After the Group is organized and a Constitution approved by the Executive Committee, the Executive Committee may give tentative approval to its establishment pending submission to the Board of Directors for final approval.

SEC. 70-C—Each Professional Group authorized by the Executive Committee shall within not more than six months thereafter adopt and conform to a Constitution which shall have been submitted to and approved by the Executive Committee. A Group Constitution may be amended by the Group subject to the approval of the Executive Committee.

SEC. 70-D—All Professional Groups shall consist exclusively of members of the Institute. No joint Professional Groups shall be recognized. However, Professional Groups of the Institute may co-operate with other organizations in the holding of joint meetings and may invite members of such organizations and the public to their meetings.

SEC. 70-E—No Professional Group or any officer or representative thereof shall have any authority to contract debts for, pledge the credit of, or in any way bind, the Institute.

SEC. 70-F—A Professional Group may not charge dues. A Group may hold or join in holding conventions or conferences and may charge for registration; but a Group may not charge for registration at a meeting, conference, or convention which it operates as part of an Institute, Section, Regional, or National meeting, conference, or convention. A Group may, but only after approval of the Executive Committee, make a charge for sending out notices to non-Group members to cover the extra expenses involved. A Group may raise revenues by other means approved by the Executive Committee.

SEC. 70-G—All members of the Institute may become members of Professional Groups in conformance with the respective Group Constitutions.

SEC. 70-H—All Professional Group meetings shall be open to all members of the Institute on an equal basis with Group members. Any member of the Institute, upon payment of charges judged to be equitable by the Executive Committee, shall receive any notices of meetings of any Group.

SEC. 70-I—All publications of Professional Groups, other than programs, notices, and the like, shall be subject to prior authorization of the Executive Committee, and shall be made available to all Institute members on an equitable basis approved by the Executive Committee.

SEC. 70-J—The Secretary-Treasurer of each Professional Group shall forward to the Secretary of the Institute a copy of each meeting notice of the Group, an annual report, and at the end of each Institute fiscal year a financial statement for that fiscal year.

SEC. 70-K—The Board of Directors may dissolve a Professional Group for any reason deemed sufficient by the Board of Directors.

STUDENT BRANCHES

SEC. 71—Upon receipt of a petition signed by a representative of the faculty and by fifteen (15) or more IRE members who are students in a school of recognized standing, the Executive Committee may authorize the establishment of an IRE Student Branch in that school.

SEC. 72—Each IRE Student Branch shall adopt and conform to a Constitution which shall have been submitted to, and approved by, the Executive Committee.

SEC. 73—Upon receipt of a petition signed by a representative of the faculty and by ten (10) or more IRE members who are students in a school of recognized standing, the Executive Committee may join with one or more other national engineering or technical societies to co-sponsor a Joint Student Branch in that school.

SEC. 73-A—Each Joint Student Branch shall adopt and conform to a constitution which shall have been submitted to, and approved by, both the IRE Executive Committee and the other co-sponsoring societies. A Joint Student Branch shall have among its officers at least a corresponding secretary who shall be a member of the IRE.

SEC. 74—No IRE Student Branch or Joint Student Branch or any officer or representative thereof shall have any authority to contract debts for, pledge the credit of, or in any way bind, the Institute.

SEC. 75—Each IRE Student Branch and Joint Student Branch corresponding secretary shall forward to the Secretary of the Institute a report of each meeting held by the Branch for the presentation or discussion of papers, and during June of each year, a financial statement for the preceding year.

SEC. 76—An IRE Student Branch or Joint Student Branch may collect dues from its members as provided in its constitution and, in addition, may accept local noncompulsory financial contributions.

SEC. 77—Failure of an IRE Student Branch or Joint Student Branch to maintain a minimum of ten (10) IRE members and to hold at least three (3) meetings each year shall place the Branch on probation. All officers and Institute representatives of the Branch shall be informed of the probation by the Secretary of the Institute, who shall also call to their attention the requirements for maintaining the Branch. If the delinquency continues for a second year, the IRE sponsorship shall automatically be withdrawn. The Secretary shall so report to the Board of Directors and so inform the officers of the Branch and Institute representative.

SEC. 78—For maintenance of an IRE or Joint Student Branch upon certification by the Institute Representative, or, in the event one has not been appointed, by a representative of the faculty, expenses of the Branch up to and including a maximum of twenty-five dollars ($25) for any one school year shall be defrayed by the Institute.

SEC. 79—The Board of Directors may dissolve an IRE Student Branch, or withdraw its sponsorship and support of a Joint

Student Branch, for any reason deemed sufficient by the Board of Directors.

COMMITTEES AND REPRESENTATIVES

SEC. 80—The standing committees, each of which shall normally consist of five or more persons, shall include the following:

Administrative Committee of the Board of Editors
Admissions
Appointments
Awards
Board of Editors
Constitution and Laws
Education
Executive Committee of the Board of Directors
Finance
Membership
Nominations
Papers Review
Policy Advisory
Professional Groups
Public Relations
Sections
Tellers
Annual Review
Antennas and Wave Guides
Audio Techniques
Circuits
Electroacoustics
Electron Devices
Electronic Computers
Facsimile
Feedback Control Systems
Industrial Electronics
Information Theory and Modulation Systems
Measurements and Instrumentation
Mobile Communications Systems
Navigation Aids
Piezoelectric Crystals
Radio Transmitters
Receivers
Research
Sound Recording and Reproducing
Standards
Symbols
Television Systems
Video Techniques
Wave Propagation

On matters which are reasonably described by the committee names, these committees or boards shall be advisory to the Board of Directors, or the Executive Committee, whichever appoints them and directs their activities. Each committee or board shall have the power to create subcommittees of its own selection.

SEC. 81—The terms of appointments to the Administrative Committee of the Board of Editors, Admissions, Awards, Board of Editors, Constitution and Laws, Education, Finance, Membership, Nominations, Papers Review, Policy Advisory, Professional Groups, Public Relations, Sections, and Tellers Committees shall start with the first day of the month following appointment and continue until the date the succeeding terms of appointments take effect. Appointments shall be made to the following committees: Annual Review, Antennas and Wave Guides, Audio Techniques, Circuits, Electroacoustics, Electron Devices, Electronic Computers, Facsimile, Feedback Control Systems, Industrial Electronics, Information Theory and Modulation Systems, Measurements and Instrumentation, Mobile Communications Systems, Navigation Aids, Piezoelectric Crystals, Radio Transmitters, Receivers, Research, Sound Recording and Reproducing, Standards, Symbols, Television Systems, Video Techniques and Wave Propagation, each year between January first and May first, and the terms of appointment shall be from May first of the year when the appointments are made until April thirtieth of the following year; additional appointments may be made to fill vacancies or to care for special cases as the need arises, with the term of the appointment expiring April thirtieth.

SEC. 82—The Membership Committee shall include each Regional Director and the Chairman of the Membership Committee of each Section, ex-officio.

Sec. 82-A—The Awards Committee shall be chosen from among Institute members of Fellow grade.

SEC. 83—The Sections Committee shall include the Chairman of each Section, ex-officio.

SEC. 83-A—The Committee on Professional Groups shall include the Chairman of each Professional Group, ex-officio.

SEC. 83-B—The Chairman of the Finance Committee shall be chosen from among the members of the Executive Committee.

SEC. 83-C—The Public Relations Committee shall include the Chairman of each Section Publicity Committee, ex-officio.

SEC. 83-D—The Policy Advisory Committee shall consist of eight (8) members, appointed annually, all of whom shall be present or former members of the Board of Directors. At least half of the members, including the Chairman, shall be members of the then present Board of Directors. Each year, at least four (4) of the members shall be re-appointed.

SEC. 84—The Appointments Committee shall be appointed by the Board of Directors at its regular November meeting. Its membership shall be chosen from those members of the Board of Directors whose terms continue through the following year and from the new Directors-elect, and shall include the President-elect. At least fourteen days before the next annual meeting of the Board of Directors, the Appointments Committee shall mail to the members of the new Board of Directors, a list of candidates for the offices of Secretary, Treasurer, Editor, and Appointed Directors, and a list of candidates to fill vacancies that exist among the Chairmen and members of the Awards, Constitution and Laws, Executive, Nominations, Policy Advisory, and Tellers Committees.

SEC. 85—The Treasurer shall make a report to the Executive Committee semi-annually at the September and March Executive Committee meetings concerning the status of the Institute's investments. The Treasurer, before making changes in the Institute's portfolios, shall report the proposed changes to the Executive Committee and obtain its approval.

SEC. 85-A—The Building Fund established by action of the Board of Directors on January 10, 1945, shall be maintained as an entity on the books of the Institute. All income derived from the Building Fund shall be transferred quarter-annually to the account of the Institute for general purposes. The principal of the Building Fund in whole or in part from time to time may be appropriated by the Board of Directors for the purpose of providing for the housing of the general activities of the Institute, and for no other purpose unless authorized by affirmative vote of two-thirds of all the members of the Board of Directors at a stipulated meeting and unless the proposal of authorization and reasons therefor shall have been mailed to all members of the Board at least thirty days before the stipulated meeting at which the vote shall be taken.

SEC. 86—The President is authorized to appoint teachers of science or engineering who are Institute members as Institute Representatives. Each such Institute Representative is charged with promoting the welfare of the Institute at his school particularly in matters relating to Student membership.

SEC. 87—The Board of Directors may appoint or direct the appointment of representatives of the Institute on joint committees, boards, and other local, national, and international bodies.

PUBLICATIONS

SEC. 88—The Institute shall publish a periodical under the title, PROCEEDINGS OF THE I.R.E. The Board of Directors may establish additional publications either periodical or otherwise in character.

SEC. 89—The Executive Secretary is authorized to accept orders received after April 1, 1948, for annual subscriptions to, or individual copies of, the PROCEEDINGS OF THE I.R.E., at the following rates, including postage:

Annual Subscriptions

	U.S. and Canada	*Other Countries*
Individuals	$18.00	$19.00
Public Libraries	13.50	14.50
Colleges	13.50	14.50
Subscription Agencies	13.50	14.50
Institute members, one additional subscription	9.00	10.00

Individual Copies

Individuals	$ 2.25	$ 2.35
Public Libraries	1.65	1.75
Colleges	1.65	1.75
Subscription Agencies	1.65	1.75
Institute members, one additional copy	1.00	1.10

SEC. 90—The price of a single annual subscription to the PROCEEDINGS OF THE I.R.E. for a Fellow, Senior Member, Special Member, Member, or Associate shall be $9.00, to be included in his annual dues.

MEMBERSHIP LISTS

Including

BIOGRAPHIES OF FELLOWS

AND

AN ALPHABETICAL ROSTER

AND

A GEOGRAPHICAL LISTING

NOTE

IN the following pages are set forth the names of the members of The Institute of Radio Engineers. These have been disposed under three headings, as follows:

Biographies of Fellows; a list of all Fellows, with a short biographical note on each.

Membership Roster; a complete listing of all members (not including Students) on record as of May 15, 1953; giving membership grades, business affiliations, and home addresses.

Geographical Listing of Membership; by states and foreign countries, and by cities within such areas; including a designation of the present grade of each member.

All listings include appointments and elections up to May 15, 1953.

In the Roster the following symbols indicative of grade are used, along with numerals indicating the year of admission to that grade:

(F) *Fellow*
(SM) *Senior Member*
(M) *Member*
(A) *Associate*
(VA) *Voting Associate.* Those who were Associates on or before March 1, 1939, automatically became Voting Associates as of that time.
(S) *Student*
(J) *Junior.* This grade no longer exists.

The Board of Directors waives the dues of all members who have attained the age of 65 years and who have been members of the Institute for 35 years. The following symbol is used to indicate this status:

(L) *Life Member*

BIOGRAPHIES OF FELLOWS*

(As of May 15, 1953)

ACHESON, Marcus A. (A'36—M'37—F'41), Staff Engineer, Sylvania Electric Products, Inc., 83-30 Kew Gardens Rd., Kew Gardens 18, L.I., N.Y.
Born: January 18, 1903, Denison, Tex. B.S.(E.E.), 1924, Rice Institute. Committees: Papers, 1937; Papers Review, 1951–53.

ADAIR, George P. (A'42—SM'44—F'47), Consulting Radio Engineer, 1610 I St., N.W., Washington 6, D.C.
Born: December 8, 1903, Rancho, Tex. B.S.(E.E.), 1926, Agricultural and Mechanical College of Texas. Sections: Washington, *secretary, 1946; vice-chairman, 1947; chairman, 1948.* Mid-Atlantic Regional, *vice-chairman, 1948.* Awards: Life Honorary Member, International Municipal Signal Association, 1944; Tau Beta Pi, 1949.

ADLER, Robert (A'42—SM'47—F'51), Associate Director of Research, Zenith Radio Corporation, 6001 W. Dickens Ave., Chicago 39, Ill.
Born: December 4, 1913, Vienna, Austria. Ph.D., 1937, University of Vienna. Committees: Modulation Systems, 1948–50.

AFFEL, Herman A. (A'14—M'40—SM'43—F'49), Assistant Vice-President, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: August, 1893, Brooklyn, N.Y. S.B., 1914, Massachusetts Institute of Technology. Committees: Meetings and Papers, 1930; New York Program, 1939, *chairman, 1940,* 1949; Papers, 1931–45; Papers Review, 1946–53. Awards: Modern Pioneers Award, National Association of Manufacturers, 1940.

ALBERT, Arthur L. (A'31—SM'47—F'50), Professor, Communication Engineering, Oregon State College, Corvallis, Ore.
Born: March 13, 1899, Forest Grove, Ore. B.S., 1923; M.S., 1926; E.E., 1938, Oregon State College. Committees: Membership, 1947–48. Institute Representative: Oregon State College, 1942–53. Awards: Fellow, AIEE, 1941.

ALEXANDERSON, Ernest F. W. (A'13—M'13—F'15) (L'49), Retired. Consulting Engineer, 1132 Adams Rd., Schenectady, N.Y.
Born: January 25, 1878, Uppsala, Sweden. E.E., 1900, Royal Technical University; Sc.D., 1926, Union College; Ph.D., 1938, Uppsala University. Dr., Technology, 1948, Royal Technical University, Stockholm, Sweden. President, 1921; Vice-President, 1920; Manager, 1917–19; Director, 1920–23. Committees: Meetings and Papers, 1928; Standardization, 1916–23; Wave Length Regulation, 1916–19. Awards: John Ericsson Gold Medal, American Society of Swedish Engineers, 1944; Edison Medal, American Institute of Electrical Engineers, 1944; Cedergren Gold Medal, Royal Swedish Technical University, 1944; Valdemar Poulsen Gold Medal, Royal Danish Technical University, 1947.

ALFORD, Andrew (A'35—M'40—F'42), Owner, Andrew Alford Consulting Engineers, 299 Atlantic Ave., Boston 10, Mass.
Born: August 5, 1904, Samara, Russia. A.B., 1924, University of California. Committees: Annual Review, 1944–45; Antennas, *chairman, 1944–45,* 1946–49; Papers Procurement, 1947–50; Radio Transmitters, 1944–45; Standards, 1944–45; Transmitters and Antennas, 1943–44. Awards: President Certificate of Merit, 1948.

ALLEN, Edward W., Jr. (M'44—F'53), Chief Engineer, Federal Communications Commission, 13th St. & Pennsylvania Ave., Washington 25, D.C.
Born: February 14, 1903, Portsmouth, Va. E.E., 1925, University of Virginia; L.L.B., 1933, George Washington University. Committees: Papers Review, 1946–49; Wave Propagation, 1949–52. Awards: Tau Beta Pi.

ANDERSON, Clifford N. (A'19—F'34), Technical Staff, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: September 22, 1895, Scandinavia, Wis. Ph.B., 1919; M.S., 1920, University of Wisconsin. Committees: Admissions, 1930–31; New York Program, 1932; Papers Review, 1953; Sections, 1941–44; Tellers, 1932–33.

APPLETON, Edward V. (A'26—F'31), Principal and Vice-Chancellor, University of Edinburgh, The Old College, South Bridge, Edinburgh 8, Scotland.
M.A.; D.Sc.; LL.D.; F.R.S. Vice-President, 1932; Director, 1932; Committees: Meetings and Papers, 1929; Wave Propagation, 1937–38. Awards: Morris Liebmann Memorial Prize, 1929; Nobel Laureate, Physics, 1947.

ARMSTRONG, Edwin H. (A'14—F'27), Professor of Electrical Engineering, Columbia University, 206 Philosophy Hall, New York 27, N.Y.
Born: December 18, 1890, New York, N.Y. E.E., 1913; D.Sc., 1929, Columbia University; D.Sc., 1941, Muhlenberg College; D.Sc., 1948, Laval University. Manager, 1916–22; Director, 1936–38. Committees: Admissions, 1926; Awards, *chairman, 1936;* Frequency Modulation, 1941; Nominations, 1940; Radio Receivers, 1936–41; Receiving Sets, 1927; Standardization, 1917–21, 1924–26; Tellers, *chairman, 1937;* Wave Length Regulation, 1916–19. Awards: Medal of Honor, 1917; Chevalier de la Legion d'Honneur, 1919; Egleston Medal, Columbia University, 1939; Holley Medal, American Society of Mechanical Engineers, 1940; National "Modern Pioneer" Award, National Association of Manufacturers, 1940; Medal of Class of 1889, School of Mines, Columbia University, 1941; Franklin Medal, The Franklin Institute, 1941; John Scott Medal, awarded by Board of Directors of City Trusts, City of Philadelphia, 1942; Edison Medal, American Institute of Electrical Engineers, 1942; Medal for Merit (United States) with Presidential Citation, 1947; Washington Award, 1941, Washington Award Commission, Western Society of Engineers.

ASHBRIDGE, Sir Noel (F'38), Director: Marconi's Wireless Telegraph Co., Ltd., Marconi House, Strand, London W.C. 2, England.
Born: December 10, 1889, Wanstead, Essex, England. B.Sc. (Engineering), 1911, King's College, London University. President, The Institution of Electrical Engineers, 1941–42; Vice-President, 1947; President, Junior Institution of Engineers, 1949–50; MICE; MIEE. Awards: Fellow of King's College, London; Knight of Royal Order of Dannebrog (Danish), 1934; Knighted 1935; James Watt Medal, The Institution of Civil Engineers, 1937; Faraday Medal, 1949.

AUSTIN, Arthur O. (F'30), Manufacturing Electrical Engineer, Box 109, Barberton, Ohio.
Born: December 28, 1879, Stockton, Calif. A.B., 1903, Stanford University.

BAILEY, Austin (A'25—M'25—F'36), Mobile Radio Engineer, American Telephone and Telegraph Company, 195 Broadway, New York 7, N.Y.
Born: June 9, 1893, Lawrence, Kan. A.B., 1915, University of Kansas; Ph.D., 1920, Cornell University. Director, 1940–42. Committees: Admissions, 1934, *chairman, 1935;* Awards, 1945, 1949; Constitution and Laws, 1932–34, 1936–42, *chairman, 1942,* 1944–45; Convention Policy, 1947–50; Membership, 1941; National Convention, 1947–51; New York Program, 1930, *chairman, 1931,* 1932–34, 1937, *chairman, 1938,* 1939–40. Sections, 1929, *chairman, 1930,* 1931–33; Tellers, *chairman, 1939,* 1940; Winter Technical Meeting, *chairman, 1945,* 1946; Professional Group on Vehicular Communications, Administrative Committee, 1949, *chairman, 1950–52;* Professional Groups, *vice-chairman, 1952.* Institute Representative: ASA Sectional Committee on Graphic Symbols and Abbreviations for Use on Drawings, 1940–51; Sectional Committee on Standards for Drawings and Drafting Room Practices, 1940–51.

* In listing membership on committees, years during which members served as chairmen or as other officers are indicated by italics.

BAILEY, Stuart L. (A'28—M'36—SM'43—F'43), Partner, Jansky and Bailey, 1339 Wisconsin Ave., N.W., Washington 7, D.C.
Born: October 7, 1905, Minneapolis, Minn. B.S. (E.E.), 1927; M.S., 1928, University of Minnesota. President, 1949; Treasurer, 1948; Director, 1943–52. Committees: Board of Directors, 1953; Admissions, 1943–44; Appointments, 1948; Awards, 1950–52; Broadcasting, *alternate, 1931–32, 1934;* Constitution and Laws, 1944, 1948, 1951; Convention, 1953; Executive, 1945–47, 1953, *vice-chairman, 1948, chairman, 1949,* 1950–51; Finance, 1948, 1950–51, *chairman, 1953;* Nominations, *chairman, 1946,* 1947–52; National Convention, 1947–48; Office Practices, 1947; Planning, 1947; Policy Development, 1948, 1951; Professional Groups, 1950; Public Relations, *alternate, 1945–46,* 1950; Radio Wave Propagation, 1942–45; Radio Wave Propagation and Utilization, 1945–47; Sections,1946–47; Special Publication Fund, 1947; Wave Propagation, 1937–41, 1948–52; Winter Technical Meeting, 1946. Institute Representative: IRE-RMA Co-ordination Committee, 1949; U.S.A. National Committee, URSI, 1949–51; Executive Council, Central Radio Propagation Laboratory, 1949–51; Joint AIEE-IRE Coordination Councillor, 1950, 1951; Joint Technical Advisory Committee, 1949–51.

BAKER, W. R. G. (A'19—F'28), Vice-President in Charge of Electronics, General Electric Company, Electronics Park, Syracuse 1, N.Y.
Born: November 30, 1892, Lockport, N.Y. B.E., 1916; M.E.E., 1918; D.S. (Honorary), 1935, Union College; Dr. Engineering (Honorary) 1951, Syracuse University. President, 1947; Director, 1940, 1946–52; Standards Co-ordinator, 1948–50 Treasurer, 1951–53. Committees: Administrative of the Board of Editors, 1953; Admissions, 1941; Board of Directors, 1953; Board of Editors, 1953; Annual Review, 1948; Appointments, 1948; Awards, 1940; Broadcasting, 1935, 1948–50, *vice-chairman, 1951;* Executive, *chairman, 1947,* 1948–53, *vice-chairman, 1951,* 1952; Finance, *chairman, 1948–53;* Meetings and Papers, 1926, *alternate, 1928,* 1929; Membership, 1928; Nominations, 1930, 1948; Nuclear Studies, *chairman, 1948,* 1949; Policy Development, 1948; Preparedness, 1940–41; Professional Groups, *chairman, 1950–53;* Public Relations, 1950; Sections, 1931–32; Standardization, 1925; Sub-committee on Power Supply, 1928; Standards, 1938–40, 1948–49; Sections, Connecticut Valley, *secretary, 1938–40;* Philadelphia, *chairman, 1930–31;* Institute Representative, ASME Review Board, 1948–51.

BALDWIN, Millard W., Jr. (A'40—SM'45—F'48), Research Engineer, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: December, 1902, Port Ewen, N.Y. E.E., 1925, Cornell University; M.A., 1928, Columbia University. Committees: Facsimile, 1941; Methods of Testing Television Transmitters, 1945–47; Special Television Test Methods, 1940; Standards, 1949–50, *vice-chairman, 1951–52;* Basic Terms Subcommittee, 1952; Definitions Co-ordinating Subcommittee, *chairman, 1951–52;* Television Coordination Subcommittee, *chairman, 1949,* 1952; Television, 1948; Television Definitions, 1945–48; Television Systems, 1949–52; Subcommittee on Definitions, *chairman, 1951–52;* Video Techniques, 1949–51.

BARNES, John L. (A'27—SM'44—F'52), Dr., Professor of Engineering, University of California, Los Angeles 24, Calif.; Associate Director, Electro-Mechanical Engineering Dept., North American Aviation, Inc., Downey, Calif.
Born: October 16, 1906, Haddonfield, N.J. B.S. and S.M. in E.E., 1928, 1929, Massachusetts Institute of Technology; A.M. and Ph.D., 1930, 1934, Princeton University. Committees: Papers, 1948–49; Technical on Wave Propagation, 1942–52.

BARROW, Wilmer L. (A'28—VA'39—M'40—F'41), Vice-President and Chief Engineer, Sperry Gyroscope Company, Great Neck, L.I., N.Y.
Born: October, 1903, Baton Rouge, La. M.S., 1929, Massachusetts Institute of Technology; Sc.D., 1931, Technische Hochschule, Munich, Germany. Director, 1943–45. Committees: Antennas, 1945–47; Awards, 1944–45, 1948, 1949; Board of Editors, 1946–53; Constitution and Laws, 1943–44; Executive, 1945; Nominations, 1943 1949; Papers, 1941–45; Papers Procurement, 1942–43; Professional Groups, 1948; Regular Papers, 1941; RMA-IRE Co-ordinating, 1948; Research, 1946–47, 1949; Standards, 1938–41; Wave Guides, 1943–44; Wave Propagation, 1941. Sections: Boston, *chairman 1939–41.* Institute Representative: Radio Technical Planning Board, *alternate, 1944–45,* 1945–46. Awards: Morris Liebmann Memorial Prize, 1943.

BARTON, F. Sherbrooke (F'35), Chief Scientific Officer, Principal Director of Electronics Research and Development, Ministry of Supply, Castlewood House, 77-91 New Oxford St., London, W. C. 1, England.
Born: May 13, 1895, Nottingham, England. Scholar, 1914, St. John's College, Cambridge; M.A., 1920, University of Cambridge; B.Sc., 1920, University of London. Member of Institution of Electrical Engineers. Awards: Fellow of the Institute of Physics. Vice-President, 1943; Director, 1943. Committees: International Liaison, 1947.

BATCHER, Ralph R. (J'16—A'18—M'22—SM'43—F'50), Chief Engineer, Radio Television Manufacturers Association, 489 Fifth Ave., New York 17, N.Y.
Born: June, 1897, Dysart, Iowa. B.S., (E.E.), 1920, Iowa State College. Committees: Annual Review, *chairman, 1949–52;* Board of Editors, 1928–52; Meetings and Papers, 1927–29; Public Relations, *chairman, 1950–51;* Standards, 1949–52; Symbols, 1940–47; Television, 1939–42; Television and Facsimile, 1937–38. Institute Representative: ASA Sectional Committee (C 16) on Radio, *secretary, 1951.* Awards: Member, Tau Beta Pi.

BATSEL, Max C. (A'21—F'27), Chief Engineer, Engineering Products Department, RCA Victor Division, Radio Corp. of America, Cooper St., Camden, N.J.
Born: June 16, 1894, Fulton, Ky. B.M.E., 1915, University of Kentucky. Director, 1933. Committees: Bibliography, 1930–32; Professional Group on Engineering Management, 1952–53; Meetings and Papers, 1928–29; Membership, 1926–27; New York Program, 1931–33; Receiving Sets, 1927–28; Standardization, 1925, 1927–30; Use of the Transmission Unit, 1928.

BAUER, Benjamin B. (S'37—A'39—SM'44—F'53), Vice-President, Engineering, Shure Brothers, Inc., 225 West Huron St., Chicago 10, Ill.
Born: June 26, 1913, Odessa, Russia. Industrial E.E. Course, 1932, Pratt Institute; E.E., 1937, University of Cincinnati. Committees: Board of Editors, 1952–53; Electroacoustics, 1945–48, *vice-chairman, 1949–52;* Papers Procurement, 1947–48; Professional Groups, 1953. Professional Groups: Audio, National *vice-chairman, 1950; chairman, 1951; Editor-in-chief of Transactions, 1952.* Awards: Acoustical Society of America; Sigma Xi; Tau Beta Pi; Eta Kappa Nu; Eta Kappa Nu Honorable Mention Award, 1946.

BAYLY, Benjamin de F. (M'43—SM'43—F'47), President, Bayly Engineering Ltd., Ajax, Ont., Canada.
Born: June, 1903, London, Ont., Canada. B.A.Sc., 1930, University of Toronto. Committees: Papers Review, 1947–49. Sections: Toronto, *chairman, 1936–37.* Institute Representative: University of Toronto, 1941–42. O.B.E., Canadian Government, 1946.

BEDFORD, Alda V. (A'31—SM'46—F'50), Research Engineer, RCA Laboratories Division, Radio Corporation of America, Princeton, N.J.
Born: January, 1904, Winters, Tex. B.S.(E.E.), 1925, University of Texas; M.S. (E.E.), 1929, Union College. Sections: Princeton, *secretary-treasurer, 1946, vice-chairman, 1947, chairman, 1948–49.* Awards: Modern Pioneer Award, National Association of Manufacturers, 1940; Incentive Awards, RCA Laboratories, 1949, 1950.

BEDFORD, Leslie H. (M'34—SM'43—F'48), Chief Television Engineer, Marconi's Wireless Telegraph Company, Ltd., Chelmsford, Essex, England.
Born: June 23, 1900, London, England. B.Sc., 1919; B.Sc. (Engineering), 1921, University of London; M.A., 1924, Cambridge University. Awards: IEE Premium, Institution of Electrical Engineers, London, 1934; Order of the British Empire, 1943.

BEERS, George L. (A'27—M'29—SM'43—F'47), Assistant Director of Engineering, RCA Victor Division, Radio Corporation of America, Camden, N.J.
Born: May 13, 1899, Indiana, Pa. B.S.(E.E.), 1921; Sc.D. (Honorary), 1947, Gettysburg College. Committees: Papers Procurement, 1946; Radio Receivers, 1942–49; Receivers, 1949–51. Awards: Modern Pioneer Award, National Association of Manufacturers, 1940. Fellow, Society of Motion Picture and Television Engineers.

BEGUN, S. J. (S'46—F'52), Vice-President and Director of Advance Development, Clevite-Brush Development Company, 3405 Perkins Ave., Cleveland 14, Ohio.
Born: December 2, 1905, Free City of Danzig. M.S., 1929; Ph.D. (Engineering), 1933, Institute of Technology, Berlin, Germany. Committees: Audio and Video Techniques, 1948–49; Electroacoustics, 1941–49; Sound Recording and Reproducing Technique, *chairman, 1949–50, 1952.*

BELL, John W. (M'46—F'53), General Manager, Smith & Stone Limited, Georgetown, Ont., Canada.
Born: September 2, 1911, Toronto, Ont., Canada. B.A.Sc., 1933, University of Toronto. Awards: M.B.E. (Member of the British Empire), 1943, His Majesty's Government.

BENNETT, Ralph D. (SM'44—F'52), Technical Director, Quarters B, Naval Ordnance Laboratory, White Oak, Silver Spring, Md.
Born: June 30, 1900, Williamson, N.Y. B.S., 1921; M.S., 1923, Union College; Ph.D. (Physics), 1925, University of Chicago; Sc.D. (Honorary), 1945, Union College. Committees: Board of Directors, 1953.

BENNETT, Rawson (A'36—M'43—SM'43—F'50), Captain, United States Navy, Bureau of Ships, Navy Dept., Washington 25, D.C.
Born: June, 1905, Chicago, Ill. B.S., 1927, United States Naval Academy; M.S., 1937, University of California. Sections: San Diego, *chairman, 1947.* Awards: Fellow, Acoustical Society of America, 1947.

BERANEK, Leo L. (S'36—A'41—SM'45—F'52), Associate Professor of Communication Engineering and Technical Director of Acoustics Laboratory, Massachusetts Institute of Technology, Cambridge 39, Mass.; Partner, Bolt Beranek and Newman; Vice-President, Blen Corp., 16 Eliot St., Cambridge 38, Mass.
Born: September 15, 1914, Solon, Iowa. B.A., 1936; D.Sc. (Honorary), 1946, Cornell College; D.Sc., 1940; M.S., 1937, Harvard University. Committees: Audio 1949–50; Professional Groups: PGA, 1949–52, PGA, *chairman, 1949–51.*

BERKNER, Lloyd V. (A'26—M'34—SM'43—F'47), President, Associated Universities, Inc., 350 Fifth Ave., New York 1, N.Y.; Research Associate, Carnegie Institution of Washington.
Born: February 1, 1905, Milwaukee, Wis. B.S.(E.E.), 1927, University of Minnesota; attended George Washington University. Committees: Board of Editors, 1941; Joint Technical Advisory, 1952; Papers, 1941; Wave Propagation, 1937–41. Awards: Special Gold Medal of Congress, 1930; Silver Medal of Aeronautical Institute; Gold Medal of the City of New York for Work on the Byrd Antarctic Expedition; Science Award, Washington Academy of Science, 1941; Legion of Merit, 1946; Honorary Officer of the Order of the British Empire; Member, National Academy of Sciences.

BEVERAGE, H. H. (A'15—M'26—F'28), Director, Radio Systems Research Laboratory, RCA Laboratories Division, Radio Corporation of America, 66 Broad St., New York 4, N.Y.
Born: October 14, 1893, North Haven, Me. B.S., 1915; D.E., 1938, University of Maine. President, 1937; Director, 1936–39. Committees: Admissions, 1936, 1939, 1941–47; Awards, *chairman, 1938,* 1939; Board of Editors, 1932–37; High-Frequency Receivers, 1930–31; New York Program, 1932–35; Nominations, *chairman, 1942,* 1943; Standards, 1934. Awards: Morris Liebmann Memorial Prize, 1923; Medal of Honor, 1945; Armstrong Medal, 1938; Radio Club of America; Signal Corps Certificate of Appreciation, 1944; President's Certificate of Merit, 1948.

BINGLEY, Frank James (A'34—M'36—SM'43—F'50), Television Research Engineer, Philco Corporation, C and Tioga Sts., Philadelphia 34, Pa.
Born: November 13, 1906, Bedford, Bedfordshire, England. B.Sc. (Mathematics), 1926; B.Sc. (Physics), 1927, University of London. Committees: Admissions, 1940, 1943; Papers Review, 1946–53. Awards: Gold Medal, Television Broadcasters' Association.

BISHOP, Harold (F'38), Director of Technical Services, British Broadcasting Corp., Broadcasting House, London W.1., England.
Born: October 29, 1900, London, England. City and Guilds College (Imperial College of Science and Technology), 1917–20; B.Sc. (Engineering), University of London, 1920. Awards: Institution Premium, Institution of Electrical Engineers, 1935; Commander of the (Order of the) British Empire, 1938; Vice-President, Institution of Electrical Engineers, 1948; Member, Institution of Mechanical Engineers; Fellow, The City and Guilds Institute, 1947.

BLACK, Harold S. (M'42—SM'43—F'48), Research Engineer, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: April 14, 1898, Leominster, Mass. B.S., 1921, Worcester Polytechnic Institute. Committees: Administrative of the Board of Editors, 1952–53; Annual Review, 1948–49; Awards, 1948; Board of Editors, 1949, 1952–53; Editorial Administrative, 1948–51; Education, 1948; Frequency Modulation, 1946; Modulation Systems, 1947, *chairman, 1948–50;* Papers Review, 1947–48; Standards, 1948–50. Awards: Best Paper Prize, AIEE, 1934; Modern Pioneer Award, National Association of Manufacturers, 1940; John Price Wetherill Medal, The Franklin Institute, 1941; Research Corporation Annual Award for Contribution to Science, 1952.

BLACK, Knox Charlton (M'29—SM'43—F'49), Business Manager, Polytechnic Research & Development Co., Inc., 55 Johnson St., Brooklyn 1, N.Y.
Born: April 23, 1905, Cambridge, Mass. A.B., 1924; A.M., 1926; Ph.D., 1927, Harvard University. Director, 1952. Committees: Awards, 1951, *chairman, 1952;* Policy Advisory, 1953; Policy Development, 1949–50; Professional Groups: Airborne Electronics, 1952, *chairman, 1953;* Technical Committee, No. 4, Electro-Acoustic Devices, 1930. Awards: President's Certificate of Merit, 1948.

BLACK, Leonard J. (A'31—SM'46—F'53), Professor of Electrical Engineering, University of California, Berkeley 4, Calif.
Born: July 29, 1904, Santa Clara, Calif. B.S. 1928; M.S. 1930; Ph.D. 1935, University of California. Committees: Education, 1949–51. Institute Representative: University of California, 1941–53. Sections: San Francisco, *chairman, 1941; secretary-treasurer, 1938–39; vice-chairman, 1940;* Member of Executive Committee, 1937–42, 1949–52; Speakers and Papers Committee, *chairman, 1937.*

BLACKWELL, Otto B. (M'20—F'28), Retired. 15 North Dr., Plandome, N.Y.
Born: August 21, 1884, Bourne, Mass. S.B., 1906, Massachusetts Institute of Technology. Committees: Standardization, 1920–23.

BLOMBERG, Hugo (M'45—F'50), President, Svenska Radioaktiebolaget, 12 Alstromergatan, Stockholm, Sweden.
Born: October 25, 1897, Stockholm, Sweden. E.E., 1920, Royal Technical University of Stockholm.

BODE, H. W. (M'41—SM'43—F'52), Director of Mathematical Research, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: December 24, 1905, Madison, Wis. A.B., 1924; M.A., 1926, Ohio State University; Ph.D., 1935, Columbia University. Committees: Circuits, 1944–47.

BOOKER, Henry G. (SM'45—F'53), Professor, Dept. of Engineering Physics and School of Electrical Engineering, Cornell University, Ithaca, N.Y.
Born: December, 1910, Barking, Essex, England. B.A., 1933; Ph.D., 1936, Cambridge University. Committees: Standards, 1949–52; Wave Propagation, *vice-chairman, 1949–50, chairman, 1950–52.* Awards: Duddell, 1946; Institution, 1947; Kelvin, 1948; Premiums, I.E.E. (London).

BOWIE, Robert M. (A'34—M'37—SM'43—F'48), Director of Engineering, Sylvania Electric Products, Inc., 1740 Broadway, New York, N.Y.
Born: August 24, 1906, Table Rock, Neb. B.S., 1929; M.S.(Physics), 1931; Ph.D.(Physics), 1933, Iowa State College. Committees: Administrative of the Board of Editors, 1953; Admissions, 1945–48; Board of Editors, 1947–53; National Convention, 1950; Nuclear Studies, 1948–50; Papers Procurement, 1945–50; Research, 1946–47; Television, 1948–49; Television Systems, 1949–52, *vice-chairman, 1951–52.*

BOWLES, Edward L. (A'22—M'28—SM'43—F'47), Consulting Professor, Department of Electrical Engineering and Industrial Management, Massachusetts Institute of Technology, Cambridge 39, Mass.
Born: December 9, 1897, Westphalia, Mo. B.S., 1920, Washington

University; M.S., 1922, Massachusetts Institute of Technology; D.Sc. (Honorary), 1945, Norwich University. Committees: Membership, 1937–40, Papers Procurement, 1942–43; Regular Papers, 1941, Standardization, 1929–31, Standards, 1932. Sections: Boston, *chairman, 1935–37.* Awards: Distinguished Service Medal, 1945; Honorary Commander, Civil Division of Most Excellent Order of British Empire, 1948; Presidential Medal for Merit, 1948.

BOWN, Ralph (M'22—F'25), Vice-President, Research, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: February 22, 1891, Fairport, N.Y. M.E., 1913; M.M.E., 1915; Ph.D., 1917, Cornell University. President, 1927; Vice-President, 1926; Director, 1926–29, 1937–39. Committees: Admissions, *chairman, 1926,* 1939–40; Awards, 1928–31, 1938–41, 1946, *chairman, 1942;* Board of Editors, 1946–53; Constitution and Laws, 1929, 1937–40; Convention Policies, 1940; Finance, *chairman, 1926;* IRE-RMA Joint Technical Advisory Committee, 1948–52, *chairman, 1951–53;* International Liaison, *chairman, 1947–49;* Meetings and Papers, 1929; Nominations, 1937, 1940–43, *chairman, 1944, 1949–51;* Receiving Sets, 1927–28; Research, 1949–50; Standards, 1941; Standardization, *chairman, 1925,* 1926. Awards: Morris Liebmann Memorial Prize, 1926; Medal of Honor, 1949.

BRADLEY, William E. (SM'45—F'53), Co-Director of Research—Technical, Philco Corporation, C & Tioga Sts., Philadelphia 34, Pa.
Born: January 7, 1913, Lansdowne, Pa. B.S. (E.E.), 1936, Moore School, University of Pennsylvania.

BRAINERD, John G. (A'33—M'39—SM'43—F'51), Professor, Education and Research, Moore School of Electrical Engineering, University of Pennsylvania, 200 S. 33 St., Philadelphia 4, Pa.
Born: August 7, 1904, Philadelphia, Pa. B.S.(E.E.), 1925; D.Sc., 1934, University of Pennsylvania. Committees: Annual Review, 1948–51; Circuits, 1947, *chairman, 1948–49,* 1949–53. Institute Representative: ASA Sectional Committee (C42) on Definitions of Electrical Terms, 1949–53; ASA Sectional Committee (C16) on Radio, 1950–51; ASA Standards Council, 1950, ASA Subcommittee on General Terms, 1948. Professional Groups: Circuit Theory, *chairman, 1950–52;* Standards, 1948–49, *chairman, 1949–51,* 1951–53. Sections: Philadelphia, *vice-chairman, 1952–53.*

BREIT, Gregory (SM'45—F'45), Professor, Department of Physics, Sloane Physics Laboratory, Yale University, New Haven 11, Conn.
Born: July 14, 1898, Russia. A.B., 1918; A.M., 1920; Ph.D., 1921, The Johns Hopkins University. Committee: Research, 1949–50.

BRENNECKE, Cornelius G. (A'36—M'46—F'51), Professor, Head, Department of Electrical Engineering, North Carolina State College, Raleigh, N.C.
Born: August 29, 1906, New York, N.Y. B.A., 1926; B.S., 1927; E.E., 1928, Columbia University; Ph.D., 1936, New York University. Committees: Education, 1951–53. Sections: North Carolina-Virginia, *vice-chairman and program chairman, 1946–48, chairman, 1948–49.* Institute Representative: Lehigh University, 1943–45.

BRILLOUIN, Leon N. (SM'44—F'52), 88 Central Park West, New York 23, N.Y.
Born: August 7, 1889, Sevres, France. Ph.D., 1921, University of Paris.

BROWN, George H. (A'30—VA'39—F'41), Director, Systems Research Laboratory, RCA Laboratories Division, Radio Corporation of America, Princeton, N.J.
Born: October 14, 1908, North Milwaukee, Wis. B.S., 1930; M.S., 1931; Ph.D., 1933; E.E.(Professional), 1942, University of Wisconsin. Committees: Annual Review, 1947, Antennas, 1944–49, Papers Procurement, 1948–50. Awards: Fellow, AIEE.

BROWN, Jesse E. (A'24—M'28—SM'43—F'49), Assistant Vice-President and Chief Engineer, Zenith Radio Corporation, 6001 W. Dickens Ave., Chicago 29, Ill.
Born: September, 1902, Greenport, N.Y. Attended Cornell University, 1920–24. Director, 1938, 1947. Committees: Admissions, 1940; Awards, 1940; Frequency Modulation, 1940–46; Industrial Electronics, 1947–49; Membership, 1949–50; Modulation Systems, 1947; Nominations, 1947; Papers Procurement, 1942–45; Public Relations, 1940; Radio Receivers, 1941, 1945–49; Receivers, 1949–51; Regular Papers, 1941; Sections, 1937; Special Publications Fund, 1947, Television, 1940–48, Televisions Systems, 1949–52. Sections: Chicago, *secretary, 1936, chairman, 1938–39.* Institute Representative: Army Signal Association, 1947.

BRUNETTI, Cledo (A'37—SM'46—F'49), Director, Engineering Research and Development, General Mills Inc., Mechanical Division, 2003 E. Hennepin, Minneapolis, Minn.; Associate Director, Stanford Research Institute, Stanford, Calif, 1949–53.
Born: April, 1910, Virginia, Minn. B.E.E. (with High Distinction), 1932; Ph.D., 1937, University of Minnesota. Committees: Circuits, 1944–51, *vice-chairman, 1949,* 1950; Radio Transmitters, 1946–49; Papers Procurement, 1948–50. Awards: National Scholarship Key; National I. A. Civic League, 1937; Outstanding Young Electrical Engineer, Eta Kappa Nu, 1941; The Material and Methods Achievement Grand Award, Materials and Methods Magazine, 1947; Naval Ordnance Development Award for Exceptional Service, United States Navy, 1945; Certificate for Outstanding Service, War Department, 1945; Certificate of Appreciation of Services, Office of Scientific Research and Development, 1945; Army-Navy Certificate of Appreciation for Outstanding Services during World War II, War and Navy Department, 1947.

BUILDER, Geoffrey (A'32—F'41), Department of Physics, University of Sydney, Sydney, N.S.W., Australia.
Born: June 21, 1906, Cue, Western Australia. B.Sc., 1928, University of Western Australia; Ph.D., 1933, King's College, London, England. Awards: Fellow, Institute of Physics, London, England.

BURKE, Charles T. (A'25—M'27—F'37), Director of Planning, General Radio Company, 275 Massachusetts Ave., Cambridge 39, Mass.
Born: August 4, 1902, Watertown, Mass. S.B., 1924; S.M., 1924, Massachusetts Institute of Technology. Committees: Handbook, 1945–47; Papers Procurement, 1946; Power Supply, 1928; Receiving Sets, 1927; Standards, 1941–43.

BURNAP, Robert S. (A'30—F'47), Manager, Commercial Engineering Sec., RCA Victor Division, Tube Department, 5 and Sussex Sts., Harrison, N.J.
Born: July 12, 1894, Monterey, Mass. S.B., 1916, Massachusetts Institute of Technology. Committees: Administrative of Board of Editors, 1952–53. Annual Review, 1943–48; Awards, 1948; Board of Editors, 1944–53; Editorial Administrative, 1946–51; Electronics, 1936–41, *chairman, 1942–45;* Subcommittee on Small High-Vacuum Tubes, 1936–38, *chairman, 1939–41;* Electron Tubes, *chairman, 1946–48;* Electron Tubes and Solid-State Devices, 1949–52; Handbook, 1945–47; Papers Procurement, 1942–44; Regular Papers, 1941; Standards, 1942–49; Symbols, 1940–41, 1943–47; Tellers, 1942. Institute Representative: ASA Subcommittee (C42.14) on Electronics, 1947–51.

BURROWS, Charles R. (A'24—M'38—SM'43—F'43), Director, School of Electrical Engineering, Cornell University, Ithaca, N.Y.
Born: June 21, 1902, Detroit, Mich. B.S.E.(E.E.), 1924, University of Michigan; A.M., 1927, Columbia University; E.E., 1935, University of Michigan; Ph.D., 1938, Columbia University. Committees: Annual Review, 1943–45; Circuits, 1945–50; National Convention, 1948; Radio Wave Propagation, 1942, *chairman, 1943–45;* Radio Wave Propagation and Utilization, 1945–47; Standards, 1943–45, 1949–50; Symbols, 1940–52; Wave Propagation, 1937–41, *vice-chairman, 1948, chairman, 1949,* 1950–53.

BUSIGNIES, Henri (M'42—SM'43—F'45), Technical Director, Federal Telecommunication Laboratories, Inc., 500 Washington Ave., Nutley, N.J.
Born: December 29, 1905, Sceaux, Paris, France. E.E., 1926, Institut Normal Electro-technique, Paris, France. Committees: Annual Review, 1948; Navigation Aids, 1946, 1947, *vice-chairman, 1948, chairman, 1949,* 1950–51; Standards, 1948–50. Awards: Presidential Certificate of Merit, 1948.

BUTTNER, Harold H. (M'27—SM'43—F'44), Vice-President, International Telephone and Telegraph Corporation, 67 Broad St., New York 4, N.Y.
Born: November 3, 1892, Porta Costa, Calif. B.S.(E.E.), 1915, University of California. Committees: Electronics,1940; Meetings and Papers, 1929; Standards, 1938–39.

BYRNE, John F. (SM'45—F'50), Director of Engineering, Communications and Electronics Div., Motorola, Inc., 4501 Augusta Blvd., Chicago 51, Ill.
Born: October 26, 1905, Cincinnati, Ohio. B.S., 1927; M.S.(E.E.), 1928, Ohio State University. Committees: Awards, 1953; Tellers, 1949; Panel on Electronic Countermeasures Research and Development Board, *chairman, 1949–51.* Awards: United States Navy Certificate of Commendation, February, 1947; Presidential Certificate of Merit, September, 1948.

CADY, Walter G. (A'14—F'27) (L'50), Research Associate, Norman Bridge Laboratory of Physics, California Institute of Technology, Pasadena 4, Calif.
Born: December 10, 1874, Providence, R.I. Ph.B., 1895; M.A., 1896, Brown University; Ph.D., 1900, University of Berlin; D.Sc., 1938, Brown University. President, 1932; Editor, 1929; Director, 1928–29, 1932–34. Committees: Annual Review, 1942–49; Awards, 1928–29, *chairman, 1930,* 1933; Bibliography, 1930–31; Board of Editors, 1928, *chairman, 1929,* 1945; Institute Sections, 1928; Meetings and Papers, 1928–29; Nominations, 1930, *chairman, 1933–34,* 1939; Papers, 1931; Piezoelectric Crystals, 1941, *chairman, 1942–49,* 1951–53; Standards, 1943–51. Sections: Connecticut Valley, *chairman, 1927–28.* Awards: Morris Liebmann Memorial Prize, 1928; Duddell Medal, Physical Society of London, 1936.

CALDWELL, Orestes H. (M'28—SM'43—F'44), Editor, *Tele-Tech* and *Electronic Industries, Television Retailing,* Caldwell-Clements, Inc., 480 Lexington Ave., New York 17, N.Y.
Born: March 8, 1888, Lexington, Ky. B.S.(E.E.), 1908; E.E., 1931; D.E., 1933, Purdue University. Manager, 1932; Director, 1932–35. Committees: Admissions, 1933; Annual Review, 1942–43; Board of Editors, 1946–53; Constitution and Laws, 1932–33, 1935; Nominations, 1934; Public Relations, *chairman, 1942, 1943–46, 1949–50;* Publicity, 1931–33, *chairman, 1934–36, 1937, 1939;* Tellers, 1932–33.

CALLAHAN, John L. (A'21—M'31—SM'43—F'53), Research Section Head, Assistant to Director of Radio Research Laboratory, RCA, RCA Laboratories Division, 66 Broad St., New York, N.Y.
Born: December 9, 1898, Minneapolis, Minn. 1919, Sorbonne University; 1941, New York University. Committees: Admissions, 1944–48; Annual Review, 1940–44; Awards, 1951; Facsimile, 1939–45; *chairman, 1940–44;* Papers, 1942; Professional Group on Communications Systems, *secretary, 1952–53;* Professional Group on Communications Systems, Administrative Committee, 1952–53; Professional Group on Communications Systems, Meetings Committee, *chairman, 1952–53;* Standards, 1940–44; Symbols, 1940–41; Television and Facsimile, 1937–38; Tellers, 1949–51, *chairman, 1950.* Awards: Army-Navy Certificate of Appreciation, 1948; Fellow, AIEE; Fellow, Radio Club of America; Member, New York Electrical Society.

CAMPBELL, Richard D. (A'34—SM'46—F'51), Point-to-Point Radio Engineer, A. T. and T. Co., 195 Broadway, New York, N.Y.
Born: May 26, 1899, St. Louis, Mo. B.S.(E.E.), 1922, George Washington University. Committees: Industrial Electronics, 1947.

CAMRAS, Marvin (S'41—A'42—SM'48—F'52), Senior Physicist, Armour Research Foundation, 35 W. 33rd St., Chicago, Ill.
Born: January 1, 1916, Chicago, Ill. B.S. (E.E.), 1944, Armour Institute of Technology; M.S. (E.E.), 1942, Illinois Institute of Technology. Committees: Professional Group on Audio, *secretary-treasurer, 1951–52.* Awards: Fellow, Acoustical Society of America, 1951; Illinois Institute of Technology Alumni Association Distinguished Service Award, 1948; Eta Kappa Nu Award (Honorable Mention), 1948; U.S. Camera Award for Contribution to Motion Picture Photography, 1949.

CARLSON, Wendell L. (A'36—SM'47—F'49), Research Engineer, RCA Laboratories Division, Princeton, N.J.
Born: January, 1897, Jamestown, N.Y. Committees: Radio Receivers, 1946–47.

CARNAHAN, C. Wesley (A'34—SM'45—F'52), Applications Engineer, Guided Missiles, Varian Associates, 611 Hansen Way, Palo Alto, Calif.
Born: July 4, 1907, Berkeley, Calif. B.A., 1927; M.A., 1931, Stanford University. Committees: Board of Editors, 1947–53; Papers Review, 1945–47. Sections: New Mexico, *chairman, 1948–49, 1952–53.*

CARTER, E. Finley (A'23—F'36), Vice-President in chge. of Engineering, Sylvania Electric Products, Inc., 1740 Broadway, New York 19, N.Y.
Born: July 1, 1901, Elgin, Tex. B.S., 1922, Rice Institute. Director, 1943–45. Committees: Admissions, 1944; Constitution and Laws, 1945–48; Editorial Administrative, 1949–50; Executive, 1944–45. Awards: Professional Recognition, 1947.

CARTER, Philip S. (A'29—M'38—SM'43—F'49), Research Engineer, RCA Laboratories Division, Rocky Point, L.I., N.Y.
Born: July, 1896, Glastonbury, Conn. A.B.(Mechanical Engineering), 1918, Stanford University. Committees: Annual Review, 1945–48; Antennas, *chairman, 1945–48;* Antennas and Waveguides, 1949–53; Board of Editors, 1937–48; Professional Group on Antennas and Propagation, 1949–53; Standards, 1945–53; Technical Program Committee, National Convention, 1949, 1952, 1953. Awards: Modern Pioneer Award, National Association of Manufacturers, 1940; Citation for Overseas Work on Countermeasures "V" 2 Rocket, Secretary of War, 1947; Army-Navy Certificate of Appreciation, 1948.

CHAFFEE, E. Leon (M'17—F'21) (L'52), Professor, Applied Physics, Emeritus, Harvard University, Cambridge 38, Mass.
S.B., 1907, Massachusetts Institute of Technology; A.M., 1908; Ph.D., 1911; S.D.(Honorary), 1944, Harvard University. Vice-President, 1922; Director, 1922. Committees: Electron Tubes, 1946; Electronics, 1936–45; Membership, 1925; Papers, 1918–19; Papers Procurement, 1942–43; Regular Papers, 1941; Research, 1949–50; Standardization, 1927–31; Symbols, 1940–43; Technical Committee, No. 3, Vacuum Tubes, 1930; Vacuum Tubes, 1945. Sections: Boston, *chairman, 1932–35.* Institute Representative: Harvard University, 1941–53. Awards: Longstreth Medal of Merit, Franklin Institute, 1912.

CHAMBERLAIN, Adolph B. (A'27—M'30—F'41), Chief Engineer, Engineering Department, Columbia Broadcasting System, Inc., 485 Madison Ave., New York 22, N.Y.
Born: February 3, 1901, Franklin, Mass. Director, 1941–44. Committees: Admissions, 1940–41; Annual Review, 1947–48; Awards, 1942; Broadcast, *alternate, 1932;* Constitution and Laws, 1947; Frequency Modulation, 1940–41; Membership, 1949–50; National Convention, 1947; New York Program, 1938–39, *chairman, 1940,* 1941–42; Papers, 1942; Professional Groups, 1948–49; Public Relations 1940; Regular Papers, 1941; Standardization, Subcommittee on the Establishment of Provisions for Safety of Operating and Other Personnel in Relation to Radio Transmitting Equipment, 1930; Technical Committee No. 2 on Radio Transmitters and Antennas, 1929–30; Standards, 1946, *chairman, 1947–49,* 1950; Tellers, *chairman, 1942;* Transmitters and Antennas, 1936. Sections: Buffalo-Niagara, *chairman, 1930–31;* Rochester, *chairman, 1928–29.* Institute Representative: ASA Standard Council, 1948–49; ASA Section Committee on Definitions of Electrical Terms, 1948–49.

CHAMBERS, Dudley E. (M'41—SM'43—F'48), Manager, Research Applications Services Dept., Research Laboratory, General Electric Company, The Knolls, Schenectady 5, N.Y.
Born: November 27, 1905, Kansas City, Mo. A.B. (E.E.), 1927, Stanford University. Committees: Awards, 1948–51; Board of Editors, 1953; Education, 1953; Research, *chairman, 1949;* Standards, 1949–50. Awards: Fellow, AIEE, 1948.

CHINN, Howard A. (A'42—SM'45—F'45), Chief Engineer, Audio-Video Division, Columbia Broadcasting System, Inc., 485 Madison Ave., New York 22, N.Y.
Born: January 5, 1906, New York, N.Y. S.B., 1927; S.M., 1929, Massachusetts Institute of Technology. Committees: Admissions, 1945–48; Audio and Video Techniques, *chairman, 1948;* Constitution and Laws, 1952; Education, 1945; Membership, 1934, 1936–38; Papers, 1935–40, 1944–45; Papers Review, 1946–52; Professional Groups, 1948; Standards, 1948; Tellers, 1946, *chairman, 1947.*

CHITTICK, Kenneth A. (A'26—SM'49—F'53), Manager, TV Receivers, RCA Victor Corporation, Front and Cooper Sts., Camden, N.J.
Born: November 6, 1903, Old Bridge, N.J. B.S., 1925, Rutgers University. Committees: Instruments and Measurements, 1949–50; Papers Procurement, 1947–50; Receivers, 1951–52; Television, 1945–48; Television Systems, 1949–53. Awards: Award of Merit, RCA Victor Corp., 1948.

CHRISTALDI, P. Samuel (S'35—A'40—SM'44—F'52), Assistant Manager, Instrument Division, Allen B. DuMont Laboratories, Inc., 760 Bloomfield Ave., Clifton, N.J.
Born: November 26, 1914, Philadelphia, Pa. E.E., 1935; Ph.D. (Physics), 1938, Rensselaer Polytechnic Institute. Committees: Admissions, 1949–52, *chairman, 1950–51;* Measurements and Instrumentation, 1950–52, *vice-chairman, 1951–52;* Subcommittee on Oscillography, *chairman, 1950–52.* Subsection, *secretary, 1951–52.* Awards: Member, Sigma Xi; Fellow, Radio Club of America.

CHU, Lan J. (A'39—VA'39—SM'48—F'52), Professor of Electrical Engineering, Massachusetts Institute of Technology, Cambridge 39, Mass.
Born: August 24, 1913, Hweiying, Kiangsu, China. B.S., 1934, Chiao Tung University; M.S., 1935; Sc.D., 1938, Massachusetts Institute of Technology. Committees: Antennas, 1948; Antennas and Wave-guides, *vice-chairman, 1949–1950,* 1950–51; Technical Program, 1949–50.

CLAPP, James K. (A'24—M'28—F'33), Engineer, General Radio Company, 275 Massachusetts Ave., Cambridge 39, Mass.
Born: December 30, 1897, Denver, Col. B.S., 1923; S.M., 1926, Massachusetts Institute of Technology. Committees: Papers, 1931–45; Papers Review, 1946–53; Piezoelectric Crystals, 1940–52; Standards, 1934–35.

CLAVIER, Andre G. (M'30—F'39), Technical Director, Research and Development Laboratories, Federal Telecommunication Laboratories, Inc., 500 Washington Ave., Nutley 10, N.J.
Born: February 15, 1894, Cambrai, France. Licencie-es-sciences physiques et mathematiques, 1918, Sorbonne, Paris; Ingenieur diplome de l'Ecole Superieure d'Electricite, 1920, Paris, France. Professeur a l'Ecole Superieure d'Electricite, 1942–47. Committees: Admissions, 1951–52; Standards, 1952; Symbols, 1949–50, *vice-chairman 1950–51, chairman 1951–52.* President, Fifth Section, Societe des Radioelectriciens, Paris, 1945–47. Awards: Membre Laureat de la Societe francais des Electriciens; Fellow, AIEE; Member, IEE (Great Britain).

CLEMENT, Lewis M. (A'14—M'17—F'26), Technical Advisor to the General Manager, Crosley Division, Avco Manufacturing Corp., 1329 Arlington St., Cincinnati 25, Ohio.
Born: January 25, 1892, Oakland, Calif. B.S.(E.E.), 1914, University of California. Director, 1945. Committees: Board of Editors, 1941–53; Electro-Acoustic Devices, 1930–31; Meetings and Papers, 1929; Papers Procurement, 1948–50; Professional Groups, 1953; Receiving Sets, 1927–28; Regular Papers, 1941; Standardization, 1929–30; Vacuum Tubes, 1929–30. Sections: Cincinnati, *chairman, 1945.*

COGGESHALL, Ivan S. (A'26—M'29—F'42), Director of Planning, International Communications, Western Union Telegraph Company, 60 Hudson St., New York 13, N.Y.
Born: September 30, 1896, Newport, R.I. President, 1951; Director, 1941–44, 1951–53. Committees: Admissions, 1934–35, 1941–42; Annual Review, 1944–47; Board of Directors, 1941–44, 1951–53; Building Fund, *vice-chairman, 1945;* Constitution and Laws, 1942, 1945–47, *chairman, 1948,* 1949, *chairman, 1950,* 1952–53; Executive, 1942, *chairman, 1951;* Finance, 1948–52; Membership, 1928, *chairman, 1929–30, chairman, 1934–35,* 1936–40, *chairman, 1941;* National Convention, *vice-chairman, 1948,* New York Program, 1938, *chairman, 1939,* 1940; Nominations, 1944, 1953; Papers, 1942–45; Papers Procurement, *group chairman, 1945,* 1946; Papers Review, 1946–47; Professional Groups, 1950; Public Relations, *chairman, 1943–45,* 1946; Sections, 1933–35, 1938–42; Standards, 1945–46. Institute Representative: Joint IRE-RTMA Coordination Committee, 1951; Joint Technical Advisory Committee, 1951. Awards: Fellow, AIEE.

COLEMAN, John B. (A'25—M'29—SM'43—F'48), Assistant Director of Engineering, RCA Victor Division, Radio Corporation of America, Front and Cooper Sts., Camden, N.J.
Born: August 1899, Indiana County, Pa. B.S.(E.E.), 1923, Carnegie Institute of Technology. Director, 1948–49. Committees: Broadcast, 1933; Constitution and Laws, 1952–53; Membership, 1949–51. Sections: Philadelphia, *chairman, 1942–43.*

COLLINS, Arthur A. (J'26—A'32—VA'39—SM'49—F'53), President, Collins Radio Company, 855 35th St., S.E., Cedar Rapids, Iowa.
Born: September 9, 1909. Kingfisher, Okla.

CONDON, Edward U. (M'42—SM'43—F'53), Director of Research and Development, Corning Glass Works, Corning, N.Y.
Born: March 2, 1902, Alamogordo, N. M. A.B., 1924; Ph.D., 1926, University of California; D.Sc. (Honorary), 1950, University of Delhi, India, and New Mexico School of Mines; 1952, Alfred University and American University. Awards: President, American Physical Society, 1946; Philosophical Society of Washington, 1951; American Association for Advancement of Science, 1953.

COOK, Ellsworth D. (A'21—VA'39—F'41), Manager, Electronic Instruments Engineering Services Section, Instrument and Nuclear Radiation Engineering Department, General Engineering Laboratory, General Electric Company, 1 River Rd., Schenectady, N.Y.
Born: June 17, 1898, Schenectady, N.Y. B.S.(E.E.), 1920; M.S. (E.E.), 1921; Ph.D.(E.E.), 1923, Union College. Committees: Admissions, 1944–48; Membership, 1936–39, *chairman, 1940,* 1942–43, *chairman, 1944–45,* 1946–48; Sections, 1935, 1937, *chairman, 1938–39, 1940–48;* Standards, 1932–33. Sections: Philadelphia, *chairman, 1934–35.* Institute Representative: ASA Sectional Committee on Acoustical Measurements and Terminology, 1936–37, 1939–46.

CORWITH, Howard P. (M'26—SM'43—F'52), Vice-President, Development and Research, The Western Union Telegraph Company, 60 Hudson St., New York 13, N.Y.
Born: December 3, 1892, Water Mill, L.I., N.Y. M.E., 1916, Cornell University. Committees: Electronics, 1938–45; Admissions, 1949–51, *chairman, 1952–53.* Awards: Fellow, AIEE, 1951; President, New York Electrical Society, 1949–50.

COSENTINO, Adolfo T. (A'37—VA'39—F'40), Operations and Communications Superintendent (Argentina), Pan American-Grace Airways, Inc., Avenida Pte. R. Saenz Pena 788, Buenos Aires, Argentina.
Born: November 18, 1898, Buenos Aires, Argentina. Attended National School, Buenos Aires. Vice-President, 1941; Director, 1941. Committees: Sections, ex-officio, 1940–41, 1947–48. Sections: Buenos Aires, *chairman, 1940–41, 1947–48.*

CRAVEN, Tunis A. M. (F'29), Partner, Craven, Lohnes and Culver, Consulting Radio Engineers, 1242-53 Munsey Bldg., Washington 4, D.C. Mail: Langley, McLean, P.O., Va.
Born: January 31, 1893, Philadelphia, Pa. Graduate, 1913, United States Naval Academy. Director, 1937. Committees: Broadcast, 1934; Meetings and Papers, 1930; Papers, 1932–41; Radio Transmitters and Antennas, 1930–31; Standardization, 1929–30; Subcommittee on Establishment of Provisions for Safety of Operating and Other Personnel in Relation to Radio Transmitting Equipment, 1929–30; Subcommittee on Nomenclature, Symbols and Definitions, *chairman, 1929–30.*

CRAWFORD, Arthur B. (A'29—SM'46—F'52), Technical Staff, Radio Research Engineer, Bell Telephone Laboratories, Box 107, Red Bank, N.J.
Born: February 26, 1907, Graysville, Ohio. B.S.(E.E.), 1928, Ohio State University. Committees: Wave Propagation, 1949–52.

CROSBY, Murray G. (A'25—M'38—SM'43—F'43), Radio-Electronic Consultant; President, Crosby Laboratories, Inc., Box 233, Robbins Lane, Hicksville, L.I., N.Y.
Born: September, 1903, Elroy, Wis. B.S., 1927; E.E., 1943, University of Wisconsin. Director, 1947–49. Committees: Admissions, 1945–46; Annual Review, 1946–47; Appointments, 1947, *chairman, 1948;* Awards, 1950–52, *chairman, 1950;* Board of Editors, 1946–52–53; Editorial Administrative, 1946–49; Executive, 1949; Frequency Modulation, 9410–45, *chairman, 1946;* Modulation Systems, *chairman, 1947,* 1948–50; National Convention, 1948; Papers, 1944–45; Papers Procurement, 1945; Papers Review, *chairman, 1946–48,* 1949–51; Policy Development, 1948–49; Professional Groups, 1948; Standards, 1946–48. Institute Representative: IRE-RTMA, Problem No. 2, *chairman, 1951.* Awards: Modern Pioneer Award, National Association of Manufacturers, 1940.

CULLUM, A. Earl, Jr. (J'28—A'31—SM'45—F'48), Head Consulting Radio Engineer, Highland Park Village, Dallas 5, Texas.
Born: September, 1909, Abilene, Tex. B.S. (Communications Engi-

neering), 1931, Massachusetts Institute of Technology. Director, 1948. Committees: Annual Review, 1948; Education, 1945; Radio Wave Propagation and Utilization, 1946–47; Standards, 1948; Wave Propagation, *chairman, 1948*, 1949–53; Policy Development, 1949–50; Nominations, 1949–50; Awards: Presidental Certificate of Merit, 1948.

CUTTING, Fulton (M'15—F'21) (L'51), Professor of Physics and Assistant to the President, Stevens Institute of Technology, Hoboken, N.J.
Born: December 27, 1886, New York, N.Y. President, 1922; Vice-President, 1921; Manager, 1920; Director, 1921–24. Committees: Education, 1944; Investments, 1944–46.

DEARDORFF, Ralph W. (A'14—SM'44—F'51), Transmission Engineering Advisor (Communication), The Pacific Telephone and Telegraph Company, 509 South West Oak St., Portland, Ore.
Born: August 9, 1894, Portland, Ore. Sections: Portland, *chairman, 1942–43, vice-chairman, 1946–47.*

deFOREST, Lee (IRE Charter Mem.) (A'12—M'14—F'18) (L'49), Director, American Television Inc. and United Engineering Company, 1027 N. Highland Ave., Los Angeles, Calif.
Born: August 26, 1873, Council Bluffs, Iowa. Ph.B., 1896; Ph.D., 1899, Yale University; Sc.D., 1919, Syracuse University; D.Sc., 1926, Yale University; D.Eng., 1937, Lewis Institute; LL.D., Talladega College, Beloit College; D.Sc., College of Osteopathic Surgery, 1951. Awards: IRE Medal of Honor, 1922; Edison Medal, 1947; President, Society of Wireless Telegraph Engineers, 1909–10. President, 1930; Director, 1930–32. Committees: Specifications for Steamship Radio Equipment, 1914; Wave Length Regulations, 1916.

DELLINGER, John Howard (F'23), Radio Consultant and Adviser, 3900 Connecticut Ave., Washington 8, D.C.
Born: July 3, 1886, Cleveland, Ohio. A.B., 1908, George Washington University; Ph.D., 1913, Princeton University; D.Sc., 1932, George Washington University. President, 1925; Vice-President, 1924; Director, 1924–27; Manager, 1928–31. Committees: Annual Review, 1938–43; Awards, 1934, 1936; Bibliography, 1930, *chairman, 1931*, 1932, 1934; Meetings and Papers, 1926, *chairman, 1928;* Nominations, 1928, *chairman, 1931*, 1935; Radio Wave Propagation, *chairman, 1942*, 1945; Receiving Sets, 1927; Revision of the Constitution, *chairman, 1927;* Standardization, 1920–25, 1927–28, *chairman, 1929–30*, 1931; Standards, 1932, 1934–41, 1943; Symbols, 1940–41, 1943–48; Use of the Transmission Unit, 1928; Wave Propagation, *chairman, 1937–41.* Sections: Washington, D.C., *chairman, 1932–33.* Institute Representative: American Documentation Institute, 1944–53; ASA Sectional Committee on Electric and Magnetic Magnitudes and Units, 1936–37, 1939–48. Awards: Medal of Honor, 1938.

DELORAINE, Edmond M. (M'25—F'41), General Technical Director, International Telephone and Telegraph Corporation, 67 Broad St., New York 4, N.Y.
Born: May 16, 1898, Clichy, Seine, France. B.S., 1920, Ecole de Physique et Chimie, Branch of Paris University. Vice-President, 1946; Director, 1946. Committees: Board of Editors, 1944–45; International Liaison, 1947; Membership, 1927.

deROSA, Louis A. (A'45—SM'51—F'52), Division Head, Electronics Warfare Division, 500 Washington Ave., Nutley 9, N.J.
Born: September 10, 1910, Tenafly, N.J. B.S.(E.E.), 1932, Polytechnic Institute. Committees: Modulation Systems, 1951–52.

DEVORE, Lloyd T. (A'42—SM'44—F'52), Manager, General Electric Company, Electronics Laboratory, Electronics Park, Syracuse, N.Y.
Born: November 14, 1909, Monongahela, Pa. B.S., 1930; M.S., 1931; Ph.D., 1933, Pennsylvania State College. Committees: Awards, 1952; Papers Review, 1951–52; Program, 1948–49. Awards: Exceptional Civilian Service Award, 1947, War Department.

DeWITT, John H., Jr. (A'31—M'38—SM'43—F'51), President, WSM Incorporated, 301 7th Ave., N., Nashville 3, Tenn.
Born: February 20, 1906, Nashville, Tenn. Committees: Professional Groups, 1948. Awards: Sigma Xi, 1949.

d'HUMY, Fernand E. (A'41—SM'45—F'49), Director, Western Union Telegraph Company and American District Telephone Co.; Director, Teleregister Corp., Ramp Bldgs. Corp., 60 Hudson St., New York 13, N.Y.
Born: August, 1873, London, England.

DIEHL, William F. (A'19—M'29—F'36), Assistant Vice-President, Dumont Airplane and Marine Instruments, Inc., Clearfield, Pa.
Born: December 18, 1896, New York, N.Y. Committees: Building Fund, 1945; Radio Transmitters and Antennas, 1929–30, Subcommittee, Receiving Sets, 1928. Sections: Philadelphia, *chairman, 1933–34; convention chairman, 1934.* Awards: United States Navy Certificate Commendation.

DOHERTY, William H. (A'29—M'36—SM'43—F'44), Director of Research, Electrical Communications, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: August 21, 1907, Cambridge, Mass. S.B., 1927; S.M., 1928, Harvard University; Sc.D., 1950, Catholic University of America. Director, 1951–52. Committees: Board of Directors, 1953; Membership, 1943–46; Nominations, 1952–53; Policy Advisory, 1952–53; Policy Development, 1951; Professional Groups, 1948–51. Awards: Morris Liebmann Memorial Prize, 1937.

DOME, Robert B. (A'27—M'38—SM'43—F'48), Electrical Consultant and Section Engineer, Radio and Television Department, Electronics Division, General Electric Company, Electronics Park, Syracuse, N.Y.
Born: October 12, 1905, Tell City, Ind. B.S.(E.E.), 1926, Purdue University; M.S.(E.E.), 1929, Union University. Committees: Board of Editors, 1946–53; Papers, 1940–45. Awards: Sigma Xi, 1926; Coffin Awards, 1936, 1948; Morris Liebmann Memorial Prize, 1951; R.E.S.A., 1951.

DORSEY, Herbert Grove (M'19—F'34), Instructor in Physics, Capitol Radio Engineering Institute, 3224 16 St., N.W., Washington, D.C.
Born: April 24, 1876, Kirkersville, Ohio. B.S., 1897; M.S., 1898; Sc.D. (Honorary), 1937, Denison University; Ph.D., 1908, Cornell University. Sections: Washington, D.C., *secretary, 1930–32, chairman, 1933.* Washington Academy of Sciences, Section Representative and *vice-president, 1941–53.* Awards: First Annual Award, Washington Society of Engineers, 1941; Fellow, American Physical Society; Acoustical Society of America; AIEE.

DOW, Jennings B. (M'26—F'42), Executive Vice-President, Hazeltine Electronics Corporation, 58-25 Little Neck Pkwy., Little Neck, L.I., N.Y.
Born: January 2, 1897, Bowling Green, Ohio. B.S., 1919, United States Naval Academy; M.S., 1926, Graduate School of Engineering, Harvard University.

DOW, William G. (M'39—SM'43—F'50), Professor, Department of Electrical Engineering, University of Michigan, Ann Arbor, Mich.
Born: September 30, 1895, Faribault, Minn. B.S.(E.E.), 1916; E.E., 1917, University of Minnesota; M.S.E.(E.E.), 1929, University of Michigan. Committees: Board of Editors, 1944–53; Electronics, 1939–45; Electron Tubes, 1946–47; Electron Tubes and Solid State Devices, 1949–52; Papers, 1941–44; Research, 1949–50; Vacuum Tubes, 1945–46. Awards: Fellow, AIEE.

DUBILIER, William (A'14—M'18—F'29) (L'53), Vice-President, Technical Director, Cornell-Dubilier Electric Corporation; President, Radio Patents Corporation, 10 E. 40 St., New York 16, N.Y.
Born: July 25, 1888, New York, N.Y. Attended Cooper Institute. Awards: Fellow, AIEE, 1925; Recipient, French Legion of Honor and made Officer of the French Academy, July, 1949.

DUMONT, Allen B. (M'30—F'31), President, Allen B. DuMont Laboratories, Inc., 750 Bloomfield Ave., Clifton, N.J.
Born: January 29, 1901, Brooklyn, N.Y. E.E., 1924; D.Eng., 1944, Rensselaer Polytechnic Institute. Committees: Standardization, 1929–31; Standards, 1932–33; Television, 1939–45. Awards: Westinghouse Award, 1927; American Television Society Award, 1943; Television Broadcasters Award, 1944; Marconi Memorial Medal of Achievement, 1945; AAAA Gold Medal Award, 1947; American Schools and Colleges Award; Member, National Television Systems Committee, 1940–44; Chevalier in National Order of French Legion of Honor, 1952.

DYER, John N. (J'30—A'32—SM'45—F'49), Vice-President, Research and Engineering, Airborne Instruments Laboratory, 160 Old Country Rd., Mineola, L.I., N.Y.
Born: July, 1910, Haverhill, Mass. B.S., 1931, Massachusetts Institute of Technology. Committees: Navigation Aids, 1949–50. Sections: Long Island Subsection, *vice-chairman, 1949, chairman, 1950.*

EASTHAM, Melville (A'13—M'13—F'25) (L'50), 8 Graygardens East, Cambridge, Mass.
Born: June 26, 1885, Oregon City, Ore. Dr.Eng., 1946 (Honorary), Oregon State College. Treasurer, 1927–40; Manager, 1922–26; Director, 1927–41; Administrator, Building Fund, 1947–48. Committees: Admissions, 1937–39, 1941–42; Awards, *chairman, 1929*, 1931, 1935, 1939, *chairman, 1941*, 1942; Bibliography, 1930–31, *chairman, 1932*, 1934; Constitution and Laws, 1930–31; Education, 1944–48; Nominations, *chairman, 1929*, 1930, 1932, *chairman, 1935*, 1936, 1938–39, 1941, 1949–50; Papers, 1916–19; Revision of the Constitution, 1925; Sections, 1925; Standardization, 1925, 1927–28, 1930; Subcommittee on Electro-Acoustic Devices, 1927–28; Subcommittee on Circuit Elements, 1928; Technical Committee No. 4, on Electro-Acoustic Devices, 1929–30; Standards, 1936–38; Wave Length Regulation, 1916. Sections: Boston, *secretary, 1914–15; secretary-treasurer, 1916–29; secretary, 1930–32.* Institute Representative: Engineering Index National Committee, 1926, 1939–43; Radio Broadcasting Committee, American Engineering Council, 1930, 1936, 1939, 1940; United States National Committee, Advisers on Electrical Measuring Instruments, 1936, 1939–51. Awards: Medal of Honor, 1937; New England Engineering Award, 1948; Medal for Merit, 1948.

EASTMAN, Austin V. (A'23—M'32—F'41), Professor and Head of Department of Electrical Engineering, University of Washington, Seattle 5, Wash.
Born: May 16, 1902, Seattle, Wash. B.S.(E.E.), 1922; M.S.(E.E.), 1929, University of Washington. Director, 1950–51. Committees: Awards, 1951; Membership, 1941–48; Papers Procurement, 1942–43; Policy Development, 1949–51; Regular Papers, 1941. Sections: Seattle, *chairman, 1929–30.* Institute Representative: University of Washington, 1941–47.

ECKERSLEY, Peter Pendleton (F'25), Telephone Manufacturing Company, St. Mary Cray, Kent, England.
Born: January, 1892, La Puebla, Mexico. Certificate of Technology, 1915, Manchester School of Technology; Higher Certificate, 1910, Bedales School. Vice-President, 1937; Director, 1937. Awards: Premium Prize Award, Institution of Electrical Engineers, 1928, 1930.

ECKERSLEY, Thomas L. (F'44), Retired, Chief Scientific Adviser to Marconi Company, Great Baddow, Chelmsford, Essex, England.
Born: December 27, 1886, London, England. B.Sc., University College, London; B.A., Cambridge University. Committees: Wave Propagation, 1937–1939. Awards: F.R.S., 1939; Fellow Award, 1944; Faraday Medal, 1951.

EHRET, Cornelius D. (F'16) (L'51), Retired, 6911 Clearview St., Philadelphia 19, Pa. Practiced Patent Law, Land Title Bldg., Philadelphia, Pa. from 1902 to July 1, 1948.
Born: January 28, 1874, Erie, Pa. E.E., 1896, Cornell University; LL.B., 1901, National Law School.

EITEL, William W. (A'39—SM'52—F'53), President, Eitel-McCullough, Inc., 798 San Mateo Ave., San Bruno, Calif.
Born: January 16, 1908, San Jose, Calif. Awards: Distinguished Service Award, U. S. Navy, 1950.

ELLEFSON, Bennett S. (A'38—M'44—F'48), Director of Central Engineering Laboratories, Sylvania Electric Products, Inc., 208-20 Willets Point Blvd., Bayside, L.I., N.Y.
Born: January 10, 1911, Canby, Minn. B.A., 1932, St. Olaf College; M.S., 1933, University of Minnesota; Ph.D., 1937, Pennsylvania State College. Committees: Annual Review, 1946–47.

ELLIOTT, Harold F. (M'25—SM'43—F'51), Consulting Engineer, 1216 Webster St., Palo Alto, Calif.
Born: June 17, 1892, Durango, Colo. A.B., 1916; Engineer, 1925, Stanford University.

ELWELL, Cyril F. (M'14—F'18) (L'50), Consulting Engineer Hewlett-Packard Company, 395 Page Mill Rd., Palo Alto, Calif.
Born: August 20, 1884, Melbourne, Victoria, Australia. A.B., 1907; E.E., 1908, Stanford University. Committees: Increase of Membership, 1913–14.

ENGLUND, Carl R. (A'17—F'28) (L'52), Retired. 740 Valencia Mesa Dr., Fullerton, Calif.
Born: November 13, 1884, Sioux City, Iowa. B.S., 1909, University of South Dakota. Committees: Fundamental Units and Measurements, 1933.

ENGSTROM, Elmer W. (A'25—M'38—F'40), Vice-President in Charge of RCA Laboratories Division, Radio Corporation of America, Princeton, N.J.
Born: August 25, 1901, Minneapolis, Minn. B.S.(E.E.), 1923, University of Minnesota; Sc.D. (Honorary), 1949, New York University. Director, 1949. Committees: Awards, 1945, *chairman, 1946*, 1947–49; Board of Editors, 1940–52; Nominations, 1947; Public Relations, 1940; Regular Papers, 1941; Research, 1946–47, 1950; Television and Facsimile, 1936–38; Television, 1939–40.

EPSTEIN, David W. (A'34—SM'43—F'52), Research Engineer, Princeton, N.J.
Born: January 11, 1908, Russia. B.S. in Physics, 1930, Lehigh University; M.S. in E.E., 1934; D.Sc. in E.E., 1937, University of Pennsylvania.

ESPENSCHIED, Lloyd (IRE Charter Mem.) (A'12—M'13—F'24), Research Consultant, Bell Telephone Laboratories, Inc., 463 West St., New York 14, N.Y.
Born: April 27, 1889, St. Louis, Mo. Pratt Institute, 1909. Manager, 1912–13, 1915–26, 1931. Committees: Admissions, 1942–47; Awards, 1919; Editing, 1914; Increase of Membership, 1917–18; Radio Telephone and Receiver Terminology, *chairman, 1924–25;* Revision of the Constitution, 1925; Standardization, 1924–25; Wave Length Regulation, 1916, 1919. Sections: New York, *chairman, 1944–45.* Institute Representative: National Advisory Council on Radio in Education, 1936–37, 1939–40; Committee on Engineering Developments, 1941–43. Awards: Medal of Honor, 1940; AIEE Award (co-receiver), 1945; Medal Award, Television Broadcasters Association, 1944.

EVANS, Porter H. (M'23—F'31), Member Technical Staff, Bell Telephone Laboratories, Inc., Whippany, N.J.
Born: January 11, 1891, Erie, Pa. B.S.(E.E.), 1914; M.S., 1920, University of Michigan. Committees: Standardization, 1930–31.

EVERITT, William L. (A'25—M'29—F'38), Dean of the College of Engineering, University of Illinois, Urbana, Ill.
Born: April 14, 1900, Baltimore, Md. E.E., 1922, Cornell University; M.S., 1926, University of Michigan; Ph.D., 1933, Ohio State University. President, 1945; Director, 1942–47, 1949–51. Committees: Awards, 1943, *chairman, 1944*, 1948, 1949; Board of Editors, 1941–53; Circuits, 1944–51; Education, *chairman, 1944*, 1950; Executive, *chairman, 1945;* Frequency Modulation, 1941–45; Investments, 1945; Membership, 1942–43; Nominations, 1942, 1946, *chairman, 1948*, 1949–50, 1952; Papers, 1941–42; Papers Procurement, *vice-chairman, 1943–45;* Policy Development, 1948–51; Professional Groups, *chairman, 1947–49*, 1950–53; Public Relations, 1950–51; Regular Papers, *vice-chairman, 1941;* Research, 1946–47; Institute Representative: Ohio State University, 1941–42; AIEE-IRE Coordinating Committee, 1950–51.

FARNSWORTH, Philo T. (A'28—M'34—F'39), Director and Vice-President in Charge of Research and Advanced Development Engineering, Capehart-Farnsworth Corporation, 3700 E. Pontiac St., Fort Wayne, Ind.
Born: August 19, 1906, Beaver, Utah. D.Sc. (Honorary), 1951, Indiana Technical College. Committees: Television, 1939–41; Television and Facsimile, 1936–38. Awards: Honorable Mention Citation for Outstanding Young Electrical Engineers, Eta Kappa Nu, 1937; Distinguished Alumni Award, Brigham Young University, 1937; Durward Howes' list of ten most distinguished young men for "America's Young Men," 1940; Fellow, Society of Motion Picture and Television Engineers, American Association for the Advancement of Science; Morris Liebmann Memorial Prize, 1941; Sigma Xi.

FARRAND, Clair L. (A'14—M'23—F'31), President, Farrand Optical Co., Bronx Blvd. and E. 238 St., New York 70, N.Y.
Born: October 22, 1895, Newark, N.J.

FARRELL, John J. (A'43—SM'47—F'48), Manager, Heavy Military Electronic Equipment, Electronics Division, Commercial and Government Equipment Dept., General Electric Company, Syracuse, N.Y.
Born: March, 1897, Watervliet, N.Y. Committees: RMA-IRE Coordination, 1945–47; Nominating, 1947. Institute Representative: ASA Sectional Committee (C16) on Radio, 1949–50.

FARRINGTON, John F. (A'19—M'29—F'31), Engineer, Raytheon Manufacturing Company, Waltham, Mass.
Born: January 11, 1895, New York, N.Y. Committees: Admissions, 1938–39; New York Program, 1939.

FAULKNER, Harry (M'24—SM'43—F'53), Deputy Engineer in Chief, General Post Office, Aldersgate St., London, E.C.1, England.
Born: April 7, 1892, Nottingham, England. B.S.(E.E.), 1911, University College. Awards: Special Premium, Institution of Electrical Engineers, 1927.

FELDMAN, Carl B. H. (A'26—VA'39—F'43), Research Engineer, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: March 26, 1902, St. Peter, Minn. B.S.(E.E.), 1926; M.S. (E.E.), 1928, University of Minnesota.

FERRELL, Enoch B. (A'25—M'29—SM'43—F'53), Switching Research Engineer, Bell Telephone Laboratories, Murray Hill, N.J.
Born: June 1, 1898, Sedan, Kans. B.A., 1920; B.S.(E.E.), 1921; M.A., 1924, University of Oklahoma. Committees: Papers, 1933–45. Awards: Fellow, ASQC, 1948.

FERRIS, Warren R. (SM'46—F'53), Electronic Scientist, Naval Research Laboratory, Washington 25, D.C.
Born: May 14, 1904, Terre Haute, Indiana. B.S.(E.E.), 1927, Rose Polytechnic Institute; M.S.(E.E.), 1932, Union College; Dr. of E.E., 1946, Polytechnic Institute of Brooklyn. Committees: Electron Devices, 1951–53; Radio Receivers, 1936–37; Standardization, 1929–31; Standards, 1932; Tellers, 1935. Sections: Washington, Membership Committee, 1952–53. Awards: Sigma Xi, 1943.

FICK, Clifford G. (A'25—SM'46—F'51), Manager, Communications Research Section, and Assistant Manager, Electron Physics Research Department, Research Laboratory, General Electric Company, Schenectady, N.Y.
Born: December 13, 1904, Ida Grove, Iowa. B.Sc.(E.E.), 1925, Iowa State College. Committees: Annual Review, 1949–50; Television Systems, 1948–52.

FIELD, Lester M. (M'48—F'52), Professor, California Institute of Technology, Pasadena, Calif.
Born: February 9, 1918, Chicago, Ill. B.S., 1939, Purdue University; Ph.D., 1941, Stanford University. Committees: Papers Review 1950-53. Awards: Honorable Mention, Outstanding Young Electrical Engineer, 1949, Eta Kappa Nu.

FIELD, Robert F. (A'18—M'30—SM'43—F'47) (L'53), Retired. 104 Church St., Watertown 72, Mass.
Born: July 10, 1885, Tuftonboro, N.H. A.B., 1906; A.M., 1907, Brown University; A.M., 1916, Harvard University. Committees: Meetings and Papers, 1930. Sections: Boston, *chairman, 1942–44.*

FINK, Donald G. (A'35—SM'45—F'47), Director of Research, R, T and A, Philco Corporation, Tioga and C Sts., Philadelphia 34, Pa.
Born: November 8, 1911, Englewood, N.J. B.Sc., 1933, Massachusetts Institute of Technology; M.S., 1942, Columbia University. Director, 1949–51. Committees: Annual Review, 1946–48; Appointments, 1948–49; Awards, 1947; Board of Editors, 1946–53; Handbook, 1945–47; Joint Technical Advisory, *vice-chairman, 1948, chairman, 1948–49,* 1950–53; Membership, 1942–45, *chairman, 1946,* 1947–48; Navigation Aids, *chairman, 1946–47,* 1948–51; Papers, 1943–45; Preparedness, 1940–41; Public Relations, 1940–42; Research, 1946–47; Standards, 1946–48; Television, 1946–47, *chairman, 1948;* Television Systems, 1949–53; Tellers, 1949. Awards: Medal of Freedom, War Department, 1946; Presidential Certificate of Merit, 1948; Fall Meeting Plaque, 1951.

FINK, Lyman R. (SM'48—F'53), Manager of Engineering, Radio & Television Receiver Dept., General Electric Co., Electronics Park, Syracuse, N.Y.
Born: November, 1912, Elk Pt., S.D. B.S.(E.E.), 1933; M.S.(E.E.), 1935; Ph.D.(E.E.), 1937, University of California. Committee: Sections, 1950–51. Sections: Syracuse, *chairman, 1949–51.*

FISK, Sir Ernest T. (M'15—F'26) (L'51), Managing Director, Electric and Musical Industries, Ltd., Blyth Rd., Hayes, Middlesex, England.
Born: August 8, 1886, Sunburyon-Thames, Middlesex, England. Vice-President, 1938; Director, 1938. Awards: Fellow, IRE, Australia; President, 1932–37, 1939–43. Honorary Member, Institution of Electrical Engineers, London; Honorary Member, British Institution of Radio Engineers.

FOSTER, Dudley E. (A'26—M'37—SM'43—F'50), Vice-President, Hazeltine Research, Inc., of California, 3320 Burbank Blvd., Burbank, Calif.
Born: December, 1900, Newark, N.J. E.E., 1922, Cornell University. Committees: Annual Review, 1938–41, 1945–46; New York Program, 1937; Papers Procurement, 1941–43; Radio Receivers, 1936–37, *chairman, 1938–41,* 1942–45; *chairman, 1945–46,* 1947; Regular Papers, 1941; Standards, 1938–41, 1945–46; Television, 1939–46; Television and Facsimile, 1938. Awards: Modern Pioneer Award, National Association of Manufacturers, 1940.

FRIIS, Harald T. (A'18—M'26—F'29), Director of Research in High Frequency and Electronics, Bell Telephone Laboratories, Inc., Box 107, Red Bank, N.J.
Born: February 22, 1893, Neastved, Denmark. E.E., 1916; Dr., Eng., 1938, Royal Technical College, Copenhagen. Director, 1941–43. Committees: Admissions, 1941; Papers, 1941; Research, 1946–47. Awards: Morris Liebmann Memorial Prize, 1939.

FULLER, Leonard F. (A'14—M'14—F'25), Acting Professor of Electrical Engineering and Co-ordinator of Government Research Contracts, Stanford University, Stanford, Calif.
Born: August 21, 1890, Portland, Ore. M.E., 1912, Cornell University; Ph.D., 1919, Stanford University. Manager, 1928. Committees: Admissions, 1928–29; Sections, 1926–28; Specifications for Steamship Radio Equipment, 1914; Standardization, 1916–19, 1930; Technical Committee No. 2, Radio Transmitters and Antennas, 1930–31; Subcommittee on the Establishment of Provisions for Safety of Operating and Other Personnel in Relation to Radio Transmitting Equipment, 1930–31; Subcommittee on Methods of Testing Apparatus, Equipment, Devices, and Materials Used in Radio Transmitters and Antennas, 1930–31; Transmitters and Antennas, 1929–30; Wave Length Regulation, 1916, 1919. Sections: San Francisco, *chairman, 1928–29.* Awards: Morris Liebmann Memorial Prize, 1919.

GEBHARD, Louis August (A'20—M'42—SM'43—F'49), Superintendent, Radio Div. II, United States Naval Research Laboratory, Washington 20, D.C.
Born: June, 1896, Buffalo, N.Y. B.S.(E.E.), George Washington University; LL.B., Georgetown University. Awards: Presidential Certificate of Merit, 1946; Fellow, American Physics Society.

GILL, Archibald J. (M'20—F'40), Engineer-in-Chief, General Post Office, London, E.C.1, England.
Born: May 13, 1889, Stoke-Sub-Hamdon, Somerset, England. B.Sc. (E.E.), 1909, University of London.

GILLETT, Glenn D. (A'22—M'27—F'34), Senior Partner, Glenn D. Gillett and Associates, Consulting Radio Engineers, 982 National Press Bldg., Washington 4, D.C.
Born: April 14, 1898, Sterling, Colo. A.B., 1919, Harvard University; S.B.(E.E.), 1921, Harvard Engineering School. Committees: Broadcast, 1935, 1937; Radio Wave Propagation, 1942–45; Wave Propagation, 1937–41.

GILMAN, George W. (A'29—SM'47—F'50), Director of Systems Engineering, Bell Telephone Laboratories, Inc., 463 West St., New York 14, N.Y.
Born: August, 1901, Salmon River, Nova Scotia, Canada. M.S., 1923, Massachusetts Institute of Technology. Committees: Board of Editors, 1945–48; Frequency Modulation, 1940–42; Public Relations, 1940–41; Publicity, 1941.

GINZTON, Edward L. (S'39—A'40—SM'46—F'51), Professor of Applied Physics and Electrical Engineering; Director, Microwave Laboratory, Stanford, University, Stanford, Calif; Member, Board of Directors, Varian Associates, Inc., Palo Alto, Calif.
Born: December 27, 1915, Ekaterinoslavsk, Russia. B.S., 1936; M.S., 1937, University of California; E.E., 1938; Ph.D., 1940, Stanford University.

GOLDMARK, Peter G. (A'36—M'38—F'42), Vice-President in charge of Laboratory Division, Columbia Broadcasting System, Inc., 485 Madison Ave., New York 22, N.Y.
Born: December 2, 1906, Budapest, Hungary. B.Sc., 1930; Ph.D., 1931, Vienna Technical College. Committees: Board of Editors, 1941–50; Television and Facsimile, 1938; Television Systems, 1949–52; Television, 1939–48. Awards: Technical Progress Medal, Television Broadcasters Association, 1944; Morris Liebmann Memorial Prize, 1945.

GOLDSMITH, Alfred (IRE Charter Mem.) (A'12—F'15), Consulting Engineer, 597 Fifth Ave., New York 17, N.Y.
Born: September, 1889, New York, N.Y. B.S., 1907, College of the City of New York; Ph.D., 1911, Columbia University; Sc.D., 1935, Lawrence College. President, 1928; Secretary, 1918–27; Editor, 1912–28, 1930–53; Director, 1912–53. Committees: Administrative Committee of the Board of Editors, *chairman, 1951–53;* Admissions, 1925; Awards, *chairman, 1919,* 1930, *chairman, 1931,* 1932–33, 1935, 1938; Bibliography, 1934; Board of Editors, *chairman, 1928, 1930–53;* Constitution and Laws, *chairman, 1935,* 1936–40; Convention Policies, 1940; Editorial Administrative, *chairman, 1946–50;* Executive, 1942–53; Finance, 1914, *chairman, 1915;* Fiscal 1947–48; Meetings and Papers, 1925–26; Nominations, 1929, *chairman, 1930,* 1931, 1936, *chairman, 1940;* Office Quarters, 1947; Papers, *chairman, 1913–19;* Planning, 1947; Special Papers, 1940–41; Membership Solicitation Policy, 1945; Standardization, *secretary, 1913, chairman, 1915,* 1916–31; Subcommittee, Circuit Elements, 1928; Standards, 1932–36; Television and Facsimile, 1936–38; Tellers, *chairman, 1932;* Wave Length Regulation, 1916, 1919. Institute Representative: ASA Standards Council, 1936, 1939–46; ASA Sectional Committee on Radio, 1936, 1939–40, *chairman, 1942–48;* ASA Subcommittee on Insulating Material Specifications for the Military Services, *chairman, 1943–18;* ASA War Committee on Radio, 1943–48; National Advisory Council on Radio in Education, 1936, 1939–40; National Advisory Council on Radio in Education, Committee on Engineering Developments, 1941–43; National Television Systems, 1940–43, 1950–51; Panel 2, *chairman, 1942–43, 1950–51;* Joint Co-ordination Committee, IRE-AIEE, 1951. Awards: Modern Pioneer Award, National Association of Manufacturers, 1940; Medal of Honor, 1941; Townsend Harris Medal, College of the City of New York, 1942; Medal Award, Television Broadcasters Association, 1945; and other awards.

GOLDSMITH, Thomas T., Jr. (A'38—SM'46—F'49), Director of Research, Allen B. DuMont Laboratories, Inc., 2 Main Ave., Passaic, N.J.
Born: January, 1910, Greenville, S.C. B.S., 1931, Furman University; Ph.D., 1936, Cornell University. Committees: Admissions, 1944–47; Electronics, 1942–45; Electron Tubes, 1946; Professional Groups, 1948; Regular Papers, 1941; Television, 1939–46; Tellers, 1944; Vacuum Tubes, 1945–46. Awards: Fellow, Society of Motion Picture Engineers.

GOODALL, William McH. (A'29—M'37—SM'43—F'51), Technical Staff, Bell Telephone Laboratories, Inc., Box 107, Red Bank, N.J.
Born: September 7, 1907, Washington, D.C. B.Sc., 1928, California Institute of Technology. Committees: New York Program, 1939–41; Papers Review, 1946–53; Tellers, *chairman, 1939, 1941.* Sections: Monmouth, N.J. Subsection, *secretary-treasurer, 1950.*

GRAHAM, Virgil M. (A'24—M'27—F'35), Director of Technical Relations, Sylvania Electric Products, Inc., 208-20 Willets Point Blvd., Bayside, L.I., N.Y.
Born: January 22, 1902, Rochester, N.Y. Attended University of Rochester. Director, 1935–41, 1946–48. Committees: Appointments, 1948; Awards, 1940, 1947–49; Constitution and Laws, 1940, 1944; Executive, 1948; Meetings and Papers, 1928–29; Membership, 1949, 1950; National Convention, 1947–50; Nominations, 1940; Papers Procurement, 1942–43, 1946; Professional Groups, 1948–49, Broadcast and Television Receivers, 1949–52, *chairman, 1949–51;* Public Relations, *chairman, 1947–48;* Publicity, 1935–36; Radio Receivers, 1936–40, Regular Papers, 1941; RMA-IRE Co-ordinating, *chairman, 1947–49;* Sections, 1930–34, *chairman, 1936–37,* 1938–45, 1948; Standardization, 1925, 1929–30; Subcommittee, Aircraft Receivers, *chairman, 1929–30;* Subcommittee Power Supply, 1928; Technical Committee No. 1 Radio Receivers and Parts, 1929–30; Standards, 1932, 1935–43, 1945–47. Sections: Rochester, *chairman, 1926–27.* Institute Representative: ASA Sectional Committee on National Electrical Safety Code, Radio Broadcast Reception Equipment, *alternate, 1939–48;* ASA Sectional Committee on Radio (C16) *chairman, 1949–52.*

GROVER, Frederick W. (M'17—SM'43—F'49) (L'52), Professor (Emeritus) of Electrical Engineering, Union College, Schenectady 8, N.Y.
Born: September 3, 1876, Lynn, Mass.. S.B., 1899, Massachusetts Institute of Technology; M.S., 1901, Wesleyan University; Ph.D., 1907, George Washington University; Ph.D., 1908, Ludwig Maximilian University, Munich, Germany. Committees: Board of Editors, 1932–53; Papers, 1941–45. Institute Representative: Union College, 1941–48.

GUILLEMIN, E. A. (A'41—SM'48—F'49), Professor of Electrical Communications, Massachusetts Institute of Technology, Cambridge 39, Mass.
Born: May, 1898, Milwaukee, Wis. B.S., 1922, University of Wisconsin; S.M.(E.E.), 1924, Massachusetts Institute of Technology; Ph.D., 1926, University of Munich, Germany (Saltonstall Fellow). Committees: Annual Review, 1944–46; Board of Editors, 1953; Circuits, *chairman, 1944–47,* 1947–51; Education, 1947–48; Standards, 1944–46. Institute Representative: Massachusetts Institute of Technology, 1945–51. Awards: Presidential Certificate of Merit, 1948.

GUNN, Ross (A'35—SM'47—F'49), Director of Physical Research, United States Weather Bureau, Washington 25, D.C.
Born: May, 1897, Cleveland, Ohio. B.S.(E.E.), 1920; M.S., 1921, University of Michigan; Ph.D., 1926, Yale University. Awards: Distinguished Service Citation, United States Navy, 1945; Air Safety Award, 1951, Fellow, America Physical Society; Member, National Academy of Sciences.

GUSTAFSON, Gilbert E. (A'27—M'38—F'40), Vice-President in Charge of Engineering, Zenith Radio Corporation, 6001 Dickens Ave., Chicago 39, Ill.
Born: November 15, 1905, Rock Island, Ill. Director, 1943. Committees: Admissions, 1943: Awards, 1942.

GUY, Raymond F. (A'25—M'31—F'39), Manager, Radio and Allocations Engineering, National Broadcasting Company, Inc., 30 Rockefeller Plaza, New York 20, N.Y.
Born: July 4, 1899, Hartford, Conn. I.E.E., 1921, Pratt Institute. President, 1950; Treasurer, 1947; Director, 1944–48, 1950–52. Committees: Annual Review, 1943–46; Antennas, 1944–47; Broadcasting, 1929–32; Building Fund, *vice-chairman, 1948;* Constitution and Laws, 1945, *chairman, 1946,* 1947–48, 1952–53; Education, 1945–48; Executive, 1946, *vice-chairman, 1947, chairman, 1950,* 1951, 1952; Fiscal, 1947–48; Finance, 1951–52; Founders, *chairman, 1947;* Frequency Modulation, 1942–46; Investments, 1947, *chairman, 1949;* Membership, 1947–48, *chairman, 1949;* Modulation Systems, 1947–50; Nominations, 1951; Office Practices, *chairman, 1947;* Professional Groups, 1951–52; Public Relations, *chairman, 1949,* 1951–53; Standards, 1943–45, *chairman, 1945–46;* Radio Transmitters, *chairman, 1944–45;* Transmitters and Antennas, 1936–42, *chairman, 1943–44;* Winter Technical Meeting, 1946. Institute Representative: ASA Standards Council, *alternate, 1946–48;* Joint Technical Advisory Committee, 1950.

HACKBUSCH, Ralph A. (A'26—M'30—F'37), President and Manager Director, Stromberg-Carlson Company, Ltd., Toronto, Canada; President, Hackbusch Electronics Ltd., 23 Primrose Avenue, Toronto, Canada.
Born: September 18, 1900, Hamilton, Ont., Canada. Vice-Presi-

dent, 1944; Director, 1938, 1944–46. Committees: Admissions, 1940; Awards, 1947–50; Public Relations, 1940, 1947–51; Sections, 1936–37; Standards, 1949–52. Sections: Toronto, *secretary, 1930–31; chairman, 1932–33.*

HAEFF, Andrew V. (A'34—M'40—SM'43—F'49), Head, Electron Tube Laboratories, Hughes Aircraft Company, Culver City, Calif.
Born: December, 1904, Moscow, Russia. E.E. and M.E., 1928, Russian Polytechnic Institute, Harbin, China; M.S.(E.E.), 1929; Ph.D., 1932, California Institute of Technology. Committees: Board of Editors, 1951–53; Editorial Administrative, 1949–51; Nuclear Studies, 1948. Awards: Special Research Fellowship, California Institute of Technology, 1932–33; Harry Diamond Memorial Award, 1950.

HAFSTAD, Lawrence R. (SM'52—F'53), Director, Division of Reactor Development, U. S. Atomic Energy Commission, 1901 Constitution Ave., Washington 25, D.C.
Born: June 18, 1904, Minneapolis, Minn. B.S.(E.E.), 1926, University of Minnesota; Ph.D. (Physics), 1933, Johns Hopkins University. Committees: Annual Review, 1949–50; Nominations, *chairman, 1951;* Nuclear Studies, *chairman, 1948–50.* Professional Groups: Nuclear Science, *chairman, 1948–53;* Administrative Committee, 1951. Awards: U. S. Delegate to International Radio Union Conference in London, 1934.

HALLBORG, Henry E. (F'45), Research and Engineering Consultant on High-Frequency Propagation, and Associated Equipments. Home address, 26 Macopin Ave., Upper Montclair, N.J.
Born: April, 1884, Stockholm, Sweden. B.Sc.(E.E.), 1907, Brown University. Committees: Constitution and Laws, 1928–32; Radio Transmitters and Antennas, 1930–31; Standardization, 1929–30; Subcommittee on the Establishment of Provisions for Safety of Operating and Other Personnel in Relation to Radio Transmitting Equipment, *chairman, 1930–31;* Subcommittee on Methods of Testing Apparatus, Equipment, Devices and Materials Used in Radio Transmitters and Antennas, 1930–31; Transmitters and Antennas, 1930.

HALLER, George L. (A'28—M'36—SM'43—F'50), Dean, School of Chemistry and Physics, The Pennsylvania State College, 123 Osmond Laboratory, State College, Pa.
Born: May 8, 1907, Pittsburgh, Pa. B.S.(E.E.), 1927; E.E., 1934; M.S. (Physics), 1935; Ph.D. (Physics), 1942, Pennsylvania State College. Committees: Papers Review, 1946–50; Professional Group on Airborne Electronics Administrative Committee, 1951–53. Sections: Dayton, *chairman, 1944–45;* Centre County (sub-section), *chairman, 1949–50.* Awards: Legion of Merit, United States Air Force, 1946.

HALLMAN, Ludlow B., Jr. (J'27—A'29—SM'44—F'52), Technical Director, C. and N. Laboratory, WADC, Wright-Patterson Air Force Base, Dayton, Ohio.
Born: July 21, 1907, Sneads, Fla. B.S., 1929; E.E., 1934, Alabama Polytechnic Institute. Committees: Modulation Systems, 1948–50. Sections: Dayton, *chairman, 1945.* Awards: War Department Commendation, 1946.

HAMBURGER, Ferdinand, Jr. (A'32—M'39—SM'43—F'53), Professor, Electrical Engineering, Johns Hopkins University, Charles & 34th Sts., Baltimore 18, Md.
Born: July, 1904, Baltimore, Md. B.E., 1924; Dr. Engr., 1931, The Johns Hopkins University. Director, 1950–51. Committees: Appointments, 1951; Nominations, 1951; Policy Advisory, 1952–53. Institute Representative: Johns Hopkins University, 1941–53. Sections: Baltimore, *chairman, 1940–41.* Awards: Fellow, American Institute of Electrical Engineers, 1949.

HANSELL, Clarence W. (A'26—M'29—SM'43—F'45), Research Supervisor, Transmission, RCA Laboratories Division, Radio Corporation of America, Rocky Point, N.Y.
Born: January 20, 1898, Medaryville, Ind. B.S.(E.E.), 1919; D.E.E. (Honorary), 1952, Purdue University. Awards: Joint Modern Pioneer Award, National Association of Manufacturers, 1940.

HANSON, O. B. (A'18—M'27—F'41), Vice-President and Chief Engineer, National Broadcasting Company, Inc., 30 Rockefeller Plaza, New York 20, N.Y.
Born: February 11, 1894, Huddersfield, Yorkshire, England. Director, 1938–43. Committees: Meetings and Papers, 1929; Members, 1950; Nominations, 1944–45, 1948; Papers, 1942–45; Papers Procurement, 1942–43; Papers Review, 1946–51, 1953; Public Relations, 1940–46; Regular Papers, 1941; Standardization, 1929; Tellers, *chairman, 1941.*

HARMON, Ralph N. (A'30—SM'45—F'52), Engineering Manager, Westinghouse Radio Stations, Inc., 1625 K St., N.W., Washington 6, D.C.
Born: August 29, 1906, California, Pa. B.S. in E.E., 1928, Carnegie Institute of Technology. Committees: Technical on Television Systems, 1947–48, 1952; Membership, 1950–51. Section: Baltimore, *vice-chairman, 1944–45; chairman, 1945–46.* Awards: Patent Awards, Westinghouse Electric Corp.; Award of Merit, U. S. Navy Bureau of Ships, U. S. Navy Ordnance, NDRC.

HARNETT, Daniel E. (A'25—M'35—F'42), Engineer, General Electric Company, Electronics Park, Syracuse, N.Y.
Born: July 20, 1899, Elmira, N.Y. A.B., 1922; E.E., 1925, Columbia University. Committees: Admissions, 1941–43; Awards, 1945–46; New York Program, 1940; Papers Procurement, 1947–48; Radio Receivers, 1936–41; Standardization: Technical Committee No. 3, Vacuum Tubes, 1929–30.

HARTIG, Henry E. (A'36—M'41—SM'43—F'52), Professor and Head, Elect. Engrg. Dept., University of Minnesota, Minneapolis 14, Minn.
Born: January 28, 1892, Minneapolis, Minn. B.E.E., 1918; Ph.D., 1924, University of Minnesota. Committees: Education, 1952–53. Sections: Twin City, *chairman, 1945–46.* Awards: Fellow, AIEE.

HARTLEY, Ralph V. L. (M'19—F'28), Retired, Formerly, Research Consultant, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: November 30, 1888, Spruce, Nev. A.B., 1909, University of Utah; B.A., 1912; B.Sc., 1913, Oxford University. Committees: Section, 1945. Awards: Medal of Honor, 1946.

HAYES, Leslie W. (F'38), Vice Director, International Radio Consultative Committee, International Telecommunication Union, Palais Wilson, Geneva, Switzerland.
Born: May 31, 1896, London, England.

HAZELTINE, Alan (A'16—M'18—F'21) (L'51), Consulting Engineer, 15 Tower Dr., Maplewood, N.J.
Born: August 7, 1886, Morristown, N.J. M.E., 1906; Sc.D. (Honorary), 1933, Stevens Institute of Technology; A.M., 1938, Columbia University. President, 1936; Manager, 1923–28; Director, 1936–39. Committees: Admissions, 1925–28; Awards, *chairman, 1937,* 1938; Education, 1945–47; Meetings and Papers, 1925, 1927; New York Program, 1935; Standardization, 1924–28. Subcommittee on Receiving Sets, 1927–28; Subcommittee on Vacuum Tubes, *chairman, 1927;* Subcommittee on Vacuum Tube Terminology, *chairman, 1924–25.* Awards: Armstrong Medal, Radio Club of America, 1937.

HEADRICK, Lewis B. (A'36—M'38—SM'43—F'53), Manager, Cathode Ray Tube Development, RCA Victor Division, New Holland Pk., Lancaster, Pa.
Born: June 6, 1904, Chattanooga, Tenn. B.S. (Physics), 1926, University of Chattanooga; Ph.D. (Physics), 1930, University of Michigan. Committees: Board of Editors, 1953; Cathode and Television Tube Subcommittee of Electron Tubes and Solid State Devices, *chairman, 1946–50.* Sections: Philadelphia, *chairman,* Lancaster Subsection, *1952–53.*

HEINTZ, Ralph M. (A'21—M'27—F'30), Consulting Engineer; Owner, The Ramohs, P.O. Box 546, Los Gatos, Calif.
Born: April 20, 1892, St. Louis, Mo. A.B., 1920, Stanford University. Committees: Membership, 1938–40; New York Program, 1938; Papers Review, 1946; Sections, 1938–40. Sections: San Francisco, *chairman, 1931–32.*

HEISING, Raymond A. (A'20—F'23), Consulting Engineer and Patent Agent, 232 Oak Ridge Ave., Summit, N.J.
Born: August 10, 1888, Albert Lea, Minn. E.E., 1912, University of North Dakota; M.S., 1914, University of Wisconsin; D.Sc., 1947, University of North Dakota. President, 1939; Treasurer, 1943–45; Manager; 1927–31; Director, 1933–35, 1939–41, 1943–45, 1947–49. Committees: Admissions, 1927, *chairman, 1928–30, vice-chairman, 1931,* 1933, 1935–38; Appointments, 1948; Constitution and Laws, 1930–34, 1941–42, *chairman, 1943–44,* 1945–50, *chairman, 1951–53;* Executive, *vice-chairman, 1943–45;* Investments, *chairman, 1944–45,* 1946; Meetings and Papers, 1926; Membership Solicitation Policy, 1945; New York Program, 1933, 1935–37; Nominations, 1933, *chairman, 1941, 1950;* Office Quarters, *chairman, 1945–47;* Planning, *chairman, 1947;* Policy Development, 1948–50; Preparedness, 1940–41; Professional Groups, 1948–53; Sections, *chairman, 1941–45,* 1946–52; Standardization, 1925. Awards: Modern Pioneer Award, Morris Liebman Memorial Prize, 1921; National Association of Manufacturers, 1940; Fellow, AIEE; Fellow, American Physical Society.

HENDERSON, John T. (A'28—SM'47—F'51), Senior Research Physicist, National Research Council, Sussex St., Ottawa, Ontario, Canada.
Born: December 9, 1905, Montreal, P.Q., Canada. B.S., 1927, M.S., 1928, McGill University; Ph.D., 1932, University of London. Committees: Board of Directors, 1953. Sections: Ottawa, 1948–49, *vice-chairman, 1949–50, chairman, 1950–51.* Awards: Fellow, Royal Society of Canada, 1944; M.B.E., Dominion of Canada, 1943.

HENNEY, Keith (A'18—M'26—SM'43—F'43), Editorial Director, *Electronics and Nucleonics,* McGraw-Hill Publishing Company, Inc., 330 W. 42nd St., New York, N.Y.
Born: October 28, 1896, McComb, Ohio. A.B., 1921, Western Reserve University; A.M., 1925, Harvard University. Director, 1945–48. Committees: Annual Review, 1937–48; Awards, 1945–46, 1948, *chairman, 1949,* 1950; Executive, 1946–47; Membership Solicitation Policy, 1945; New York Program, 1934, 1935–38, 1940–41, *chairman, 1942;* Nominations, 1950; Nuclear Studies, 1948; Planning, 1947; Policy Development, 1951; Publicity, 1937–39; Public Relations, 1943–50; RMA-IRE Co-ordinating, 1947–49; Standards, 1945–48. Institute Representative: IRE-RMA Co-ordination Committee, 1950; Atomic Energy Commission, Advisory Committee on Industrial Information. Institute Representative: Joint IRE-RTMA, Co-ordination Committee, 1951.

HERBST, Philip J. (M'41—SM'43—F'53), Technical Administrator for Standard Products, Radio Corporation of America, Camden, N.J.
Born: January 24, 1903, Philadelphia, Pa. B.S. (Physics), 1925, St. Thomas College; M.S. (Physics), 1927, La Salle College. Committees: Radio Transmitters, 1952–53, *chairman, 1953.* Sections: Philadelphia, Executive Committee, 1952–53; Papers & Meetings Committee, *chairman, 1952–53.*

HEROLD, Edward W. (A'30—M'38—SM'43—F'48), Director, Radio Tube Research Laboratory, RCA Laboratories Division, Radio Corporation of America, Princeton, N.J.
Born: October 15, 1907, New York, N.Y. B.Sc., 1930, University of Virginia; M.Sc., 1942, Polytechnic Institute of Brooklyn. Committees: Board of Editors, 1946–53; Editorial Administrative, 1946–51; Membership, 1942; Papers, 1944, 1945; Winter Technical Meeting, 1945. Sections: Princeton, *vice-chairman, 1948; chairman, 1949.*

HESSEL, John (A'31—VA'39—SM'48—F'53), Chief, Radio Communication Branch, Signal Corps Engineering Labs., Fort Monmouth, N.J.
Born: March 15, 1908, Grand Rapids, Mich. B.S.(E.E.), 1929; M.S.(E.E.), 1930, Univ. of Michigan. Committees: Papers Procurement, 1948–50.

HEWLETT, William R. (S'35—A'38—M'47—F'48), Vice-President, Hewlett-Packard Company, 395 Page Mill Rd., Palo Alto, Calif.
Born: May 20, 1913, Ann Arbor, Mich. A.B., 1934, Stanford University; M.S., 1936, Massachusetts Institute of Technology; E.E., 1939, Stanford University. Director, 1950–52. Committees: Board of Directors, 1953; Executive, 1953; Finance, 1953; Papers Review, 1953; Nominations, 1950–52; Policy Development, 1950–52. Sections: San Francisco, *vice-chairman, 1948–49; chairman, 1949–50.*

HILL, Albert G. (SM'46—F'50), Professor of Physics; Director, Lincoln Laboratory, Massachusetts Institute of Technology, 77 Massachusetts Ave., Cambridge 39, Mass.
Born: January 11, 1910, St. Louis, Mo. B.S., 1930; M.S., 1934, Washington University; Ph.D., 1937, University of Rochester. Awards: Presidential Certificate of Merit, 1948.

HILLIARD, John K. (A'25—M'29—SM'43—F'52), Chief Engineer, 9356 Santa Monica Blvd., Beverly Hills, Calif.
Born: October 22, 1901, Wyndmere, N.D. B.S., 1924, Hamline University; Ph.D. in E., University of Hollywood. Committees: Audio Techniques, 1950, 1951–52; Board of Editors, 1951–53; Professional Group on Audio, *advertising chairman, 1952.* Section: Los Angeles, *chairman, 1933–34.* Awards: Fellow, Acoustical Society of America; Fellow, Audio Engineering Society, and Fellow, Society of Motion Picture and Television Engineers.

HINNERS, Frank A. (IRE Charter Mem.) (A'12—M'15—F'26), President, Hinners-Galanek Radio Corp., 28-14 Broadway, Long Island City 6, N.Y.
Born: February 19, 1894, New York, N.Y. I.E.E., 1915, Pratt Institute. Committees: New York Program, 1941–42. Awards: Charter Member, Wireless Institute.

HIRSCH, Charles J. (M'39—SM'43—F'51), Chief Engineer, Research Division, Hazeltine Corporation, 58-25 Little Neck Parkway, Little Neck, L.I., N.Y.
Born: October, 1902, Pittsburgh, Pa. A.B., 1923, Columbia College; E.E., 1925, Columbia University. Committees: Board of Editors, 1952–53; Navigation Aids, *vice-chairman, 1947–52;* Task Group on Pulse Definitions, *chairman, 1950–52;* Television Systems Definitions Subcommittee, 1951–53. Sections: Long Island Subsection, *vice-chairman, 1952; chairman, 1953.* Awards: Certificate of Commendation, U. S. Navy, 1947.

HOGAN, John V. L. (IRE Charter Mem.) (A'12—M'12—F'15), President, Hogan Laboratories, Inc., 155 Perry St., New York 14, N.Y.
Born: February 14, 1890, Philadelphia, Pa. President, 1920; Vice-President, 1916–19; Manager, 1912–15, 1921–32; Director, 1916–20, 1932–36, 1948–50. Committees: Annual Review, 1927, 1947–51; Appointments, 1948; Awards, 1919, *chairman, 1928,* 1932–33, 1945, 1948; Broadcasting, 1929–37; Constitution and Laws, 1928–29, *chairman, 1932–34,* 1935–36; Constitutional Amendments, *chairman, 1915;* Editing, *chairman, 1914;* Facsimile, 1939–46, *chairman, 1947–51,* 1952; Finance, 1915; Financial Matters, 1915; Increase of Membership, *chairman, 1916,* 1917–19; Joint Technical Advisory, 1948–54; Nominations, 1931, 1937–38, 1943–44, *chairman, 1945;* Papers, 1915–19, 1942–45; Papers Procurement, 1947; Papers Review, 1946; Policy Advisory, 1952; Policy Development, 1950–51; Professional Groups, 1950; Professional Recognition, 1947; Publicity, *chairman, 1913,* 1914, *chairman, 1915,* 1916–19; Revision of the Constitution, *chairman, 1925,* 1926–27; Sections, 1925; Specifications for Steamship Radio Equipment, 1914; Standardization, 1913, 1915, *chairman, 1916–19,* 1920–29, 1932, 1936–37, 1947–51; Subcommittee on Vacuum Tubes, *chairman, 1927;* Subcommittee on Receiving Sets, 1927–28; Subcommittee on Use of the Transmission Unit, *chairman, 1928.* Institute Representative: ASA Sectional Committee on Electrical Installation on Shipboard, 1930, 1936; ASA Sectional Committee on Radio, 1930; ASA Sectional Committee on Radio Electrical Co-ordination, 1936, 1939–46; Joint Technical Advisory Committee, 1948–52.

HOLLMANN, Hans E. (A'48—F'53), Research Scientist, U. S. Naval Air Missile Test Center, Point Mugu, Calif.
Born: November 4, 1899, Solingen, Germany. Ph.D., 1928; Dr. Habil., 1933, Technische Hochschule; Professor of Applied Physics, 1945, University of Jena.

HOLMES, Lynn C. (M'44—SM'49—F'49), Director of Research, Stromberg-Carlson Company, 100 Carlson Rd., Rochester 3, N.Y.
Born: April, 1904, Brookfield, N.Y. E.E., 1925; M.E.E., 1932; Rensselaer Polytechnic Institute. Awards: Fellow, A.I.E.E.

HOLMES, Ralph S. (A'25—SM'45—F'52), Director, Contract Research Laboratory, Radio Corporation of America, David Sarnoff Research Center, RCA Laboratories Division, Princeton, N.J.
Born: May 26, 1902, Murray, Neb. B.S., 1923, University of Nebraska. Committees: Radio Receivers, 1939–40. Awards: Modern Pioneer Award, National Association of Manufacturers, 1937.

HOOPER, Stanford C. (A'33—F'46), Rear Admiral, United States Navy, Retired. Consultant, 6320 Alton Rd., Miami Beach, Fla.
Born: August 16, 1884, Colton, Calif. B.S., 1905, United States Naval Academy; LL.D. (Honorary), 1948, Drury College. Committee: Increase of Membership, 1913–14. Awards: Medal of Honor, 1934; Elliot Cressen Medal, Franklin Institute; Marconi Medal of Merit; Veterans Wireless Medal.

HORN, Charles W. (A'14—M'28—F'30), Partner and Manager, Radio Impulsora Mexicana, S.A.; Cia. Distribuidora Mercantil, S.A., Calle Rhin 33, Colonia Cuauhtemoc, Mexico City, D.F., Mexico.
Born: July 9, 1894, New York, N.Y. Director, 1933–34. Committees: Admissions, 1933–37, 1940–42; Broadcasting 1928–32; Broadcast, 1933–37; New York Program, 1932, *chairman, 1933, 1934;* Public Relations, 1945–46; Sections, 1929–30, *chairman, 1931–32,* 1933; Television and Facsimile, 1936–38. Institute Representative: National Advisory Council on Radio in Education, 1936, 1939–40; Committee on Engineering Developments, 1941–43.

HORTON, J. Warren (A'20—F'29), Chief Consultant, United States Navy Underwater Sound Laboratory, New London, Conn.
Born: December 18, 1889, Ipswich, Mass. S.B., 1914; Sc.D., 1935, Massachusetts Institute of Technology. Committees: Awards, 1932; Board of Editors, 1930–31, 1935–40; Meetings and Papers, 1929, *chairman, 1930;* Membership, 1947; Standards, *chairman, 1931–32;* Technical Committee No. 3, Vacuum Tubes, 1929–30. Institute Representative: United States National Committee, Advisers on Symbols (International Electrotechnical Committee), 1936–37, 1939–51; ASA Committee on Electric and Magnetic Magnitudes and Units, 1952.

HOWES, Frederick S. (A'37—M'43—SM'43—F'50), Associate Professor, Electrical Engineering, and Director, Department of University Extension, McGill University, Montreal, P.Q., Canada.
Born: July 25, 1896, Paris, Ont., Canada. B.S.(E.E.), 1924; M.Sc. (E.E.), 1926, McGill University; Ph.D. (E.E.), 1929, Imperial College, University of London. Director, 1948. Committees: Awards, 1950; Education, 1945–46, 1951–53. Sections: Montreal, *chairman, 1944–45;* Canadian Council, *chairman, 1947–48.* Institute Representative: McGill University, 1941–51.

HULL, David R. (A'36—F'47), Captain, United States Navy, retired; Vice-President, General Manager, Equipment Divisions, Raytheon Manufacturing Company, Waltham 54, Mass.
Born: October, 1903, Newton, N.J. B.S., 1925, United States Naval Academy; M.S., 1933, Harvard University. Committees: Electron Tube, 1946–47; Electronics, 1943–45; Vacuum Tubes, 1945–46. Awards: Legion of Merit; Navy Commendation Ribbon.

HULL, Lewis M. (J'17—A'19—M'27—F'28), Chairman of the Board, Aircraft Radio Corporation, Boonton, N.J.
Born: Feburary 27, 1898, Great Bend, Kan. A.B., 1917; A.M., 1918, University of Kansas; Ph.D., 1922, Harvard University. President, 1933; Manager, 1929–32; Director, 1932–35. Committees: Admissions, 1927–28; Awards, *chairman, 1935,* 1936–37; Broadcasting, *chairman, 1928–31,* 1932; Meetings and Papers, 1928–30; New York Program, 1931; Nominations, 1928–31, *chairman, 1934,* 1935; Papers, 1931; Standardization, 1927–28; Receiving Sets, 1927–28; Use of the Transmission Unit, 1928; Registration of Engineers, 1940. Institute Representative: Radio Advisory Committee, Bureau of Standards, Department of Commerce, 1930, 1936; ASA Sectional Committee on Radio, 1930; National Advisory Council on Radio in Education, 1936–37, 1939–40; National Advisory Council on Radio in Education, Committee on Engineering Developments, 1941–43.

HUNT, Frederick V. (A'28—M'41—SM'43—F'47), Gordon McKay Professor of Applied Physics, 222 Lyman Laboratory, Harvard University, Cambridge 38, Mass.
Born: February 15, 1905, Barnesville, Ohio. B.A., 1924; B.E.E., 1925, Ohio State University; A.M., 1928; Ph.D., 1934; S.D. (Honorary) 1945, Harvard University. Committees: Audio Techniques, 1949–50; Electroacoustics, 1941–51; Papers, 1942–45; Papers Procurement, 1942–43, 1947–48; Papers Review, 1946–48; Regular Papers, 1941.

HUNTER, Theodore A. (A'29—M'45—SM'46—F'53), President, Hunter Mfg. Co., 1164 E. Court St., Iowa City, Iowa; Research Professor at State University of Iowa.
Born: December 5, 1900, Dike, Iowa. B.S.(E.E.), 1922; M.S. (Physics), 1923; M.S.(E.E.), 1931, State University of Iowa. Director, 1948–50. Committees: Papers, 1945–50; Policy Development, 1948–53; Nominations, *chairman, 1949–50,* 1951; Sections, 1950. Sections: Cedar Rapids, *temporary chairman, 1945; chairman, 1946–47.* Awards: Sigma Xi, 1923.

HUTCHESON, John A. (A'28—M'30—SM'43—F'48), Vice-President and Director of Research, Westinghouse Research Laboratories, East Pittsburgh, Pa.
Born: January, 1905, Park River, N.D. B.S., 1926; D.Sc. (Honorary), 1943, University of North Dakota. Director, 1948. Committees: Board of Editors, 1946–50; Nominations, 1948; Nuclear Studies, 1948; Policy Development, 1948. Sections: Connecticut Valley, *chairman, 1935–36;* Pittsburgh, *chairman, 1945–46.*

IAMS, Harley A. (A'31—M'38—SM'43—F'50), Associate Department Head, Hughes Aircraft Company, Florence at Teale St., Culver City, Calif.
Born: March 13, 1905, Lorentz, W.Va. B.A.(M.E.), 1927, Stanford University. Committees: Papers, 1941–45; Papers Review, 1946–47. Awards: Joint Award, Modern Pioneers, National Association of Manufacturers, 1940; Sigma Xi.

ISBISTER, Eric J. (A'39—SM'45—F'53), Engineering Department Head, Sperry Gyroscope Co., Div. of the Sperry Corp., Great Neck, N.Y.
Born: June 11, 1912, Brooklyn, N.Y. B.S.(E.E.), 1934, Massachusetts Institute of Technology; M.S.(E.E.), 1940, Polytechnic Institute of Brooklyn. Committees: Registration, 1952; Tellers, 1950, *chairman, 1951.* Sections: Long Island Sub-Section, *chairman, 1948–49;* New York, *treasurer, 1951–52.* Awards: Certificate of Commendation, 1947.

ISRAEL, Dorman D. (A'23—M'30—F'42), Executive Vice-President, Emerson Radio and Phonograph Corporation, 111 Eighth Ave., New York, N.Y.
Born: July 21, 1900, Newport, Ky. E.E., 1923, University of Cincinnati. Committee: Administrative, 1949–51; Awards, 1943–44, 1947; Joint Technical Advisory Committee, 1952–53; Membership, 1941; National Television System Committee, 1950–53; New York Program, 1940–41; Nominations, 1946; Papers, 1940–41; Papers Procurement, *chairman, 1942–43, general chairman, 1944–47;* Professional Groups, 1951–53; Public Relations, 1940–44; RMA-IRE Co-ordinating, 1947–48; Radio Receivers, 1948–51; Regular Papers, *chairman, 1941;* Television and Facsimile, 1936–37; Winter Technical Meeting, 1946. Professional Groups: Broadcast and Television Receivers, *chairman, 1951–53;* Professional Group Chapters, *chairman, 1952–53.* Sections: Cincinnati, *chairman, 1931–32.*

JACKSON, William E. (A'29—M'34—SM'43—F'51), Chief, Electronics Division, Civil Aeronautics Administration, Technic Development and Evaluation Center, Weir Cook Airport, Indianapolis 24, Ind.
Born: May 8, 1904, Bridgewater, Mass. B.S.(E.E.), 1925, Brown University. Committees: Antennas, 1944–46; Navigation Aids, 1947–48; Radio Transmitters, 1946; Transmitters, 1944–45; Transmitters and Antennas, 1938–44. Awards: Citation for service on Radio Technical Commission for Aeronautics Special Committee 31; Cull Prize in Engineering, Brown University, 1925.

JACKSON, Willis (SM'48—F'50), Professor of Electrical Engineering, and Head, Electrical Engineering Department, Imperial College, Exhibition Rd., South Kensington, London, S.W. 7, England.
Born: October 29, 1904, Burnley, Lancs., England. D.Sc., 1936, Manchester University; Ph.D., 1936, Oxford University.

JANSKY, C. M., Jr. (A'18—M'25—F'28), Partner, Jansky & Bailey, National Press Bldg., Washington, D.C.
Born: June 28, 1895, Delton, Mich. B.A., 1917; M.A., 1919, University of Wisconsin. President, 1934; Manager, 1929–32; Director, 1932–42. Committees: Admission, 1929–30, *chairman, 1931,* 1932–33, *chairman, 1936–37,* 1938–40; Awards, 1942; Board of Editors, 1942–50; Broadcasting, 1931–33, 1935–36, *chairman, 1937;* Constitution and Laws, 1932–33, 1941; Education, 1944; Frequency Modulation, 1940–43; Membership, 1925, 1928, 1941–43; Nominations, 1936, *chairman, 1937,* 1938, *chairman, 1939,* 1940–42, 1945; Preparedness, 1940–41; Publicity, 1936; Public Relations, 1946; Receiver Sets, 1928; Standards, 1932; Sections, 1925; Standardization, 1928–31; Use of the Transmission Unit, 1928. Institute Representative: American Documentation Institute, 1939–43; First National Conference on Educational Broadcasting, 1937; American Council on Education, Planning Committee, National Conference on Educational Broadcasting, 1936–37, 1939–43; URSI Executive Committee, 1936–37, 1939–49; ASA Sectional Committee on Radio-Electrical Coordination, 1926, 1939–46.

JARVIS, Kenneth W. (A'24—M'27—F'34), President, Jarvis Electronics Corporation, 6058 W. Fullerton Ave., Chicago 39, Ill.
Born: October 18, 1901, Mansfield, Ohio. B.E.E., 1923, Ohio State University. Committees: Receivers, 1947–52; Radio Receivers and Parts, 1930–31; Receiver Sets, 1927–28. Sections: Chicago, *chairman, 1948–49.*

JENSEN, Axel G. (A'23—M'26—F'42), Director of Television Research, Bell Telephone Laboratories, Inc., Murray Hill Laboratory, Murray Hill, N.J.
Born: February 7, 1896, Copenhagen, Denmark. E.E., 1920, Royal Technical College; Post Graduate, 1921–22, Columbia University. Committees: Audio and Video Techniques, 1948; Co-ordination for International Technical Organizations, *chairman, 1950–52;* Instruments and Measurements, 1949–50; IRE, RTMA, SMPTE Television Co-ordinating, Committee, *chairman, 1950–51;* Standards, 1948, *vice-chairman, 1949–50, chairman, 1951–52;* Television, 1939–47, *chairman, 1948;* Television and Facsimile, 1938; Television Systems, *chairman, 1949–51.* Institute Representative: ASA Sectional Committee (C42) on Definitions of Electrical Terms, 1949–52; ASA Standards Council, 1951–52; ASA Sectional Committee (C16) on Radio, 1951–52; IRE, AIEE, ASA (C42), Definitions Co-ordinating Committee, 1949–52; IRE-AIEE Committee on Noise Definitions, 1951; CCIR Executive Committee, 1952.

JETT, Ewell K. (A'29—M'38—F'39), Vice-President and Director of Television, Baltimore Sunpapers, Baltimore, Md.
Born: March 20, 1893, Baltimore, Md. Director, 1938. Committees: Public Relations, 1945–46. Sections: Washington, D.C., *chairman, 1935–36.*

JOHNSON, J. Kelly (A'25—M'35—SM'43—F'49), Consulting Engineer, 511 Fifth Ave., New York 17, N.Y.
Born: January, 1903, Oskaloosa, Iowa. A.B., 1924; B.S., 1926; E.E. 1927, Columbia University. Director, 1942. Committees: Board of Editors, 1946–53; Nominations, 1942; Papers Procurement, 1944–45; Radio Receivers, 1936–37, 1941–50; Receivers, 1950–53; Registration of Engineers, 1940–43; Regular Papers, 1941; Sections, 1943–44. Sections: Chicago, *secretary, 1935–36, chairman, 1937–38;* New York, *treasurer, 1948–49.*

JOHNSON, John B. (M'40—SM'43—F'51), Retired, Research Engineer, Edison Laboratory, Thomas A. Edison, Inc., West Orange, N.J.
Born: October 2, 1887, Gothenberg, Sweden. B.S., 1913; M.S., 1914, University of North Dakota; Ph.D., 1917, Yale University.

JOLLIFFE, Charles B. (M'25—F'30), Vice-President and Technical Director, Radio Corporation of America, 30 Rockefeller Plaza, New York 20, N.Y.
Born: November 13, 1894, Mannington, W.VA. B.S., 1915; M.S., 1920, West Virginia University; Ph.D., 1922, Cornell University; LL.D., 1942, West Virginia University. Director, 1936–37, 1944, Committees: Admissions, 1938; Awards, 1942; Bibliography, 1930–32; Broadcast, 1932, 1936–37; Frequency Modulation, 1940–41; Meetings and Papers, 1930; Nominations, 1937, 1941; Piezoelectric Crystals, 1940; Policy Development, 1948; Preparedness, 1940–41; Subcommittee on Receiving Sets, 1927; Standardization, 1925–26, *chairman, 1928–31;* Subcommittee on Vacuum Tubes, 1927–28, *chairman, 1928;* Television and Facsimile, 1936–48. Sections: Washington, D.C., *chairman, 1929–30.* Institute Representative: American Council on Education, Planning Committee, National Conference on Educational Broadcasting, 1936–37, 1939–43.

JORDAN, Edward C. (S'36—A'39—SM'45—F'53), Professor of Electrical Engineering, University of Illinois, Urbana, Ill.
Born: December 31, 1910, Edmonton, Alberta, Canada. B.S. (E.E.), 1934; M.S. (E.E.), University of Alberta; Ph.D. (E.E.), 1940, Ohio State University. Committees: Annual Review, 1949–51; Antennas, 1945–48; Antennas and Waveguides, 1949–52; Membership, 1950–52; Papers Review, 1951–53. Institute Representative: Ohio State University, 1942–45; University of Illinois, 1946–50. Sections: Columbus, sub-section, 1945.

KAAR, Ira J. (J'22—A'24—M'29—F'41), Manager of Engineering, Electronics Division, General Electric Company, Electronics Park, Syracuse, N.Y.
Born: October 17, 1902, Dunsmuir, Calif. B.S.(E.E.), 1924, University of Utah. Director, 1939, 1948. Committees: Admissions, 1940; Annual Review, 1940–45; Awards, 1947–48; Joint Technical Advisory, *vice-chairman, 1950–51, chairman, 1951–52;* Nominations, 1949–50; Public Relations, 1940, 1942; Standards, 1940–45; Television, 1939, *chairman, 1940–46,* 1947–48; Television Systems, 1949–52.

KANDOIAN, Armig G. (S'35—A'36—SM'44—F'51), Head, Radio and Radar Components Division, Federal Telecommunication Laboratories, Inc., 500 Washington Ave., Nutley, N.J.
Born: November 28, 1911, Van, Armenia. B.S., 1934; M.S., 1935, Harvard University. Committees: Papers Review, 1946–53. Awards: Eta Kappa Nu, Honorable Mention, 1943.

KANTEBET, Shankar R. (A'25—M'31—SM'43—F'49), General Manager, Overseas Communications Service, Government of India, Radio House, Apollo Bunder, Bombay 1, India.
Born: December, 1900, Kanara, Bombay, India. B.A. (Honours) M.N., Technical Scholar, 1922, Bombay University. Vice-President, 1953. Awards: A.M.I.E.E., 1928; M.I.E.(I), 1944; Marconi veteran, 1951.

KARPLUS, Eduard (A'31—F'38), Engineer, General Radio Company, 275 Massachusetts Ave., Cambridge 39, Mass.
Born: September 7, 1899, Moedling, Austria. Ingenieur, 1923 Technische Hochschule, Vienna, Austria.

KEAR, Frank G. (A'24—M'31—SM'43—F'53), Consulting Radio Engineer, 1302—18th St., N.W., Washington 6, D.C.
Born: October 18, 1903, Minersville, Schuylkill County, Pa. E.E., 1926, Lehigh University; S.M. (E.E.), 1928; Sc.D. (E.E.), 1933, Massachusetts Institute of Technology. Committees: Standardization, Technical Committee on Radio Transmitters, 1929–30; Standards, 1934–35.

KELL, Ray D. (A'35—F'47), Head, Television Section, RCA Laboratories Division, Radio Corporation of America, Princeton, N.J.
Born: June 7, 1904, Kell, Ill. B.S.(E.E.), 1926, University of Illinois. Committees: Television, 1941, 1946–48; Television Systems, 1949–52. Awards: Modern Pioneer Award, National Association of Manufacturers, 1940; Stuart Ballantine Medal of the Franklin Institute, 1948.

KELLY, Mervin J. (M'25—F'38), President, Bell Telephone Laboratories, Inc., 463 West St., New York, N.Y.
Born: February 14, 1894, Princeton, Mo. B.S., 1914, Missouri School of Mines and Metallurgy, Rolla, Mo.; M.S., 1915, University of Kentucky; Ph.D., 1918, University of Chicago; D.Eng., 1936, University of Missouri; D.Sc., 1946, University of Kentucky. Committees: Standardization Subcommittee on Vacuum Tubes, 1927–29; Technical Committee No. 3, Vacuum Tubes, 1930. Institute Representative: ASA Technical Committee, Vacuum Tubes, 1930.

KETO, John E. (A'38—SM'46—F'48), Technical Director, Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.
Born: June 9, 1909, Maynard, Mass. E.E., 1932; M.S., 1935, University of Cincinnati. Committees: Wave Propagation, 1948–51. Professional Group on Airborne Electronics, *chairman, 1951;* Administrative Committee, 1951–53. Sections: Dayton, *chairman, 1946–47.*

KILGOUR, Charles E. (A'25—M'30—SM'42—F'51), Research Consultant, Crosley Division, AVCO Manufacturing Corporation, 1329 Arlington St., Cincinnati, O.
Born: March 29, 1886, Detroit, Mich. C.E., 1910, University of Cincinnati. Committees: Facsimile, 1940; Papers Procurement, 1947–48, 1949–50; Television and Facsimile, 1940. Sections: Cincinnati, *chairman, 1932–33.*

KILLIAN, Thomas J. (A'47—SM'47—F'51), Chief Scientist, Office of Ordnance Research, Duke University, Durham, N.C.
Born: August 4, 1904, Schenectady, N.Y. B.S., M.S., 1926, Massachusetts Institute of Technology; M.A., 1927; Ph.D., 1929, Princeton University. Committees: Nuclear Studies, 1947–50. Awards: Regional Prize, AIEE, 1936.

KIMBALL, Charles N. (A'34—M'40—SM'43—F'52), President, Midwest Research Institute, 4049 Pennsylvania, Kansas City, Mo.
Born: April 21, 1911, Boston, Mass. B.E.E., 1931, Northeastern University; S.M., 1932; Sc.D., 1934, Harvard University. Committees: Meetings and Papers, *chairman, 1952–53;* Mobile Communications, 1952–53; Publicity, *chairman, 1951–53;* Railroad and Vehicular Communication, 1948–52. Sections: Kansas City, *vice-president, 1941–43.*

KING, Ronald W. P. (A'30—SM'43—F'53), Gordon Mackay Professor of Applied Physics, Cruft Lab., Harvard Univ., Cambridge 38, Mass.
Born: September 19, 1905, Williamstown, Mass. B.A., 1927; M.S., 1929, University of Rochester; Ph.D., 1932, University of Wisconsin. Committees: Antennas, 1944–46; Papers Review, 1952; Transmitters, 1944–45; Transmitters and Antennas, 1942–44.

KLOEFFLER, Royce G. (SM'46—F'53), Professor and Head, Dept. of Electrical Engineering, Kansas State College, Manhattan, Kansas.
Born: June 18, 1890, Armada, Michigan. B.S.(E.E.), 1913, University of Michigan; M.S., 1930, Mass. Institute of Technology.

KNOWLES, Hugh S. (A'25—F'41), Consulting Engineer; President and Director of Research, Industrial Research Products, 9400 Belmont Ave., Franklin Park, Ill.
Born: September 23, 1904, Hynes, Iowa. A.B., 1928, Columbia University. Committees: Annual Review, 1938–41; Board of Editors, 1945–53; Electroacoustics, 1936–37, *chairman, 1938–41, 1946–47;* Papers, 1941; Papers Procurement, 1942–43; Regular Papers, 1941; Standards, 1938–41; Symbols, 1940–41, 1943–47. Sections: Chicago, *chairman, 1934–35.*

KNOX, James B. (A'34—SM'46—F'51), General Manager, Engineering Products Dept., RCA Victor Co. Ltd., 1001 Lenoir, Montreal 30, P.Q., Canada.
Born: November, 1910, Winnipeg, Manitoba, Canada. Committees: Radio Transmitters, 1947–52.

KOCK, Winston E. (SM'45—F'52), Director of Acoustics Research, Bell Telephone Labs., Inc., Murray Hill, N.J.
Born: December 5, 1909, Cincinnati, Ohio. E.E., 1932; M.S. (physics), 1933, University of Cincinnati; Ph.D., 1934, University of Berlin; D.Sc. (Honorary) 1952, University of Cincinnati. Committees: Antennas and Waveguides, 1947–51; Editorial, 1951–52; Papers Review, 1951–53; Professional Group on Antennas and Propagation, Administrative Committee, 1949–51. Awards: Outstanding Young Electrical Engineer, Eta Kappa Nu; Fellow and Member of Executive Council, Acoustical Society; Fellow, American Physical Society.

KOMPFNER, Rudolf (F'50), Member of Technical Staff, Bell Telephone Laboratories, Murray Hill, N.J.
Born: May 16, 1909, Vienna, Austria. Engineering Diploma, 1933, Technical College, Vienna; D.Phil., Oxford University.

LACK, Frederick R. (A'20—F'37), Vice-President, Western Electric Company, Inc., 120 Broadway, New York 5, N.Y.
Born: July 18, 1895, Eastbourne, England. S.B., 1925, Harvard University. Director, 1940, 1946–47. Committees: Appointments, 1948; Awards, 1941, 1948; Board of Editors, 1946; Electronics, 1936–40; Executive, 1947; Fiscal, 1947–48; National Convention, 1947; Nuclear Studies, 1948; Office Practices, 1947; Papers, 1942–45; RMA-IRE Co-ordinating, 1948; Special Publication Fund, 1947; Tellers, 1940. Institute Representative: ASA Board of Directors, 1945–51.

LAMSON, Horatio W. (A'15—M'27—F'33), Engineer, General Radio Company, 275 Massachusetts Ave., Cambridge, Mass.; Faculty Member, Northeastern University, Boston, Mass.
Born: January 2, 1893, Somerville, Mass. S.B., 1915, Massachusetts Institute of Technology; A.M., 1917, Harvard University. Sections: Boston, *chairman, 1937–39.*

LANDON, Vernon D. (A'27—M'29—SM'43—F'51), Research Engineer, RCA Laboratories Division, Princeton, N.J.
Born: May, 1901, Denver, Colo. Attended Detroit Junior College, 1920. Committees: Frequency Modulation, 1941–46; Modulation Systems, 1947–52; Papers Review, 1947–52.

LANGLEY, Ralph H. (A'12—M'16—F'29), Assistant to the President, Farrand Optical Company, Inc., 4401 Bronx Blvd., New York 70, N.Y.
Born: January 5, 1889, New York, N.Y. E.E., 1913, Columbia University. Committees: Admissions, 1945; Awards, 1934; Bibliography, 1930–32; New York Program 1934; Radio Telegraph and Receiver Terminology, *chairman, 1924–25;* Registration of Engineers, 1940–41; Sections, 1930–33, 1935; Standardization, 1924–27; Technical Committee No. 1, Radio Receivers and Parts, 1930; Standards, 1934–35; Wave Length Regulation, 1916. Sections: Cincinnati, *chairman, 1929–30.*

LAPORT, Edmund A. (A'25—M'27—SM'43—F'53), Chief Engineer, RCA International Division, 30 Rockefeller Plaza, New York 20, N.Y.
Born: July 2, 1902, Nashua, N.H. Committees: Annual Review, 1946–47; Policy Development, 1948; Radio Transmitters 1946, *chairman, 1947–48.* Institute Representative: ASA Electrical Standards Committee, 1948–51; U. S. National Committee of the International Electrotechnical Commission, 1949–51. Sections: Montreal, *chairman, 1940–42.*

LAW, Harold B. (SM'46—F'52), Research Engineer, RCA Laboratories Division, Princeton, N.J.
Born: September 7, 1911, Douds, Iowa. B.S., 1934, Kent State University; M.S., 1936; Ph.D., 1941, Ohio State University. Awards: Television Broadcasters' Association Award, 1946.

LAW, Russel R. (A'34—M'40—SM'43—F'53), Assistant to Vice-President, CBS-Hytron, Danvers, Mass.
Born: January 11, 1907, Hampton, Iowa. B.S., 1929; M.S., 1931, Iowa State College; D.S., 1933, Harvard Engineering School.

LEHDE, Pendleton E. (A'14—F'27), Owner, Electron Engineering Company; President, Pendleton Terminal Corporation; President, Tidewater Terminal Company, Inc.; 1050 Constance St., New Orleans 13, La.
Born: October 2, 1892, New Orleans, La. B.E., 1914; M.E.E., 1926, Tulane University. Committees: Membership, 1927–29. Sections: New Orleans, *chairman, 1928–33.*

LEWIS, George H. (A'12—M'15—SM'43—F'51) (L'51), Retired. Formerly Assistant Vice-President, International Telephone and Telegraph Corporation, 67 Broad St., New York, N.Y.
Born: September 15, 1886, Media, Pa. M.E.I., 1911, Bliss School of Applied Science. Manager, 1918–19, 1923, 1926; Director, 1935. Committees: Admissions, 1929–30, 1942; Awards, 1935; Electronics, 1936–39; Facsimile, 1939–41; New York Program, *chairman, 1935,* 1936; Public Relations, 1947–48; Standardization, 1916–17, 1919, 1925, 1928–30; Symbols, 1940; Technical Committee No. 3—Vacuum Tubes, 1929–30; Television, 1939–41.

LINDENBLAD, Nils E. (M'34—SM'43—F'48), Research Engineer, RCA Laboratories Division, Princeton, N.J.
Born: October 30, 1895, Norrkoping, Sweden. M.E. 1915, Norrkoping Polytechnic Institute; Attended Royal Institute of Technology, Stockholm, 1916–19. Committees: Antenna Subcommittee, 1940. Awards: Modern Pioneer Award, National Association of Manufacturers, 1940; RCA Laboratories Award for Pioneering in Slot Antennas, Radio Corporation of America, 1947.

LINDSAY, William W., Jr. (A'24—M'26—F'39), Consulting Engineer; Staff Electronic Engineer, Military Operations Research Division, Lockheed Aircraft Corp., Burbank, Calif.
Born: November 16, 1899, Overbrook, Pa. Privately educated, equivalent "Doktor Ingenieur" degree. Committees: Nominations, 1942; Transmitters, 1946–47. Sections: Los Angeles, *secretary-treasurer, 1928–29; chairman, 1940–41.*

LITTLE, Donald G. (A'20—M'27—F'29), Assistant Engineering Manager and Consulting Engineer, Westinghouse Electric Corporation, 2519 Wilkens Ave., Baltimore, Md.
Born: May 17, 1893, Kalamazoo, Mich. B.S.(E.E.), 1917, University of Michigan. Committees: Board of Editors, 1944–53; Meetings and Papers, 1928–29; Standardization, Technical Committee No. 2, Radio Transmitters and Antennas, 1929–30; Subcommittee on Nomenclature, Symbols and Definitions, 1929–30; Subcommittee on Methods of Testing Apparatus, Equipment, Devices, and Materials Used in Radio Transmitters and Antennas, 1929–30; Standardization, 1931–32; Standards, 1932; Transmitters and Antennas, 1936–38. Sections: Baltimore, *chairman, 1951–52.* Awards: Fellow, AIEE.

LITTON, Charles V. (A'25—SM'44—F'47), President, Chairman, Board of Directors, Litton Industries, Litton Engineering Laboratories, 1049 Brittan Ave., San Carlos, Calif.
Born: March 13, 1904, San Francisco, Calif. A.B., 1924; E.E., 1925, Stanford University. Committees: Papers, 1945; Papers Review, 1946–52. Sections: San Francisco, *chairman, 1932–33.*

LLEWELLYN, Frederick B. (A'23—F'38), Systems Studies Engineer, Bell Telephone Laboratories, Inc., 463 West St., New York 14, N.Y.
Born: September 16, 1897, New Orleans, La. M.E., 1922, Stevens Institute of Technology; Ph.D., 1928, Columbia University. President, 1946; Director, 1939–48. Committees: Administrative Committee, Board of Editors, 1952–53; Awards, 1942, *chairman, 1947,* 1948; Board of Editors, 1949, 1952–53; Constitution and Laws, 1947, 1950; Electronics, 1939–43; Editorial Administrative, 1946–51; Executive, 1942–44, *chairman, 1946;* Finance, 1948–51; Fiscal, 1947–48; International Liaison, 1947, 1949; Investment, 1946; Membership, 1941, 1949, 1950; Membership Solicitation Policy, 1945; Nominations, 1944, 1947–48; Office Quarters, 1947; Papers, 1932–39, *vice-chairman, 1940–42, chairman, 1943–46;* Policy Advisory, 1952–53; Policy Development, 1949–50, *chairman, 1951;* Professional Groups, 1948; Public Relations, 1950; Symbols, 1940–41. Institute Representative: ASA Electrical Standards Committee, 1948–51; National Research Council, Division of Engineering and Industrial Research, 1948–51; United States National Committee of the International Electrotechnical Commission, 1949–51. Awards: Morris Liebmann Memorial Prize, 1935.

LODGE, William B. (A'34—M'37—SM'43—F'49), Vice-President in Charge of Engineering, CBS Television Network, 485 Madison Ave., New York 22, N.Y.
Born: August 17, 1907, Whitemarsh, Pa. B.S., 1930; M.S., 1931, Massachusetts Institute of Technology. Committees: Annual Review, 1946–48; Antennas, 1944–45; Awards, 1946; Transmitters, 1944–45; Transmitters and Antennas, 1940–41; Winter Technical Meeting, 1946.

LOOMIS, Alfred L. (M'28—SM'43—F'44), President, Loomis Institute for Scientific Research, 14 Wall St., New York, N.Y.
Born: November 4, 1887, New York, N.Y. A.B., 1909, Yale University; LL.B., 1912, Harvard University; D.Sc. 1932, Wesleyan University; M.Sc., 1933, Yale University; LL.D., 1941, University of California. Awards: John Price Wetherill Medal, The Franklin Institute, 1934. Member, National Academy of Science.

LOUGHREN, Arthur V. (A'24—M'29—SM'43—F'44), Director of Research, Hazeltine Corporation, 58-25 Little Neck Parkway, Little Neck, N.Y.; Executive Vice-President, Hazeltine Research, Inc., Chicago.
Born: September 15, 1902, Rensselaer, N.Y. B.A., 1923; E.E., 1925, Columbia University. Director, 1952. Committees: Admissions, 1931–33; Awards, 1949–50, *chairman, 1951,* 1952; Board of Directors, 1952–53; Finance, 1953; Membership, 1934; Papers Procurement, 1947–50; Policy Advisory, 1953; Radio Receivers, Subcommittee on Definitions, 1927–28; Standardization, Subcommittee on Vacuum Tubes, 1927–28; Standards, 1947; Television, 1940–45.

LUBCKE, Harry R. (A'26—M'32—SM'43—F'51), Consulting Engineer and Registered Patent Agent, 2443 Creston Way, Hollywood 28, Calif.
Born: August 25, 1905, Alameda, Calif. B.S., 1929; Graduate Study, 1930, University of California. Committees: Papers Review, 1946–47. Sections: San Francisco, Organization Committee, 1927; Los Angeles, West Coast Convention Committee, 1952. Awards: Academy of Television Arts and Sciences Award, 1951; "Best Branch Paper" Award, Institute of Electrical Engineers, 1930; Certificate of Commendation, U. S. Navy, World War II; Certificate, War Department (U. S. Army), World War II; Eta Kappa Nu; Sigma Xi; Tau Beta Pi; Phi Beta Kappa.

LUCK, David G. C. (M'46—SM'50—F'51), Research Staff, RCA Laboratories Division, Radio Corporation of America, Princeton, N.J.
Born: July, 1906, Whittier, Calif. B.S., 1927; Ph.D., 1932, Massachusetts Institute of Technology.

MacDONALD, William A. (A'19—M'26—SM'43—F'53), Chairman of the Board, Hazeltine Electronics Corp., 58-25 Little Neck Pkwy., Little Neck, L.I., N.Y.
Born: December, 1895, New York, N.Y. Committees: Standardization Technical Committee No. 1., Radio Receivers and Parts, 1930. Awards: Certificate of Merit, U. S. Government, 1947. Corporate Member, Institution of Engineers, Australia.

MacKINNON, Keith Abbott (SM'46—F'49), Consulting Engineer, P.O. Box 542, Ottawa, Ont., Canada.
Born: September, 1905, Kingston, Ont., Canada. B.Sc.(E.E.), 1926; B.Sc. (Physics), 1928; M.Sc. (Physics), 1929, Queens University. Committees: Antennas, 1946–48. Sections: Ottawa, *chairman, 1947.*

MALOFF, Ioury G. (M'27—F'36), Development Engineer, RCA Victor Division, Radio Corporation of America, Camden, N.J.
Born: June 3, 1899, Vladivostok, Russia. Committees: Bibliography, 1928; Papers Procurement, 1947–50; Receiving Sets, 1928; Teller, 1940.

MALTER, Louis (A'37—SM'45—F'52), Research Physicist, RCA Laboratories, Princeton, N.J.
Born: April 28, 1907, New York, N.Y. B.S., 1926, College of the City of New York; M.A., 1931; Ph.D., 1936, Cornell University. Committees: Electron Devices, 1945–49; Electron Devices Conference Technical Subcommittee, *chairman, 1947;* Papers Review, 1945–50. Awards: Fellow, American Physical Society; Sigma Xi.

MANSON, Ray H. (M'23—F'50), Director, Stromberg-Carlson Company, 100 Carlson Rd., Rochester 3, N.Y.
Born: August 25, 1877, Bath, Me. B.S.(E.E.), 1898; E.E., 1901; D.Eng., 1933, University of Maine. President 1931; Manager, 1927–30; Director, 1931–33. Committees: Awards, 1932, 1940; Bibliography, 1930; Nominations, 1929–30, *chairman, 1932,* 1934, 1940; Public Relations, 1940, 1947–48; Regular Papers, 1941; Standardization, 1926–30; Subcommittee on Electro-Acoustic Devices, *chairman, 1928;* Technical Committee No. 4, Electro-Acoustic Devices, 1930; Tellers, 1932–33; Television and Facsimile, 1936–38. Institute Representative: ASA Electrical Standards Committee, 1936–39.

MARKS, William S., Jr. (A'44—SM'44—F'52), Chief Engineer, Coles Signal Laboratory, Fort Monmouth, N.J.
Born: March 18, 1900, Nashville, Tenn. B.S. in E.E., 1929, Louisiana State University; Grad. work in Physics, 1935, Rutgers University.

MARVIN, Harry B. (M'31—SM'43—F'50), Sect. Engineer, General Electric Company, Electronics Park, Syracuse, N.Y.
Born: August, 1894, Charleston, Pa. B.S.(E.E.), 1915; M.S.(E.E.), 1925, Union College. Committees: Admissions, 1940; Awards, 1940; Frequency Modulation, 1940–45; Papers, 1940; Papers Procurement, 1946–50.

MASON, Warren P. (A'36—VA'39—F'41), Research Engineer, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: September 28, 1900, Colorado Springs, Colo. B.S.(E.E.), 1921, University of Kansas; M.A., 1924; Ph.D., 1928, Columbia University. Committees: Papers Procurement, 1947–50; Papers Review, 1947–51, 1953; Piezoelectric Crystals, 1940–53.

McARTHUR, Elmer D. (M'42—SM'43—F'45), Manager, Electron Tube Section, General Electric Research Laboratory, The Knolls, Schenectady, N.Y.
Born: May 3, 1903, Salamanca, N.Y. B.S.(E.E.), 1925; M.S. (Physics), 1948, Union College. Committees: Board of Editors, 1945–53.

McCULLOUGH, Jack A. (A'39—SM'52—F'53), Vice-President and Treasurer, Eitel-McCullough, Inc., 798 San Mateo Ave., San Bruno, Calif.
Born: November 25, 1907, San Francisco, Calif. Awards: Civilian Distinguished Service Medal, U. S. Navy, 1940.

McCUTCHEN, Brunson S. (A'21—M'26—F'32), Consulting Engineer, 149 Broadway, New York 6, N.Y.
Born: November 29, 1892, North Plainfield, N.J. Lit.B., 1915; E.E., 1917, Princeton University.

McDONALD, Arthur S. (M'23—F'41), Chief Engineer, Overseas Telecommunication Commission (Australia), 47 York St., Sydney, N.S.W., Australia.
Born: March 6, 1890, Castle Donnington, Victoria, Australia. Vice-President, 1949; Director, 1949. Awards: Fellow, Past President, IRE, Australia.

McELROY, Paul K. (A'25—M'27—F'31), Design Engineer, General Radio Company, 275 Massachusetts Ave., Cambridge 39, Mass.
Born: August 7, 1899, Toledo, Ohio. A.B., 1920; A.M., 1921, Harvard University. Committees: Administrative Committee of the Professional Group on Quality Control, 1951–53; Membership, 1940. Sections: Boston, *secretary, 1939–41.*

McILWAIN, Knox (A'31—M'40—SM'43—F'48), Chief Consulting Engineer, Hazeltine Electronics Corporation, 58-25 Little Neck Pkwy., Little Neck, L.I., N.Y.
Born: September 4, 1897, Philadelphia, Pa. B.S., 1918, Princeton University; B.S.(E.E.) 1921; E.E., 1930, University of Pennsylvania. Committees: Administrative Committee of the Board of Editors, 1949–53; Admissions, 1944–45; Board of Editors, 1946, 1949–53; Circuits, 1944–45; Education, 1945; Electroacoustics, 1936–45; Electronics, 1936–38; Handbooks, 1945–47; Papers, 1942–45; Standards, 1945–46. Sections: Philadelphia, *chairman, 1935–36.* Institute Representative: National Television Systems Committee, Panel 8, 1940–43.

McKINLEY, Donald W. R. (A'39—SM'46—F'48), Sect. Head, Radio and Electrical Engineering Division, National Research Council, Ottawa, Ont., Canada.
Born: September 22, 1912, Shanghai, China. B.A., 1934; M.A., 1935; Ph.D., 1938, University of Toronto. Sections: Ottawa, *chairman, 1946–47.* Awards: O.B.E.; Fellow, American Physical Society; Fellow, Royal Society of Canada.

McNICOL, Donald M. (A'14—M'14—F'24) (L'49), Consulting Communication Engineer, 25 Beaver St., New York 4, N.Y.
Born: July 23, 1875, Hopetown, Ont., Canada. Instructor, Teacher's College, Columbia University; Lecturer on Communications, University of Utah, Sheffield Scientific School, Yale University and Copper Union. President, 1926; Vice-President, 1925; Manager, 1919–24; Director, 1925–28; Advertising Manager, 1921–22. Committees: Administrative of the Board of Editors, 1952; Admissions, 1935; Advertising, 1925; Bibliography, 1930–32; Editorial Administrative, 1946–51; Meetings and Papers, *chairman, 1925;* Membership, 1925; Nominations, 1928–30, 1933; Publicity, 1931–34; Revision of the Constitution, 1927; Sections, *chairman, 1925,* 1928; Standardization, 1922–27. Institute Representative: Fourth National Radio Conference, 1926; National Fire Protection Association (National Electric Code), 1936; American Engineering Standards Committee (now American Standards Association) Sectional Committee on Electric Wiring and Apparatus in Relation in Fire Hazard (Nat'l Electric Code), 1930.

MCRAE, James W. (A'37—F'47), Vice-President in charge of Systems Development, Bell Telephone Laboratories, Inc., 463 West St., New York 14, N.Y.
Born: October 25, 1910, Vancouver, B.C., Canada. B.S.(E.E.), 1933, University of British Columbia; M.S., 1934; Ph.D., 1937, California Institute of Technology. Director, 1949–52. President, 1953. Committees: Appointments, 1950; Awards, 1948–51; Board of Editors, 1946–52; Executive, 1950–53; Board of Directors, 1952–53; Finance, 1952–53; Policy Development, 1948; Standards Coordination, 1952; Tellers, *chairman, 1948.* Sections: New York, *chairman, 1948–49.* Awards: Legion of Merit, War Department, 1945; Eta Kappa Nu, Honorable Mention, 1943.

MEACHAM, Larned A. (A'38—SM'45—F'48), Research Engr., Bell Telephone Laboratories, Inc., 463 West St., New York 14, N.Y.
Born: September, 1908, Denver, Colo. B.S.(E.E.), 1929, University of Washington; Certificate of Research, 1930, Cambridge University. Committees: Board of Editors, 1946–52; Modulation Systems, 1950–53. Awards: Eta Kappa Nu, Outstanding Young Electrical Engineer, 1939.

MERTZ, Pierre (SM'44—F'50), Engineer, Bell Telephone Laboratories, Inc., 463 West St., New York 14, N.Y.
Born: April, 1897, Paris, France. A.B., 1918; Ph.D., 1926, Cornell University. Committees: Facsimile, 1939–53; Papers Procurement, 1945–50. Awards: Army-Navy Certificate of Appreciation, Department of Defense, 1948; Army Certificate of Appreciation, Technical Industrial Intelligence Committee, Joint Chiefs-of-Staff, 1951; Fellow, Society of Motion Picture and Television Engineers.

METCALF, George F. (A'34—M'38—F'42), General Manager, Commercial and Government Equipment Dept., General Electric Company, Electronics Park, Syracuse, N.Y.
Born: December 7, 1906, Milwaukee, Wis. B.S.(E.E.), 1928, Purdue University. Associate Editor, 1926–28. Committees: Board of Editors, 1946–53; Editorial Administrative, 1949; Electronics, 1936–41; Papers Review, *chairman, 1949–53;* Professional Groups, 1953; Tellers, 1948, *chairman, 1949.*

MIESSNER, Benjamin F. (A'37—F'37), President, Miessner Inventions, Inc., Van Buren Rd., Morristown, N.J.
Born: July 27, 1890, Huntingburg, Ind. Attended United States Naval Electrical School, 1908–09; Attended Purdue University, 1913–16.

MILLER, John H. (A'19—M'25—SM'43—F'50), Vice-President for Research and Engineering, Weston Electrical Instrument Corporation, 614 Frelinghuysen Ave., Newark 5, N.J.
Born: June 6, 1893, Oak Park, Ill. B.S.(E.E.), 1915, University of Illinois. Committees: Institute Sections, 1928; Sections 1933–34, 1938–39, *chairman, 1940,* 1941–44. Sections: Chicago, *chairman, 1927–29, secretary, 1929–30.* Institute Representative: ASA Subcommittee (C42.6) on Electrical Instruments 1949–51.

MILLER, John M. (A'17—F'20) (L'52), Retired. 2900 30 St., S.E., Washington 20, D.C.
Born: June, 1882, Hanover, Pa. B.A., 1904; M.A., 1907; Ph.D., 1915, Yale University. Awards: Distinguished Civilian Service Award, United States Navy, 1945; Medal of Honor, I.R.E., 1953.

MINTON, John P. (F'39), "Special Leave," Research Adviser, Magnolia Petroleum Company, Field Research Department, Dallas, Tex.; Research Associate, 1952–53, Department of Physics, University of California.
Born: November 7, 1889, Wapella, Ill. Engineering, 1910, Bradley University; B.S., 1912, Massachusetts Institute of Technology; Ph.D., 1921, University of Chicago. Committees: Electroacoustic Devices, 1927–28; Membership, 1941–43. Awards: Fellow in Physics, National Research Council, University of Chicago, 1921–22; Fellow, American Physical Society, American Association for Advancement of Science.

MORRISON, John F. (A'29—M'36—SM'43—F'51), Technical Staff, Bell Telephone Laboratories, Inc., Morristown Rd., Whippany, N.J.
Born: March 14, 1906, Buffalo, N.Y. Committees: Annual Review, 1945–46; Antennas, 1944–45; Awards, 1951–53; Radio Transmitters, *chairman, 1945,* 1946; Standards, 1945–46, 1952; Transmitters, 1944–45; Transmitters and Antennas, 1938–44. Sections: North Jersey Subsection, *vice-chairman, 1950, chairman, 1951.*

MORTON, George A. (A'39—SM'46—F'51), Section Head, RCA Laboratories Division, Radio Corporation of America, Princeton, N.J.
Born: March 24, 1903, New Hartford, N.Y. B.S., 1926; M.S., 1928; Ph.D., 1932, Massachusetts Institute of Technology. Committees: Measurements and Instrumentation, 1951–52; Nuclear Studies, 1948. Awards: Overseas Premium Award, Institute of Electrical Engineers, 1937–38; Certificates of Commendation, Bureau of Ships, National Defense Research Council, United States Air Force.

MORTON, Jack A. (A'36—SM'49—F'53), Assistant Director of Electronic Apparatus Development, Bell Telephone Laboratories, Murray Hill, N.J.
Born: September 3, 1913, St. Louis, Mo. B.S., 1935, Wayne University; M.S., 1936, University of Michigan. Committees: Electron Tubes, 1946–48; Electron Tubes and Solid State Devices, 1949–52; Electronics, 1943–45; Membership, 1943–44; Papers Review, 1953; Vacuum Tubes, 1945. Awards: Honorable Mention, Eta Kappa Nu, 1945; Alumni Award, Wayne University, 1951.

MOUNTJOY, Garrard (A'37—M'40—SM'43—F'50), Chief Electronics Engineer, Stromberg-Carlson Company, 100 Carlson Rd., Rochester, N.Y.
Born: October 21, 1905, Boscobel, Wis. B.S., 1929, Washington University. Committees: Receivers, 1942–53; Television, 1945–47; Subcommittee on Methods of Testing Television Receivers, *chairman, 1947;* Subcommittee on Standards on Radio Receivers, Definition of Terms, *chairman, 1950.* Sections: Rochester, *secretary, 1948–49, vice-chairman, 1950–51, chairman, 1952.* Institute Representative: ASA War Standards Committee on Methods of Measuring Radio Noise, 1945–48. Awards: Modern Pioneer Award, National Association of Manufacturers.

MOUROMTSEFF, Ilia E. (A'34—SM'45—F'47), Professor, Physics Dept., Upsala College, Prospect Ave., East Orange, N.J.
Born: December 9, 1881, St. Petersburg, Russia. Mil. Eng., 1906, Nicholas Engineering Academy; Dipl. Eng. (E.E.), 1910, Grand Ducal Institute of Technology, Darmstadt, Germany. Committees: Electronics, 1941–45; Electron Tubes, 1945–46; Electron Tubes and Solid-State Devices, 1949–53; Membership, 1947–48; Papers, 1944–45; Papers Procurement, 1945–50; Papers Review, 1946–50; Vacuum Tubes, 1945–46. Awards: Order of Merit (Silver W), Westinghouse Electric Corp., 1947.

MUMFORD, William W. (A'30—SM'46—F'52), Technical Staff, Member, Bell Telephone Laboratories, Inc., Box 107, Red Bank, N.J.
Born: June 17, 1905, Vancouver, Wash. B.A., 1930, Willamette University. Committees: National Convention Program, 1950–51. Professional Group on Microwave Theory and Technique, Administrative Committee, *secretary-treasurer, 1952–53.* Awards: Burghart Prize, 1926, Willamette University.

MURRAY, Albert F. (A'20—M'26—F'38), Consulting Television Engineer, 4707 Windom Pl., N.W., Washington 16, D.C.
Born: June 22, 1894, Decatur, Ala. B.A., 1915, Maryville College; B.S., 1918, Harvard University; S.B., 1918, Massachusetts Institute of Technology; D.Sc., 1939, Maryville College. Director, 1936–39. Committees: Awards, 1936; Electronics, 1937–40; Institute Sections, 1929–30, 1936; Membership, 1929–39; Papers, 1934–45; Papers Review, 1946–53; Papers Procurement, 1947–50; Television, 1939–45; Television and Facsimile, 1936–38; Television Systems, 1949–53. Sections: Philadelphia, *chairman, 1937–38.*

NELSON, Edward L. (A'19—M'25—F'38), Technical Director, Signal Corps Engineering Laboratories, Fort Monmouth, N.J.
Born: March 10, 1891, Warsaw, Ind. B.S.(E.E.), 1914, Armour Institute of Technology. Manager, 1932; Director, 1932–36. Committees: Awards, 1929; Board of Editors, 1941–53; Broadcasting, 1928–31, *chairman, 1932;* Broadcast, *chairman, 1933–36;* Meetings and Papers, 1928–29; Nominations, 1932, 1935; Registration of Engineers, 1940–43; Standardization, 1927–31; Subcommittee on the Use of the Transmission Unit, 1928; Standards, 1932–36. Institute Representative: Planning Committee, National Conference in Educational Broadcasting, American Council of Education, 1936, 1939–43.

NERGAARD, Leon S. (A'29—M'38—SM'43—F'52), Research Engineer, RCA Laboratories Division, Princeton 5, N.J.
Born: September 2, 1905, Battle Lake, Minn. B.S. in E.E., 1927, University of Minnesota; M.S. in E.E., 1930, Union College; Ph.D. in Physics, 1935, University of Minnesota. Committees: Annual Review, 1948–50; Electronics, 1940–45; Electron Tubes, 1946–47, *vice-chairman, 1948–49;* Electron Devices, *chairman, 1948,* 1952–53; Electron Tubes and Solid-State Devices, *chairman, 1949–51;* Measurement and Instrumentation, 1952; Professional Group on Electron Devices, Administrative Committee, *vice-chairman, 1952–53;* Standards, 1949–51; Technical on Advanced Developments, 1944–47; Vacuum Tubes, 1945–46. Institute Representative: ASA Sectional Committee (C60) on Standardization of Electron Tubes, 1949–51, ASA Subcommittee C42.14 on Electron Tubes, 1952–53.

NOBLE, Daniel E. (A'25—SM'44—F'47), Vice-President and Director of Research, Motorola, Inc., 4545 Augusta Blvd., Chicago, Ill.
Born: October 4, 1901, Naugatuck, Conn. B.S., 1929, University of Connecticut. Committees: Annual Review, 1941–42, 1946; Frequency Modulation, *chairman, 1940–42,* 1943–45; Mobile Communication, *chairman, 1945–47, 1949–51,* 1952; Papers Procurement, 1942–43, 1947, 1949–50; Regular Papers, 1941; Standards, 1940–42.

NOIZEUX, Pedro J. (A'30—F'47), Assistant General Manager, Transradio Internacional, Compania Argentina de Telecommunicaciones, San Martin, 379, Buenos Aires 4, Argentina.
Born: 1900, France. Sections: Buenos Aires, Founder, 1939, *chairman 1941.*

NORTH, Dwight O. (A'35—M'38—SM'43—F'43), Research Engineer, RCA Laboratories Division, Radio Corporation of America, Princeton, N.J.
Born: September 28, 1909, Hartford, Conn. B.S., 1930, Wesleyan University; Ph.D., 1933, California Institute of Technology. Committees: Awards, 1948; Board of Editors, 1946–53; Papers, 1944–45.

NORTON, Kenneth A. (A'29—M'38—SM'43—F'43), Chief, Frequency Utilization Research Section; Assistant Chief, Central Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colo.
Born: February 27, 1907, Rockwell City, Iowa. B.S., 1928, University of Chicago. Committees: Administrative Committee of the Board of Editors, 1953; Board of Editors, 1951–53; Editorial Administrative, *alternate, 1949–51,* 1952; Navigation Aids, 1950–53; Papers Procurement, 1949–50; Papers Review, 1946–51; Radio Wave Propagation, 1942–45; Radio Wave Propagation and Utilization, 1947–48; Wave Propagation, 1937–41, 1949–53.

NYQUIST, Harry (A'39—SM'47—F'52), Assistant Director of Systems Studies, Bell Telephone Laboratories, 463 West St., New York 14, N.Y.
Born: February 7, 1889, Nilsby, Sweden. B.S.(E.E.), 1914; M.S., 1915, University of North Dakota; Ph.D., 1917, Yale University.

OLIVE, Gordon W. (A'29—VA'39—F'51), Retired. RR. #2, Gananoque, Ontario, Canada; Formerly Director General of Engineering, Canadian Broadcasting Corporation.
Born: March 18, 1898, Montreal, P.Q., Canada. Attended McGill University, 1919–22. Committees: Frequency Modulation, 1946; Modulation Systems, 1947.

OLSON, Harry F. (A'37—VA'39—SM'48—F'49), Director, Acoustical Laboratory, RCA Laboratories Division, Radio Corporation of America, Princeton, N.J.
Born: December, 1902, Mount Pleasant, Iowa. B.E., 1924; M.S., 1925, E.E. (Professional, 1932); Ph.D., 1928, University of Iowa. Committees: Annual Review, 1949–50; Board of Editors, 1940–53; Electroacoustics, 1932–53, *chairman, 1934–38;* Papers Procurement, 1943–47; Standards, 1934–38. Institute Representative: ASA Sectional Committee on Acoustical Measurements and Terminology, 1940–51; Sectional Committee on Graphical Symbols and Abbreviations for Use on Drawings, 1949–50.

O'NEILL, George D. (A'28—SM'46—F'49), Manager of Engineering Personnel Development, Sylvania Electric Products, Inc., Bayside, L.I., N.Y.
Born: July, 1900, Montclair, N.J. B.S., 1924, University of Mich-

igan. Committees: Board of Editors, 1952–53; Electron Tube Conference, *chairman, 1947;* Electronics, 1936–45; Electron Tubes, 1946–48; Electron Tubes and Solid-State Devices, 1949–51, *vice-chairman, 1951–52, chairman, 1952–53;* Professional Group on Electron Devices, *chairman, 1952–53;* Standards, 1952–53; Vacuum Tubes, 1945–46, *chairman, 1946–51.*

OSBORNE, Harold S. (A'14—M'29—SM'43—F'45) (L'52), Consulting Engineer, 379 Highland Ave., Upper Montclair, N.J.
Born: August 1, 1887, Fayetteville, N.Y. B.S., 1908; Eng.D., 1910, Massachusetts Institute of Technology. Committees: Standardization, 1926–28.

OSWALD, Arthur A. (A'19—M'25—F'28), Transmission Systems Development Engineer, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: March 3, 1891, Lake Linden, Mich. B.S.(E.E.), 1916; E.E., 1927, Illinois Institute of Technology. Committees: Papers Procurement, 1942–43; Regular Papers, 1941; Standardization, 1925.

OUIMET, Alphonse J. (A'39—SM'44—F'52), General Manager, Canadian Broadcasting Corp., P.O. Box 806, Ottawa, Ont., Canada.
Born: June 12, 1908, Montreal, P.Q., Canada. B.A., 1928, St. Mary's College; B. Elect. Engrg., 1932, McGill University. Committees: Education, 1944; Television, 1946–48; Television Systems, 1949–1952. Sections: Montreal, *chairman, 1942–43.* Awards: Ross Medal, 1948, Engineering Institute of Canada.

OXLEY, Allan B. (A'25—M'33—SM'46—F'53), Chief Engineer, RCA Victor Co., Ltd., 1001 Lenoir St., Montreal, Quebec, Canada.
Born: July 7, 1901, London, England. Director, 1951–52. Committees: Awards, 1953; Membership, 1953; Nominations, 1952–53. Sections: Toronto, *chairman, 1934–35;* Montreal, *chairman, 1939–40; 1949–50.*

PACKARD, David (S'34—A'41—SM'47—F'48), President, Hewlett-Packard Company, 395 Page Mill Rd., Palo Alto, Calif.
Born: September 7, 1912, Pueblo, Colo. A.B., 1934, E.E., 1939, Stanford University. Committees: Awards, 1949; Instruments and Measurements, 1949–50. Sections: San Francisco, *secretary, 1943–44; chairman, 1945–46.*

PAGE, Robert M. (SM'45—F'47), Associate Director of Research for Electronics; Superintendent, Radio Division III, United States Naval Research Laboratory, Washington 25, D.C.
Born: June 2, 1903, St. Paul, Minn. B.Sc., 1927; D.Sc. (Honorary), 1943, Hamline University; M.A., 1932, George Washington University. Committees: Board of Editors, 1946–53. Awards: Distinguished Civilian Service Award, United States Navy, 1945; Citation O.S.R.D., 1946; Certificate of Merit, The President of the United States, 1947; Harry Diamond Memorial Award, 1953.

PANNILL, Charles J. (M'13—F'16) (L'49), Retired President and Director, RCA Institutes, Inc., and Radiomarine Corporation of America, Consultant Office, 30 Rockefeller Plaza, New York 20, N.Y.
Born: May 13, 1879, Petersburg, Pa. Committees: Publicity, 1916–19. Sections: Washington, *secretary-treasurer, 1914, vice-chairman, 1916–19.* Awards: First Certificate of Skill in Radio, 1911, No. 1 Commercial Radio Operators License, 1912, United States Government. Pioneer Radio Communication, 1902. Successfully sent First Trans-Atlantic Radiogram, 1906. Expert Radio Aide, U. S. Navy, Assistant to Director Naval Communications, 1914–19. Decorations: Chevalier of the First Order of Leopold; Marconi Memorial Medal of Achievement, The Veteran Wireless Operators Association, 1943. Delegate, International Radio and Telecommunication Conventions, 1927–47. Delegate, London Conference Society Naval Architects and Marine Engineers, 1952.

PARKER, Henry W. (SM'48—F'52), Technical Consultant, 40–43 172 St., Flushing 58, N.Y.
Born: December 11, 1896, Brooklyn, N.Y. B.S.(E.E.), New York University. Committees: Electronics, 1935–44; Industrial Electronics, 1944–53; Papers Review, 1944–53.

PAYNE, Leonard S. (M'16—SM'43—F'49) (L'52), Chief Engineer, Canadian Overseas Telecommunication Corporation, 211 St. Sacrament St., Montreal, P.Q., Canada.
Born: February 28, 1886, London, England.

PETERSON, Harold O. (A'22—M'31—F'41), Section Head, RCA Laboratories Division, Radio Corporation of America, 140 Moriches Rd., Riverhead, L.I., N.Y.
Born: November 3, 1899, Blair, Neb. B.Sc.(E.E.), 1921; Doctor of Engineering (Honorary), 1951, University of Nebraska. Committees: Board of Editors, 1944–53; Industrial Electronics, 1947–50; Instruments and Measurements, 1949–50; Papers, 1934–44; Radio Receivers, 1936–47; Radio Wave Propagation and Utilization, 1945–48; Standardization, Subcommittee on Aircraft Receivers, 1930–31; Standards, 1934–35; Transmitters and Antennas, 1936; Wave Propagation, 1937–41, 1949–53.

PICKARD, Greenleaf W. (IRE Charter Mem.) (M'12—F'15) (L'49), Chairman of Board, Pickard and Burns, Inc., 240 Highland Ave., Needham 94, Mass.
Born: February 14, 1877, Portland, Me. President, 1913; Manager, 1912; Director, 1913–15. Committees: Board of Editors, 1928–52; Bibliography, 1930–32; Constitution and Laws, 1928–31; Meetings and Papers, 1927–29; Nominations, 1929, 1933, *chairman, 1938;* Specifications for Steamship Radio Equipment, 1914; Standardization, 1914–15, 1925; Wave Length Regulation, 1916; Wave Propagation, 1937–38. Sections: Organization of Boston Section, 1914. Awards: Medal of Honor, 1926; Armstrong Medal, Radio Club of America, 1940.

PIERCE, George W. (M'12—F'15) (L'49), Rumford Professor of Physics (Emeritus), and Gordon McKay Professor of Communication Engineering (Emeritus), Research Laboratory of Physics, Harvard University, Cambridge, Mass.
Born: January 11, 1872, Webberville, Tex. B.S., 1893; M.A., 1894, University of Texas; A.M., 1899; Ph.D., 1900, Harvard University. President, 1918–19; Vice-President, 1915; Director, 1915, 1918–21. Committees: Sections, 1925, 1928; Standardization, 1914–19. Section: Organization of Boston Section 1914, *chairman, 1922–32.* Awards: Medal of Honor, 1929; Franklin Medal, Franklin Institute, 1943.

PIERCE, John Alvin (SM'45—F'47), Senior Research Fellow, Cruft Laboratory, Harvard University, Cambridge 38, Mass.
Born: December 11, 1907, Spokane, Wash. B.A., 1937, University of Maine. Committees: Annual Review, 1948; Radio Wave Propagation and Utilization, 1945–48; Navigation Aids, 1947, *chairman, 1948–49,* 1950; Standards, 1948; Wave Propagation, 1949–50. Awards: Fellow, American Association for the Advancement of Science.

PIERCE, John R. (S'35—A'38—SM'46—F'48), Director of Electronics Research, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: March 27, 1910, Des Moines, Iowa. B.S., 1933, M.S., 1934, Ph.D., 1936, California Institute of Technology. Committees: Papers Procurement, *second vice-chairman, 1943.* Awards: Eta Kappa Nu, Outstanding Young Electrical Engineer, 1942; Morris Liebmann Memorial Prize, 1947.

PIORE, Emanuel R. (A'38—M'42—SM'43—F'50), Deputy Chief and Chief Scientist, Office of Naval Research, Navy Department, Washington, D.C.
Born: July 19, 1908, Wilno, Russia. B.A., 1930; Ph.D., 1935, University of Wisconsin. Director, 1951. Committees: Awards, 1949; Technical Program Committee, 1950 IRE Convention.

POLKINGHORN, Frank A. (A'25—F'38), Technical Staff, Bell Telephone Laboratories, Inc., Whippany, N.J.
Born: July 23, 1897, Holbrook, Mass. B.S., 1922, University of California. Committees: Admissions, 1943–48, *vice-chairman, 1945–48;* National Convention, 1948; Sections, 1941–45; Standardization, Subcommittee on High-Frequency Receivers, 1930–31. Sections: Northern New Jersey Subsection, *treasurer, 1952.*

POPPELE, J. R. (A'30—M'39—SM'43—F'50), Consulting Television and Radio Engineer, 9 Crest Circle, So. Orange, N.J.
Born: February 4, 1898, Newark, N.J. Director, 1947. Committees: Building, 1945–46; Facsimile, 1940, 1942; Membership, 1939–40; New York Program, 1940; Papers, 1942–45; Papers Procurement, 1942–43; Public Relations, 1943–46; Regular Papers, 1941; National Committee, 1947.

POTTER, Ralph K. (A'25—M'26—F'41), Director, Transmission Research, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: October 1, 1894, Elgin, Ill. B.S., 1917, Whitman College;

E.E., 1923, Columbia University. Committees: Awards, 1944; Papers, 1931–41.

POUNSETT, Frank H. R. (A'26—SM'44—F'47), Manager of Manufacturing Professional Equipment Division, Canadian Radio Manufacturing Corp. Ltd., 11-17 Brentcliffe Rd., Toronto 17, Ont., Canada.
Born: September 12, 1904, London, England. B.A.Sc., 1928, University of Toronto. Director, 1949–50. Committees: Awards, 1952; Canadian Building Fund and Auditor, 1945; Members, 1951–52; Nominations, 1948–50; Radio Receivers, 1946–51. Sections: Toronto, *chairman, 1945–46.*

PRATT, Haraden (A'14—M'17—F'29), Telecommunications Advisor to the President of the United States, Room 4, Executive Office Bldg., Washington 25, D.C.
Born: July 18, 1891, San Francisco, Calif. B.S., 1914, University of California. President, 1938; Treasurer, 1941–42; Secretary, 1943–53; Director, 1935–53. Committees: Admissions, 1937; Annual Review, 1937; Appointments, *chairman, 1947;* Awards, 1937, *chairman, 1939,* 1940–41, 1944; *vice-chairman, 1945, chairman, 1948;* Board of Editors, 1941–53; Board of Directors, 1953; Building Fund Administrator, 1947–48; Constitution and Laws, 1941, 1951; Editorial Administrative, 1947–50; Executive, *vice-chairman, 1941–42, secretary, 1943–53;* Fiscal, *chairman, 1947,* 1948; Investments, 1944–46; New York Program, 1933, 1935, *chairman, 1936,* 1937; Joint Technical Advisory, 1948–49; Nominations, 1941–43; *chairman, 1936,* 1947, 1948, 1952; Office Quarters, 1947; Policy Development, *chairman, 1951;* Preparedness, *chairman, 1940–41;* Standardization, 1928–31; Technical Committee No. 2, Radio Transmitters and Antennas, 1930; Standards, 1932. *chairman, 1934–35;* 1936–37; Tellers, *chairman, 1936.* Institute Representative: ASA Sectional Committee (C42) on Definitions of Electrical Terms, 1930–46, 1949–51; ASA Board of Directors, 1939–41; ASA Sectional Committee on Radio, 1936–48; Joint Technical Advisory Committee, 1949–51. Radio Technical Planning Board, 1944, *chairman, 1945–48.* Awards: Medal of Honor, 1944.

PREISMAN, Albert (M'38—SM'43—F'53), Vice-President in charge of Engineering, Capitol Radio Engineering Institute, 3224 16th St. N.W., Washington 10, D.C.
Born: February 8, 1901, New York, N.Y. A.B., 1922; E.E., 1924, Columbia University. Committees: Admissions, 1942; Education, 1950–53; Membership, 1943–47; Papers Review, 1948–53.

PRESSLEY, Jackson H. (A'20—F'31), Consulting Engineer, 1036 San Diego Rd., Santa Barbara, Calif.
Born: June 7, 1896, Rio Vista, Calif. B.S.(E.E.), 1920, University of California. Committees: Radio Receivers, 1933.

PRICE, Lloyd M. (A'31—SM'46—F'49), Chief Engineer, Radio Valve Company of Canada, Ltd., 189 Dufferin St., Toronto 3, Ont., Canada.
Born: August, 1897, St. Thomas, Ont., Canada. B.A.Sc., 1923, University of Toronto. Committees: Electron Tubes, 1946–47. Sections: Toronto, *chairman, 1935–36, secretary, 1934.*

PRIEST, Conan A. (A'24—M'38—SM'43—F'47), Division Security Officer, Electronics Division, General Electric Company, Electronics Park, Syracuse, N.Y.
Born: August 11, 1900, Solon, Me. B.S.(E.E.), 1922; E.E. (Professional), 1925, University of Maine. Committees: Board of Editors, 1941–53; Board of Directors, 1953. Sections: Syracuse, *chairman, 1947.*

PUGSLEY, Donald W. (A'39—M'45—SM'46—F'52), Manager of Engineering, Parts Engineering, General Electric Co., Electronics Park, Syracuse, N.Y.
Born: December, 1912, Salt Lake City, Utah. B.S., in E.E., 1935, University of Utah. Committees: Television, 1945–48; Television Systems, 1949–52. Awards: Eta Kappa Nu, Most Outstanding Young Electrical Engineer (Hon. Ment.), 1944.

PUNCHARD, John C. R. (A'37—SM'45—F'53), Chief Engineer, Belleville Plant, Northern Electric Company, Ltd., 240 Sidney St., Belleville, Ontario, Canada.
Born: April 13, 1911, Toronto, Ontario, Canada. B.S., 1933, University of Toronto. Committees: Radio Transmitter, 1947–50. Sections: Montreal, *secretary, 1941–44, chairman, 1946–47.* Secretary, Canadian Council, I.R.E., 1947–53.

QUARLES, Lawrence R. (M'42—SM'43—F'52), Professor of Electrical Engineering, Thornton Hall, University of Virginia, Charlottesville, Va.
Born: January 26, 1908, Charlottesville, Va. B.S.E., 1929; Ph.D. (Physics), 1935, University of Virginia. Committees: Education, 1949–53. Sections: N.C.-Va., *chairman, 1946.*

RAJCHMAN, Jan A. (SM'46—F'53), Senior Research Engineer, RCA Laboratories, Princeton, N.J.
Born: August 10, 1911, London, England. Dipl.E.E., 1935; Dr. Sc., 1938, Swiss Federal Institute of Technology. Committees: Electronic Computers, 1948–53; Papers Review, 1950–52. Subcommittee on High Speed Storage Devices, *chairman, 1948;* Subcommittee on Static Storage Elements, 1952–53. Awards: Levy Medal, Franklin Institute, 1948.

RAMO, Simon (A'38—SM'44—F'50), Vice-President, Director of Operations, Hughes Aircraft Company, Culver City, Calif.; Research Associate, California Institute of Technology, Pasadena, Calif.
Born: May, 1913, Salt Lake City, Utah. B.S., 1933, University of Utah; Ph.D., 1936, California Institute of Technology. Committees: Board of Editors, 1946–53; Papers, 1941–45. Awards: Eta Kappa Nu Honorable Mention, 1941.

RANGER, Richard H. (F'37), President, Rangertone, Inc., 73 Winthrop St., Newark 4, N.J.
Born: June 13, 1889, Indianapolis, Ind. B.S., 1911, Massachusetts Institute of Technology. Committees: Meetings and Papers, 1928–30; New York Program, *chairman, 1930–32;* Papers, 1931–33.

RATCLIFFE, John A. (M'29—A'32—F'53), Cavendish Laboratory, Cambridge, England.
Born: December 1902, Bacup, Lancashire, England. M.A., 1927, Cambridge. Awards: Fellow of the Royal Society.

REICH, Herbert J. (A'26—M'41—SM'43—F'49), Professor of Electrical Engineering, Dunham Lab., Yale University, New Haven, Conn.
Born: October, 1900, Staten Island, N.Y. M.E., 1924; Ph.D. (Physics), 1929, Cornell University. Director, 1944, 1948–51. Committees: Administrative Committee of Professional Group on Electron Devices, 1952; Admissions, 1945–46; Appointments, 1950; Awards, 1948; Board of Editors, 1943–53; Constitution and Laws, 1949–50; Education, 1945–48, *chairman, 1949–51,* 1952–53; Electronics, 1941–45; Electron Tubes, 1945–48; Electron Tube Conference Committee, 1946, 1950, *chairman, 1951;* Electron Tubes and Solid-State Devices, 1949–52. Institute Representative: University of Illinois, 1941–43; Yale University, 1948–50. Awards: Fellow, American Physical Society.

REID, John D. (A'41—M'44—SM'46—F'49), Vice-President, American Radio and Television Inc., P.O. Box 328, N. Little Rock, Ark.
Born: March, 1907, Morristown, N.J. Attended University of Pennsylvania, 1925–28. Director, 1950–51. Committees: Awards, 1951–53; Board of Editors, 1947–51; Editorial Administrative, 1949–50; Membership, 1949–50; Papers Procurement, 1945–46, *chairman, 1948–49;* Papers Review, 1946; Policy Development, 1950–52; Professional Groups, 1948, 1950; Receivers, 1946–50, *vice-chairman, 1950–52.* Section: Cincinnati, *chairman, 1946–47.* Institute Representative: National Electronics Conference, Board of Directors, 1951. Awards: Presidential Certificate of Merit, 1948; Naval Ordnance Development Award, United States Navy, 1945.

REOCH, Alexander E. (M'14—F'16) (L'49), Retired. Kennebunkport, Me.
Born: April 27, 1884, Sheffield, England. E.E., 1902, Sheffield University College. Manager, 1925–27. Committees: Meetings and Papers, 1925; Standardization, 1925–26.

RETTENMEYER, Francis X. (A'26—M'29—SM'43—F'44), Executive Engineer, Philco Corp., Tioga & C Sts., Philadelphia 32, Pa.
Born: July 27, 1900, Kendrick, Okla. B.S.(E.E.), 1922, University of Colorado. Committees: Administrative Committee of the Board of Editors, 1950–53 Board of Editors, 1946–53; Membership, 1938–40; Papers, 1942–45; Papers Procurement, 1947–49; Public Relations, 1941–42; Publicity, 1939, Radio Receivers, 1936–37; Sections,

1936; Standardization: Technical Committee No. 1, Radio Receivers and Parts, 1929–30.

REUKEMA, Lester E. (A'30—SM'46—F'51), Professor of Electrical Engineering, 123 Cory Hall, University of California, Berkeley, Calif.
Born: August 31, 1891, Chicago, Ill. B.S., 1922; M.S., 1924; Ph.D., 1926, University of California. Sections: San Francisco, *secretary, 1946–47; vice-chairman, 1947–48; chairman, 1948–49.* Awards: Fellow, American Institute of Electrical Engineers, 1946.

RICE, Stephen O. (SM'47—F'53), Member of Technical Staff, Bell Telephone Laboratories, 463 West St., New York, N.Y.
Born: November, 1907, Shedds, Ore. B.S., 1929, Oregon State College. Committees: Papers Review, 1947.

RICHMOND, Harold B. (A'14—M'23—F'29), Chairman of the Board, General Radio Company, 275 Massachusetts Ave., Cambridge 39, Mass.
Born: March 22, 1892, Medford, Mass. S.B., 1914, Massachusetts Institute of Technology; D.Eng. (Honorary), 1947, Norwich University. Committees: Admissions, 1940; Nominations, 1940; Preparedness, 1940–41; Public Relations, 1947; Registration of Engineers, *chairman, 1940–43;* Standardization, 1928–30. Awards: Presidential Medal for Merit, 1947, Guided Missiles Development.

RICHTER, Walter (SM'44—F'53), Consulting Electrical Engineer, 5426 N. Kent Ave., Milwaukee 11, Wisconsin.
Born: May 17, 1900, Heidelberg, Germany. B.S., 1923, Institute of Technology. Committees: Definitions, 1952–53; Industrial Electronics, 1947–52; Papers Procurement, 1946; Professional Group on Instrumentation, Admissions Committee. Section: Milwaukee, Program Committee, *chairman, 1946.* Awards: Fellow, American Institute of Electrical Engineers, 1942.

ROBERTS, Walter van B. (A'22—F'29), President of Applied Science Corporation of Princeton, Box 44, Princeton, N.J.
Born: November 13, 1893, Titusville, Pa. B.S., 1915; E.E., 1917; Ph.D., 1924, Princeton University. Committees: Standardization, Subcommittee on the Use of the Transmission Unit, 1928.

ROCKWELL, Ronald J. (A'25—M'31—SM'43—F'45), Vice-President in Charge of Engineering, Crosley Broadcasting Corporation, 140 W. Ninth St., Cincinnati, Ohio.
Born: February 5, 1904, Omaha, Neb. B.S.(E.E.), 1927. Iowa State College; E.E. (Professional), 1946. Committees: Electroacoustics, 1951–52; Sections, ex-officio, 1938–39. Sections: Cincinnati, *chairman, 1938–39.* Vice President, Director of Engineering; I.R.E. Professional Groups.

ROETKEN, Alfred A. (A'29—M'40—SM'43—F'53), Research Engineer, Bell Telephone Laboratories, Inc., Mountain Ave., Murray Hill, N.J.
Born: October, 1902, Covington, Ky. B.S.(E.E.), 1927; M.S., 1929, Ohio State University.

ROSE, Albert (A'36—M'40—SM'43—F'48), Physicist; Engineer, RCA Laboratories Division, Radio Corporation of America, Princeton, N.J.
Born: March, 1910, New York, N.Y. A.B., 1931; Ph.D. (Physics), 1935, Cornell University. Awards: Morris Liebmann Memorial Prize, 1946; Television Broadcasters Association Award, 1945; Journal Award, Society of Motion Picture Engineers, 1946.

ROYDEN, George T. (A'19—M'27—F'33), Engineer, Mackay Radio and Telegraph Company, 67 Broad St., New York, 4 N.Y.
Born: June 20, 1895, Fort Clark, Tex. A.B., 1917, Engineer, 1924, Leland Stanford Junior University. Director, 1946. Committees: Admissions, 1941–42, *chairman, 1943–48;* Awards, 1946; Constitution and Laws, 1944, 1949; New York Program, 1938–42; Sections, 1941–45; Professional Groups, 1952–53; National Convention, 1946; Professional Group on Communications Systems, *chairman, 1952–53;* Convention Record, 1953. Sections: San Francisco, *chairman, 1933–34.* Awards: Sigma Xi.

RUSH, Walter A. (F'36) (L'49), Retired. 200 Rideau Terr., Ottawa, Ont., Canada.
Born: April 25, 1880, London, England. Vice-President, 1942; Director, 1942.

RUST, William M., Jr. (SM'47—F'53), Chief, Geophysics Research, 1200 Main, Houston 2, Tex.
Born: January, 1907, Liberty, Tex. B.A., 1928; M.A., 1929; Ph.D., 1931, The Rice Institute. Director, 1951–52. Committees: Awards, 1953; Professional Group, 1953. Awards: President, Society of Exploration Geophysicsts, 1945.

RYAN, Francis M. (J'14—A'17—M'26—F'40), Radio Engineer, American Telephone and Telegraph Company, 195 Broadway, New York 7, N.Y.
Born: February 4, 1895, Seattle, Wash. B.S.(E.E.), 1919, University of Washington. Committees: Admissions, 1939; Meetings and Papers, 1930; New York Program, 1930; Papers, 1931–36; Railroad and Vehicular Communication, 1945–46; Tellers, 1938. Institute Representative: Committee on Aeronautic Radio Research, Department of Commerce, 1930–31; Liaison Committee on Aeronautic Radio Research, 1936–37, 1939–41.

RYBNER, Jorgen C. F. (A'25—SM'47—F'53), Professor, Ostervoldgade 10 G, Copenhagen K, Denmark.
Born: November 26, 1902, Frederiksberg, Denmark. M.S.(E.E.), 1926, Royal Techn. Univ. of Denmark. Director, 1951. Awards: President, Danish National Committee of URSI, 1948.

RYDER, John D. (A'29—SM'45—F'52), Professor and Head of Electrical Engineering Dept., University of Illinois, Urbana, Ill.
Born: May 8, 1907, Columbus, Ohio. B.E.E., 1928; M.S., 1929, Ohio State University; Ph.D., 1944, Iowa State College. Director, 1952. Committees: Board of Directors, 1953; Papers Review, 1948–52, *chairman, 1953;* Education, 1945–46, 1949–52, *chairman, 1953;* Policy Advisory, 1952; AIEE-IRE Electron Tube Conference, *vice-chairman, 1951.*

SALINGER, Hans W. G. (A'37—SM'46—F'51), Research Physicist, Capehart-Farnsworth Corporation, 3700 East Pontiac St., Fort Wayne, Ind.
Born: April 1, 1891, Berlin, Germany. Ph.D., 1915, University of Berlin. Committees: Papers Procurement, 1947–50. Sections: Fort Wayne, *chairman, 1949–50.* Awards: Sigma Xi.

SALISBURY, Winfield W. (SM'44—F'47), Chief Physicist, Supervisor of Accelerated Research, California Research & Development Company, Livermore, Calif.
Born: December 27, 1903, Carthage, Ill. A.B., 1926, University of Iowa; D.S. (Honorary), 1950, Cornell College; 1951, Mackay Professor of Electrical Engineering, University of California. Committees: Education, 1946; Nuclear Studies, 1948; Papers Review, 1946; Railroad and Vehicular Communications, 1945–47.

SALZBERG, Bernard (J'25—A'30—M'38—SM'43—F'52), Associate Superintendent, Radio Division I, Naval Research Laboratory, Washington 25, D.C.
Born: July 22, 1907, New York, N.Y. E.E., 1929; M.E.E., 1933; D.E.E., 1941, Polytechnic Institute of Brooklyn. Committees: Electronics, 1943–44; Membership, 1939–46.

SAMUEL, Arthur L. (A'24—VA'39—SM'44—F'45), Manager of Research, International Business Machines Corporation, Poughkeepsie, N.Y.
Born: December 5, 1901, Emporia, Kan. A.B., 1923, College of Emporia; S.B., 1925; S.M., 1926, Massachusetts Institute of Technology; D.Sc. (Honorary), 1946, College of Emporia. Committees: Annual Review, 1950; Electronics, 1944–45; Electron Tubes, 1946–47; Electron Tubes and Solid-State Devices, 1949, *vice-chairman, 1950–51, chairman, 1951–52;* Research, 1949–50; Standards, 1951–52; Symbols, 1946–51; Vacuum Tubes, 1945; Papers Review, 1952–53. Sections: Mid Hudson Subsection, *chairman, 1951–52.* Awards: Paper Award, 1937.

SARNOFF, David (A'12—M'14—F'17), Chairman of the Board and Chief Executive Officer, Radio Corporation of America, 30 Rockefeller Plaza, New York, N.Y.
Born: February 27, 1891, Uzlian, Minsk, Russia. D.Sc. (Honorary), 1927, St. Lawrence University; D.Sc. (Honorary), 1935, Marietta College; D.Lit. (Honorary), 1935, Norwich University; D.C.S. (Honorary), 1938, Oglethorpe University; D.Sc. (Honorary), 1939, Suffolk University; LL.D. (Honorary), 1946, Jewish Theological Seminary; LL.D. (Honorary), 1946, Bethany College; D.C.S. (Honorary), 1948, Boston University; LL.D. (Honorary), 1950, John Carroll University; L.H.D. (Honorary), 1950, University of Louisville; D.Sc. (Honorary) Pennsylvania Military College, 1952; LL.D. (Honorary) University of Pennsylvania, 1952. Secretary, 1915–17; Director, 1915–17; Manager, 1918–20. Committees: Constitutional Amendments, 1915; Financial Matters, 1915; Increase of Membership, 1916–18; Publicity, 1915–16, *chairman, 1916–19;* Wave Length Regulation, 1916. Sections: San Francisco Representation, 1915. Awards: Grand Medal of Association des Ingenieurs-Docteurs of France, 1950; National Chairman, 1951, Red Cross Fund Campaign; Appointed Brigadier General, Honorary Reserve, Army of U. S., 1951; Honorary Life Member, Engineers Club of Philadelphia, 1952; Honorary Fellow, Weismann Institute of Science, Rehovoth, Israel, 1952; Member of Honor Société Française des Ingenieurs Techniciens du Vide, 1953.

SCHADE, Otto H. (M'40—SM'43—F'51), Staff Engineer, RCA Victor Division, Radio Corporation of America, 415 S. Fifth St., Harrison, N.J.
Born: April 27, 1903, Schmalkalden, Germany. Attended Technische Hochschule, Berlin-Carlottenburg, 1922–24. Awards: Modern Pioneer Award, National Association of Manufacturers, 1940; Morris Liebmann Memorial Prize, 1950; RCA Victor Award of Merit, Radio Corporation of America, 1946; David Sarnoff Gold Medal Award and Fellowship Award from Society of Motion Picture and Television Engineers, 1951.

SCHELKUNOFF, Sergei A. (A'40—F'44), Technical Staff, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: January 27, 1897, Samara, Russia. B.A., 1923; M.A., 1923, State College of Washington; Ph.D., 1928, Columbia University. Committees: Annual Review, 1947; Antennas, 1945–48; Antennas and Waveguides, 1949–51; Papers, 1942–45; Papers Review, 1946; Radio Wave Propagation and Utilization, 1945–46, *chairman, 1947;* Standards, 1947. Institute Representative: ASA Sectional Committee (C61) on Electric and Magnetic Magnitudes and Units, 1949–52. Awards: Franklin Institute Stuart Ballantine Medal, 1949; Morris Liebmann Memorial Prize, 1942.

SCHELLENG, John C. (A'23—M'25—F'28), Director of Radio Research, Bell Telephone Laboratories, Inc., Holmdel, N.J.
Born: November 12, 1892, Freeport, Ill. A.B., 1915, Cornell University. Committees: Annual Review, 1937; Antennas, 1944–48; Antennas and Waveguides, 1949–50; Awards, 1943; Handbooks, 1945; Radio Transmitters, 1945–47; Standardization, 1931; Subcommittee on Methods of Testing Apparatus, Equipment and Devices, 1929–30; Standards, 1936–37; Transmitters, 1944; Transmitters and Antennas, *chairman, 1936–37,* 1938–44. Institute Representative: ASA Definitions Co-ordinating Committee, 1948; ASA Sectional Committee on Definitions of Electrical Terms, 1948–50; ASA Subcommittee on Communications, *vice-chairman, 1948–51;* Joint IRE, AIEE, ASA (C42) Definitions Co-ordinating Committee, 1949–51.

SCHLEIMANN-JENSEN, Arne (A'45—SM'47—F'48), Owner and Director, Schleimann-Jensen Laboratoriet, Paternostervägen 13–17, Stockholm-Johanneshov, Sweden.
Born: July 27, 1906, Randers, Denmark. Radio and Telephone Course, Royal Technical University of Denmark, 1925–31.

SCHMIT, Dominic F. (A'25—M'38—SM'43—F'51), Vice-President and Director of Engineering, RCA Victor Division, Radio Corporation of America, Camden, N.J.
Born: August 30, 1902, Port Washington, Wis. B.S.(E.E.), 1923, University of Wisconsin.

SCOTT, Hermon H. (M'35—SM'43—F'52), President and Director of Engineering, Hermon Hosmer Scott, Inc., 385 Putnam Ave., Cambridge 39, Mass.
Born: March 28, 1909, Somerville, Mass. B.S., 1930; M.S., 1931, Massachusetts Institute of Technology. Committees: Audio Techniques, *vice-chairman, 1950–52;* Board of Editors, 1951–53; Electro-Acoustics, 1941–46. Sections: Boston, *vice-chairman, 1948–49; chairman, 1949–50.* Awards: John Potts Memorial Award, 1951; Fellow, Audio Engineering Society; Fellow, Acoustical Society of America.

SCOTT-TAGGART, John (A'18—F'35), Wynwood, Beaconsfield, Bucks., England.
Born: May 27, 1897, Bolton, Lancs., England.

SEELEY, Stuart W. (M'40—SM'43—F'43), Director, Industry Service Laboratory, RCA Laboratories Division, Radio Corporation of America, 711 Fifth Ave., New York 22, N.Y.
Born: June 23, 1901, Chicago, Ill. B.S.(E.E.), 1925, Michigan State College. Committees: Admissions, 1944–48; Awards, 1949; Board of Editors, 1947–53; Circuits, 1944–47; Modulation Systems, 1947–50; Professional Groups, 1948; Receivers, 1950–52. Awards: Morris Liebmann Memorial Prize, 1948.

SHACKELFORD, Benjamin E. (A'23—M'26—F'38), Director, License Department, RCA International Division, Radio Corporation of America, 30 Rockefeller Plaza, New York 20, N.Y.
Born: August 12, 1891, Richmond, Mo. A.B., 1912; A.M., 1913, University of Missouri; Ph.D., 1916, University of Chicago. President, 1948; Director, 1945–50. Committees: Appointments, 1948; Awards, 1941, 1943–44, 1950–51; Bibliography, *chairman, 1930,* 1931; Board of Directors, 1953; Board of Editors, 1937–40; Building Fund, *chairman, 1944–45;* Constitution and Laws, 1946, *chairman, 1947;* Convention Policy, 1947–50; Education, 1949; Executive, *chairman, 1948,* 1949; Frequency Modulation, 1942–45; Institute Sections, 1929–32, *chairman, 1933,* 1934; Meetings and Papers, 1929; National Convention, *chairman, 1944,* 1947; New York Program, 1941–42; Nominations, 1949–50; Papers, 1932–36; Papers Procurement, 1942–43; Planning, 1947; Policy Development, *chairman, 1949,* 1950; Professional Groups, 1950; Sections, 1943–45, 1949–50; Special Papers, *chairman, 1940–41;* Special Publications Fund, 1947; Standardization, 1943; Standards, 1932. Institute Representative: ASA Sectional Committee on Definition of Electrical Terms, Subcommittee on Vacuum Tubes, 1936, 1939–48; ASA Sectional Committee on Vacuum Tubes for Industrial Purposes, 1936, 1939–48.

SHANNON, Claude E. (S'36—M'48—SM'49—F'50), Research Mathematician, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: April, 1916, Petoskey, Mich. B.S.(E.E.), 1936, University of Michigan; S.M.(E.E.), 1940; Ph.D. (Mathematics), 1940, Massachusetts Institute of Technology. Institute Representative: IRE, AIEE Committee on Noise Definitions, 1949–50. Awards: Alfred Noble Prize, AIEE, 1940; Morris Liebmann Memorial Prize, 1949.

SHAW, Henry S. (A'17—M'21—F'35) (L'52), Retired. R.F.D. #1, Box 294-B, Westbrook, Me.
Born: November 29, 1884, Boston, Mass. A.B., 1906, Harvard University.

SHELBY, Robert E. (A'29—M'36—SM'43—F'48), Director of Color TV Systems Development Project, National Broadcasting Company, Inc., 30 Rockefeller Plaza, New York 20, N.Y.
Born: July 20, 1906, Austin, Tex. B.S.(E.E.), 1927; B.A., 1928; M.A. (Physics), 1929, University of Texas. Committees: Annual Review, 1950–51; Papers Procurement, 1947–50; Papers Review, 1948–51; Standards, 1951–52; Television, 1939–48; Television and Facsimile, 1938; Television Systems, *vice-chairman, 1949–51, chairman, 1951–52.*

SHEPHERD, James E. (A'36—SM'44—F'48), Director of Electronic Tube Engineering, Sperry Gyroscope Company, Inc., Lakeville Rd., Marcus Ave., Great Neck, L.I., N.Y.
Born: May 29, 1910, Houston, Tex. A.B. (Physics, E.E.), 1932; M.A.(E.E.), 1933, University of Missouri; M.S., 1935; D.Sc. (Communication Engineering), 1940, Harvard University. Director, 1948–50. Committees: Admissions, 1944; Awards, 1951–53; Constitution and Laws, *chairman, 1949;* Convention Policy, *chairman, 1947–48;* Membership, 1943; National Convention, *chairman, 1947;* Sections, *1947–48;* Tellers, 1946–47; Winter Technical Meeting, *vice-chairman, 1945–46.* Sections: New York, *secretary, 1944–45; vice-chairman, 1946–47; chairman, 1947–48.*

SHEPHERD, William G. (A'42—SM'49—F'52), Professor of Electrical Engineering Department, University of Minnesota, Minneapolis 14, Minn.
Born: August 28, 1911, Fort William, Ontario, Canada. B.S.(E.E.), 1933; Ph.D., 1937, University of Minnesota. Committees: Electron Tubes and Solid State Devices, 1951–52; Electron Tube Research Conference, *chairman, 1953.*

SHOUPP, William E. (SM'45—F'51), Director of Development, Westinghouse Atomic Power Division, P.O. Box 1468, Pittsburgh, Pa.
Born: October 5, 1908, Troy, Ohio. B.A., 1931, Miami University; M.A., 1933; Ph.D., 1937, University of Illinois. Committees: Nuclear Studies, 1948–51; Papers Procurement, 1949–50. Sections: Pittsburgh, *chairman, 1946–47.*

SILING, Philip F. (M'40—SM'43—F'51), Engineer-in-Charge, RCA Frequency Bureau, 30 Rockefeller Plaza, New York 20, N.Y.
Born: August 14, 1897, Oil City, Pa. Ph.B., 1917, Yale University. Committees: Nominations, 1946; Winter Technical Meeting, 1946. Institute Representative: Joint Technical Advisory Committee, 1948–53, *chairman, 1948–49.* Awards: Sigma Xi.

SILVERMAN, Daniel (A'42—SM'51—F'53), Exploration Research Director, Stanolind Oil and Gas Company, P.O. Box 591, Tulsa, Oklahoma.
Born: June 24, 1905, Montreal, Quebec, Canada. B.S., 1927, University of California; M.S., 1929; Sc.D., 1930, Massachusetts Institute of Technology. Committee: Papers Procurement, 1947–50. Section: Tulsa, *chairman, 1951–52.* Awards: Medallist, 1927; Heller Travelling Fellow, 1928–30, University of California.

SIMON, Emil J. (IRE Charter Mem.) (M'12—F'15) (L'41), Consulting Engineer, 50 Church St., New York 7, N.Y.
Born: October 25, 1888, New York, N.Y. Attended Columbia University, 1905–1909. Secretary, 1912–14; Director, 1912–14; Manager, 1915. Committees: Publicity, 1913, 1915; Specifications for Steamship Radio Equipment, 1914; Standardization, 1915.

SINCLAIR, Donald B. (J'30—A'33—M'38—SM'43—F'43), Chief Engineer, General Radio Company, 275 Massachusetts Ave., Cambridge 39, Mass.
Born: May 23, 1910, Winnipeg, Manitoba, Canada. S.B., 1931; S.M., 1932; Sc.D., 1935, Massachusetts Institute of Technology, President, 1952; Treasurer, 1949–50; Director, 1945–52. Committees: Admission, 1948; Antennas, 1944–46; Awards, 1951; Appointments, 1951; Board of Directors, 1945–53; Executive, 1948, *vice-chairman, 1949–50, chairman, 1952;* Finance, ex-officio, *treasurer, 1949–50,* 1952–53; Membership, 1947–48, 1950–53; Nominations, 1948–53; Papers, 1941–45; Papers Procurement, 1945–46; Planning, 1947; Radio Transmitters, 1945–46; Special Publication Fund, 1947; Television, 1940–46; Transmitters, 1944; Transmitters and Antennas, 1941–44. Institute Representative: Radio Technical Planning Board, 1945–46, *alternate, 1947–48.* Awards: President's Certificate of Merit, 1948; Fellow, AIEE; Sigma Xi.

SKIFTER, Hector R. (A'31—M'36—SM'43—F'51), President, Airborne Instruments Laboratory, Mineola, L.I., N.Y.
Born: March 4, 1901, Austin, Minn. B.A., 1922; Sc.D., 1945, Saint Olaf College. Committees: Navigation Research and Development Board, *chairman, 1950–51.* Awards: Presidential Certificate of Merit, 1947.

SLEPIAN, Joseph (SM'45—F'45), Associate Director of Research, Westinghouse Electric Corporation, East Pittsburgh, Pa.
Born: February 11, 1891, Boston, Mass. A.B., 1911; A.M., 1912; Ph.D., 1913, Harvard University; Dr. Eng. (Honorary), 1949, Case Institute of Technology. Awards: AIEE Award, 1933. Edison Medal, 1948, AIEE; Benjamin Garver Lamme Medal, 1942, AIEE; John Scott Medal, 1932.

SMITH, David B. (A'35—SM'44—F'48), Vice-President, Research, Philco Corporation, Tioga and C Sts., Philadelphia 34, Pa.
Born: December 3, 1911, Newton, N.J. S.B., 1933; S.M., 1934, Massachusetts Institute of Technology. Director, 1947. Committees: Frequency Modulation, 1940–46; IRE-RMA Problem No. 2 Committee; Membership, 1949–51; Public Relations, 1947–48; Special Publication Fund, 1947; Television, 1942–48; Television Systems, 1949–52. Sections: Philadelphia, *chairman, 1945–46.*

SMITH, Newbern (A'41—SM'46—F'52), Chief, Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D.C.
Born: January 21, 1909, Philadelphia, Pa. B.S. in Engineering, 1930; M.S. in Engineering, 1931; Ph.D. in Physics, 1935, University of Pennsylvania. Committees: Administrative Committee of the Board of Editors, 1951–53; Board of Editors, 1951–53; Professional Group on Antennas and Propagation, 1948–52, *chairman, 1952;* Standards, 1952; Wave Propagation, 1948–52, *chairman, 1952.*

SMITH, Phillip H. (A'34—SM'46—F'52), Technical Staff, Bell Telephone Laboratories, Inc., Morristown Rd., Whippany, N.J.
Born: April 29, 1905, Lexington, Mass. B.S. in E.E., 1928, Tufts College. Committees: Antennas, 1947–48, Sub-committee on Antennas, Methods of Testing, 1947–48; Antennas and Waveguides, 1949–52; Sub-committee on Antennas and Waveguides, Waveguides and Transmission Line Definitions, 1949–50, *chairman, 1951.*

SMITH-ROSE, Reginald L. (SM'44—F'44), Director of Radio Research, Department of Scientific and Industrial Research, Charles House, Regent St., London, W.1, England.
Born: April 2, 1894, London, England. B.Sc., 1914; M.Sc., 1922; Ph.D., 1923; D.Sc., 1926, Imperial College of Science and Technology. Vice-President, 1948; Director, 1948. Committees: Radio Wave Propagation, 1944–45; Radio Wave Propagation and Utilization, 1945–48; Wave Propagation, 1949, 1951–52. Awards: Student Premium, 1917; Wireless Premium, 1925, 1938, 1939; Dudell Premium, 1942, Institution of Electrical Engineers, London; Coronation Medal, 1937; United States Medal of Freedom with Silver Palm, 1947; Fellow, City and Guilds Institute, 1951; Commander of the Order of the British Empire, 1952.

SOUTHWORTH, George C. (M'26—F'41), Member of Technical Staff, Radio Research Engineer, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: August 24, 1890, Little Cooley, Pa. B.S., 1941, Grove City College; Ph.D., 1923, Yale University; Sc.D. (Honorary), 1931, Grove City College. Committees: Administrative Committee, Professional Group on Microwave Theory and Techniques; Meetings and Papers, 1930; Papers, 1931–34; Standardization, Circuit Elements, 1928. Awards: Louis Levy Medal, Franklin Institute, 1946; Stuart Ballantine Medal, Franklin Institute, 1947; Morris Liebmann Memorial Prize, 1938.

SPANGENBERG, Karl R. (A'34—SM'45—F'49), Professor of Electrical Engineering, Stanford University, Stanford, Calif.
Born: April 1910, Cleveland, Ohio. B.S.(E.E.), 1932; M.S.(E.E.), 1933, Case Institute of Technology; Ph.D., 1937, Ohio State University. Committees: Awards, 1950; Education, 1946, 1949–51; Membership, 1941; Papers, 1943–45; Papers Procurement, 1942–43, 1945; Regular Papers, 1941. Institute Representative: Stanford University, 1942–47. Sections: San Francisco, *secretary, 1940–42, chairman, 1943–44.*

STEEL, W. Arthur (M'19—SM'43—F'50), Engineering Consultant, Federal Electric Manufacturing Company, Ltd., 9600 St. Lawrence Blvd., Montreal, P.Q., Canada.
Born: November, 1890, Castleton, Ont., Canada. B.A.Sc., 1915, Toronto University. Committees: Broadcast, 1936. Sections: Ottawa, *chairman, 1945–46.*

STEEN, Jerome R. (A'36—M'36—SM'43—F'50), Director of Quality Control, Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y.
Born: June 29, 1901, West Bloomfield, N.Y. B.S.(E.E.), 1923, University of Wisconsin. Committees: Annual Review, 1948; Electronics, 1944–45; Electron Tubes, 1946–47; Instruments and Measurements, 1949–53; Papers Review, 1948–53; Professional Groups, 1951–52; Standards, 1948–51; Symbols, 1945–47; Vacuum Tubes, 1945–46. Institute Representative: ASA (C67) Committee, 1951. Awards: Fellow, American Society for Quality Control.

STERLING, George E. (M'41—SM'43—F'49), Commissioner, Federal Communications Commission, 7241 New Post Office Bldg., Washington 25, D.C.
Born: June, 1894, Peak's Island, Me.

STEVENS, Archie M. (A'12—M'25—F'31) (L'53), Radio Engineer, Sales Division, Federal Telephone and Radio Corporation, 100 Kingsland Rd., Clifton, N.J.
Born: September 22, 1887, Glidden, Iowa. A.B., 1909, Leland Stanford Junior University. Sections: Buenos Aires, *chairman, 1940.*

STONE, Ellery W. (A'14—M'16—F'24), Rear Admiral, United States Naval Reserve; President and Director, American Cable and Radio Corporation; President and Director, All America Cables and Radio, Inc.; President and Director, The Commercial Cable Co.; President and Director, Mackay Radio and Telegraph Co.; Vice-President and Director, International Telephone and Telegraph Corporation, 67 Broad St., New York, N.Y.
Born: January 14, 1894, Oakland, Calif. Committees: Meetings and Papers, 1930; Membership, 1925. Awards: Grand Officer, Crown of Italy, 1944; Knight Commander, British Empire, 1945; Knight of Grand Cross of St. Maurice and St. Lazarus, Italian Government, 1945; United States Army Distinguished Service Medal, 1945; Knight of Grand Cross, San Marino, 1946; United States Navy Distinguished Service Medal, 1946; Marconi Medal of Achievement, VWOA, 1953.

STRAITON, Archie W. (M'47—SM'49—F'53), Professor of Electrical Engineering and Director, Electrical Engineering Research Laboratory, Department of Electrical Engineering, The University of Texas, Austin, Texas.
Born: August, 1907, Arlington, Texas. B.S.(E.E.), 1929; M.A., 1931; Ph.D., 1939, The University of Texas. Director, 1953. Committees: Board of Editors; Nominations, 1953; Policy Advisory, 1953; Wave Propagation, 1949–53. Institute Representative: The University of Texas, 1947–50.

STRATTON, Julius A. (M'42—SM'43—F'45), Provost, and Vice-President, Massachusetts Institute of Technology, Cambridge 39, Mass.
Born: May 18, 1901, Seattle, Wash. S.B., 1923; S.M., 1925, Massachusetts Institute of Technology; Sc.Dd., 1927, Technische Hochschule, Zurich, Switzerland. Director, 1948–51. Committees: Annual Review, 1945–46; Appointments, 1948; Board of Editors, 1946–53; Education, 1945; International Liaison, 1949; Membership, 1947; Policy Development, 1949–51; Radio Wave Propagation and Utilization, 1945, 1947, *chairman, 1946,* 1947–48; Standards, 1945–46. Awards: Presidential Medal for Merit, 1946.

STRONG, Charles E. (A'25—M'27—SM'43—F'49), Chief Radio Engineer, Standard Telephones and Cables Ltd., Oakleigh Rd., New Southgate, N. 11, London, England.
Born: November, 1898, Omagh, Tyrone County, Northern Ireland. B.A., 1922, Trinity College; B.Al., 1922, University of Dublin; A.M., 1933; M., 1937, The Institution of Electrical Engineers. Awards: Officer of the Order of the British Empire, 1947.

SWINYARD, William O. (A'37—M'39—SM'43—F'45), Chief Engineer, Hazeltine Research, Inc., 325 W. Huron St., Chicago 10, Ill.
Born: July 17, 1904, Logan, Utah. B.S., 1927, Utah State College. Director, 1945–46. Committees: Annual Review, 1948–49; Education, 1945–48; National Convention, 1947; Radio Receivers, *chairman, 1946–48,* 1949–52; Receivers, 1949–53; Sections, 1945, *chairman, 1946–47,* 1948–50; Standards, 1947–48. Sections: Chicago, *chairman, 1944–45;* secretary, *1943–44.*

SZEGHO, Constantin S. (A'41—SM'51—F'52), Director of Research, The Rauland Corp., 4245 N. Knox Ave., Chicago 41, Ill.
Born: March 15, 1905, Hungary. Dr. of Engineering, 1932, Institute of Technology, Aachen, Germany; E.E., 1928, Institute of Technology, Munich. Committees: Papers Review, 1952–53.

TANK, Franz (A'31—F'49), Professor of High-Frequency Technics and Physics, Swiss Federal Institute of Technology, Sternwartstrasse 7, Zurich, Switzerland.
Born: March, 1890, Zurich, Switzerland, Ph.D., 1915, University of Zurich; Professor, Swiss Federal Institute of Technology, 1922; Rector, Swiss Federal Institute of Technology, 1943–47; President, Swiss Electrotechnical Institution, 1952.

TAYLOR, A. Hoyt (M'16—F'20) (L'51), Retired. 745 West 12th St., Claremont, Calif.
Born: January 1, 1879, Chicago, Ill. B.S., 1902, Northwestern University; Ph.D., 1909, University of Göttingen, Germany. President, 1929; Director, 1929–31. Committees: Awards, 1928–31. Meetings and Papers, 1928; Sections, 1928. Section: Washington, *chairman, 1919–28.* Awards: John Scott Medal and Premium, Board of City Trustees, Philadelphia, 1942; Medal of Merit, President of the United States, 1944; Morris Liebmann Memorial Prize, 1927; Medal of Honor, 1942.

TAYLOR, Charles H. (M'13—F'15) (L'48), 390 Riverside Dr., New York 25, N.Y.
Born: August 22, 1875, Uxbridge, Middlesex, England. Committees: Antenna Terminology, *chairman, 1924–25;* Membership, 1925; Sections, 1925; Standardization, 1915–21, 1924–25.

TEARE, Benjamin R., Jr., (A'41—SM'45—F'51), Dean, College of Engineering and Science, Carnegie Institute of Technology, Pittsburgh, Pa.
Born: January, 1907, Menomonie, Wis. B.S.(E.E.), 1927; M.S., 1928, University of Wisconsin; D.Eng., 1937, Yale University. Committees: Education, 1944. Sections: Pittsburgh, *chairman, 1943–44.* Institute Representative: Carnegie Institute of Technology, 1944–45. Awards: George Westinghouse Award, American Society for Engineering Education, 1947.

TERMAN, Frederick E. (A'25—F'37), Dean, School of Engineering, Stanford University, Stanford, Calif.
Born: June 7, 1900, English, Ind. A.B., 1920; Engineer, 1922, Stanford University; Sc.D., 1924, Massachusetts Institute of Technology; Sc.D. (Honorary), 1945, Harvard University, and University of British Columbia, 1950. President, 1941; Vice-President, 1940; Director, 1940–43, 1948–49. Committees: Admissions, 1940; Annual Review, 1946–47; Appointments, 1949; Awards, 1940, 1942–43; Constitution and Laws, 1944–47; Education, 1949, 1950; Handbook, 1945–47; Membership, 1939–40, *chairman, 1942,* 1949–50; Nominations, 1943, 1948–49, 1953, *chairman, 1951;* Policy Development, 1948–50; Professional Groups, 1948; Research, *chairman, 1945–48;* Standards, 1934–40, 1946. Sections: San Francisco, *secretary, 1931–32; chairman, 1939, 1951;* Institute Representative: Stanford University, 1941; National Research Council, Division of Engineering and Research, 1943–46.

THAYER, Gordon N. (SM'47—F'51), Vice-President, Bell Telephone Laboratories, Inc., 463 West St., New York 14, N.Y.
Born: October 6, 1908, Delta, Colo. Stevens Institute of Technology, 1926–30; ME, 1946.

THOMAS, Henry P. (A'34—VA'39—M'44—SM'47—F'51), Engineer, General Electric Company, Electronics Park, Syracuse, N.Y.
Born: May, 1904, Boston, Mass. B.A., 1925; M.S., 1927, Harvard University. Committees: Papers Review, 1946–52; Radio Wave Propagation, 1942–45; Wave Propagation, 1940–41. Awards: Coffin Award, General Electric Company, 1948.

TINUS, William C. (A'31—M'36—SM'43—F'51), Director of Military Electronics, Bell Telephone Laboratories, Inc., Whippany, N.J.
Born: October, 1905, Chicago, Ill. B.S.(E.E.), 1928, Texas Agricultural and Mechanical College. Committees: Board of Editors, 1946–53.

TOWN, George R. (A'37—SM'44—F'50), Associate Director of the Engineering Experiment Station; Professor of Electrical Engineering, Iowa State College, 104 Marston Hall, Ames, Iowa.
Born: May 26, 1905, Poultney, Vt. E.E., 1926; D.Engr., 1929, Rensselaer Polytechnic Institute. Director, 1949, 1951–53. Committees: Appointments, 1952; Awards, 1948–49; Board of Directors, 1949, 1951, 1953; Education, 1945–48; Frequency Modulation, 1946; Membership, 1953; Papers Procurement, 1947–50. Sections: Rochester, *secretary, 1942–44, chairman, 1944–46.*

TRAVIS, Irven (SM'46—F'53), Vice-President of Research, Burroughs Adding Machine Company, 511 North Broad St., Philadelphia 23, Pa.
Born: March, 1904, McConnellsville, Ohio. B.S.(E.E.), 1926, Drexel Institute of Technology; M.S.(E.E.), 1928; Sc.D.(E.E.), 1938, University of Pennsylvania. Section: Philadelphia, *vice-chairman, 1933–34.* Awards: Commendation, U. S. Navy 1946; Alumni Citation, Drexel Inst. of Technology.

TREVOR, Bertram A. (A'29—M'38—SM'43—F'53), Engineer, RCA Laboratories Division, Princeton, N.J.
Born: February, 1906, Ithaca, N.Y. E.E., 1928, Cornell University. Committees: Membership, 1943–46; Modulation Systems, 1946–51; Papers Review, 1946–53; Standards, 1950. Awards: Tau Beta Pi; Eta Kappa Nu, 1927; Sigma Xi, 1951.

TURNER, Hubert M. (A'14—M'30—F'37) (L'49), Associate Professor, Emeritus, of Electrical Engineering, Yale University, New Haven, Conn.
Born: July 20, 1882, Hillsboro, Ill. B.S., 1910; M.S., 1915, University of Illinois. President, 1944; Director, 1933–46. Committees: Admissions, 1936, 1939–40, *chairman, 1941–42*, 1943; Annual Review, 1937–39, 1943–44; Awards, *chairman, 1934*, 1938–39; *chairman, 1940*, 1941; Bibliography, 1930–31; Circuit Elements, *chairman, 1927–28;* Constitution and Laws, *chairman, 1936–40*, 1941–43; Executive, *chairman, 1944;* Investments, 1944–46; Meetings and Papers, 1929; Nominations, 1938, 1941, *vice-chairman, 1945;* Papers, 1932–44; Papers Procurement, 1942–43; Preparedness, 1940–41; Regular Papers, 1941; Sections, 1952; Standardization, 1926–31; Standards, 1932–37, 1940–47; Symbols, *chairman, 1940–44*, 1946–48; Tellers, 1940. Institute Representative: Yale University, 1941–47; United States National Committee of the International Electrotechnical Commission, 1944–48, Technical Advisor, U. S. National Committee, International Electrotechnical Commission, Letter Symbols, 1946–53; Chief Delegate, United States National Committee Letter Symbols for Electrical Quantities, Paris, France, 1950; United States Paper Committee World Power Conference, London, 1950; ASA Sectional Subcommittee on Letter Symbols for Radio, 1936, 1939–49; Electrical Standards Committee, 1939–46; Sectional Committee on Specifications for Dry Cells and Batteries, 1936–53; Subcommittee on Communication Symbols of Sectional Committee on Graphical Symbols and Abbreviations for Use on Drawings, 1939–48. Chairman, ASA Sectional Committee on Letter Symbols and Abbreviations for Science and Engineering, 1940–52.

TUTTLE, W. Norris (A'26—SM'46—F'49), Engineering Consultant, General Radio Company, 275 Massachusetts Ave., Cambridge 39, Mass.
Born: March 29, 1902, Croton-on-Hudson, N.Y. A.B., 1924; S.M. (Electrical Communication Engineering), 1926; Ph.D. (Physics), 1929, Harvard University. Committees: Annual Review, 1949–51; Circuits, 1944–48, *chairman, 1949–51*, 1951–52; Education, 1953; Papers Review, 1948-52; Policy Development, 1948–50; Standards, 1949–51.

TUVE, Merle A. (A'45—F'45), Director, Department of Terrestrial Magnetism, Carnegie Institution of Washington, 5241 Broad Branch Rd., N.W., Washington 15, D.C.
Born: June 27, 1901, Canton, S.D. B.S., 1922; A.M., 1923, University of Minnesota; Ph.D., 1926, The Johns Hopkins University; D.Sc., 1948, Case Institute; D.Sc., 1949, Kenyon College; D.Sc., 1949, Williams College; D.Sc., 1950, Johns Hopkins University. Awards: Fellow, American Physical Society; American Academy of Arts and Sciences; Member, National Academy of Sciences, American Philosophical Society; Vice-President, American Association for the Advancement of Science, 1947; American Association for the Advancement of Science Prize (with L. R. Hatstad and O. Dahl), 1931; Presidential Medal for Merit, 1946; Research Corporation Award, 1947; John Scott Award, 1948; Comstock Prize, 1949; C.B.E., 1949.

ULLRICH, Edward Hill (M'26—F'39), Standard Telephones and Cables, Ltd., Ilminster, Somerset, England.
Born: December 8, 1894, Cardiff, Wales. Mechanical Sciences Tripos 1921, Christ's College. Committees: Membership, 1927. Awards: Institution Premium, Institution of Electrical Engineers, 1936.

ULREY, Dayton (A'28—M'40—SM'43—F'50), Consultant, RCA Victor Division, Radio Corporation of America, Harrison, N.J.
Born: September, 1884, North Manchester, Ind. B.A., 1911; M.A., 1912, Indiana University; Ph.D., 1917, Stanford University. Committees: Electronics, 1936–37; Papers, 1940–45; Papers Review, 1946–50, 1952.

VAN ATTA, Lester C. (M'42—SM'43—F'52), Head, Microwave Laboratory, Hughes Aircraft Co., Culver City, Calif.
Born: April 18, 1905, Portland, Ore. B.A., 1927, Reed College; M.S., 1929; Ph.D., 1931, Washington University. Committees: Antennas, 1945–47, *vice-chairman, 1948;* Antennas and Waveguides, *chairman, 1949–50*, 1950–51; Awards, 1953; Membership, 1953; Papers Review, 1951–53; Professional Groups, 1951–52, *vice-chairman, 1953;* Professional Group on Antennas and Propagation, Administrative Committee, *chairman, 1949–50*, 1950–52; Research, 1946–47; Standards, 1949–51. Sections: Los Angeles, Professional Group Coordinator, 1951–52.

VAN DER POL, Balthasar (M'52—F'29), Director, International Radio Consultative Committee, (C.C.I.R.), Palais Wilson, Geneva, Switzerland.
Born: January 27, 1889. D.Sc., 1919, Utrecht. Vice-President, 1934; Director, 1934. Committees: Electronics, 1936–40; Meetings and Papers, 1929; Wave Propagation, 1937–39. Awards: Honorary Member, Netherlands Radio Society, 1920; Knight, Order of the Orange Nassau, 1927; Medal of Honor, Institute of Radio Engineers, 1935; Knight, Order of the Netherlands Lion, 1946; Valdemar Poulsen Gold Medal, Danish Academy of Technical Sciences, 1953.

VAN DYCK, Arthur F. (IRE Charter Mem.) (A'12—M'18—F'25), Staff Assistant to Vice-President and Technical Director, Radio Corporation of America, 30 Rockefeller Plaza, New York 20, N.Y.
Born: May 20, 1891, Stuyvesant Falls, N.Y. Ph.B., 1911, Yale University. President, 1942; Manager, 1930–32; Director, 1932–35, 1939–44. Committees: Admissions, 1930–31, *chairman, 1932–33* 1934, 1937–39, *chairman, 1940*, 1943; Annual Review, *chairman, 1937–39*, 1943–44; Awards, 1934, 1940, 1952–53, Bibliography, 1930–32; Constitution and Laws, 1933–34, 1943; Executive, *chairman, 1942*, 1943; Nominations, 1932, 1951; New York Program, *chairman, 1934*, 1935, 1939–40; Papers, 1940; Papers Procurement, 1942–43; Public Relations, 1940, *chairman, 1941*, 1943–46; Registration of Engineers, 1940; Regular Papers, 1941; Research, 1946–47; Standards, 1933–35; Tellers, 1932–33, *chairman, 1936*. Institute Representative: ASA Sectional Committee on Preferred Numbers, 1936, 1939–51; ASA Sectional Committee on Preferred Voltages, 100 Volts and under, 1949–50. Awards: Modern Pioneer Award, National Association of Manufacturers, 1940; Legion of Merit, 1946.

VAN DYKE, Karl S. (A'15—M'26—SM'43—F'44), Professor of Physics, Wesleyan University, Scott Laboratory, Middletown, Conn.
Born: December 8, 1892, Brooklyn, N.Y. B.S., 1916; M.S., 1917, Wesleyan University; Ph.D., 1921, University of Chicago. Committees: Admissions, 1929; Annual Review, 1941–51; Board of Editors, 1933–40, 1947–51, 1953; Meetings and Papers, *chairman, 1929*, 1930; Membership, 1942–47; Papers, 1932–33, 1944–45; Papers Procurement, 1945–48; Papers Review, 1946; Piezoelectric Crystals, *chairman, 1940–41*, 1942–43, 1945–49, *chairman, 1949–51*, 1951–52; Standards, 1941, 1949–51. Sections: Connecticut Valley, *secretary-treasurer, 1927, chairman, 1934–35.*

VARIAN, Russel H. (A'40—SM'51—F'52), President, Varian Associates, 611 Hansen Way, Palo Alto, Calif.
Born: April 24, 1898, Washington, D.C. A.B., 1925, Stanford University; M.A., 1927. Stanford University; Dr. Eng. (Honorary), 1943, Polytechnic Institute of Brooklyn. Awards: John Price Wetherill Medal, Franklin Institute, 1950.

WAGNER, Karl Willy (F'51), Professor Dr., Dr.-Ing., Hauptstrasse 61, Friedrichsdorf i. Taunus, Germany.
Born: February 22, 1883, Friedrichsdorf i. Taunus, Germany. Dr. Phil., 1910, University Göttingen, Germany; Dr.-Ing. h. c., 1921, Technische Hochschule Darmstadt. Awards: Member of the Academy of Sciences, Berlin, 1925; Honorary Fellow, (Ehrenbuerger), 1925, Technische Hochschule Karlsruhe; Foreign Honorary Member, 1931, American Academy of Arts and Sciences; Cedergren Gold Medal, Tekniska Hogskolan, Stockholm, 1919; Heinrich-Hertz-Gold Medal, Heinrich-Hertz Society for the Advancement of Radio, Berlin, 1929; Gauss-Weber-Medal, University of Göttingen, 1933; Corresponding Member of the Royal Sweden Academy of Engineering Sciences, 1935, Stockholm; Honorary Member of the Acoustical Society of Sweden, 1947; President of the Academy of Sciences and Literature, Mainz, 1949; Foreign Member of the Accademia dei Lincei, Rome, 1951; Honorary Senator of the Technical University, Berlin, 1953.

WARNECKE, Robert R. (SM'48—F'50), Technical Director, Electronics Department, Centre de Recherches de la Compagnie Générale de Télégraphie Sans Fils, 23, Rue du Maroc, Paris, France.
Born: November, 1906, Tours, France. Doctor, 1933, University of Paris. Awards: Henri Becquerel Prize, Academy of Sciences of Paris, 1945; Ancel Prize, French Society of Electricians, 1943; Silver Medal, General Syndicate of Electrical Construction, 1948; Blondel Medal, 1951; D'Aumale Prize, Academy of Sciences of Paris, 1952; Member of the French Society of Physics, of the French Society of Electricians, of the Society of Radioelectricians (President of the "Microwaves Section").

WATSON-WATT, Sir Robert (SM'46—F'47), Governing Director, Sir Robert Watson-Watt and Partners, Ltd., 7 Gayfere St., London, S.W. 1, England.
Born: April 13, 1892, United Kingdom. B.S., 1912; LL.D., 1942, University of St. Andrews, Dundee; D.Sc. (Honorary), 1943, University of Toronto. Vice-President, 1950; Director, 1950.

WEBER, Ernst (M'41—SM'43—F'51), Director, Microwave Research Institute; Professor and Head, Department of Electrical Engineering, Polytechnic Institute of Brooklyn, 85 Livingston St., Brooklyn 2, N.Y.
Born: September 6, 1901, Vienna, Austria. Dipl. Eng.(E.E.), 1924, Technical University, Vienna; Ph.D., 1926, University of Vienna; Sc.D., 1927, Technical University. Director, 1952–54. Committees: Annual Review, 1950–51; Awards, 1952, *chairman, 1953;* Board of Editors, 1949–51, 1953; Board of Directors, 1953; Circuits, 1949–52; Education, 1944–51; Finance, 1952; Instruments and Measurements, *chairman, 1949–51*, 1951–52; Membership, 1941–48; Policy Advisory, 1952; Professional Groups, 1953; Professional Group: Instrumentation, *chairman, 1950–52;* Standards, 1949–51, *vice-chairman, 1951–52*. Awards, Fellow, AIEE; Fellow, American Physical Society; President's Certificate of Merit, 1948.

WEBSTER, Edward M. (A'30—M'38—SM'43—F'44), Commissioner, Federal Communications Commission, Washington 25, D.C.
Born: February 28, 1889, Washington, D.C. Director, 1946. Committees: Membership, 1940; Public Relations, 1945–46. Sections, Washington, *secretary, 1940, chairman, 1942.*

WEINBERGER, Julius (A'13—F'25), Staff Member, RCA Laboratories Division, Radio Corporation of America, 711 Fifth Ave., New York 22, N.Y.
Born: July 22, 1893, New York, N.Y. B.S., 1913, College of the City of New York. Committees: Industrial Electonics, 1946–52; Meetings and Papers, 1929; Research, 1946–47. Awards: Modern Pioneer Award, National Association of Manufacturers, 1940.

WEIR, Irvin Reed (A'25—M'41—SM'43—F'49), Manager, Engineering Administration C and G.E. Department, General Electric Company, Electronics Park, Syracuse, N.Y.
Born: September, 1897, Prarie Creek, Ind. B.S., 1921; E.E. (Professional), 1932, Rose Polytechnic Institute. Committees: Annual Review, 1950–52; Antennas, 1944–45; Radio Transmitters, 1945–52; Transmitters, 1944–45.

WELLS, Harry W. (M'36—SM'43—F'53), Chairman, Upper Atmosphere Section, Carnegie Institution of Washington, Dept. of Terr. Magnetism, 5241 Broad Branch Pl., Washington 15, D.C.
Born: January 13, 1907, Washington, D.C. B.S.(E.E.), 1928; E.E., 1937, University of Maryland. Committees: Annual Review, 1950–51; Awards, 1953; Professional Group, Antennas and Propagation, Editor, 1951–52; Radio Wave Propagation & Utilization 1945–47; Standards, 1953; Wave Propagation, 1949–50, *vice-chairman, 1951–52*. Sections: Washington, *secretary, 1948, vice-chairman, 1949, chairman, 1950*. Awards: Scientific Achievement, Washington Acad. of Sciences, 1947.

WENDELL, Edward N. (A'26—M'33—SM'43—F'47), Managing Director, Compania Standard Electric Argentina, Calle Uruguay 1037, Buenos Aires, Argentina.
Born: August 11, 1903, Rockport, Mass. B.Sc., 1925, Massachusetts Institute of Technology.

WHEELER, Harold A. (A'27—M'28—F'35), Consulting Radio Physicist; President, Wheeler Laboratories, Inc., 122 Cutter Mill Rd., Great Neck, L.I., N.Y.
Born: May 10, 1903, St. Paul, Minn. B.S. (Physics), 1925, George Washington University. Director, 1934, 1940–45. Committees: Annual Review, 1937, 1940–48; Awards, 1942, *chairman, 1943*, 1944; Bibliography, 1930–32; Board of Editors, 1940–53; Broadcast, 1935–37; Circuits, 1944–46; Editorial Administrative, 1949–52; Executive, 1943–44; Handbook, *chairman, 1945–47;* Meetings and Papers, 1929–30; Membership, 1941–42; New York Program, 1931; Nominations, 1948; Paper, 1931–33; 1935–39; Papers Procurement, 1942–44; Professional Recognition, 1947; Public Relations, 1940; Radio Receivers, 1936, *chairman, 1937;* Regular Papers, 1941; Special Papers, 1940–41; Standardization, 1931; Subcommittee on Electroacoustic Devices, 1927–28; Technical Committee No. 4 on Electoacoustic Devices, 1930; Standards, 1932, 1936–39, *chairman, 1940–45*, 1945–48; Symbols, 1946. Sections: Long Island Subsection, *chairman, 1948–49*. Institute Representative: ASA Sectional Committee on Definitions of Electrical Terms (C-42), 1948, 1950–51; National Television Systems Committee, *alternate, 1940–43*. Awards: Fellow, AIEE; Radio Club of America; Associate, I.E.E.; Modern Pioneer Award, National Association of Manufacturers, 1940; Morris Liebmann Memorial Prize, 1940; United States Navy Certificate of Commendation, 1947.

WHEELER, Lynde P. (F'28), Vice-President, Pickard and Burns, Inc., 240 Highland Ave., Needham 94, Mass.
Born: July 27, 1874, Bridgeport, Conn. Ph.B., 1894; Ph.D., 1902, Yale University. President, 1943; Director, 1940–45. Committees: Bibliography, 1930–32; Board of Editors, 1930–32; Executive, *chairman, 1943;* Frequency Modulation, 1940–45; Meetings and Papers, 1929–30; Membership Solicitation Policy, 1945; Nominations, 1939, 1942, 1944; Papers, 1931–32, 1934; Papers Procurement, 1942–43; Public Relations, 1945–46; Regular Papers, 1941; Standardization Subcommittee on Circuit Elements, 1928. Sections: Washington, *chairman, 1930–32*. Institute Representative: RMA-IRE Co-ordinating, 1943.

WHINNERY, John R. (A'41—SM'44—F'52), Professor of Electrical Engineering, University of California, 232 Cory Hall, Berkeley 4, Calif.
Born: July 26, 1916, Read, Delta County, Colo. B.S., 1937; Ph.D., 1948, University of California. Committees: Antennas, 1948; Awards, 1952; Board of Editors, 1946–53; Handbook, 1945–47; Papers, 1944–45; Papers Procurement, 1947–50. Sections, San Francisco, *secretary-treasurer, 1949–50, vice-chairman, 1951*, 1952–53.

WHITE, William C. (A'15—M'25—F'40), Electronics Engineer, Research Laboratory, General Electric Company, P.O. Box 1088, Schenectady, N.Y.
Born: March 24, 1890, Brooklyn, N.Y. E.E., 1912, Columbia University. Treasurer, 1946; Director, 1943–47. Committees: Awards 1944, *chairman, 1945*, 1946; Bibliography, 1930–32; Board of Editors, 1930, 1944, 1946–53; Education, 1945–46; Executive, *vice-president, 1946;* Investments, *chairman, 1946;* Meetings and Papers, 1928–30; Membership, 1947–52, *chairman, 1953;* Nominations, 1933, 1940, 1944–46; Office Practices, 1947; Papers, 1931–44; Papers Procurement, 1944–50; Professional Recognition, *chairman, 1947;* Standardization, 1925, 1929–30; Subcommittee on Vacuum Tubes, 1927–28. Institute Representative: National Electronics Conference Board of Directors, 1947–50.

WHITTEMORE, Laurens E. (A'16—M'25—F'27), Staff Engineer, American Telephone and Telegraph Company, 195 Broadway, New York, N.Y.
Born: August 20, 1892, Topeka, Kan. A.B., 1914, Washburn College; M.A., 1915, University of Kansas. Vice-President, 1928; Manager, 1926–27, 1929; Director, 1928, 1935–37. Committees: Administrative, Board of Editors, 1951–52; Annual Review, 1937–39, *chairman, 1940–49*, 1950–52; Awards, 1937, 1948; Bibliography, 1930–32; Board of Editors, 1929–52; Broadcast, 1933; Editorial Administrative, 1946–52; Institute Sections, *chairman, 1926;* Meetings and Papers, 1929; Membership, *chairman, 1925;* Standardization, 1920–25, *chairman, 1926–29*, 1929–31; Subcommittee on Direction Finding Terminology, *chairman, 1924–25;* Subcommittee on Electroacoustic Devices, 1927–28; Standards, 1932–35; 1944–52; Symbols, *chairman, 1944;* Tellers, 1934. Institute Representative: ASA Sectional Committee on Graphical Symbols and Abbreviations for Use on Drawings, 1939; ASA Sectional Committee on Radio, 1930, 1936, 1939–48; ASA Sectional Committee on Radio Electrical Co-ordination, 1936, 1939–46; ASA Sectional Committee on Standards for Drawings and Drafting Room Practices, 1930, 1936, 1939; ASA Subcommittee on Electrical Abbreviations, Including Radio, 1930; United States National Committee on Advisors on Symbols, 1936, 1939–51.

WIESNER, Jerome B. (S'36—A'40—SM'48—F'52), Professor and Director, Research Laboratory of Electronics, Massachusetts Institute of Technology, 77 Massachusetts Ave., Cambridge 39, Mass.
Born: May 30, 1915, Detroit, Mich. B.S., 1937; M.S., 1938; Ph.D., 1950, University of Michigan. Committees: Nuclear Studies, 1948; Modulation Systems, 1949–50; Research, 1949–50; Board of Editors, 1949–51, 1953.

WILLIAMS, Charles E. (J'15—A'17—M'24—SM'43—F'52), Chief Electronics Engineer, Office of Assistant Industrial Manager, U. S. N. Seattle, 2400 11th Ave., S.W., Seattle 4, Wash.
Born: March 15, 1896, Seattle, Wash. Committees: Standardization, 1929. Sections: Seattle, *chairman, 1925; secretary, 1921–22, 1924, 1935.*

WILLIAMSON, Raymond H. (A'31—M'44—SM'46—F'51), Supervisor, Microwave Systems Engineering, General Electric Company, Electronics Park, Syracuse, N.Y.
Born: April 6, 1907, Eagle Grove, Iowa. B.S.(E.E.), 1928, Iowa State College; M.S.(E.E.), 1935, Union College. Committees: Membership, 1945–46; Papers Procurement, 1947–50. Sections: Syracuse, *vice-chairman, 1948–49, chairman, 1949.*

WILMOTTE, Raymond M. (M'29—F'38), Consulting Engineer and President, Raymond M. Wilmotte, Inc., 1469 Church St. N.W., Washington 5, D.C.
Born: August 13, 1901, Paris, France. M.A., 1921, Cambridge University, England. Committees: Handbook, 1945–47; Industrial Electronics, 1947–48; New York Program, 1933; Nomenclature, Symbols and Definitions, 1929–30; Papers, 1932–33; Papers Review, 1946–51; Radio Receivers, 1940–47; Radio Transmitters and Antennas, 1929–30; Sections, 1932; Standardization, 1931; Standards, 1932. Awards: Premium for Research, Institution of Electrical Engineers, 1930.

WINTRINGHAM, William T. (A'26—SM'45—F'51), Television Research Engineer, Bell Telephone Laboratories, Inc., Murray Hill, N.J.
Born: January 18, 1904, Brooklyn, N.Y. B.S.(E.C.E.), 1924, Harvard University. Committees: Papers Review, 1948–49. Sections: New York, *treasurer, 1949–50.*

WOLFF, Irving G. (A'27—VA'39—F'42), Director of Research, RCA Laboratories Division, Radio Corporation of America, Princeton, N.J.
Born: July, 1894, New York, N.Y. B.S., 1916, Dartmouth College; Ph.D., 1923, Cornell University. Director, 1952–53. Committees: Sections, *chairman, 1953;* Appointments, 1952; Board of Editors, 1946–53; Board of Directors, 1952–53; Education, 1945–46, 1948–52; Electronics, 1943–45; Meetings and Papers, 1928–30; Nominations, 1952; Papers, 1931–45; Sections, 1937, *chairman, 1953;* Standardization: Electroacoustic Devices, 1927–28; Technical Committee No. 4, Electroacoustic Devices, 1929–30; Use of the Transmission Unit, 1928. Sections: Philadelphia, *chairman, 1936–37.* Institute Representative: ASA Sectional Committee on Acoustical Measurements and Terminology, 1936, 1939. Awards: Distinguished Public Service Award, United States Navy, 1949.

WOOLVERTON, Robert B. (A'13—M'13—F'15) (L'49), Colonel, United States Army, Retired. 654 Twelfth Ave., San Francisco 18, Calif.
Born: September 22, 1884, Greensboro, Pa. B.S., 1912, Harvard University. Committees: Increase of Membership, 1914; Papers, 1915; Publicity, 1915–19. Sections: San Francisco Representation, *chairman, 1915.*

WOONTON, Garnet A. (A'40—SM'44—F'51), Professor of Physics; Director, Eaton Electronics Research Laboratory, McGill University, Montreal, P.Q., Canada.
Born: July, 1906, London, Ont., Canada. B.A., 1925; M.A., 1931, University of Western Ontario. Committees: Education, 1945–46. Sections: London, *chairman, 1945.* Institute Representative: University of Western Ontario, 1941–47. Awards: Fellow, Royal Society of Canada, International Chairman, Commission VII, U.R.S.I.

YOUNG, Charles J. (A'35—SM'45—F'53), Research Engineer, RCA Laboratories Division, RCA, Princeton, N.J.
Born: December 17, 1899, Cambridge, Mass. B.A., 1921, Harvard. Committees: Annual Review, 1944–46; Board of Editors, 1941–46; Facsimile, 1939–44, *chairman, 1944–46, vice chairman, 1949–52;* Papers Procurement, 1947; Standards, 1944–46; Television and Facsimile, 1936–38. Awards: Modern Pioneer Award, National Association of Manufacturers, 1946.

YOUNG, Leo C. (A'19—M'29—SM'43—F'43), Consultant, Naval Research Laboratory, Washington 25, D.C.
Born: January 12, 1891, Danville, Ill. Sections: Washington, *secretary, 1938–39, chairman, 1940.* Awards: Fellow, AAAS, AIEE; Member APS; Member SPE; President's Certificate of Merit, 1946.

ZAHL, Harold A. (A'39—SM'46—F'50), Director of Research, Signal Corps Engineering Laboratories, Fort Monmouth, N.J.
Born: August, 1904, Chatsworth, Ill. A.B., 1927, North Central College; M.S., 1929; Ph.D., 1931, State University of Iowa. Director, 1949. Committees: Administrative Committee of the Board of Editors, 1953; Board of Editors, 1951–53; Editorial Administrative, 1949–52; Electroacoustics, 1936–37; Electronics, 1943–44. Awards: Legion of Merit, Department of the Army, 1945.

ZENNECK, Jonathan A. W. (F'48), Professor, Retired, Experimental Physics Laboratory, Institute of Technology, Munich, Germany; President, Deutsches Museum; Geheimer Regierungsrat.
Born: April 15, 1871, Ruppertshofen, Wuerttemberg, Germany. D.Sc., 1894, University of Tuebingen, Germany; Dr.Ing. (Honorary), Institute of Technology, Dresden. Vice-President, 1933; Director, 1933. Committees: Standardization, 1915–17, 1927. Awards: Member, Bavarian Academy of Science, 1917; Gold Medal, Heinrich Hertz Gesellschaft, 1926; Medal of Honor, 1928; Goethe Medal for Art and Science, German Government, 1932; Gauss-Weber Medal, University of Goettingen, 1933; Member, German Aeronautical Academy, 1938; Honorary Member, German Physical Society, 1941; Honorary Member, German Society for Applied Physics, 1941; Corresponding Member, Academy of Science Goettingen, 1941; Siemens-Stephan Memorial Plate, German Society of Electrical Engineers, 1943; Gold Medal, The City of Munich, 1946; Grashof Medal, Society of German Engineers, 1949. President, Union of German Physical Societies, 1950; Honorary Citizen, Institute of Technology, Stuttgart and Karlsruhe, 1951.

ZOTTU, Paul D. (A'31—M'38—SM'43—F'44), President, Consulting Engineer, Electronic Heating Corporation, 66 Needham St., Newton Highlands 61, Mass.
Born: March 22, 1906, Bucharest, Roumania. B.A., 1931, Wesleyan University. Committees: Annual Review, 1945–46; Board of Editors, 1943; Industrial Electronics, 1945–47, *chairman, 1945,* 1946–47; Membership, 1947–48; Papers Procurement, 1946; Standards, 1945, 1947. Awards: Hyat Award, Plastics Industry.

ZWORYKIN, Vladimir K. (M'30—F'38), Director of Electronic Research, Vice-President and Technical Consultant, RCA Laboratories Division, David Sarnoff Research Center, Radio Corporation of America, Princeton, N.J.
Born: July, 1889, Mourom, Russia. E.E., 1912, Petrograd Institute of Technology; Ph.D., 1926, University of Pittsburgh; D.Sc., 1938, Brooklyn Polytechnic Institute. Committees: Board of Editors, 1944–53. Awards: Medal of Honor, 1951; Morris Liebmann Memorial Prize, 1934; Modern Pioneer Award, National Association of Manufacturers, 1940; Rumford Medal, American Academy of Arts and Sciences, 1941; Overseas Award, British Institution of Electrical Engineers, 1939; War Department Certificate of Appreciation, 1945; Howard N. Potts Medal, Franklin Institute, 1947; United Staes Navy Certificate of Commendation, 1947; Presidential Certificate of Merit, 1948; Lamme Award, 1948; Gold Medal of Achievement, Poor Richard Club, 1949; Society of Motion Picture and Television Engineer Progress Medal Award, 1951; AIEE Edison Medal, 1952; Fellow, AIEE, American Physical Society, American Association for the Advancement of Science; Member, Electron Microscope Society of America, National Academy of Sciences of U.S.A.; American Academy of Arts and Sciences; American Philosophical Society; National Research Council; Sigma Xi; Officer of French Academy of Science.

MEMBERSHIP ROSTER

The following list gives in alphabetical order the names of all members, except those of student grade, as of May 15, 1953

A

AALSETH, EARL P. (S'50-A'52), Geologist, Amerada Petroleum Corp., Box 583, Williston, N.D. **Home:** 520 W. 11 St., Williston, N.D.

AARON, BERTRAM D. (S'40-A'45-M'48), Engr. & Sales Consultant, Bomac Labs., Salem Rd., Beverly, Mass. **Home:** 3157 Sepulveda Blvd., Los Angeles, Calif.

AARON, M. ROBERT (S'49-A'52), Tech. Staff, Bell Telephone Labs., Murray Hill, N.J. **Home:** 100 Franklin St., Franklin Village, Morristown, N.J.

AARONS, CIVIA RUTH (A'49), Tech. Writer, Munitions Board, Broad & Wood St., Phila., Pa. **Home:** 2108 A South John Russell Circle, Elkins Park, Pa.

AARONS, JULES (S'44-A'51), Project Scientist—Solar Noise Studies, Cambridge Research Center, 224 Albany St., Cambridge, Mass. **Home:** 8 Shumaker Path, Newton Centre 59, Mass.

AARONSON, DAVID A. (S'46-A'53), Project Supvr., Canadian Aviation Electronics, Ltd., 17 DeCastelnau St., E., Montreal 14, P.Q., Canada. **Home:** 879 Buchanan St., Ville St. Laurent, Montreal 9, P.Q., Canada.

AAS, EUGENE A. (A'47), Staff Mem., Sandia Corp., Albuquerque, N.Mex. **Home:** 2115 Utah St., N.E., Albuquerque, N.Mex.

AAS, HERBERT G. (S'50-A'51), Elec. Engr., United Aircraft Research Dept., Silver Lane Rd., E. Hartford, Conn. **Home:** 30 Legion Dr., East Hartford, Conn.

AASEN, CURTIS L. (S'50-A'51), Electronics Engr., Hqs., USMC, Washington 25, D.C. **Home:** 1456 Arlington Terr., Alexandria, Va.

ABAJIAN, H. B. (M'46), Pres., Westbury Electronics, Inc., 40 Urban Ave., Westbury, L.I., N.Y. **Home:** 250 Linden Ave., Westbury, L.I., N.Y.

ABASCAL, NESTOR (M'47). **Home:** 3709½ Clarington Ave., Los Angeles 34, Calif.

ABATE, ANTHONY (M'45), Plant Mgr., Melpar, Inc., 10 Potter St., Cambridge, Mass. **Home:** 55 Clark Lane, Waltham 54, Mass.

ABBEY, KIRK (A'46), Electronic Scientist, USN Electronics Lab., San Diego 52, Calif. **Home:** 1116 Savoy St., San Diego 7, Calif.

ABBITT, CHARLES W. (A'50), Maj. USAF, Aircraft Radiation Lab., Wright Field, Dayton, Ohio. **Home:** 105 Florence Ave., Fairborn, Ohio.

ABBOTT, ROBERT C. (S'49-A'50), Grad. Research Asst., Physics Dept., Syracuse Univ., Syracuse, N.Y. **Home:** 1032 Wadsworth St., Syracuse 8, N.Y.

ABBOTT, WILTON R. (M'45-SM'46), Group Leader, Auto Fire and Flight Control, North American Aviation, Inc., 12214 Lakewood Blvd., Downey, Calif. **Home:** 8403 Catalina Ave., Whittier, Calif.

ABBOUD, FUAD L. (S'50-A'51), Design Engr., Sylvania Elec. Prod. Inc., 254 Rano St., Buffalo, N.Y **Home:** Palestine.

ABDUN-NAB, ZAKI (S'50-A'52), Elec. Engr., Sloan-Kettering Institute for Cancer Research, 444 E. 68 St., New York 21, N.Y. **Home:** 30 Gedney Park Dr., White Plains, N.Y.

ABEL, ADAM E. (A'41-SM'45), Asst. Engrg. Director, Radio Div., Bendix Aviation Corp., Baltimore 4, Md. **Home:** 612 Hatherleigh Rd., Baltimore 12, Md.

ABEL, CHARLES F. (A'44), Studio Engrg. Supvr., Kennedy Broadcasting Co., Station KFMB-TV, 1405 5th Ave., San Diego 1, Calif. **Home:** 2615 Covington Rd., San Diego 4, Calif.

ABEL, FRANK W. (S'49-A'50), Product Engr., P.R. Mallory Co., Indianapolis, Ind. **Home:** 1143 S. Mickley Ave., Indianapolis, Ind.

ABEL, FRED (S'50-A'52), Jr. Elect. Engr., Andrew Alford Consulting Engrs., 299 Atlantic Ave., Boston, Mass. **Home:** 70 Fowler Ave., Revere, Mass.

ABEL, HARRY L. (M'46), Principal Production Officer, Ministry of Supply, Directorate of Electronic Production, Castlewood House, New Oxford St., London, W.1, England. **Home:** Drayton Poultry Farm, Balcombe Rd., Horley, Surrey, England.

ABEL-HARRY, CLIFFORD B. (A'47), Chief Electro-Acoustic Engr., Hawley Products, Ltd., Garman Rd., Northumberland Park, Tottenham, London N. 17, England. **Home:** 60 Highbury Park, London N. 5, England.

ABELL, CARL W. (A'48), 3561 92 St., Jackson Heights, L.I., N.Y.

ABELL, GURDON R. (A'47), Chief, Implementation Sect., SAC & MATS Systems Lab., Rome Air Development Center, USAF, Griffiss Air Force Base, Rome, N.Y. **Home:** 82 College Ave., Poughkeepsie, N.Y.

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ZWIEP, THEODORE C. (S'50-A'51), Elec. Engr., RCA Victor, Camden, N.J. **Home:** Apt. R-1, 531 King's Hwy., Moorestown, N.J.

ZWISSLER, HOWARD R. (A'50), Project Engr., Commonwealth Engrg. Co. of Ohio, 1771 Springfield St., Dayton, Ohio. **Home:** 238 Crestview Ct., Dayton, Ohio.

ZWORYKIN, VLADIMIR K. (M'30-F'38), V.P. & Tech. Consultant, Dir. of Electronic Research, David Sarnoff Research Center, RCA Labs. Div., Princeton, N.J. **Home:** 103 Battle Rd. Circle, Princeton, N.J.

ZYGMUNT, HENRY J. (A'40-M'47), Design Engr., Union Switch & Sig. Co., Braddock Ave., Swissvale, Pa. **Home:** 201 Talbot Ave., Braddock, Pa.

ZYLLA, HENRY R. (S'47-A'50), Project Engr., Sperry Gyroscope Co., Great Neck, L.I., N.Y. **Home:** 167 Glen Head Rd., Glen Head, L.I., N.Y.

GEOGRAPHICAL LISTING OF MEMBERSHIP

The following list gives in geographical order the names of all members, except those of Student grade, as of May 15, 1953.

UNITED STATES

ALABAMA

Auburn
Frost, W. O. (A)
O'Kelley, H. E. (M)
Steere, R. M. (SM)
Summer, H. M. (A)

Birmingham
Bewig, K. W. (SM)
Gray, C. M. (A)
Hammond, J. L., Jr. (A)
Humphreys, T. G., Jr. (A)
Jones, R. M., Jr. (A)
Little, S. C. (A)
Lowery, H. R. (A)
Minton, R. E. (A)
Wood, T. D., Jr. (A)

Cullman
Buxton, J. E. (A)

Fairfield
Clements, C. C. (A)

Florence
Riley, C. W., Jr. (A)

Fort McClellan
Nakamoto, M. (A)

Frisco City
Johns, J. H. (A)

Hartselle
Kimbrough, T. E., Jr. (A)

Huntsville
Austin, W. C., Jr. (A)
Bailey, R. M. (A)
Baker, L. E. (A)
Bennett, R. A. (A)
Bonin, G. C. (A)
Brock, C. O. (A)
Childers, F. M. (A)
Cook, H. E. (A)
Cox, T. J., Jr. (A)
Davidson, J. K. (A)
Dean, H. C., Jr. (M)
Digesu, F. E. (A)
Downs, S. W., Jr. (A)
Dyess, C. H. (A)
Edwards, R. L. (A)
Farrior, J. S., Jr. (A)
French, D. E. (A)
Gary, H. T. (A)
Greenwood, T. L. (A)
Haeger, J. R. (M)
Haraway, R. C. (A)
Harper, J. W. (A)
Hirschler, O. H. (A)
Hoberg, O. A. (A)
Johnston, S. L. (M)
Lucas, J. H. (A)
McLaney, R. W. (A)
Martin, R. C. (A)
Miller, H. G. (A)
Moore, F. B. (A)
Morgan, C. G. (A)
Mosakoff, G. S. (A)
Neal, W. O. (A)
Nelson, R. W. (A)
Norman, J. E. (M)
Owen, E. L. (A)
Owen, S. M. (A)
Powell, J. T. (A)
Reinbolt, E. J. (A)
Ross, I. W. (A)
Russell, C. H. (A)
Sadler, G. L. (A)
Sarge, A. E. (A)
Saunders, G. H. (A)
Schreiner, C. W. (A)
Smith, A. G. (A)
Smith, L. B. (A)
Staples, D. N. (A)
Swearingen, C. N. (A)
Taylor, H. M. (A)
Vincent, H. F. (A)
Weaver, T. H. (A)
Wells, B. C. (A)
White, J. R. (A)
Williams, E. E. (A)
Wimpey, J. L. (A)
Wood, L. P. (A)

Madison
Parker, C. W. (A)

Mobile
Andrews, E. W. (A)
Baucum, P. G. (M)
Dudley, H. J. (A)

Montgomery
Box, F. M. (A)
Garber, J. F. (A)
Lehr, O. A. (A)
Whiting, R. J. (A)

Opelika
Murphy, C. E. (A)

Tuscaloosa
Littlefield, J. T. (A)
Shaver, F. T. (A)

ARIZONA

Cortado
Strang, R. P. (A)

Gilbert
Peabody, S. J. (A)

Glendale
Burns, C. L. (A)
Edwards, M. J. (A)

Jerome
Martens, A. (A)
Mayper, V., Jr. (A)
Ruddock, K. A. (A)

Kingman
Wallace, P. H. (A)

Marana
Wong, B. G. (A)

Mesa
Peterson, D. G. (A)
Sabin, W. D. (A)
Smith, D. A. (A)

Oracle
Koerner, H. (A)

Phoenix
Adams, W. L. (A)
Anderson, W. J. (A)
Anderson, H. R. (A)
Baum, R. V. (A)
Berens, G. F. (SM)
Blackert, R. O. (A)
Boenning, C. B. (M)
Brown, D. W. (A)
Butterfield, F. E. (M)
Carter, D. F. (A)
Chadek, T. J. (A)
Chambers, J. A. (SM)
Clark, C. J. (M)
Conrad, E. (A)
Cook, G. W. (A)
Creighton, A. M., Jr. (M)
Cuckler, V. A. (A)
Debel, C. A. (A)
Diehl, H. A. (A)
Diven, L. (A)
Dreste, F. E. (M)
Eberhard, E. (SM)
Echols, R. A. (A)
Eckert, H. R. (A)
Elsner, R. W. (SM)
Engler, A. R. (A)
Englund, R. A. (A)
Fenton, N. L. (A)
Ferguson, W. F. (A)
Frank, C. E. (A)
Fritz, C. B. (A)
Geppert, D. V. (A)
Gottlieb, P. (A)
Greer, P. H. (A)
Griffith, J. W. (A)
Ham, N. C. (A)
Hammond, J. R. (A)
Hancock, G. W. (A)
Hitt, W. R. (A)
Hulteen, C. K. (A)
Hume, A. S. (SM)
Jones, J. E. (A)
Kemmeries, F. D. (A)
Knight, J. D. (A)
Knowles, W. N. (A)
Lanzinger, D. J. (A)
Noon, J. R. (A)
Nyswander, R. E. (A)
McClanathan, G. L. (A)
McCoy, E. W., Jr. (M)
McFaul, Z. F. (A)
Meyer, C. F., Jr. (SM)
Miller, H. K. (A)
Morgan, H. L. (M)
Morrison, F. (M)
Morton, D. E. (A)
Pennington, R. J. (A)
Phillips, T. A. (M)
Pomeroy, I. D. (A)
Pool, E. B. (A)
Olson, R. H. (SM)
Reeves, D. B. (A)
Relyea, R. (A)
Samuelson, R. E. (SM)
Saxon, W. R. (A)
Shannon, C. V. (A)
Shepard, E. S. (A)
Shepler, J. E. (A)
Smith, A. L. (M)
Sokoloff, P. W. (SM)
Stautner, P. L. (M)
Stevens, C. R. (A)
Stoklas, F. P. (A)
Thess, J. H. (A)
Trego, D. G. (M)
Vandiveer, P. R. (A)
Vogel, V. H. (M)
Voskowitz, L. K. (M)
Yost, R. R., Jr. (M)
Ward, S. A. (M)
Wiley, C. A. (M)
Wilhelm, R. L. (A)
Winkler, M. R. (VA)
Wunderlich, L. J. (A)

Scottsdale
Dahl, W. E. (A)
Enzler, A. J. (A)
Estes, C. L. (M)
Gabrielson, R. G. (A)
Rich, G. C. (SM)

Sonoita
Boice, F. S. (A)

Tempe
Quinsler, W. T. (A)
Schwarz, C. R. (A)

Temple
Harkins, D. (A)

Tucson
Barringer, E. F. (A)
Bartholomew, D. (A)
Bersbach, A. J. (A)
Boyce, M. R. Jr. (A)
Bundy, R. C. (A)
Burch, E. C. (M)
Clark, H. L. (SM)
DeSchot, C. (A)
Doughy, F. W. (M)
Eddy, R. C. (M)
Green, F. W. (M)
Grindle, C. E. (M)
Hansbrough, F. G. (A)
Hausenbauer, C. R. (A)
Heyser, R. C. (A)
Hildreth, D. E. (A)
Hill, D. A. (M)
Johnson, C. L. (A)
Jones, J. W. (M)
Kamhi, M. (A)
Kasten, J. W. (M)
Kenney, B. D. (A)
Kernkamp, C. F. (A)
Kimball, R. E. (A)
Myers, J. L. (A)
Poulson, W. A. (A)
Record, W. V. (M)
Robertson, A. J. L. (A)
Simpson, E. J. (A)
Smith, J. (A)
Steward, H. E. (SM)
Stultz, L. R. (M)
Stutz, R. E. (A)
Walker, G. A., Sr. (M)

Wickenburg
Yount, R. G. (A)

ARKANSAS

Berryville
Mead, M. C., Jr. (A)

Eldorado
Jennings, C. S., Jr. (A)
Sorrells, W. E. (A)

England
McClanahan, W. J. (A)

Everton
Wightman, E. R. (SM)

Fayetteville
Cannon, W. W. (A)
Coleman, J. T. (A)
El-Melehy, M. A. (A)
Hyde, H. I. (A)
Naugle, R. B. (A)
Raible, R. W. (A)

Ft. Smith
Duvall, G. (A)
Miller, J. C. (A)

Herrison
Ward, F. E. (A)

Hope
Klipsch, P. W. (SM)

Hot Springs
Papoulias, V. P. (A)

Little Rock
Barnes, H. C. (A)
Belless, J. J. (A)
Carson, C. J. (M)
Clayton, J. W. (A)
Cooke, H. F. (A)
Dillaplain, V. L. (SM)
Edwards, J. M. (A)
Emery, R. H. (A)
Garrett, O. R. (A)
George, E. E. (SM)
Grubbs, C. E. (A)
Hale, W. B. (A)
Hammett, W. F. (A)
Harington, C. F. (A)
Hegar, E. A. (SM)
Kimball, V. L., Jr. (M)
Leonard, J. T. (A)
Levin, M. S. (A)
Phillips, G. D. (A)
Phillips, J. B. (A)
Russell, J. O. (A)
Spilman, J. C. (A)
Wilson, F. J. (M)
Woolfolk, R. L. (A)
Wylie, J. E. (A)

Malvern
Beem, R. M. (SM)
Nider, M. E. (A)

North Little Rock
Furnell, W. W., Jr. (A)
Reid, J. D. (F)
Scott, G. H. (SM)
Stewart, W. F. (SM)
Wood, M. L. (A)

Pine Bluff
Thompson, E. E. (A)

Scott
McRae, J. P. (A)

Siloam Springs
Anderson, M. K. (A)
Smith, C. E. (M)

CALIFORNIA

Agoura
Schulte, R. W. (A)

Alameda
Branum, D. R. (A)
Hall, T. D. (A)
McNulty, J. W. (M)
Thompson, E. M. (A)

Albany
Elsken, R. H. (A)
Kiessling, R. C. (A)
Sorensen, E. G. (M)
Taskett, D. A. (A)
Williamson, S. R. (M)

Alhambra
Buchanan, R. A. (A)
Bunker, E. R., Jr. (A)
Cary, H. H. (A)
Gleim, R. A. (A)
Gum, J. D. (A)
Horton, D. K. (A)
Houdyshell, H. H., Jr. (A)
Lowe, M. E. (M)
Mueller, F. W. (A)
Munsey, C. J. (A)
Seidner, O. R. (A)
Thompson, W. C., Jr. (M)
Weeks, A. D. (A)

Altadena
Ahrich, J. C. (A)
Baird, A. D. (A)
Black, L. (M)
Braun, V. J. (SM)
Chalmers, P. H. (A)
Curtis, H. A. (A)
Davis, F. H. (A)
Ellis, D. D., Jr. (A)
Gismot, W. (A)
Goldstein, S. J., Jr. (A)
Hopkins, W. L. (A)
Ingall, W. E. (A)
James, J. N. (A)
Johnson, H. S. (M)
Johnson, R. T. (A)
Krueger, R. E. (M)
Lewis, R. S. (A)
Linnes, K. W. (A)
Locanthi, B. N. (A)
Lolass, A., Jr. (A)
Mallinckrodt, A. J. (A)
Pride, E. W. (M)
Redwood, R. C., Jr. (A)
Riedel, J. C. (A)
Sink, R. L. (SM)
Sirri, N. (A)
Shaw, N. H. (A)
Shuey, C. W. (A)
Stephenson, H. G., Jr. (A)
Talmo, R. E. (A)
Thomson, B. (A)
West, L. E. (SM)
Wilson, G. P. (SM)
Wilson, M. C. (A)
Young, W. D. (A)
Zweizig, J. R. (A)

Anaheim
Hilbers, G. R. (A)
Jeschke, A. W. (A)
Lamers, K. W. (A)
Rassier, D. B. (A)

Angwin
Neilsen, I. R. (A)

Aptos
Wrathall, G. R. (A)

Arcadia
Anderson, R. J. (A)
Babeaux, A. G. (A)
Backus, R. A. (A)
Bell, N. W. (A)
Duncan, D. B. (A)
Eland, R. C. A. (M)
Fiske, J. J. (M)
Flatten, O. H. (A)
Fletcher, T. C. (M)
Holmes, P. J. (A)
Horton, E. J. (A)
Jarmie, T. W. (SM)
Madsen, E. C. (M)
Pitzer, R. L. (A)
Sanders, R. W. (SM)
Stimson, J. D. (A)
Walp, R. M. (A)
Wolcott, G. W. (A)

Arlington
Bishop, B. E. (A)
Day, J. L. (A)
Hata, F. T. (M)
Kapulsky, S. (A)
Rosen, H. H. (SM)
Whalen, P. K. (A)

Atascadero
Arden, O. W. (A)

Atherton
Eldred, W. N. (SM)
Held, H. E. (VA)
Jones, R. M. (SM)
Scofield, P. F. (SM)
Sheffield, R. F. (A)

Azusa
Hurley, R. B. (A)

Bakersfield,
Griffith, C. D. (A)
Hood, H. E. (A)
Whiting, W. E. (M)

Balboa Island
Hansen, E. H. (SM)

Bell
Louie, W. (A)
Stenger, F. J. (M)
Tosspon, A. E. (A)
Zelenay, J. (A)

Bellflower
Aikman, G. N. (A)
Bigelow, H. L., Jr. (M)
Lehtone, L. L. (A)
Thompson, M. F. (A)
Wall, V. W. (A)

Bell Gardens
Adams, R. L. (A)
Henderson, F. B. (A)

Belmont
Alff, W. H., Jr. (A)
Churchon, S. P. (A)
Harp, M. C. (A)
Hyne, A. D. (A)
Parmenter, E. W. (A)
Peck, A. O. (A)
Towne, A. E. (M)

Berkeley
Acker, R. C. (A)
Aiken, W. R. (A)
Anderson, O. A. (A)
Angelakos, D. T. (SM)
Anger, H. O. (A)
Axtell, J. D., Jr. (M)
Badger, G. M. W. (A)
Bandtel, K. C. (A)
Best, L. E., Jr. (A)
Bloom, M. S. (M)
Bonner, H. W. (A)
Bruns, R. A. (M)
Buffum, J. H. (A)
Carter, L. J., Jr. (A)
Clapp, F. D. (SM)
Davis, D. D. (VA)
Davis, R. W. (A)
Ellsworth, R. L. (A)
Farly, G. M. (VA)
Fass, S. J. (VA)
Fong, J. W. (A)
Freeman, E. D. (A)
Gallichotte, J. H. (A)
Goodman, D. H. (SM)
Haubrock, F. W. (M)
Heard, H. G. (A)
Heasly, C. C., Jr. (A)
Johnson, B. M. (A)
Kalibjian, R. (A)
Keller, J. E. (A)
Krause, O. H. (A)
Kummer, W. H. (A)
Larsh, A. E. (A)
Lutz, I. C. (A)
MacIntyre, R. M. (A)
McKinney, L. F. (A)
Mack, D. A. (M)
Madey, R. (A)
Maesiner, E. E. A. (A)
Mains, M. C. (A)
Matthael, G. L. (A)
Meisling, T. H. (A)
Morton, P. L. (SM)
Nelson, R. S. (A)
Nelson, W. H. (SM)
Noller, W. E. (SM)
Ogg, R. D. (M)
Plonsey, R. (A)
Priedigkeit, J. H. (SM)
Pritchett, W. S. (M)
Relf, K. E. (A)
Reukema, L. E. (F)
Robertson, R. D. (M)
Schmidt, F. G. (A)
Schroder, R. D. (M)
Scott, H. J. (SM)
Seader, L. D. (A)
Sedon, P. H. (A)
Serang, A. M. (A)
Shiu, P. D. C. (A)
Silva, L. M. (A)
Silver, S. (SM)
Sleeper, G. E. (SM)
Sloan, D. H. (SM)
Smith, A. J. (A)
Smith, B. H. (A)
Smith, O. J. M. (SM)
Stubbins, W. F. (M)
Turner, S. E. (A)
Viales, L. O. (A)
Vogelsberg, F. E. (A)
Wang, E. H. (A)
Whinnery, J. R. (F)
Williams, C. S. (A)
Wing, C. (A)
Woodyard, J. R. (VA)
Wulfhorst, J. H. (A)
Yadavalli, S. V. (A)

Beverly Hills
Albin, F. G. (A)
Austrian, R. B. (SM)
Avrech, N. (A)
Barnett, H. A. (A)
Berliner, O. (A)
Birdsell, G. (M)
Craig, J. C. (A)
Crawford, A. A. (SM)
Lichterman, G. (M)
Lowhurst, H. G. (A)
Mackey, R. C. (A)
Marks, M. L. (A)
Nutt, J. H. (A)
Paskusz, G. H. (A)
Rosa, G. N. (A)
Rutherford, C. E. (SM)
Sharpe, L. E. (A)
Tidmarsh, G. P. (A)
Weiss, L. H. (M).
Williams, J. V. (SM)
Winchell, R. W. (A)
Wolcott, C. F. (SM)

Bishop
Pearson, D. R. (A)
Rudolph, E. G. (A)
Wolf, J. E. (A)

Brawley
Markling, J. C. (A)

Burbank
Angwin, B. S. (SM)
Babcock, D. F. (A)
Bain, M. B. (A)
Benfield, C. W. (A)
Bennett, P. L. (M)
Bercovitz, N., Jr. (A)
Berkheimer, R. I. (A)
Brockway, D. C. (VA)
Brown, W. A. (A)
Bunce, J. W. (A)
Callan, R. W. (A)
Chester, C. L. (A)
Cochran, E. D. (M)
Davis, W. K. (A)
De Clue, J. L. (A)
Edgerton, A. K. (A)
Everett, F. A. M. (VA)
Fredendall, B. F. (VA)
Gilbert, E. M. (A)
Gorka, W. A. (A)
Grim, R. L. (A)
Hanniger, G. A. (A)
Hathaway, J. C. (A)
Higgins, D. J. (A)
Higgins, S. F. (A)
Hoff, K. (SM)
Jackson, R. S. (A)
Johnson, C. E. (A)
Lehan, F. W. (SM)
Lofquist, D. J. (A)
Lumenello, K. A. (A)
McCleery, J. J. (A)
Marosz, M. J. (A)
Martin, W. R. (A)
Mosier, R. R. (A)
Mueller, W. A. (VA)
Mullich, G. L. (A)
Olmstead, T. H. (A)
Peters, R. L. (A)
Phillips, G. A. (A)
Quist, R. C. (A)
Robinson, J. A. (A)
Scarborough, T. H. (A)
Schwartz, H. (A)
Seitz, F. R. (VA)
Sell, D. D. (A)
Shaw, R. A. (A)
Shrader, V. L. (A)
Slocomb, G. M. (A)
Smith, C. A., Jr. (A)
Smith, R. A. (A)
Stevens, R. W. (A)
Ter Veen, L. A. G. (A)
Waddell, B. L. (A)
Wagner, H. B. (A)
Weatherford, R. V. (A)
White, R. A. (A)
Whitten, G. A. (A)
Williams, N. H. (A)
Woodard, T. C. (A)
Woods, H. D. (A)
Wunderman, I. (A)
Zilm, C. F. (A)

Burlingame
Dernham, C. R. (A)
Fleming, H. B. (A)
Gates, W. F. (A)
Gola, A. S. (A)
Haines, W. D. (M)
Hart, A. L. (A)
McVea, N. C. (A)
Ogilvie, A. R. (SM)
Peck, C. D. (SM)
Reece, O. A. (A)
Reinartz, J. L. (SM)
Wood, R. A. (A)

Calabasas
Hedene, T. H. (SM)

Camarillo
Benson, C. L. (A)
Canning, R. G. (M)
Hearn, O. E. (SM)
Jennett, N. E., Jr. (A)
Kamena, J. G. (A)
Neuron, E. (A)
Sternke, E. C. (SM)
Wenters, R. L. (A)

Cambria
Barton, C. H. (M)
Montross, J. G. (M)
Schultek, L. R. (A)
Zuranski, R. C. (A)

Camp Pendleton
Rudenauer, F. X. (M)

Campbell
Critchlow, A. J. (A)
Flewelling, G. B. (A)
Hanson, L. W. (A)
Noble, W. E. (A)

Canoga Park
Bertucci, J. F. H. (M)
Block, E. B. (A)
Frankiewich, C. (A)
Meyer, D. R. (A)
Peterson, M. C. (A)

Carmel
Chitwood, J. S. (A)

Carpenteria
Hoffman, L. E. (A)
Keller, E. G. (A)

China Lake
Allen, P. S. (M)
Anderson, A. B. C. (A)
Ashbrook, F. M. (SM)
Beresford, D. R. (A)
Biberman, L. M. (M)
Bothwell, F. E. (M)
Boyle, J. M. (A)
Christman, T. J. (M)
Clark, D. B. (A)
Crawford, J. A. (A)
Creusere, M. C. (A)
Dember, A. B. (A)
Deyoe, D. C. (A)
Drucker, A. N. (A)
Ducuff, G. (A)
Everett, J. A. (A)
Ewing, D. L. (M)
Farrington, H. W. (A)
Ferris, A. B. (A)
Field, W. A. (A)
Freeman, C. F. (A)
Gado, L. G. (A)
Gregory, J. H. (SM)
Harris, J. F. (A)
Hartis, S. E. (A)
Howell, F. S. (SM)
Hurst, G. W. (A)
Jackson, B. B. (A)
Jeung, J. L. (A)
Keyes, J. C. (M)
Kim, P. S. K. (A)
Larsen, C. L. (A)
Lee, R. E. (M)
Lawrence, R. E. (A)
Madden, J. P. (A)
Merriam, R. T. (A)
Mikesell, R. M. (A)
Newburgh, H. (M)
Ollikkal, E. E. (A)
Olsen, R. C. (A)
Petersen, H. E. (A)
Pike, B. W. (M)
Romero, E. S. (A)
Schimmel, G. (A)
Scott, W. H., Jr. (A)
Segal, J. B. (A)
Shield, R. G., Jr. (A)
Simecka, W. B., Jr. (A)
Smith, R. R. (A)
Sprague, D. L. (A)
Swift, I. H. (A)
Sykes, L. (A)
Urban, L. R. (A)
Vore, W. E. (M)
Warner, S. D. (A)
Warr, G. D. (M)
Wong, T. (A)
Zellmer, W. G. (A)

Chino
Bourne, C. P. (A)

Chula Vista
Bard, H. B. (A)
Chiles, J. R., Jr. (A)
Hauk, G. L. (A)
Schulman, M. (A)
Steiner, F. A. (A)
Varian, R. H. (A)
Yager, J. C. (A)

Claremont
Andrew, V. J. (SM)
Carroll, L. R. (A)
Depew, H. D., Jr. (A)
Dunifon, J. W. (A)
Hubbard, L. J. (A)
Jones, L. E. (A)
Stecker, E. J. (A)
Taylor, A. H. (F)
Wildman, R. C. (M)
Young, C. W. (M)

Coalinga
Bowman, R. B. (A)

Compton
Begley, W. W. (M)
Cooper, J. R. (M)
Hodgson, R. W. (A)
Hurst, W. F. (A)
Keppel, R. A. (A)
Myers, W. A. (A)
Valenti, R. J. (A)
Weber, W. R. (A)

Concord
Allen, T. V., Jr. (A)
Bogdanoff, A. G. (A)
Fairbrother, F., Jr. (A)
Nielsen, G. A. (A)
Rose, J. E. (A)
Voelker, F. (A)

Corona
Adrian, D. J. (A)
Bastedo, G. R. (SM)
Bogue, H. (A)
Callomon, J. R. (A)
Codier, E. O. (A)
Davis, R. G. (A)
Emerson, R. R. (A)
Fletcher, R. C. (A)
Hamilton, R. E. (A)
Harris, E. A., Jr. (A)
Lambert, R. M. (M)
Nordseth, M. P. (A)
Sacks, J. M. (A)
Scharp, G. A. (A)
Thomas, H. A. (SM)
Todd, B. J. (A)
Tuckerman, L. P. (SM)
Van Orsdel, K. A. (A)
Walters, A. W. (A)
Whiteley, T. B. (A)
Wood, B. C. (A)

Corona del Mar
Poole, J. H. (VA)

Coronado
Garard, E. A. (SM)

Corte Madera
Walters, A. M. (A)

Covelo
Brown, E. L. (M)

Covina
Clark, J. H. (SM)
Jones, J. G. (VA)
Knox, N. W. (M)
Mathisen, W. D. (A)
Metzger, H. W. (A)
Skaggs, E. R. (A)

Culver City
Allen, B. G. (A)
Arant, E. W. (M)
Aseltine, J. A. (A)
Bakeman, D. C. (A)
Barlow, D. S. (SM)
Barnett, J. T. (A)
Bevan, W. R. (A)
Birdsall, C. K. (A)
Buell, F. D. (A)
Burns, G. A. (VA)
Campbell, R. A. (A)
Chalfin, N. L. (A)
Chiappinelli, B. A. (A)
Chlavin, L. (A)
Cohee, A. V. (A)
Craven, W. A., Jr. (A)
Cronin, W. J. (M)
Curl, G. W. (A)
Day, R. A. (A)
De Bord, M. J. (A)
Deutsch, R. (A)
De Villier, J. (A)
Dodak, M. (A)
Doig, A., Jr. (A)
Doshay, I. (A)
Dulin, J. L. (A)
Durham, L. G. (A)
Ehrlich, M. J. (SM)
Elliott, R. S. (A)
Euler, K. C. (A)
Fletcher, J. C. (A)
Follis, F. R. (M)
Frankel, S. (SM)
Gates, H. P., Jr. (M)
Gillmer, A. H. (A)
Gold, B. (M)
Gould, E. W. (A)
Guptill, H. R. (A)
Hall, N. I. (SM)
Hebenstreit, W. B. (SM)
Henderson, K. W. (A)
Herrnfeld, F. P. (SM)
Hichle, M. E. (SM)
Hollands, L. C. (SM)
Jacobs, J. E. (A)
Janken, S. (A)
Julian, R. S. (M)
Karl, D. R. (A)
Klestadt, B. (A)
Koontz, D. E. (A)
Lane, C. A. (A)
Lakatos, E. (SM)
Leon, H. I. (A)
Levin, S. (A)
Low, H. (A)
McFadden, B. W. (A)
Milek, J. T. (A)
Mohr, M. E. (M)
Morrow, C. T. (A)
Norby, H. A. (A)
North, H. Q. (SM)
Oser, E. A. (SM)
Parode, L. C. (A)
Reeves, J. T. (A)
Romig, H. G. (SM)
Rosen, S. A. (A)
Rubel, J. H. (A)
Rudin, M. B. (A)
Schieke, P. F. (A)
Schonheinz, E. J. (A)
Senf, G. A. (A)
Shank, R. J. (SM)
Smith, H. M. (A)
Stone, E. S. (A)
Taylor, T. T. (M)
Tobin, G. C. (A)
Vall, A. E. (A)
Van Atta, L. C. (F)
Viton, E. J. (A)
Watkins, D. A. (A)
Weber, G. J. (A)
Wilkinson, J. H. (A)
Wilson, H. G. (A)
Woltz, R. (A)
Woodruff, T. E. (A)
Woolridge, D. E. (SM)
Zint, K. E. (SM)

Cupertino
Beaumont, J. O. (A)
Bettendorff, O. A. (A)
Ewing, A. E. (A)
Gillmeister, F. W. (VA)
Kean, D. W. (A)
Varian, R. H. (F)

Danville
Bundrick, R. J. (A)
Norris, N. J. (A)

Davis
Jacob, F. C. (A)

Delano
Russell, J. D., Jr. (A)
Smith, S. R. (A)

Del Mar
Widenmann, J. A. (M)

Del Rosa
Bindner, J. T. (M)

Denair
Sayre, M. B. (A)

Downey
Bower, J. L. (SM)
Bunker, R. S. (A)
Butler, A. G. (VA)
Cahn, S. L. (M)
Comyns, L. S. (A)
Del Duca, A. (A)
Dunklee, L. H. (A)
Edlefsen, N. E. (SM)
Farrand, W. A. (M)
Henry, J. L., Jr. (A)
Hodson, W. G. (SM)
Hoogasian, L. (A)
Kilpatrick, L. L. (A)
King, R. L., Jr. (A)
Koppel, R. L. (A)
Laubenstein, R. A. (A)
Larsen, H. P. (A)
Leeking, A. M. (A)
Popp, D. R. (A)
Rasmussen, C. F. (A)
Singleton, H. E. (SM)
Slaton, J. H. (A)
Strauss, L. (A)
Szabo, J. E. (A)
Taylor, L. A. (A)
White, J. G. (A)
Wolfe, A. E., Jr. (A)
Wolking, D. H. (A)
Yoshii, J. (A)

Duarte
Baker, C. W. (A)
Tucker, M. C. (A)

East Los Angeles
Katayama, T. T. (A)

East Palo Alto
Learnard, H. P. (A)

Edwards
Coe, J. C. (M)
Lynne, S. (M)
Thomas, R. (M)

El Cajon
Bond, C. H. (SM)
Burton, K. M. (A)
Cunningham, E. E. (A)
Dana, J. J. (M)
Eikelman, J. A., Jr. (A)
Heibeck, H. L. (A)
Pitt, C. J. (A)
Sherburne, C. J. (M)
Soltesz, E. S. (A)

El Centro
Womack, J. R. (A)

El Cerrito
Barnes, J. W. (A)
Gray, H. F., Jr. (M)
Jensen, R. H. (A)
Lawrence, M. J. (A)
Meade, J. P. (A)
Molzahn, V. L. (A)
Radsliff, J. L. (A)
Scott, N. B. (A)
Warren, W. J. (SM)
Watson, H. M. (M)
Yeiser, J. O. (A)

El Monte
Atherton, C. A. (A)
Dolde, L. A. (A)
Hayes, E. A. (SM)
Wanlass, L. K. (A)

El Segundo
Ganahl, P. J. (A)
Garon, R. J. (M)
Johnson, R. A. (A)
Mesak, C. (A)
Quigg, K. R. (A)
Stokem, M. D. (A)

El Sobrante
Thomason, T. H. (A)

Emeryville
Cowley, P. E. A. (A)

Encino
Benbrooks, L. A. (A)
Frey, S. C. (M)
Gleason, J. P. (A)
Humphreys, J. D. (M)
Hurvodo, K. W. (A)
Pischel, E. F. (SM)
Russell, R. M. (SM)
Scanlan, J. A. (A)
Scholland, R. J. (A)
Seltzer, L. J. (A)

Escondido
Mathes, R. C. (SM)
Moore, R. M. (VA)

Eureka
Olson, A. E. (A)
Smullin, W. B. (A)

Exeter
White, W. L. (A)

Fairfield
Shapiro, H. L. (A)

Fair Oaks
Petersen, M. C. (A)

Flintridge
Blasier, H. E. (VA)

Fort Jones
Fowler, J. A. B. (A)

Fresno
Bartlett, P. R. (A)
Foin, O. F., Jr. (M)
Mealey, K. L. (A)
Schuler, R. M. (A)
Shohara, S. (A)
Simpson, H. J. (VA)

Fullerton
Barnes, J. L. (F)
Clark, C. M. (A)
Cother, R. H. (A)
Englund, C. R. (F)
Gandy, A. R. (A)
Harding, G. A. (A)
Hoff, R. G. (A)
Janeway, R. K. (A)
Kerber, S. M. (M)
Kohlenberger, C. W. (A)
Moore, J. R. (SM)
Riffle, L. V. (A)
Roberson, R. E. (SM)
Tilley, A. E. (M)
Way, G. B. (A)

Gardena
Brown, M. H. (SM)
Cornell, L. L. (A)
Demsky, J. C. (A)
Geisert, F. W. (A)
Harris, A. W. (M)
Magnuson, V. P. (A)
Maxwell, R. L. (A)
Norris, W. F. (A)
Oliver, J. R. (M)
Taber, J. E. (A)
West, S. F. (A)
Willard, D. S. (M)

Garden Grove
Corvi, J. A. (A)
Means, P. S. (A)
Schnitger, A. W. (A)

Garvey
Fairbanks, A. F. (A)

Glendale
Auerbach, M. (A)
Bassett, D. M. (A)
Brandon, E. T. (A)
Bridges, R. L. (A)
Brown, C. M. (A)
Campbell, R. L. (SM)
Cox, J. A. (A)
Ericson, R. L. (A)
Fester, D. E. (F)
Geib, D. G. (A)
Glassford, H. A. (A)
Greenwood, D. T. (A)
Hasche, J. C. (A)
Huntsman, H. F. (A)
Kennedy, M. E. (SM)
Kent, G. R. (A)
Koehler, L. K. (A)
Koerner, C. T. (VA)
Kreuder, N. L. (A)
Krill, C. K. (A)
Larter, T. C. (A)
Lee, R. K. P. (A)
Lewi, J. B. (A)
Lobenber, T. J. (A)
Loomis, D. F. (A)
McCleece, H. M. (A)
Mitchell, J. A. (A)
Nuut, A. (A)
Paul, F. A. (M)
Perrin, C. A. (A)
Peterson, J. E. (A)
Read, G. W. (VA)
Sandy, R. J. (A)
Seabaugh, D. A. (A)
Shahan, O. (A)
Steele, E. E. (A)
Swenson, A. N., Jr. (A)
Thompson, R. W. (A)
Vernon, F. L., Jr. (A)
Ward, W. S. (A)
Worthen, W. L. (A)
York, E., Jr. (A)

Glendora
Schafer, H. G. (A)
Walker, W. D. (A)
Wolfe, C. M. (VA)

Granada Hills
Gallwey, K. L. (A)
Midcalf, W. A. (A)

Hamilton
Donegon, R. E. (A)
Gibbs, J. B. (A)
Miller, R. J. (A)

Hanford
Nelson, R. A. (A)

Harbor City
Golightly, R. T. (A)

Hawthorne
Beauchamp, E. P. (M)
Blumenthal, I. S. (A)
Busuttil, H. L. (A)
Charpentier, D. E. (M)
Decuir, L. E. (A)
Erznoznik, F., Jr. (M)
Gerson, H. (A)
Hall, C. A. (A)
Holbrook, J. G. (M)
Langdon, J. G. (A)
Lyons, L. H. (A)
Lund, W. W., Jr. (M)
McCann, F. A. (A)
Mund, M. A. (A)
St. John, E. E. (M)
Stephenson, R. O. (A)
Van Vorhis, J. L. (A)
Young, G. O. (A)

Hayward
Brown, A. E. (A)
George, A. A. (A)
Kippenhan, D. O. (A)
Prosser, T. F. (A)
Shortall, J. W., Jr. (A)

Hermosa Beach
Cleary, J. D. (A)
Knox, R. M. (A)
MacGarvey, E. R. (A)
McPherson, R. G. (A)
Mevey, B. D. (A)
Ransom, J. E. (A)
Roland, L. F. (A)
Ropa, R. L. (A)
Scott, R. G. (A)
Wagner, R. E. (A)

Hollydale
Stone, L. M. (A)

Hollywood
Ahlport, B. T. (A)
Arand, E. M. (M)
Benham, E. E. (M)
Bowman, L. H. (SM)
Braddy, J. A. (A)
Bryant, H. L. (A)
Caldwell, P. G. (SM)
Cox, M. B., Jr. (A)
Davis, J. I. (A)
Deen, J. R. (M)
Denechaud, R. G. (VA)
Denney, B. H. (A)
Edgerton, A. D. (A)
Filizola, V. F. (A)
Galloway, W. J. (A)
Lubcke, H. R. (F)
Manus, G. C. (A)
Miller, G. B. (VA)
Moody, R. C. (SM)
Neely, N. B. (M)
Newcomb, R. (SM)
Pett, L. E. (M)
Pound, A. E. (A)
Reiche, L. P. (A)
Rogers, G. F. (SM)
Ross, E. H. (M)
Saxton, A. H. (A)
Schick, H. G. (M)
Smith, W. R. (A)
Stafford, J. W. (M)
Stark, H. P. (A)
Stoddart, R. R. (SM)
Templin, E. W. (SM)
Thatcher, J. W. (SM)
Van Groos, J. C. (SM)

Huntington Park
Allen, R. M. (A)
Beck, J. W. (A)
Buchholz, C. W. (A)
Dowers, A. A. (VA)
Griffith, M. H. (VA)
Linton, T. B. (A)
Steiner, F. W. (A)

Imperial Beach
Pette, D. C. (A)

Indio
Mountain, C. F. (A)

Inglewood
Ambrose, E. G. (A)
Anderson, A. T. (M)
Beleskas, S. M. (A)
Browne, J. D. (A)
Carlson, C. G. (SM)
Connely, R., Jr. (A)
Dahl, J. D. (A)
Ellingboe, J. K. (A)
Gasper, C. A. (A)
Glascock, R. D. (A)
Gregory, C. N., Jr. (A)
Gustin, J. T. (A)
Howes, R. E. (A)
Klein, E. F. (A)
Larsen, C. W., Jr. (A)
Leedy, C. A. (A)
Malone, H. L. (A)
Miller, F. A. (A)
Nelson, E. W. (A)
Palm, A. W. (A)
Poundstone, J. R. (A)
Schwank, R. T. (A)
Silva, W. (VA)
Stevens, J. E. (M)
Sur, J. (A)
Swan, R. L. (A)
Thrall, L. L. (A)
Vose, A. W. (M)
Wells, W. W. (A)
Wick, O. F. (A)
Widenhoefer, J. G. (A)
Zak, E. T. (A)

Inverness
Matthews, W. I. (M)
Streich, R. J. (VA)

Inyokern
Toporeck, E. R. (SM)

Jackson
Van Thiel, J. (VA)

Kentfield
Conrad, R. C. (M)
Kimbell, G. D. (A)
Ness, G. L. (A)

Kenwood
Hosmer, E. A. (SM)

Klamath
Stoll, J. L. (A)

La Canada
Brewer, M. S. (A)
Faris, E. M. (A)
Henry, D. S. (A)
Huntington, A. (M)
Hylkema, C. G. (A)
Kenkel, H. H. (SM)
Newberry, A. W. (A)
Parks, R. J. (A)
Rhoads, J. A. (SM)
Rosman, A. S. (A)
Seeley, W. M., Jr. (A)
Slaughter, D. W. (A)
Stagnaro, J. A. (SM)
Weil, F. M. (M)
Wolfe, H. (M)

La Crescenta
Anderson, G. H. (A)
Goodman, P. R. (A)
Hirschberg, W. J. (A)
Hughes, W. R. (SM)
O'Neil, W. T. (A)
Ott, L. G. (A)
Perry, E. P. (A)
Pratt, J. H. (SM)
Silvertooth, E. W. (M)
Sweetnam, G. E. (A)
Willey, J. D. (A)

LaFayette
Morrison, K. G. (M)
Salisbury, W. W. (F)
Waddell, J. F. (A)

La Habra
Bechtold, I. C. (SM)
Blake, F. G., Jr. (SM)
Mueller, T. D. (A)
Wheeler, R. W. (A)

La Jolla
Anderson, J. D. (A)
Bishop, H. O. (SM)
Chadbourne, H. L. (A)
Coleman, G. M. (A)
Fox, E. M. (M)
Orpin, L. H. (SM)
Ritchart, R. C. (A)
Tampico, J. (SM)
Theobald, D. J. (A)

Lakewood
Iseri, C. H. (A)
Schroeder, R. L. (A)

La Mesa
Cary, R. J., Jr. (A)
Christensen, R. J. (SM)
Clapp, E. B. (A)
Cleveland, W. C., Jr. (M)
Demers, E. F. (A)
Fish, W. V. (A)
Fisher, H. G. (A)
Fishman, M. (A)
Folland, D. F. (SM)
Gray, K. B. (A)
Grumbein, P., Jr. (VA)
Hardin, C. A. (A)
Huckle, D. R. (A)
Ivans, W. S., Jr. (A)
Lester, P. S. (A)
Lowe, D. M. (A)
Loveberg, A. G., Jr. (A)
McAdam, J. C. (M)
Oemcke, E. C. (A)
Smyth, J. B. (SM)
Whitaker, J. L. (A)

Lancaster
Bravo, M. V. (A)
Ransdell, P. M. (A)

La Verne
Lawler, R. H. (A)
Rnasil, R. J. (A)
Riley, O. V. (M)

Lawndale
Bullock, W. W. (M)
Hannum, A. J. (A)

Leevining
Kelley, J. R. (A)

Lemon Grove
Valasek, H. H. (A)
Webb, J. A. (A)

Lennox
Sward, W. C. (A)

Livermore
Billinghurst, E. M. (A)
Bothun, R. B. (A)
Caestensen, H. K. (A)
Crew, B. L. (A)
Curry, C. R. (A)
Everson, C. T. (A)
Graham, R. H. (M)
Griffith, J. E. (A)
Inami, F. K. (A)
Levinthal, J. G. (A)
Manhart, R. A. (A)
Molzahn, D. W. (A)
Price, G. W. (M)
Salisbury, J. D. (A)

Long Beach
Andersen, E. A. (M)
Antista, B. A. (A)
Ashcraft, A. E., Jr. (A)
Beau, J. F. (A)
Bet, D. V. (A)
Blowers, R. C. (A)
Bonem, E. J. (A)
Brainin, S. M. (M)
Brown, R. W. (A)
Buckley, J. W. (A)
Campora, M. T. (A)
Cherney, R. W. (A)
Cole, B. T. (A)
Cosgrave, S. J. (A)
Dahlin, R. K. (A)
Dean, N. W. (A)
Diedrich, W. A. (A)
Dillard, G. B. (A)
Dozier, J. J., Jr. (A)
Drankhan, O. W. (A)
Drozd, D. H. (A)
Farrand, C. E. (A)
Fether, W. B. (A)
Frieberg, M. (A)
Gardner, F. H. (SM)
Grammes, E. G., Jr. (A)
Greenslade, R. S. (A)
Hansen, R. A. (A)
Heckert, R. E. (A)
Hetlinger, F. J. (A)
Himler, G. J. (A)
Hoffman, M. (A)
Jimenez, J. W. (A)
Jones, B. R. (M)
Jones, G. V. (A)
Kruger, F. W. (A)
Ley, E. W. (A)
Loewenstein, C. N. (A)
McCaron, S. I. (A)
Mintz, M. (A)
Morris, G. R. (A)
Muniak, C. (A)
Page, R. K. (A)
Pelc, T. (A)
Petersen, E. L. (M)
Peterson, W. D. (A)
Pierson, J. E. (A)
Price, E. L. (A)
Rupert, M. J. (A)
Schneider, W. J. (A)
Sisco, W. B. (M)
Skene, R. A. (A)
Slavitt, J. (A)
Smity, R. B. (A)
Soergel, D. G. (M)
Sprong, D. C. (A)
Stephens, H. M. (A)
Stowell, N. J. (M)
Strasburger, T. J. (A)
Walkley, S. E. (A)
Werdel, J. H. (A)
Whistler, W. J. (A)
Wicks, D. S. (SM)
Wiley, F. L. (A)
Talmage, G. E. (A)
Tapp, J. E. (M)
Taylor, C. A., Jr. (A)
Thomsen, G. A. (A)
Thresh, J. L. (A)
Trapp, J. A. (A)
Trussell, A. B. (M)
Vandal, W. L., Jr. (A)

Los Altos
Alva, A. J. A. (A)
Bagley, A. S. (A)
Blumberg, M. (M)
Brown, J. F. (SM)
Burkhard, F. J. (A)
Elwell, C. F. (F)
Ginsburg, C. P. (A)
Ginzton, E. L. (F)
Gould, G. P. (A)
Hackley, G. E. (A)
Hanisch, W. R. (M)
Heintz, R. M., Jr. (A)
Hennies, S. R. (M)
Hodges, E. B. (A)
Hunter, P. B. (SM)

Lorence, E. L. (A)
McGuigan, W. D. (M)
Miller, H. C. (VA)
Murphy, E. J. (M)
Myers, W. D. (SM)
Nelson, B. E. (A)
Noe, J. D. (SM)
Overacker, H. E. (SM)
Pederson, D. O. (A)
Rockwell, W. S. (A)
Schrock, N. B. (SM)
Stanley, C. B. (M)
Tetenbaum, S. J. (A)
Van Reneselaer, C. (M)
Vehn, R. E. (A)
Wholey, W. B. (SM)
Wilder, K. T. (A)

Los Angeles
Amiss, J. R. (A)
Ackerlind, E. (SM)
Adachi, T. (A)
Alagna, G. I. (A)
Allen, F. C. (A)
Ambrosio, A. (A)
Anderson, D. N., Jr. (A)
Anderson, K. W. (SM)
Anker, E. R. (A)
Allen, W. L. (A)
Antell, S. (A)
Arnold, H. J. (A)
Azaren, D. (A)
Badertscher, R. O. J. (A)
Baker, J. J. (A)
Baker, M. L. (A)
Baldwin, L. W. (SM)
Balugo, J. J. (A)
Barnhart, W. H. (A)
Battocletti, J. H. (A)
Bayley, R. M. (A)
Becker, H. (M)
Beckstead, D. L. (A)
Begovich, N. A. (A)
Bell, H. A. (A)
Bell, W. D. (A)
Belz, A. R. (A)
Bender, F. A. (A)
Bennett, R. R. (A)
Beranek, J. S. (SM)
Bertrem, C. J. (A)
Bialek, J. (A)
Blackman, B. G. (SM)
Blair, D. R. (A)
Blasberg, L. A. (A)
Bodge, A. H. (A)
Boling, H. E. (A)
Bonney, R. B. (SM)
Bonness, Q. L. (M)
Bookee, J. R. (A)
Borgeson, P. W. (A)
Borofka, R. P. (A)
Bovich, E. J. (A)
Bowler, G. E. (SM)
Bradley, J. L. (A)
Bravo, A. (A)
Britton, C. W. (A)
Brockway, W. W. (VA)
Brooks, W. O. (M)
Brown, A. S. (SM)
Brown, B. J. (A)
Brown, N. M., Jr. (A)
Brown, P. M. (A)
Brownstone, N. (A)
Brubaker, G. P., Jr. (A)
Bucknell, W. H. (VA)
Burbeck, D. W. (A)
Burke, J. J. (A)
Burnham, J. (M)
Burnsweig, J., Jr. (M)
Burr, K. L. (A)
Catlinan, A. O. (A)
Cain, G. H., Jr. (A)
Capps, J. W. (A)
Carlson, E. H., Jr. (A)
Carr, J. W. (A)
Chandler, J. A. (A)
Chase, W. P. (A)
Chrystie, H. (M)
Chown, J. B. (A)
Clark, A. C. (A)
Clark, D., Jr. (A)
Clark, F. J. (A)
Clark, R. W. (VA)
Clark, T. C. (SM)
Clarke, W. R. (A)
Clock, D. P. (A)
Cole, B. M. (SM)
Cole, F. H. (VA)
Conviser, H. (VA)
Cooper, P. V. (A)
Corner, K. T. (M)
Courtney, W. R. (A)
Covington, A. W. (A)
Crabb, R. C. (A)
Crandon, D. H. (M)
Crockett, J. E. (A)
Crooke, V. E. (A)
Cunningham, E. W. (VA)
Curran, G. W. (SM)
Curtis, E. C. (A)
Curtiss, A. N. (SM)
Dally, C. R. (A)
Darling, J. K. (A)
Daspit, J. I. (A)
Davis, R. (M)
De Forest, L. (F)
De Lano, R. H. (A)
Dempster, B. (SM)
Denny, W. I. (A)
Denton, R. F., Jr. (A)
Dexter, G. W. (A)
Dietrich, J. E. (A)
Dill, J. M. (A)
Dillon, R. S. (A)
Dine, F. E. (A)
Dobbertin, W. H. (A)
Domike, D. A. (A)
Downes, L. (M)
Dresselhouse, P. H. (A)
Drummond, E. J. (A)
Dunn, G. R. (A)
Dunnigan, F. A. (A)
Duvall, L. L. (A)
Dye, R. C. (A)
Dye, R. R. (A)
Eckert, J. A., Jr. (A)
Edgerton, D., Jr. (A)
Edson, M. (M)
Edwards, J. (M)
Edwards, J. N. (A)
Edwards, R. O. (A)
Ekmanian, D. J. (A)
Ekpatian, J. (A)
Elliott, J. W. (A)
Elliott, P. C., Jr. (A)
Ellsworth, A. R. (A)
Emerson, R. W. (A)
Enenstein, N. H. (A)
Engel, H. L. (A)
Epstein, H. (A)
Erdley, H. F. (A)
Estep, C. R. (VA)
Euler, L. J., Jr. (A)
Evans, H. W. (A)
Fabulich, A. J. (A)
Fails, W. A. (M)
Favreau, R. R. (A)
Feigus, J. I. (A)
Felt, W. (A)
Fenn, W. H. (SM)
Field, L. M. (F)
Filman, N. J. (A)
Fine, E. (A)
Finkelstein, S. I. (A)
Finney, B. W. (A)
Firle, T. E. (A)
Firth, F. (A)
Fischer, B. (A)
Fjeldsted, N. B. (A)
Fling, J. J. (A)
Flcok, W. L. (A)
Flynt, F. V. (A)
Fodor, F. H. (VA)
Forrest, C. B. (A)
Fort, J. E. (A)
Foulon, F. (M)
Frampton, M. W. (A)
Franco, M. (M)
Frear, G. C. (A)
Freedman, L. M. (A)
Friedlander, S. L. (A)
Fujimoto, T. Y. (A)
Fuller, T. D. (A)
Futterman, M. (A)
Gabler, R. T. (SM)
Gaines, B. R. (SM)
Ganzenhuber, J. H. (A)
Garafalo, J. J. (A)
Gardner, L. B. (A)
Geissinger, G. I. (A)
Gerlough, D. L. (M)
Giannetto, C. (M)
Gibbons, C. A. (A)
Gibbs, F. R. (A)
Golbert, S. A. (A)
Gold, A. R. (A)
Gold, D. (A)
Goldberg, P. A. (A)
Goldenstern, G. (A)
Golvin, B. (A)
Goodwin, C. E. (A)
Gorden, H. C. (A)
Gore, M. R. (A)
Gossland, J. K. (A)
Gottier, T. L. (SM)
Gould, R. G. (A)
Grant, E. W. (M)
Grant, R. L. (A)
Grantham, G. W. (A)
Grater, V. M. (A)
Green, J. S. (A)
Green, J. W. (A)
Green, S. S. (A)
Greenbaum, M. (A)
Greenler, P. H. (A)
Grigg, R. W. (A)
Grignon, L. D. (SM)
Gross, F. A. (A)
Gross, J. E. (A)
Guerrero, E. S. (M)
Gurley, J. G. (A)
Gutcheon, W. Y. (A)
Guthrie, W. R. (A)
Guy, S. A. (A)
Haas, R. W. (A)
Hall, C. R. (A)
Hall, E. C. (A)
Hammond, A. L. (A)
Hance, H. V. (M)
Hansen, H. R. (A)
Hardy, W. G. (A)
Harmon, W. S. (SM)
Harper, R. B. (M)
Harris, R. C. (A)
Harris, W. R. (A)
Hartman, A. M. (A)
Haurlan, P. N. (M)
Heaverlo, H. D. (A)
Henschke, R. A. (A)
Hershberger, W. D. (SM)
Hill, C. R. (A)
Hill, W. B. (A)
Hilliard, J. K. (F)
Hilsdale, F. A. (A)
Himes, R. (M)
Hirschfield, G. (A)
Hodder, W. K. (A)
Hoffman, L. A. (A)
Hoffman, S. (A)
Holcomb, D. R. (A)
Holt, D. E. (A)
Holt, T. N. (A)
Hoo, E. (A)
Hornbostel, W. G. (A)
Horrell, M. W. (SM)
Hughes, E. L. (A)
Hughes, E. S. (A)
Hughes, H. M. (M)
Hughes, W. A. (M)
Hull, R. E. (A)
Hunter, W. O. (M)
Hurd, F. K. (M)
Hyden, I. F. (M)
Iannelli, E. (M)
Ireland, F. (SM)
Jackson, B. B. (A)
Jackson, K. R. (M)
Jamison, J. W., Jr. (A)
Jevons, L. O. (A)
Johnson, H. R. (A)
Johnson, J. S. (A)
Johnson, M. W. (A)
Johnson, R. M. W. (M)
Jones, D. (A)
Joseph, H. (A)
Kagan, M. F. (A)
Kahn, F. (A)
Kahrilas, P. J. (M)
Kalson, N. H. (A)
Katz, L. (A)
Kappel, T. J. (A)
Kappler, M. O. (SM)
Kaufman, A. B. (M)
Kayner, H. J. (SM)
Kazarian, D. G. (A)
Kelly, D. H. (A)
Kelly, D. A. (SM)
Kelly, R. S. (A)
Kennedy, F. M. (SM)
Kibler, P. J. (SM)
Kirkman, H. L. (A)
Kimbrough, W. R. (A)
King, E. F. (SM)
King, E. N. (A)
King, S. W. (A)
Kirsch, H. (A)
Kitabayashi, T. (A)
Klein, W. S. (M)
Kliment, P. (A)
Kline, R. L. (A)
Knecht, R. O. (A)
Knoll, D. W. (A)
Kluehe, W. (A)
Knaul, J. E. (A)
Knowlton, O. H., Jr. (A)
Knopoff, L. (A)
Kodera, C. F. (A)
Koenig, W. A. (A)
Koukol, J. F. (A)
Krause, C. A. (A)
Krausz, R. (A)
Kreager, P. C. (A)
Kroemer, J. R. (A)
Kryske, L. E. (A)
Kuratani, K. K. (A)
Kurtz, L. A. (A)
Lader, L. J. (M)
Lanning, W. M. (A)
Lark, E. J. (M)
Lavas, G. P. (A)
La Violette, R. F. (A)
Lazo, C. L. (A)
Lawlor, R. C. (SM)
Lebell, D. (A)
Leitner, R. G. (SM)
Levine, L. (A)
Lew, H. W. (A)
Lewis, B. G. (M)
Lichty, J. R. (A)
Lieberknecht, J. A. (A)
Lieberman, I. J. (A)
Lietzan, A. A. (A)
Lindsay, W. W., Jr. (F)
Lipman, C. E. (M)
Lissauer, S. (A)
Lockard, R. E., Jr. (A)
Lord, D. L. (A)
Lovejoy, R. E. (SM)
Lund, W. W. (A)
Lutz, S. G. (SM)
Lynch, F. W. (A)
MacKenzie, L. G. (A)
Macklin, T. G. (A)
Magid, M. (A)
Maguire, W. W. (A)
Manderfeld, E. C. (SM)
Margol, L. (A)
Margolin, A. R. (A)
Margolis, M. (A)
Markakis, M. J. (A)
Mason, C. W. (M)
Matheny, L. E. (A)
Mathews, W. E. (M)
Matsumoto, E. (A)
Mautner, L. (SM)
McAllister, J. T. (A)
McCabe, A. P. (M)
McClellan, L. D. (A)
McClintock, D. G. (A)
McCoy, R. E. (M)
McKechnie, R. M. (A)
McMahon, M. E. (A)
McRae, F. B. (M)
McRuer, D. T. (A)
Meier, D. A. (A)
Meigs, V. C. (A)
Meissner, K. H. (SM)
Melniker, B. (A)
Merrill, J. A. (A)
Metcalf, D. E. (M)
Metcalf, H. E. (SM)
Mettler, R. F. (A)
Meyer, A. W. (A)
Meyers, R. C. (A)
Michels, L. (A)
Milham, R. F., Jr. (A)
Miller, B. F. (SM)
Miller, T. W. (M)
Miller, W. B. (M)
Millstone, S. D. (A)
Milton, L. A. (M)
Mintz, E. (M)
Mirakentz, A. (A)
Mitchell, B. B. (A)
Mitchell, P. R. (A)
Miyata, J. J. (A)
Mockbee, R. L. (A)
Mooney, G. F. (A)
Moore, G. M., Jr. (A)
Moore, J. A. (A)
Moore, R. T. (A)
Moser, C. M. (A)
Moss, J. F. (A)
Mueller, G. J. (SM)
Munger, J. C. (A)
Murufas, P. P. (A)
Myers, K. E. (A)
Naylor, A. W. (A)
Neal, F. R. (A)
Neelands, R. (A)
Nelson, C. S., Jr. (A)
Newman, C. (A)
Nichols, A. H. (A)
Nichols, F. J. (M)
Noble, J. J. (M)
Noland, A. R. (A)
Noorland, M. (A)
Nourse, R. B. (A)
Nuban, E. (A)
Numan, J. K. (A)
O'Connor, G. J. (M)
Oglesby, W. D. (A)
Olson, J. H. (M)
Oodrys, A. A. (A)
Ordesch, W. E. (A)
Osborn, R. H. (A)
Ostland, F. G. (A)
Ovitt, M. D. (A)
Paddock, O. K. (M)
Paeth, K. L. (A)
Papas, C. H. (A)
Parker, A. T. (M)
Patton, W. L. (A)
Perrine, C. D., Jr. (A)
Perry, J. T. (A)
Perry, R. H. (A)
Peterson, F. V. (A)
Petry, C. B. (SM)
Pfeffer, I. (A)
Pidhayny, D. D. (A)
Pierce, C. G. (M)
Pincus, L. (M)
Pipes, L. A. (M)
Pollack, M. (SM)
Pregler, R. A. (A)
Profumo, V. J. (A)
Proud, W. H. (A)
Ramo, S. (F)
Randall, R. D. (A)
Rappaport, R. B. (A)
Reddicks, J. E. (A)
Reed, R. G. (A)
Reed, R. H. (A)
Reimer, R. N. (A)
Reinsch, P. J. (A)
Reyes, C. M. (M)
Reynolds, G. W. (A)
Richards, J. A. K. (SM)
Richards, W. S. (VA)
Ridenour, L. N., Jr. (SM)
Riek, F. O., Jr. (A)
Rittersbacher, J. E. (A)
Roberts, L. L., Jr. (A)
Robinson, W. H. (A)
Rodda, E. N. (A)
Rodgers, P. W. (A)
Rodimon, C. C. (M)
Rogers, T. A. (M)
Roney, R. K. (A)
Rose, H. B. (A)
Rose, W. (A)
Rothe, C. W. (A)
Ruderman, M. (A)
Rufo, J. D. (M)
Russell, G. M. (A)
Rutherford, B. J. (A)
Rutkin, B. B. (A)
Rypinski, C. A., Jr. (A)
Sakharoff, A. G. (A)
Salamonovich, G. M. (A)
Sanders, L. L. (A)
Sanders, R. W. (A)
Sanders, R. C. (A)
Saturensky, G. (A)
Sawyer, G. E. (VA)
Schachat, T. (M)
Scharf, W. (A)
Schindler, M. (M)
Schmidt, B. F. (A)
Schmidt, J. C. (M)
Schoen, S. (A)
Schonbrun, L. M. (A)
Schott, F. W. (M)
Schreiber, E. H. (SM)
Sciuto, F. A. (A)
Scoville, R. R. (SM)
Seaton, A. F. (A)
Secretan, F. (A)
Seid, E. (A)
Selleck, R. S. (M)
Sensiper, S. (SM)
Sepmeyer, L. W. (SM)
Sharp, R. L. (A)
Shaw, D. B. (SM)
Shaw, R. G. (M)
Shearer, R. W. (A)
Shepherd, H. F., Jr. (A)
Shiowitz, M. (A)
Shoulders, H. D. (M)
Shuler, M. H. (M)
Siera, M. M. (A)
Sigler, H. R., Jr. (A)
Sigmon, L. C. (SM)
Silent, H. C. (VA)
Sims, J. L. (A)
Singman, R. (A)
Sisson, R. L. (M)
Slote, L. H. (A)
Skoller, M. (A)
Smith, G. F. (A)
Smith, H. A. (VA)
Smith, R. T. (A)
Smyth, R. K. (A)
Snell, H. R. (M)
Snow, V. M. (A)
Snyder, R. M. (A)
Sodaro, J. F. (SM)
Soderquist, G. W. (A)
Sofen, I. A. (A)
Sollars, R. C. (M)
Somers, F. J. (SM)
Sommer, J. G. (A)
Speer, W. S. (A)
Sperling, P. (SM)
Sprague, E. T. (A)
Spriggs, A. J. (SM)
Stahl, R. (A)
Starr, I. M. (A)
Sterns, W. G. (M)
Stevens, S. (SM)
Steward, M. H. (A)
Stewart, A. A. (A)
Stoltz, J. R. (A)
Stoltz, P. G. (A)
Stone, C. A. (A)
Stuart-Williams, R. (M)
Sutherland, L. C. (A)
Swanson, E. R. (SM)
Takahashi, A. Y. (A)
Tanielian, G. (A)
Tendick, C. B., Jr. (A)
Tetherow, R. C. (A)
Thatcher, R. (A)
Theodore, C. (A)
Thompson, G. L. (A)
Thompson, R. B. (A)
Thorensen, R. (A)
Thorp, W. E. (A)
Tickell, E. B. (A)
Tinsley, W. E. (M)
Toeppen, M. K. (SM)
Tong, K. C. (A)
Trautman, D. L., Jr. (M)
Uecke, E. H. (A)
Ule, L. A. (M)
Urey, G. M. (A)
Van Ackere, M. G. (A)
Van Kirk, F. W. (A)
Velasco, F. C. (A)
Veneklasen, P. S. (M)
Villa, R. (A)
Vitzelio, R. B. (A)
Vladimir, L. O. (SM)
Walker, F. R. (SM)
Wallace, D. C. (VA)

Walley, B. (SM)
Walters, L. G. (A)
Ward, R. A. (M)
Warner, D. E. (SM)
Warshaw, M. (A)
Watanabe, E. (A)
Webb, J. R. (A)
Weber, J. W. (A)
Weinberg, L. (M)
Weingarten, R. (A)
Weintraub, H. H. (A)
Welliver, C. L. (M)
Wells, J. L. (M)
Wersen, D. T. (M)
Werts, L. C. (A)
Whiston, R. W. (M)
White, C. R. (A)
Willcocks, S. J. (A)
Wilson, L. W. (M)
Wilson, O. B., Jr. (A)
Winters, B. C. (M)
Wipson, J. W. (A)
Witten, E. L. (M)
Wizelman, A. (A)
Wolverton, R. W. (A)
Woodside, W. J. (A)
Worden, D. M. (A)
Worthen, K. J. (M)
Woster, S. H., Jr. (A)
Wright, P. B. (A)
Wright, R. E. (A)
Wybrow, E. (M)
Yamashiro, J. M. (A)
Yoder, D. R. (A)
Yonemoto, N. (A)
Youngs, G. W. (A)
Yucht, G. (A)
Zeitzew, H. (A)
Ziolkowski, A. (SM)
Zipper, I. (A)
Zukin, A. S. (A)

Los Gatos
Bautista, J. (A)
Bramley, N. V. (A)
Campbell, A. B. (A)
Goddard, W. A. (A)
Heintz, R. M. (F)
Hummell, K. H., Jr. (A)
Jaffe, J. S. (A)
Kaufman, J. (SM)
Rolph, D. B. (A)
Sund, H. E., Jr. (A)

Lynwood
Barnett, R. S. (M)
Gerken, G. H. (M)

Malibu
Yearsley, W.A.C.A. (M)

Manhattan Beach
Anderson, R. S. (A)
Bail, L. G. (A)
Berntsen, P. L. (A)
Clay, J. D. (A)
Curtis, C. W. (A)
Dobbins, W. E. (A)
Emmerich, L. (A)
Evans, J. C. (A)
Fonda, B. G. (SM)
Fulton, A. S. (A)
Genco, F. (A)
Haas, D. B. (A)
Hill, D. M. (A)
Holmes, R. L. (A)
Kirkland, V. D. (A)
Knittle, D. L. (A)
McKenna, Q. C. (A)
Moore, J. M. (A)
Mullins, W. H. (A)
Murray, R. E. (A)
Phelps, W. H. (A)
Plummer, D. (SM)
Rodman, S. B. (A)
Shoemaker, H. D. (A)
Sinclair, J. G., Jr. (A)
Sloan, C. S. (A)
Stack, G. C. (A)
Starkey, M. J. (A)
Stewart, E. A. (A)
Suffield, F. G. (SM)
Sundt, P. C. (A)
Swarthe, E. (SM)
Taylor, C. K. (A)
Tucker, V. L. (A)
Vandegrift, R. B. (SM)
Van Horne, T. B. (A)
Walz, R. F. (SM)
Young, R. D. (A)

Mar Vista
Jamieson, J. L. (A)

Mather Field
Neudorfer, W. L. (A)
Randolph, R. C. (A)

Maywood
Campbell, B. R. (A)
Olson, W. J. (A)

McClellan A.F.B.
Fells, W. E. (M)

Menlo Park
Auld, B. A. (A)
Boxall, F. S. (A)
Barnard, G. A. (M)
Broderick, D. L. (A)
Davis, J. H. (A)
De Lihan, R. (M)
Ellis, A. R. (M)
Fisher, C. E. (A)
Gammell, H. C. (A)
Grinich, V. H. (A)
Grow, R. W. (A)
Gunn, L. W. (A)
Helwig, N. C. (A)
Herrero, M. C. (A)
Hirotsu, G. S. (A)
Holtmann, E. H. (A)
Honey, J. F. (SM)
Huggins, R. A. (A)
Jobbins, C. W. (A)
Kaar, J. M. (VA)
Kane, R. W. (M)
King, J. W., Jr. (M)
Leadabrand, R. L. (A)
Malling, L. R. (VA)
Morgan, V. T. (A)
Pearson, P. A. (M)
Petrak, J. R. (SM)
Pfost, R. F. (A)
Robbiano, P. P. (M)
Rockwell, R. G. (A)
Salinon, V. (SM)
Silhavy, W. M. (A)
Sphar, C. H. (VA)
Stampalia, I. J., Jr. (A)
Stanbury, R. J. (A)
Stoner, J. W. (A)
Thormahlen, W. H. (A)
Trumbull, A. F. (A)
Vane, A. B. (M)
Westburg, V. B. (A)
Willrodt, M. J. (A)

Merced
Olesen, D. H. (A)
Pinsky, B. (A)

Millbrae
Foote, W. B. (A)
McCullough, J. A. (SM)
Moore, K. A. (M)
Murdock, C. E. (A)
Peirce, J. A. (A)

Mill Valley
Behringer, D. S. (M)
Bird, J. R. (SM)
Smith, H. H. (A)
Vreeland, R. W. (A)

Modesto
Bates, W. H., Jr. (VA)
Hancock, J. B. (A)
Onnigian, P. K. (A)
Stone, J. A. (A)

Monrovia
Bickel, R. C. (A)
Lothringer, R. C. (A)
Quackenbush, R. E. (A)
Sprague, W. C. (A)
Wilts, J. R. (A)

Montebello
Crozer, W. A. (A)
Dodeman, H. (A)
Harriman, D. E., Jr. (A)
Hodge, J. (M)

Monterey
Alker, C. A. (A)
Bauer, R. E. (A)
Bauer, W. M. (M)
Bacon, W. L. (A)
Baumgartner, W. S. (M)
Chaney, J. G. (SM)
Conte, T. M. (SM)
Cain, E. L. (A)
Flagg, D. J. (A)
Frey, A. R. (SM)
Fucile, F. B. (A)
Glet, G. R. (SM)
Glasgow, R. S. (SM)
Goddard, E. G. (M)
Herron, R. G. (A)
Hoisington, D. B. (SM)
Johnson, W. F. (A)
Kahal, R. (SM)
Kaluger, M. M. (A)
Klamm, C. F., Jr. (A)
Leff, B. (M)
Miller, R. L. (M)
Peterson, W. R. (A)
Riggin, J. D. (M)
Rothauge, C. H. (A)
Ryan, C. M. (A)
Sheingold, A. (M)
Smith, W. C. (A)
Strickland, J. L. (A)
Taylor, W. G. (M)
Zoller, C. J. (A)

Montrose
Bullock, R. E. (A)
Christilaw, J. S. (A)
Hamilton, H. J. (A)
Jensen, A. K. (M)
La Gasse, S. G. (A)
Van Patten, W. D. (A)

Moraga
Tibbetts, D. R. (SM)

Mountain View
Burkhart, R. N. (A)
Dahinden, D. T. (A)
Farlow, C. C. (A)
Jesse, E. (A)
McCone, G. L. (M)
Mancebo, T. W. (A)
Moreno, T. (A)
Maccono, F. J. (VA)
Peterson, C. J. (A)
Rowe, R. M. (A)
Soderstrum, J. C. (A)
Stead, D. A. (A)
Weeks, R. L. (A)

Mount Wilson
Barnes, R. B. (VA)
Knight, J. B., Jr. (SM)

Muroc
Titus, R. W. (A)

Napa
Cattell, G. W. (SM)
Guyton, C. W. (A)
Roberts, W. L. (A)
Sorensen, A. G. (A)

National City
Fredlund, F. A. (A)
Newell, A. E. (A)
Vann, I. M., Jr. (M)

Norco
Brown, M. H. (A)
Witbeck, L. H. (A)

North Highlands
Land, D. W. (A)

North Hollywood
Aboussleman, W. (SM)
Arne, R. E. (A)
Beaudine, D. M. (A)
Berger, J. B. (A)
Bertolet, E. C. (M)
Burkart, E. H., Jr. (A)
Busenkell, C. C. (SM)
Campbell, B. K. (A)
Ceccarini, R. E. (A)
Chandler, C. W. (A)
Crystal, D. G. (A)
Curtis, J. P. (A)
Cutler, S. (A)
Daniel, R. L. (M)
Davidson, L. G. (A)
Derderian, N. (A)
Deyo, A. E. (A)
Elster, S. (A)
Endsley, G. T. (A)
Ewing, L. R. (A)
Farnsworth, H. D. (VA)
Fielding, B. L. (M)
Forbath, F. P. (A)
Futchik, A. J. (A)
Gion, J. A. (A)
Gove, E. L. (SM)
Grinnell, A. L. (A)
Hiatt, R. S. (A)
Huggins, W. G. (A)
Harrison, W. H. (A)
Hoffman, W. C. (M)
Hughson, D. L. (A)
Jacobson, R. (A)
Jensen, K. K. (M)
Klotz, E. (A)
Larse, G. L. (A)
Leonard, N. E. (A)
Martin, V. G. (SM)
Mleczko, E. L. (M)
Mobley, M. P., Jr. (M)
Mont, C. H. (A)
Moore, V. (SM)
Morrissey, D. J. (A)
Morrison, A. I. (A)
Osborne, W. E. (A)
Pastor, C. C. (A)
Perrault, R. E. (A)
Politi, E. V. (A)
Rabbin, I. G. (M)
Rawlins, R. E. (SM)
Rosene, K. T. (A)
Scott, H. A. (A)
Smith, M. H. (A)
Stalford, W. E. (A)
Sullivan, J. R. (M)
Sumner, T. B. (A)
Toomin, H. (M)
Towle, R. W. (A)
Troutman, A. F. (A)
Tucker, R. E. (M)
Urlovic, W. C. (A)
Vincent, R. C. (M)
Volpe, F. (A)
Vrooman, D. H. (A)
Wilson, J. W. (A)
Winkler, J. L. (A)
Woodward, E. O. (A)

Northridge
Ainsworth, M. J. (SM)
Bass, L. J. (A)
Daush, A. A., Jr. (A)
Miller, F. G. (A)
Telle, G. R. (A)
Wooden, R. E. (A)
Wyland, G. P. (M)

North Sacramento
Kelliher, J. E. (VA)

Norton A.F.B.
Young, K. A. (A)

Norwalk
Bakst, A. A. (A)
Beatty, W. M. (A)
Bradt, A. J. (A)
Brandes, R. E. (A)
Campbell, D. H. (A)
Clark, R. E. (A)
Kohn, I. A. (A)
Leicester, J. F. (A)
Miller, E. F. (A)
Morgan, R. C. (SM)
Obray, D. C. (A)
Thurman, F. J. (A)

Novato
Frary, R. S. (A)
Gipple, H. W. (A)
O'Neal, K. R. (A)

Oakdale
Moll, K. D. (A)

Oakland
Andersen, V. O. (A)
Andrews, W. F. (A)
Baumgartner, J. V. (A)
Black, L. J. (SM)
Cagle, D. S. (A)
Chew, B. H. (A)
Clark, O. (A)
Cone, D. R. (A)
Crill, P. D. (A)
Daverio, A. J. (A)
Dorr, R. (A)
Downey C. E. (A)
Drake, H. B. (M)
Feldman, N. E. (A)
Ferreira, E. (A)
Forbes, A. C. (SM)
Gausmann, W. H. (A)
Gennett, D. F., Jr. (A)
Gilliland, W. D. (M)
Gleasner, J. M. (M)
Harbidge, E. A. (A)
Harris, B. E., Jr. (A)
Heron, D. J. (A)
Hoefener, C. E. (A)
Hom, N. P. (A)
Jenkins, K. D. (A)
Jiu, R. (A)
Kaifer, R. C. (A)
Kan, G. (A)
Kirsten, F. A. (A)
Lar Rieu, E. A., Jr. (M)
Lee, L. K. (SM)
Lee, S. (A)
Louie, P. V. (A)
MacLeod, D. A. (A)
Malone, W. C., Jr. (A)
Morrison, G. E. (A)
Nofrey, L. C. (A)
Owren, H. M. (A)
Pattison, A. (A)
Penther, C. J. (SM)
Pigozzi, L. J. (A)
Rector, R. H. (A)
Rosenberg, J. M. (A)
Schwemin, A. J. (A)
Upham, F. T. (A)
Wahlgren, W. W. (SM)
Wolfe, H. T. (A)

Oceanside
Ulmer, H. W. (A)

Oildale
Mitchell, P. P. (A)

Ontario
Calderwood, K. J. (A)
DeWitt, C. P. (A)
June, R. H. (A)
Konkel, T. C. (A)
Pollock, R. D. (M)
Resnik, A. E. (A)
Ritter, E. (SM)

Orange
Elliott, M. S. (A)

Orinda
Noble, M., Jr. (A)
Thunen, G. W. (A)

Oroville
Gregory, R. M. (A)

Oxnard
Akers, R. F. (A)
Anderson, T. J. (A)
Ankerstar, R. H. (A)
Bell, D. E. (M)
Binkley, M. (A)
Bowen, W. A., Jr. (M)
Bradford, W. O. (M)
Brown, W. C. (M)
Cornwall, E. A., Jr. (A)
Cassidy, R. E. (A)
Darden, R. R., Jr. (M)
Dickson, E. L. (A)
Fauvre, R. F. (A)
Fields, M. H. (M)
Ford, J. P. (A)
Gibson, M. M. (A)
Gleason, J. L. (A)
Gosley, A. W. (A)
Green, C. A. (A)
Hollmann, H. E. (A)
Horn, R. H. (A)
Ishii, F. K. (A)
Keigher, J. P. (A)
Kingman, G. M. (M)
Lambert, G. M. (A)
Landay, R. B. (A)
La Plant, O. (M)
Lathrop, P. A. (A)
Link, W. F. (A)
Masin, G. F. (M)
McQuiston, W. R. (M)
Meader, H. W. (A)
Miller, J. W. (A)
Miller, W. A. (A)
Moore, M. H. (A)
Moseley, J. A. (A)
Mumma, J. W. (A)
Nauss, B. M. (A)
Nawalinski, T. E. (A)
Novo, R. B. (A)
Palter, N. H. (SM)
Pike, J. M. (A)
Pochop, L. C. (A)
Porter, J. R. (A)
Potter, N. A., Jr. (A)
Ramsay, W. R. (A)
Sander, M. H. (A)
Schneider, P. R. (A)
Seamer, C. W. (A)
Sedlacek, W. C. (M)
Semel, D. (A)
Skiff, W. S. (A)
Snow, R. B. (A)
Solferino, T. A. (A)
Sorden, L. V. (A)
Spranger, P. B. (A)
Stone, J. E. (A)
Switzer, W. L. (A)
Welch, C. H. (A)
Wood, E. (A)
Wythe, D. H., Jr. (A)
Yalen, S. (A)
Zopf, D. O. (A)

Pacific Grove
Norris, W. E. (M)

Pacific Palisades
Alberts, W. A. (A)
Albrecht, A. (SM)
Arndt, W. F. (SM)
Beagles, R. (SM)
Brewer, A. F. (SM)
Danenberg, L. W. (A)
Dufford, D. E. (A)
Garber, R. S. (A)
Garland, M. D., Jr. (A)
Giffin, K. A. (M)
Green, D. J. (A)
Greene, G. M. (SM)
Hadden, F. A. (A)
Haeff, A. V. (F)
Halloran, R. G. (A)
Howard, L. W. (SM)
Iams, H. (F)
Kauke, J. R. (A)
Kelsey, L. (A)
Larson, H. T. (A)
Le Grand, C. (A)
Mallett, J. D. (A)
McCann, J. G. (A)
McCloud, W. W. (A)
Membury, P. J. (A)
Muchmore, R. B. (SM)
Neidefler, C. R. (A)
Sarkissian, H. H. (A)

Smith, S. T. (SM)
Spandau, E. P. (SM)
Tyson, O. A. (A)
Whelan, D. E. (A)

Pacoima
Briggs, J. G. (A)
Fingerett, J. A. (A)
Ingebretsen, E. E. (A)
Kortman, C. M. (A)
Martin, D. L. (A)
Stevens, T. E. (A)
Turnbull, J. S., Jr. (A)
Zechiel, W. J. (A)

Palm City
Williamson, R. J. (A)

Palo Alto
Arnold, D. T. (A)
Baker, G. R. (A)
Battelle, R. B. (A)
Bauer, B. (VA)
Beaver, W. L. (A)
Bennion, D. R. (A)
Bolljahn, J. T. (SM)
Bomeisler, R. E. (A)
Carter, J. O. (A)
Chadwick, J. H., Jr. (A)
Chiang, F. C. (A)
Christensen, P. C. (A)
Clark, C. B. (M)
Clelland, F. W., Jr. (SM)
Clifford, D. G. (SM)
Code, J. A. (SM)
Corbell, P. L., Jr. (M)
Crapuchettes, P. W. (M)
Crumly, C. B. (A)
Daniel, R. D. (A)
De Grasse, R. W. (A)
Dethlefsen, D. G. (A)
Drake, L. J. (A)
Dunbar, A. S. (SM)
Eldredge, A. L. (A)
Elliott, H. F. (F)
Elspas, B. (A)
Filmer, J. C. (A)
Fisher, G. (SM)
Floyd, W. B., Jr. (A)
Fong, A. (SM)
Ford, V. S. (A)
Fuller, L. F. (F)
Gallagher, W. J. (A)
Gilbert, R. M. (A)
Gillette, P. R. (SM)
Goldberg, J. (A)
Granger, J. V. (SM)
Grass, J. W. (A)
Griese, R. H. (A)
Grimm, R. A. (A)
Hall, E. G. (M)
Hand, B. P. (A)
Hans, W. J. (A)
Harman, W. A. (A)
Hewlett, W. R. (F)
Heywood, J. B. (A)
Hilton, E. A. (A)
Holden, G. R. (A)
Honey, R. C. (A)
Isberg, R. A. (SM)
Jakubowski, W. (A)
Johns, L. W. (A)
Johnson, W., Jr. (A)
Jones, C. B. (SM)
Jones, R. E. (A)
Kellogg, H. A. (A)
Kennedy, H. D. (A)
Kerwin, W. J. (A)
Kirkwood, R. L. (A)
Krause, R. A. (SM)
Kruse, F. W., Jr. (A)
La Fetra, F. E. (A)
LaForge, L. H., Jr. (SM)
Lynch, W. M. (M)
Mahurin, C. R. (A)
Marsh, M. D. (M)
Mathers, G. C. (A)
Miller, R. E. (A)
Miller, S. W. (A)
Nelson, F. A. (A)
Oliver, B. M. (M)
Owens, O. G. (M)
Packard, D. (F)
Pappas, N. L. (A)
Patton, P. B. (A)
Porter, N. E. (M)
Poulter, H. C. (A)
Quinn, R. A. (A)
Renihan, L. B. (A)
Reynolds, D. K. (SM)
Roberts, L. A. (A)
Rockwood, C. C. (A)
Rorden, R. J. (A)
Scheuch, D. (SM)
Secard, E. L. (A)
Shellhammer, W. L. (A)
Shimizu, J. K. (A)
Singleton, R. C. (A)
Smith, S. L. (A)
Snow, W. B. (SM)
Snyder, W. (A)
Steele, C. W. (A)
Steensen, S. A. (A)
Stelter, E. C. (A)
Swain, J. R. (A)
Tomlin, W. T. (A)
Turner, T. F. (A)
Veltfort, T. E., Jr. (A)
Villard, O. G., Jr. (SM)
Wagener, W. G. (SM)
Ward, C. E. (M)
White, F. M., Jr. (A)
Wise, W. L. (A)
Wright, M. (A)
Wyatt, W. C. (A)
Zeidler, H. M. (M)
Zevenbergen, J. W. (A)

Palos Verdes Estates
Brewer, G. R. (M)
Caldwell, J. J., Jr. (SM)
Clement, A. J. F. (A)
Dazey, M. H. (A)
Flynn, F. J. (SM)
Hannum, D. E. (M)
Kroah, R. A. (A)
Mallinckrodt, C. O. (SM)
Moore, C. C., Jr. (A)
Peterson, W. E. (SM)
Reitz, L. P., Jr. (SM)
Stevens, F., Jr. (A)
Wagenseil, W. (SM)
Walance, C. G. (A)
Williams, C. (A)

Paramount
Acker, W. W. (A)
Child, C. H. (M)
Williams, N. (A)

Pasadena
Adler, J. A. (A)
Anderson, R. W. (M)
Angus, D. G. (A)
Ashby, R. M. (SM)
Bagley, G. D. (SM)
Barasch, M. V. (SM)
Beatty, C. G. (A)
Benioff, H. (VA)
Blackman, W. S. (A)
Blatterman, H. L. (M)
Bolton, M. W. (A)
Booth, F. O., Jr. (A)
Bradish, W. M. (A)
Braun, T. H. (M)
Bremner, D. S. (A)
Burke, H. E., Jr. (SM)
Cady, W. G. (F)
Chase, N. C. (A)
Conn, R. B. (M)
Crossett, E. C. (VA)
Cummings, C. I. (A)
David, J. (A)
Davis, D. C. (A)
Dennison, P. R. (A)
Dixon, W. J. (A)
Donoho, P. L. (A)
Downs, G. W., Jr. (SM)
Dwyer, R. J. (VA)
Ellis, A. T. (A)
Erdman, D. C. (A)
Everitt, R. S. (A)
Ford, J. R. (A)
Foster, J. F. (A)
Frank, M. E. (A)
Gardner, J. A. (A)
Gates, C. R. (A)
Giannini, G. M. (SM)
Gilbertson, B. I. (A)
Gilchriest, C. E. (A)
Gleghorn, G. J. (A)
Goeppinger, A. L. (M)
Goodell, E. M. (M)
Goodwin, P. S. (SM)
Gosswiller, R. O. (A)
Gould, R. W. (A)
Granger, W. E. (A)
Grobecker, A. J. (M)
Grove, H. G. (A)
Hamilton, R. C. (A)
Harden, P. A. (M)
Hare, G. H. (A)
Hatch, M. (A)
Hiraoka, F. A. (A)
Holden, W. H. T. (SM)
Holmes, W. R. (A)
Horwitz, L. B. (A)
Hoskins, E. E. (A)
Howes, E. T. (VA)
Johnson, R. W. (SM)
Kalbach, J. F. (SM)
Kirsten, C. C. (A)
Koerner, T. W. (A)
Liljegren, L. K. (A)
Lowy, M. A. (A)
Maass, C. F. (A)
Madsen, R. G. (M)
Marshall, R. (A)
Mattson, E. (A)
McCool, J. M. (A)
McFarlane, M. D. (SM)
Miller, G. J. (A)
Molander, A. B. (A)
Montgomery, D. R. (A)
Moran, R. B., Jr. (SM)
Morison, R. (A)
Moseley, F. L. (SM)
Motta, N. (A)
Mundt, E. (A)
Neff, G. A. (A)
Newhouse, G. B. (A)
Neumeyer, B. W. (A)
Nicholson, W. Q. (M)
Odekirk, M. D. (A)
Oshiro, F. K. (A)
Owen, R. P. (SM)
Peoples, J. E. (A)
Pickering, W. H. (SM)
Ray, P. J., Jr. (A)
Rechtin, E. (A)
Reynolds, R. A. (A)
Riddle, F. M. (A)
Riggins, H. C. (A)
Roberts, R. E. (A)
Robinson, L. P. (A)
Ross, I. (A)
Rutishauser, R. W. (M)
Savant, C. A. (A)
Scarbrough, A. D. (A)
Schwartz, E. D. (A)
Scull, J. R. (M)
Sefton, W. E. (A)
Seiler, R. (A)
Shadle, P. W. (M)
Shaffer, P. A., Jr. (A)
Shapiro, H. (A)
Shultise, Q. M. (M)
Simmons, E., Jr. (VA)
Skeeters, R. N. (A)
Skinner, M. R. (A)
Slavin, M. (A)
Sly, W. G. (A)
Smith, M. C. (M)
Spaulding, C. P. (A)
Stanton, G. (A)
Stensgaard, C. P., Jr. (A)
Stormes, J. M. (A)
Strassner, R. M. (M)
Swan, M. L. (M)
Tehan, M. F. (A)
Tejada-Flores, L. H. (A)
Thurston, J. M. (SM)
Tong, S. R. (A)
Toukdarian, R. Z. (A)
Vail, R. W. (A)
Van Biene, F. K. (A)
Waldschmidt, N. E. (A)
Warman, R. C. (A)
Warner, A. H. (M)
Watts, E. W. (M)
Wedel, J. J., Jr. (M)
Weinert, B. R. (A)
Westlake, P. R. (A)
Williams, R. W. (A)
Younger, U. E. (A)
Zarem, A. M. (A)

Pebble Beach
Menneken, C. E. (A)

Petaluma
Boutz, F. E. (M)
Boysen, J. A. (A)
Garzoli, F. F. (A)
Ravenscroft, H. A. (A)

Pico
Carlson, R. S. (A)
Fuller, C. A. (A)
Nelson, E. K. (A)
Swanson, R. L. (A)

Piedmont
Brooks, R. E. (A)
Cole, C. H. (VA)
Evans, C. P. (M)
Forster, A. G. (VA)

Playa Del Rey
Beckwith, H. W. (A)
Kennedy, W. R. (A)
Woods, W. A. (VA)

Pleasanton
Wharton, C. B. (A)

Point Arena
Heckinger, R. G., Jr. (A)

Point Mugu
Clayton, J. F. (A)
Elliott, G. L. (A)
Graham, W. (A)
Johnson, L. B. (A)
Kanze, A. J. K. (A)
Lund, T. J. (A)
Ross, P. A. (A)
Reid, I. H. (VA)

Pomona
Abraham, R. P. (A)
Allen, J. W. (SM)
Abramis, B. D. (M)
Allen, J. R. (A)
Bessette, A. (A)
Birch, R. S. (A)
Craig, F. D. (M)
Dresner, J. W. (A)
Dutcher, L. R. (A)
Ellis, G. M. (SM)
Fong, L. F. (A)
Gleason, M. J. (A)
Gottler, R. L. (A)
Hain, J. L. (A)
Hemphill, F. A. (A)
Hopper, B. (A)
Hubbard, B. F. (M)
Jackson, J. C. (A)
Kidwell, W. M. (A)
Koehler, E. C. (A)
Lloyd, A. T. (A)
Michaels, E. L. (SM)
Mickelson, J. R. (A)
O'Brien, J. C. (SM)
Pace, R. T. (M)
Parsons, N. L. (A)
Pile, D. H. (M)
Rue, C. A. (A)
Schertz, C. W. (A)
Shalloway, A. M. (M)
Shimada, G. (A)
Soward, R. (M)
Stevenson, W. A. (M)
Sylvester, G. E. (A)
Symonds, R. J. (A)
Towler, W. R. (M)
Watkins, E. L. (A)
White, M. A. (A)
Wiggins, E. T. (A)
Wingard, C. G. (A)

Port Hueneme
Metcalfe, J. D. (A)
Reedy, J. F. (A)
Sandler, B. (A)
York, R. A. (A)

Puente
Linebarger, P. J. (A)
McMahon, J. E. (M)

Rancho Santa Fe
Baker, R. H. (M)

Redlands
Seifert, F. F. (M)

Redondo Beach
Birkenhead, W. (M)
Bissett, T. B. (A)
Boyer, J. M. (A)
Boyer, B. E. (M)
Crane, G. B. (A)
Dutton, O. B. (A)
Hutter, G. L. (A)
Jacoil, W. J. (A)
Linhart, T., Jr. (A)
Lundstrom, O. C. (A)
Lytle, A. C., Jr. (A)
Newton, S. H. (A)
Prothers, L. T. (A)
Smith, H. A. P. (A)
Stephenson, D. L. (M)
Stroud, S. G. (A)
Willis, M. R. (A)

Redwood City
Babin, V. (A)
Babintzeff, V. A. (A)
Barkley, J. W., Jr. (A)
Bloom, G. (A)
Bradford, C. W. (A)
Covell, D. F. (A)
Data, C. D. (A)
Dumas, K. L. (A)
Eshleman, V. R. (A)
Foster, C. P., Jr. (A)
Freise, W. H. (A)
Gregg, D. P. (A)
Haag, M. W. (VA)
Harper, J. W. (A)
Harvey, L. J. (A)
Hedberg, H. E. (A)
Hulett, H. R. (A)
Hummel, C. V. (A)
Johnston, H. (A)
Kerby, M. H. (A)
Lacy, P. D. (A)
Langevin, R. Z. (A)
Leslie, F. E. (M)
Litton, C. V. (F)
Liu, C. K. (A)
Luebke, W. R. (A)
Meng, E. D. (A)
Morris, A. J. (SM)
Norcross, J. B. (A)
Patterson, G. K. (SM)
Pillsbury, A. F. (A)
Reed, D. E. (M)
Reyling, G. F. (A)
Romander, H. (SM)
Scarborough, D. S. (A)
Show, O. C. (A)
Sorg, H. E. (M)
Stahl, R. J. (M)
Thompson, R. E. (A)
Tinney, F. B. (VA)
Tipping, C. C., Jr. (A)
West, E. B., Jr. (A)

Reseda
Benson, S. (SM)
Chaiken, L. (A)
Colander, R. E. (M)
Cowden, E. R. (A)
Hoffart, H. M. (A)
Jakubowski, M. C. (A)
Katz, I. (A)
Milwitt, W. (A)
Penniwell, A. F. (A)
Peterson, J. A. (A)
Rosenbloom, A. (A)
Rudy, E. W. (A)
Schultheis, H. B., Jr. (A)
Smith, W. W. (A)
Sonners, R. J. (A)
Underberger, G. M. (A)
Wilson, R. A. (A)
Woodbeck, R. J. (A)
Woodson, W. L. (A)

Richmond
Airhart, R. V. (A)
Brubaker, E. A. (A)
Corl, J. L. (M)
Haase, W. D. (A)
Jacobs, H. N. (M)
Kimes, R. E. (A)
Laudeman, J. A. (A)
Lovell, E. L. (A)
Lowe, C., Jr. (VA)
Murray, J. H. (A)
Schrader, G. F. (A)
Snider, I. A. (A)

Ridgecrest
Kimball, G. D. (A)

Rivera
Schmidt, J. N. (A)
Shade, R. R. (A)

Riverside
Andres, P. G. (VA)
Blutman, E. (SM)
Bowen, D. A. (A)
Bower, G. G. (M)
De Marco, R. J. (A)
Dick, J. O. (A)
Fournier, L. W. (A)
Huntoon, R. D. (SM)
Humphreys, T. I. (SM)
Husten, B. F. (A)
Knoob, G. B. (A)
Lamm, R. A. (SM)
Lance, H. W. (M)
Lapham, E. G. (SM)
Lichtman, S. W. (SM)
Lundquist, C. R. (A)
MacLean, W. D. (A)
Mayeda, T. A. (A)
McCroskey, A. A. (M)
Morehouse, G. D. (A)
Parszik, P. J. (A)
Pawley, M. G. (SM)
Powers, A. B. (M)
Riverside, D. E. (M)
Sledge, O. D. (SM)
Smith, R. P. (A)
Williams, L. L. (A)
Williams, W. F. (A)

Robles Del Rio
Nason, C. H. W. (A)

Rolling Hills
Reichert, D. G. (A)
Tillotson, J. H. (A)

Rosemead
Crawford, G. N. (A)
Ferl, R. H. (A)

Roseville
Wester, E., Jr. (A)

Sacramento
Bairos, C. A. (A)
Bennett, R. C. (A)
Berger, E. W. (M)
Breuer, H. J. (M)
Broderson, L. V. (A)
Buechner, J. F. (A)
Chesney, A. P. (SM)
Dickinson, I. E. (A)
Driggs, L. O. (A)
Durr, E. (A)
Dutton, I. L. (M)
Ernst, E. C. (A)
Feeney, C. J. (A)
Godfrey, X. W. (M)
Hartman, H. (A)
Howard, R. D. (A)
Hudson, C. A. (A)
Hunt, M. E. (A)
Johnson, W. A. (A)
Kemp, E. M. (A)
Koch, W. F. (M)
Kult, M. L. (M)
Leecing, R. W. (A)
Lowe, D. G. (A)
Martin, N. A. (M)
Mason, G. F. (A)

McKinnon, R. J. (A)
Miller, J. R. (VA)
Miura, A. (A)
Morris, W. P. (A)
Naschke, E. S. (M)
Nielson, R. W. (A)
Oates, T. L. (VA)
Pipher, R. W. (A)
Russell, E. B., Jr. (A)
Russell, M. F. (A)
Sakauye, I. (A)
Scotch, C. (A)
Slater, A. P. (A)
Slater, H. C. (M)
Smart, M. E. (A)
Spadoni, A. F. (A)
Stronce, G. S. (M)
Starzec, J. S. (A)
Whitby, E. R. (A)
Wilson, V. C. (A)
Wing, J. (A)
Wolfe, H. W. (A)

Salinas
Delorimier, J. B. (A)
Lowe, N. (A)
Wilson, K. M. (A)
Wright, O. N. (A)

San Anselmo
Berryhill, J. L. (M)
Bouquet, F. L., Jr. (A)

San Bernardino
Abernathy, O. R. (A)
Carson, E. L. (A)
Ewing, G. W. (A)
Featherstone, S. J. (M)
Haddon, R. E. (A)
Joe, R. H. (A)
Kimmel, R. (A)
Marlow, H. C. (A)
Pettit, H. L. (A)
Titcomb, R. D. (A)
Verbance, A. (A)

San Bruno
Culver, J. E. (A)
Haegele, R. W. (M)
Johnstone, F. C. (A)
Preist, D. H. (M)
Snodrly, R. E. (A)
Welch, J. R. (M)

San Carolos
Abraham, W. G. (A)
Ahlgren, W. E. (M)
Ayer, W. E. (M)
Burgess, J. E. (M)
Byrne, P. F. (VA)
Carter, J. M. (SM)
Chan, W. W. (A)
Clark, J. F. (M)
Clark, J. W. (M)
Cool, L. R. (A)
Cooper, J. I. (A)
Crane, M. C. (A)
Cummings, K. M. (SM)
Fisher, L. L. (M)
Fisher, W. C. (SM)
Gillen, D. A. (A)
Greene, H. A., Jr. (M)
Heflin, W. H. (A)
Jensen, R. L. (A)
Johnson, R. E. (A)
Jolly, J. A. (A)
Joseph, W. F. (A)
Kovalevski, N. N. (A)
Kyle, W. F., Jr. (A)
Lichenstein, M. I. (A)
Maltzer, I. (A)
Marsh, C. J. (A)
McAlpine, W. N. (A)
McAulay, W. H. (VA)
Nelson, R. B. (M)
Orr, J. A. (A)
Patton, W. R. (M)
Paul, R. S. (A)
Peacock, M. L. (A)
Rudisuhle, E. J. (A)
St. Clair, M. W. (A)
Sebald, L. E. (A)
Smaha, N. F. (A)
Soderstrom, H. W. (M)
Stearns, H. M. (SM)
Stolaroff, M. J. (M)
Winenow, R. E. (A)

San Diego
Abbey, K. (A)
Abel, C. F. (A)
Altman, D. E. (A)
Anderson, J. S. (VA)
Anthony, D. J. (A)
Applin, R. H. (A)
Austin, R. W. (M)
Baer, G. W. (A)
Bailey, D. G. (A)
Ballieu, H. L. (A)
Bange, E. E. (A)
Beauregard, W. G. (A)
Beyer, C. M. (M)
Bowers, J. L. (A)
Bowers, R. W. (VA)
Brady, M. E. (A)
Brackett, R. T. (A)
Bremmer, R. A. (A)
Brokaw, H. R. (M)
Brooks, J. L. (M)
Browder, J. W. (M)
Bossoletti, J. E. (A)
Bowman, W. B. (A)
Brunswick, H. D. (A)
Buehler, M. E. (A)
Burkhardt, R. H. (A)
Burnett, W. L. (M)
Byrnes, F. X. (M)
Campbell, R. (A)
Campbell, W. D. (A)
Caporaletti, G. A. (A)
Cardoza, H. L. (A)
Carter, D. (A)
Caspers, J. W. (A)
Cattermole, G. B. (A)
Cawley, J. H., Jr. (A)
Chasinowitz, G. (A)
Chew, T. W. (SM)
Collins, W. G. (M)
Combs, S. A. (A)
Comstock, R. L. (A)
Coombs, G. F. (A)
Cooper, L. V. (A)
Cooper, R. D. (A)
Cram, C. C. (M)
Crispell, H. L. (M)
Crowell, D. D. (A)
Culler, D. M. (A)
Curl, G. H. (A)
Dameson, L. G., Jr. (M)
Davis, J. S. (A)
Day, J. P. (M)
Dellinger, J. T. (A)
Dewey, D. A. (A)
Dickstein, H. D. (A)
Dodd, G. M. (M)
Doig, J. H. (VA)
Donahue, J. (M)
Drayner, A. H. (A)
Duncan, J. G. (M)
Dunn, C. E. (A)
Edson, G. L. (A)
Elderkin, C. D. (A)
Evans, A. R. (A)
Farmer, A. A., Jr. (A)
Ferreira, R. (A)
Focke, A. B. (SM)
Freres, C. H. (M)
Gabrielson, H. C. (A)
Gaither, T. B. (A)
Garcia, G. C. (A)
Geren, K. E. (A)
Goddard, W. R., Jr. (M)
Gordon, R. A. (A)
Gottwald, C. H. (A)
Grumman, E. G. (A)
Haflinger, D. J. (A)
Hall, R. F. (A)
Hamann, O. F. (A)
Harrington, P. C. (A)
Harris, L. G. (A)
Hartin, W. J. (A)
Hayes, W. R. (A)
Hazebrook, H. (A)
Hedlund, K. W. (A)
Helgeson, V. L. (A)
Herbert, W. J. (A)
Heritage, D. P. (A)
Heritage, J. L. (A)
Hicks, C. N. (A)
Hicks, J. M. (A)
Hicks, P. A. (A)
Hix, R. C. (A)
Hixson, E. L. (A)
Hoffman, W. C. (A)
Holcomb, D. E., Jr. (A)
Holloway, J. (SM)
Homes, G. B. (A)
Hopkins, R. U. (M)
Hughes, L. R. (A)
Hulbert, S. G. (A)
Hyman, R. M. (A)
Jensen, P. A. (A)
Johanson, E. H. (A)
Jones, H. G. (M)
Kalbfell, D. C. (SM)
Kaplan, M. N. (A)
Karcher, E. R. (M)
Keeler, P. M. (A)
Keeran, R. V. (A)
Keith, I. W. (A)
Kerr, H. C., Jr. (A)
Kiernan, E. F. (SM)
Kirkman, R. A. (SM)
Lambert, T. M. (A)
LaZelle, L. L. (A)
Lazurus, A. (A)
Lebduska, R. L. (M)
Lee, H. E. (M)
Leeds, M. F. (A)
Leftwich, L. L. (M)
Liddiard, G. E. (A)
Lock, R. W. (A)
Logue, S. H. (A)
Long, J. V. (VA)
Makinson, H. O. (M)
Martin, P. C., Jr. (A)
Maxfield, J. P. (SM)
McDaniel, G. A. (A)
Merrill, J. E., Jr. (A)
McGee, H. A. (A)
McGehee, C. R. (A)
McGinnis, C. W. (A)
McNally, I. L. (SM)
McNaney, J. T. (SM)
Michael, F. J. (A)
Miller, C. N. (A)
Miller, R. H., Jr. (M)
Moe, C. R. (SM)
Montalvo, E. (A)
Moon, R. F. (A)
Moulton, A. B. (M)
Mulvey, J. X., Jr. (A)
Murphree, F. J., Jr. (A)
Naive, J. A. (A)
Oeram, R. L. (A)
Oblinger, P. M. (M)
Olds, O. S. (M)
O'Neill, J. R. (A)
Ong, A. M. (A)
Orr, J. B. (M)
Owens, A. T. (A)
Pagels, W. (A)
Parker, A. B. (M)
Parker, S. E. (A)
Parker, T. J. (M)
Parks, V. H. (A)
Peek, G. E. (A)
Perkins, B. M. (A)
Perkins, P. H. (A)
Phillips, E. T. (A)
Pickens, G. O. (A)
Pine, T. G. (A)
Photinos, H. R. (A)
Poe, C. M. (A)
Pollack, P. (A)
Prather, A. W. (M)
Proctor, D. (A)
Quam, R. W. (A)
Quintana, I. M. (A)
Rambo, L. W. (A)
Ravey, D. L. (A)
Redelings, J. T. (A)
Reynolds, Z. D. (A)
Rich, A. P. (M)
Risk, A. E. (SM)
Robinson, E. B. (SM)
Rogers, S. (M)
Romans, W. E. (A)
Roshon, A. H., Jr. (M)
Rountree, W. R. (A)
Runvan, T. W. (A)
Russell, W. F. (A)
Sampson, J. F. (A)
Sarnaw, W. J. (A)
Schart, W. J. (A)
Schreiber, O. W. (A)
Schwidetzky, W. H. (A)
Scott, J. E., Jr. (M)
Sessions, S. H. (M)
Shaw, L. L., Jr. (A)
Shellbarger, J. N. (A)
Sherwood, R. M. (M)
Siegel, J. S. (A)
Silberman, R. T. (A)
Skillman, B. D. (A)
Small, B. I. (M)
Spilmer, B. H. (A)
Spitler, R. H. (A)
Squibb, W. F. (VA)
Stephenson, R. G. (SM)
Steppler, R. V. (M)
Sterling, W. V. (A)
Stewart, W. A. (A)
Stoeckert, E. D. (A)
Story, H. (M)
Tabler, J. G. (A)
Talbot, R. J. (A)
Teeter, W. L. (A)
Thatcher, E. W. (SM)
Thomas, J. J. (A)
Thurman, R. V. (A)
Tibbals, L. (VA)
Tirrell, C. W. (M)
Trolese, L. G. (SM)
Tucker, D. P. (SM)
Tucker, E. (A)
Tucker, J. A. (A)
Turner, P. M. (A)
Van Horn, I. H. (M)
Viles, F. L. (A)
Volberg, H. W. (A)
Wade, O. (A)
Wambsganss, B. (A)
Ward, D. M. (A)
Weisbrod, S. (A)
Wells, M. T. (M)
Wells, T. C. (A)
Werner, H. C. (A)
Westerwick, R. A. (A)
Wilson, W. D. (A)
Winans, G. L. (A)
Wolff, H. G. (M)
Yager, E. K. (M)
Zable, W. J. (A)
Zagon, A. R. (A)
Zellmer, N. A. (A)
Zimmerman, J. K. (A)

San Fernando
Anderson, K. B. (A)
Bauer, J. A. (A)
Carlson, D. G. (A)
Coltin, A. H. (A)
Duncan, J. R. (A)
Girouard, L. O., Jr. (A)
Graber, R. E. (M)
Robinett, D. B. (A)
Warne, V. J. (VA)

San Francisco
Austin, J. R., Jr. (M)
Aymar, E. (VA)
Baldwin, R. S. (VA)
Beasley, W. A. (SM)
Bender, S. P. (A)
Berte, D. W. (A)
Blasdel, F. G., Jr. (A)
Bolstridge, L. J. (A)
Boss, L. J. (M)
Bowie, R. L. (A)
Brace, F. R. (M)
Bradshaw, L. (A)
Bright, H. S. (SM)
Brinton, R. L. (SM)
Broekemeier, A. E. (A)
Brown, R. L. (A)
Brownfield, L. B. (A)
Brummer, J. W. (A)
Bundy, C. W. (SM)
Calvert, C. C. (A)
Carlson, H. J. (A)
Chan, C. (A)
Chapman, G. H. (M)
Cheu, E. D. (SM)
Clark, B. L. (M)
Collins, E. L. (A)
Cone, D. I. (A)
Convery, T. J. (A)
Cooke, L. G. (M)
Cronan, W. C. (A)
Dague, G. I. (A)
Dame, A. M. (A)
Damonte, J. B. (A)
Danielson, E. G. (VA)
Darmento, J. (A)
Davis, R. A. (A)
Dent, W. U. (A)
Detweiler, D. C. (A)
Doran, J. W. (A)
Doty, J. C. (A)
Dudley, J. A. (A)
Dunlap, H. B. (M)
Eachus, W. J. (A)
Earl, H. D. (M)
Eisenscher, E. S. (M)
Fair, E. G. (A)
Faithorn, N. R. (M)
Fisher, R. W. (M)
Fisher, W. P. (SM)
Fong, B. W. (A)
Fraedrich, D. K. (A)
Freiermuth, V. J. (M)
Gallo, F. J. (A)
Geer, D. A. (A)
Gloor, R. D. (A)
Goldsmith, A. (M)
Graf, E. A. (A)
Grzesik, J. (A)
Halstead, F. H., Jr. (A)
Hammett, R. L. (M)
Hankel, E. M. (A)
Hanscom, W. W. (SM)
Harmon, W. R. (M)
Harpole, J. L. (A)
Haus, R. (A)
Hawkins, E. R., Jr. (A)
Hazelwood, C. A. (A)
Heal, E. (A)
Heesacker, L. L. (A)
Hessler, W. G., Jr. (A)
Hodgkin, N. M. (A)
Hoeflich, A. F. (A)
Holmes, H. B. (M)
Hom, S. (A)
Horn, E. M. (A)
Hornby, D. A. (A)
Howard, E. G. (A)
Howard, R. V. (SM)
Hudson, J. C. (A)
Hughes, J. M. (A)
Hurlbut, G. N. (A)
Hussey, W. J. (VA)
Ingersoll, J. C. (A)
Jenkins, C. D., Jr. (A)
Jensen, R. C. (A)
Johnson, J. B. (A)
Johnston, J. G. (A)
Jolley, N. A. (A)
Jones, J. J. (A)
Kafafian, J. (M)
Kalb, H. N. (A)
Karp, P. W. (A)
Kaufman, A. W. (VA)
Kees, A. A. (M)
Kelley, T. B. (A)
King, L. G. (A)
Kiyoi, G. T. (A)
Kindell, F. E. (A)
Klein, A. L. (A)
Kochenderfer, W., Jr. (A)
Kotzum, J. (A)
Kramer, J. (VA)
Krowl, G. W. (A)
Landells, J. H. (A)
Lasky, P. G. (A)
Lee, F. B. (A)
Lee, J. A. (A)
Lee, R. J. (A)
Lee, R. W. (A)
LeGrand, H. R. (A)
Lewis, E. L. (A)
Liepold, R. B. (A)
Linder, A. W., Jr. (A)
Lippincott, D. K. (SM)
Lucas, F. G. (A)
Lusted, L. B. (A)
Maas, R. R. (A)
Markey, L. T., Jr. (A)
Marshall, E. G. (M)
Marshall, E. L. (A)
McBride, W. J., Jr. (SM)
McCrary, R. O. (A)
McConnell, V. (A)
McCormish, W. J. (A)
McDade, J. J., Jr. (A)
McEwan, A. J. (A)
McKay, J. B. (A)
McMenomey, J. M. (M)
McQueeney, K. A. (A)
Melnicoe, S. A. (M)
Meyer, J. W. (A)
Miller, C. M. (M)
Modlin, C. J. (M)
Moreland, H. H. (A)
Morrison, A. C. (VA)
Most, N. (M)
Moulin, H. J. (A)
Murphrey, J. G. (M)
Nalman, N. S. (A)
Nawrocki, J. T. (A)
Newell, R. S. (A)
Newnan, H. L. (M)
Nikonenko, P. V. (M)
Northway, M. F. (A)
Notthoff, A. P., Jr. (A)
Nyberg, R. A. (A)
Nye, W. H. (M)
Oberg, V. H. (A)
Olsen, J. C. (M)
O'Neil, J. A. (A)
Pacher, F. A. (A)
Pallas, C. M. (A)
Parisky, R. N. (A)
Parmer, M. E. (A)
Philbin, J. T. (A)
Phillips, R. H. (M)
Pinkney, J. L. (A)
Poe, W. E. (A)
Ranks, J. F. (A)
Rende, A. A. (A)
Richardson, A. S. (M)
Rocklitz, H. C. (A)
Rogers, R. N. (A)
Roth, I. (A)
Saylor, R. A. (A)
Scrievers, B. J. (A)
Sharman, H. M. (A)
Slavin, S. (M)
Smith, A. W. (A)
Smith, M. O. (A)
Smith, S. B. (SM)
Snow, J. E. (A)
Sprague, Z. E. (A)
Stairs, W. F. (A)
Stand, T. R. (A)
Stevens, C. L. (A)
Stewart, J. (A)
Stewart, W. E. (M)
Sullivan, P. H. (A)
Svendsen, E. C. (A)
Thille, R. W. (A)
Thompson, H. K. (A)
Tognazzini, M. O. (A)
Tom, H. (A)
Tourville, G. A. (M)
Tucker, G. L. (M)
Ujifusa, R. L. (A)
Unsworth, R. G. (A)
Vaus, C. D. (A)
Walter, C. A., Jr. (A)
Watz, N. P. (A)
West, J. P. (M)
Whalley, J. M. (A)
Whitehead, E. A. (M)
Wholey, C. W. (A)
Williams, P. A. (VA)
Wislon, C. B. (A)
Wojcik, B. M. (M)
Wollenberg, H. A. (M)
Wong, H. F. (A)
Wong, J. L. (A)
Wong, W. E. (A)
Wood, E. P., Jr. (A)
Wood, G. V. (M)
Woodruff, R. L. (A)
Woolverton, R. B. (F)
Wright, O. (M)
Ynagihara, F. T. (A)

San Gabriel
Adamson, P. A. (A)
Alverson, J. G. (M)
Appel, R. M. (A)

Bowman, J. Y. (A)
Donner, W. (M)
Fesko, J., Jr. (A)
Fitzwater, W., Jr. (M)
Fox, M. (M)
Lindesmith, J. L. (A)
Painchaud, P. A. (A)
Reilly, R. R. (A)
Spargo, P. W. (A)
Weaver, C. E. (VA)

Sanger
Jones, C. H. (A)

San Jose
Beeson, R. H. (A)
Bixby, L. H., Jr. (A)
Bowdle, R. R. (A)
Chao, S. C. (A)
Christopherson, W. A. (A)
Dinapoli, F. C. (A)
Donahue, W. J. (A)
Dowling, R. H. (M)
Engwicht, H. (SM)
Gonzalez, J. (A)
Haanstra, J. W. (A)
Hagopian, J. J. (M)
Hancock, N. (A)
Hasen, J. E. (A)
Hurt, C. V. (A)
Igram, R. G. (A)
Libby, L. L. (SM)
McCullough, J. S. (M)
Perry, R. L. (M)
Quement, R. J. (VA)
Rambo, W. R. (SM)
Stevens, L. D., Jr. (A)
Stuart, G. S. (A)
Townsend, C. K. (A)
Van Ess, J. C. (A)
Wood, F. B. (A)

San Leandro
Albrecht, J. F. (A)
Bidwell, H. H. (A)
Cerruti, B. A. (A)
Damron, S. S. (A)
Eakin, J. H. (A)
Holloman, C. J. (A)
Regnier, N. J. (A)
Silverman, B. P. (A)

San Lorenzo
Farrelle, P. S. (M)
Winningstad, C. N. (A)

San Luis Obispo
Lyman, R. P. (SM)
Radius, C. (SM)
Roney, E. L. (M)
Wolf, H. K. (M)

San Marino
Cahalan, E. T. (VA)
Crouch, C. A. (A)
Franklin, P. G. (A)
Fuller, B. L. (A)
Gauldin, C. B. (A)
Herbert, C. (SM)
Irwin, E. M. (A)
Kempf, W. F., Jr. (A)
Mauritz, F. E. (M)
Nikirk, T. E. (VA)
Sanders, L., Jr. (A)
Smith, W. E. (A)
Whistler, J. P. (VA)

San Mateo
Andrews, C. A., Jr. (A)
Bartholomew, H. C. (A)
Berg, C. H. (A)
Chow, B. (M)
Cisler, S. A. (A)
Demere, R. M., Jr. (A)
Downie, W. A. (M)
Erickson, L. G. (SM)
Grace, J. R. (SM)
Haylock, F. B. (M)
Heaton, J. S. (A)
Heller, R. E. (A)
Janakos, N. (A)
Jaski, T. (A)
Jipp, J. (M)
Johnson, W. J., Jr. (A)
Korman, M. M. (A)
Leo, R. E. (A)
Line, G. D. (M)
Maudens, L. C. (A)
Mainland, R. (A)
Newman, R. J. (A)
Oshima, K. (A)
Pascoe, D. (A)
Robinson, R. L. (A)
Shaw, C. E. (A)
Stoddard, D. J., Jr. (A)
Taylor, E. D. (A)
Taylor, R. A. (A)
Zweifel, F. A. (A)

San Pablo
Donner, D. F. (A)
Luckenbach, R. R. (A)
Mingst, H. C. (A)
Tajima, G. K. (A)

San Pedro
Carlson, C. O. (A)
Kiser, K. W. (A)
Ransom, J. D. H. (M)
Young, H. A. (SM)

San Rafael
Catania, C. J. (A)
Freeman, W. L. (A)
Matthews, D. W. (A)
Pitman, D. R. (A)
Schaub, L. E. (A)
Wells, F. D. (A)

Santa Ana
Knipe, W. M. (A)
Kosar, W. S., Jr. (A)
Levering, C. A. (VA)
Porter, W. R. (A)

Santa Barbara
Benton, R. F. (A)
Brun, G. E. (A)
Buchanan, J. M. (A)
Collins, W. C. (A)
Dawley, R. L. (A)
Dowling, K. T. (A)
Johnson, S. F. (M)
Maki, G. J. (SM)
McEuen, A. H. (A)
Pack, H. G. (A)
Paul, A. D. (M)
Pressley, J. H. (F)
Smith, D. S. (A)
Smith, H. W. (A)
Thomsen, P. H. (SM)
Whitacre, D. P., Sr. (M)

Santa Clara
Nau, R. H. (SM)
Watson, K. J. (M)
Yagi, H. S. (A)

Santa Cruz
Jackson, C. L. (A)
Ottem, I. E. (A)

Santa Maria
Simas, F. O. (A)

Santa Monica
Alborn, R. H. (A)
Allen, D. H. (M)
Arsenault, W. R. (A)
Bertram, S. (SM)
Brown, W. A. (A)
Burgar, D. G. (A)
Butt, C. (M)
Carpenter, S. L. (A)
Carver, F. R. (SM)
Combs, W. E. (A)
Connelly, H. J. (A)
Cruse, P. M. (A)
Culbertson, J. T. (A)
DeLucia, E. V. (A)
Digby, J. F. (SM)
D'Nelly, G. O. (A)
Doersam, P. D. (SM)
Eagan, J. A. (A)
Eisenstein, A. M. (A)
Escher, P. H. (A)
Evenson, R. C. (A)
Everest, F. A. (SM)
Exner, W. L. (A)
Gage, B. M. (A)
Goulet, T. A. (A)
Hadlock, C. K. (A)
Halliday, R. G. (A)
Herr, D. L. (SM)
Hierath, D. C. (M)
Hund, E. (A)
Hunter, W. T. (A)
Justice, L. E. (A)
Kennedy, C. B. (A)
Klinge, W. H. (A)
Krantz, C. H. (VA)
Lalande, B. H., Jr. (A)
Maloney, W. F. (A)
Marshall, A. R. (A)
McCharles, J. R. (M)
Melara, J. D. (A)
Mikkelson, M. E. (A)
Morrow, J. E. (M)
Naef, C. A. (A)
Plew, H. E., Jr. (A)
Quandt, R. L. (A)
Quavraux, H. F. (A)
Reaser, R. R. (A)
Reich, E. (A)
Rumer, W. I. (A)
Ryland, M. E. (A)
Salzer, J. M. (A)
Schull, G. R. (M)
Stafford, R. M. (A)
Steenson, B. O. (A)
Stineman, V. E. (M)
Tate, W. R. (A)
Tatum, F. A. (A)
Uncapher, K. W. (A)
Ungar, L. B. (A)
Ware, W. H. (SM)
Wehner, R. S. (M)
Whitaker, J. N. (SM)
Wilson, D. W. (M)
Youtcheff, J. S. (M)

Santa Paula
Sharp, J. M. (VA)

Santa Rosa
Carden, M. W., Jr. (A)
Kruse, C. J. (A)
Merrill, G. E. (A)
White, M. E. (A)

Santee
Freedman, S. (SM)

Saratoga
Brolly, A. H. (SM)
Egan, R. D. (A)
Nettesheim, H. P. (A)

Saugus
Herriman, T. D. (A)

Seaside
Hammond, G. C. (A)
Monson, D. J. (M)

Sepulveda
Corey, E. J. (A)
Olson, C. P., Jr. (M)
Thompson, T. H., Jr. (A)

Sharp Park
Piltz, F. (A)

Sherman Oaks
Allen, R. J. (A)
Caldwell, W. D. (A)
Cartheuser, W. (A)
Christensen, A. A. (A)
Crownover, J. W. (A)
Dean, J. P. (A)
Epstein, S. (A)
Fields, L. (A)
Foote, S. H. (A)
Hall, F. W. (SM)
Knudson, J. A. (A)
Loeber, N. C. (A)
Mann, D. A. (A)
Monderer, B. A. (M)
Monroe, J. C. (A)
Murray, R. W., Jr. (M)
Phillips, E. K. (A)
Pratt, A. (SM)
Ross, M. N. (A)
Russell, D. C. (M)
Ruth, L. C. (M)
Rutland, D. F. (A)
Schinazi, B. N. (A)
Sheriff, D. R. (M)
Timothy, K. O. (A)
Wiggins, G. P. (A)
Zeuschner, R. F. (A)

Somis
Beymer, E. H. (A)
Harvey, J. P. (A)

Sonoma
Lingle, R. H., Jr. (A)

South Arcadia
Montgomery, D. N. (A)

South Gate
Dickinson, H. (A)
Dreessen, W. B. (A)
Gilliam, C. E. (A)

South Palo Alto
Huynen, J. R. (M)

South Pasadena
Bishop, J. F. (A)
Boggs, C. A. (SM)
Ketchum, D. J. (A)
Kuck, R. G. (A)
Morrison, R. (A)
Nelson, K. L. (A)
Reedy, P. H. (VA)
Schwarzmann, W. A. (A)
Shrock, J. B. (SM)
Scott, R. F. (A)
Sutton, W. R. (A)
Wood, W. S. (A)

South San Francisco
Tripp, A. L. (M)
Whitney, W. L. (A)
Wood, R. W. (A)

South Whittier
Rousey, W. A. (A)

Stanford
Arfin, B. (A)
Blanchard, H. P. (M)
Buss, R. R. (SM)
Bohlke, P. G. (SM)
Carter, P. S., Jr. (A)
Caryotakis, G. (A)
Chodorow, M. (SM)
Chang, N. C. (A)
Clarke, L. G. (A)
Craig, R. A. (A)
Cohn, S. B. (SM)
Doll, E. B. (SM)
Dunn, D. A. (A)
Edson, W. A. (SM)
Evans, W. E., Jr. (A)
Fechter, H. R. (A)
Gallagher, J. J. (A)
Gallagher, P. B. (A)
Gamson, E. R. (A)
Grace, D. J. (A)
Graham, B. (SM)
Hammond, S. B. (A)
Harman, W. W. (A)
Harris, D. B. (SM)
Helliwell, R. A. (SM)
Hobson, J. E. (M)
Hom, F. M. (SM)
Hoover, W. G. (A)
Hopf, E. W. (A)
Jasberg, J. H. (A)
Jones, E. M. T. (A)
Kaisel, S. F. (SM)
Kamphoefner, F. J. (SM)
Kautz, W. H. (A)
Kinchieloe, W. R., Jr. (A)
Kohl, W. H. (SM)
Lebacqz, J. V. (M)
Long, R. A. (A)
McWhorter, M. M. (A)
Moore, E. J. (SM)
Morrin, T. H. (M)
Manning, L. A. (A)
Narud, J. A. (A)
Pettit, J. M. (SM)
Putz, J. L. (A)
Rice, P. J., Jr. (SM)
Ross, J. M. (A)
Ryland, B. G. (M)
Rynn, N. (SM)
Stewart, J. L. (A)
Susskind, C. (A)
Tal, C. T. (SM)
Tanner, R. L. (A)
Taylor, J. (A)
Terman, F. E. (F)
Turner, F. M. (A)
Tuttle, D. F., Jr. (M)
Varenhorst, V. D. (A)
Vikramsingh, R. (A)
Waterman, A. T., Jr. (A)
Weaver, D. K., Jr. (A)
Wernli, J. M. (A)
Whitby, O. (SM)
Wightman, B. A. (A)
Winkler, R. H. (A)
Zitelli, L. T. (A)

Stockton
Anson, C. T. (VA)
Echandi, J. (A)
Fegan, A. A. (A)
Greene, M. B. (A)
Matsuo, D. T. (A)
Welch, H. E. (A)

Studio City
Dusseau, A. E., Jr. (A)
Margerum, D. L. (A)

Sunland
Chernof, J., Jr. (A)
Jacobs, H. M. (A)

Sunnyvale
Adams, M. B. (SM)
Case, M. D. (VA)
Conner, C. C. (A)
Giulii, J. D. (A)
Hansen, H. W., Jr. (A)
Hartke, D. C. (A)
Hiestand, N. P. (A)
Watson, R. H. (A)

Sunset Beach
Sadler, E. J. (A)

Sun Valley
Buie, J. L. (A)
Gold, C. H. (A)
Mentzer, S. C. (A)
Sisson, A. R. (A)

Tarzana
Berlin, W. N. (A)
Dickinson, G. R. (M)
Eliason, M. C. (SM)
Ellison, M., Jr. (A)
Green, R. D. (A)
Rhoad, E. J. (M)
Tyrrell, R. A. (A)
Welch, W. E. (M)

Temple City
Armagost, H. C. (VA)
Chaney, J. F. (A)
Harrison, A. E. (A)
Heffner, E. K. (A)
Ming, D. L. (A)
Nasiruddin (A)

Terra Bella
McMaster, J. J. (A)

Thousand Oaks
Schnert, P. J. (A)

Topanga
Gard, C. D. (A)

Torrance
Brewer, J. W. (A)
Coy, L. H., Jr. (A)
Eckdahl, D. E. (A)
Hudspeth, T. (A)
Laverty, N. P. (M)
Norris, R. M. (A)
Rovenstine, J. A. (A)
Sprague, R. E. (A)
Striplin, J. E. (M)

Travis
Strother, J. F. (A)
Williams, T. G. (A)

Tujunga
Holmes, L. O. (A)

Turlock
Jorge, C. D. (A)

Tustin
Becker, D. R. (A)

Upland
Kimball, J. L. (A)
Takenaka, G. (M)
Taylor, A. D. (A)

Vallejo
Abjornson, C. (A)
Angst, D. C. (A)
Bril, D. H. (A)
Clemens, G. W., Jr. (A)
Dausman, R. H. (M)
Ekstrand, P. A. (SM)
Glaze, R. H. (A)
Hanley, R. J. (A)
Hansen, E. N. (A)
Heineman, J. T. (VA)
Hoskins, J. W. (A)
Mann, F. E. (M)
O'Bryan, R. L. (A)
Quick, T. C. (A)
Spears, R. W. (M)
Steidley, J. W. (SM)
Timmerman, H. A. (A)
Wheeler, F. K. B. (A)
Zech, A. W. (A)

Valley Center
Ketchum, D. L. (A)

Van Nuys
Anderson, G. R. (M)
Bernds, E. L. (A)
Bettencourt, V. S. (A)
Blancher, D. W. (A)
Blight, A. F., Jr. (A)
Boyd, J. C. (A)
Brunner, R. H. (M)
Cain, G. A. (A)
Carter, S. T. (A)
Cohen, J. E. (A)
Crowther, E. E. (A)
Dadant, P. M. (A)
Deaux, F. J. (A)
Dinning, J. R. (A)
Fredman, N. E. (A)
Gallenson, L. (A)
Gaunt, R. P. (M)
Gieseke, G. R. (A)
Green, A. P. (A)
Hussey, J. G. (M)
Johnson, R. D. (A)
Jones, A. C. (A)
Kesselman, M. S. (A)
Kettler, R. F., Jr. (A)
Klecker, G. J. (A)
Klemens, W. P. (A)
Kroll, W. (A)
Lacy, R. R. W. (M)
Levinthal, E. C. (A)
Loretz, N. C. (A)
Lovick, E., Jr. (A)
Lyon, R. E. (A)
Magnuson, R. W. (A)
Mallach, L. W. (SM)
Marshall, R. W. (A)
Martin, W. L. (A)
Marygold, G. E. (A)
McChanahan, R. T. (M
Merrill, D. H. (A)
Miller, C. E. (SM)
Morgan, R. L. (M)
Nelson, R. M. (A)
Nibbe, G. H. (SM)
O'Halloran, J. F. (M)
Olsefsky, C. C. (A)
Paller, J. L. (A)
Pangborn, H. W. (SM)

Parker, W. H., Jr. (SM)
Peterson, R. W. (A)
Radmacher, D. S. (M)
Randolph, R. C. (A)
Resca, J. A. (A)
Rodgers, J. L. (A)
Rosen, H. A. (A)
Russo, R. (A)
Smith, J. C. (A)
Tasker, R. (A)
Urman, B. S. (A)
Wald, K. A. (A)
Whitlock, J. R. (A)
Whitman, K. C. (A)
Williams, W. E. (M)
Wolman, L. L. (A)
Wood, D. O. (A)

Venice
Abascal, N. (M)
Cochran, K. W. (A)
Cowart, B. E. (A)
Cutshall, G. L. (A)
DeLeon, L. H. (A)
DeLey, E. (A)
Diamond, P. (M)
Fenton, A. N. (SM)
Graham, J. M., Jr. (A)
Gunning, W. F. (A)
Holmes, W. T. (M)
Johnson, G. (A)
Kirkpatrick, R. L. (A)
Kinaga, T. (A)
Kroft, H. M. (A)
Landis, R. I. (A)
Love, C. E. (A)
McWilliams, J. D. (A)
Parsons, G. W. (A)
Post, G. (A)
Reedy, C. W. (M)
Robbins, W. M., Jr. (A)
Russell, G. M. (M)
Tufts, R. M. (A)
Ulman, L. J. (A)
Wilson, T. A. (M)

Ventura
Andersen, J. F. (A)
Arnold, W. F. (M)
Baugh, H. W. (A)
Bernhardt, E. C. (A)
Cohen, H. I. (A)
Dame, R. O. (A)
Edwards, R. S. (A)
Kepler, R. G. (A)
MacDonald, W. L. (A)
Pruett, J. W. (A)
Schloss, J. K. (A)

Victorville
White, J. L. (A)

Visalia
Tanner, T. B. (A)

Walnut Creek
Chase, R. C. (A)
Dale, P. R. (A)
Eukel, W. W. (A)
Hansen, H. M. (A)
MacLane, A. B. (A)
Mitchell, J. R. (A)
Walkup, J. F. (A)

Watsonville
Duer, S. J. (A)

Weaverville
Mosley, R. B. (A)
Snyder, W. G. (A)

Westchester
Seufert, F. J., Jr. (A)
Stanton, R. S. (VA)

West Covina
Arford, F. W. (A)
Bethard, C. T. (A)
Barker, R. D. (M)
Dickey, R. G. (A)
Homer, C. W. (A)
Kemp, G. H. (A)
Rose, H. H., Jr. (A)
Smith, R. A. (A)
Stone, R. E. (A)

West Los Angeles
Ambrosio, B. F. (A)
Carson, D. G. (A)
Cary, J. W. (A)
Ferguson, W. M. (A)
Gordon, G. (A)
Gray, J. B. (SM)
Lewis, D. E. (A)
Loy, V. S. (A)
Melanger, G. E. (A)
Mizell, M. H. (A)
Monroe, A. J. (A)
Mullin, J. T. (M)
Pastan, H. L. (A)
Perry, C. S. (A)
Scoffone, R. G. (A)
Wright, E. C. (M)

Westmorland
Austin, H. B. (M)
Scharrer, R. G. (A)

Westwood Village
Fleischmann, F. A. (A)

Whittier
Abbott, W. R. (SM)
Allison, R. E. (SM)
Amendt, L. E. (A)
Bassett, K. (M)
Campbell, A. T. (M)
Conly, E. R. (A)
Correa, F. (A)
Davenport, C. M. (M)
Davidson, E. D. (A)
Donoghue, J. J. (M)
Downey, W. F. (A)
Elbinger, B. (A)
Fischer, J. J. (A)
Geiger, R. F. (A)
Gow, K. P. (A)
Hobbs, W. D., Jr. (A)
Holmes, E. A. (SM)
Ingersoll, E. R. (A)
Jackson, M. O. (A)
Joerger, J. C. (A)
Keifer, L. F., Jr. (A)
Kent, S. S. (A)
Kleinhofer, B. A. (SM)
Klepinger, L. H. (M)
Krausz, A. (A)
Kreider, P. A. (A)
Lockhart, E. H. (A)
Long, F. R. (A)
Marsh, J. A. (A)
Martin, P. W. (A)
McCoy, R. N. (A)
Noe, L. B. (A)
O'Brien, E. J. (SM)
Olsen, V. O. (A)
Parker, N. F. (A)
Polder, J. H. (A)
Randall, G. M. (A)
Savant, C. J., Jr. (A)
Sawyer, H. F. (A)
Schmidt, F. W. (SM)
Tanaka, R. I. (A)
Triman, E. L. (M)
Van Velzer, V. C. (A)
Vorie, I. N. (VA)
Wanlass, C. L. (A)
Wells, R. M. (A)
White, L. M. (A)

Wilmington
Ahrens, G. W. (M)
Harris, H. M. (A)

Woodland Hills
Arman, A. J. (A)
Berman, H. (A)
Chikar, R. E. (A)
Corduan, A. E. (A)
Ellis, J. W., Jr. (A)
Fredricks, J. E. (VA)
Jamieson, H. W. (SM)
Mann, D. O. (A)
Morgan, H. C. (A)
Ottinger, D. P., Jr. (A)
Perry, R. E. (A)
Sandberg, H. L. (M)
Schroeter, R. G. (A)

Woodside
Dawson, P. F. (A)
Eitel, W. W. (SM)
Rock, A. J. (A)
Smith, H. W., Jr. (A)

Yorba Linda
Wymore, R. H. (A)

COLORADO

Arvada
Murahata, S. (A)
Spano, A. J. (A)

Boulder
Ahlbeck, W. H. (A)
Applegate, C. J. (A)
Axtell, J. C. (A)
Bitter, C. R., Jr. (A)
Carlin, P. W. (A)
Dougherty, H. T. (A)
Freudenberg, H. O. (A)
Fulton, F. F., Jr. (A)
Goerke, V. H. (M)
Herbstreit, J. W. (SM)
Johler, J. R. (A)
Johnson, E. E. (A)
Jones, R. N. (A)
Kirby, R. S. (M)
Krueger, R. E. (M)
Miller, H. L. (A)
Norton, K. A. (F)
Rice, P. L. (M)
Stacey, D. S. (SM)
Thompson, H. A. (A)
Worcester, W. G. (A)

Colorado Springs
Ashby, G. L. (M)
Barghausen, A. F., Jr. (A)
Barsis, A. P. (A)
Behnke, A. O. (SM)
Decker, M. T. (A)
Estin, A. J. (A)
Gozinsky, J. R. (A)
Hennigar, N. E. (A)
Hintz, H. F. (A)
Hornberg, K. O. (A)
Hubbard, R. W. (A)
Jeys, F. H. (A)
Lanxon, R. C. (A)
Liggans, C. E. (A)
Lone, R. S. (A)
Maloney, L. J. (A)
Marak, G. E. (A)
McGavin, R. E. (A)
Peterson, C. F. (M)
Vietoreen, J. A. (SM)
Vitalisel, R. L. (A)
Zinky, W. R. (A)

Denver
Bedford, S., Jr. (A)
Blanchard, R. R. (M)
Blankenship, L. F. (M)
Bliss, W. R. (M)
Bowen, R. G. (M)
Butts, J. H. (A)
Cobbs, D. M. (M)
Coombs, W. C. (SM)
Cruse, A. W. (SM)
Cullen, J. G. (A)
Deutsch, K. T. (M)
Drummond, F. A. (A)
Ekrem, T. C. (A)
Fingado, F. H. (M)
Fleming, C. W. (A)
Forsman, E. H. (M)
Fraser, R. L. (A)
Fuqua, C. (M)
Garretson, H. W. (A)
Hatchett, S. E. (SM)
Hathaway, C. M. (SM)
Hedberg, C. A. (SM)
Johnson, H. S. (A)
Kemper, J. A. (A)
Kemmerly, J. E. (A)
Knight, S. J., Jr. (A)
McAdam, W. W. K. (SM)
McLoud, W. C. (M)
Miles, C. W. (A)
Morrissey, T. G. (SM)
Morroni, D. J. (A)
Mueller, A. G. (A)
Olson, C. G. (A)
Petterson, W. N. (M)
Piecha, L. M. (M)
Pochop, D. R. (A)
Post, E. A. (SM)
Pyle, J. C. (A)
Raper, A. J. (A)
Reno, H. (A)
Rhoden, V. C., Jr. (A)
Rinker, E. A. (A)
Robertson, A. L. (A)
Robinson, M. E. (A)
Sakaguchi, H. K. (A)
Sargent, R. E. (A)
Sharp, H. (A)
Smilley, J. D. (A)
Stewart, M. J. (A)
Swanson, R. E. (M)
Timpte, C. C. (A)
Todd, F. J. (M)
Wang, C. S. (A)
Webb, R. C. (M)
Whipple, R. C. (A)
Willard, J. H. (A)
Williams, A. I., Jr. (M)
Wright, P. H. (A)

Englewood
Globe, R. W. (A)
Thaxton, H. A. (A)

Fort Collins
Bottom, V. E. (M)
Britton, C. C. (A)
Dean, J. E. (M)

Fort Morgan
Lum, H. E. (A)
Zambo, J. W. (A)

Golden
Fletcher, H. E. (SM)

Lakewood
Dunn, L. J. (A)

Lamar
Dimmitt, E. E. (A)

Lemon
Howe, G. A. (A)

Littleton
Eagon, D. G. (A)

Longmont
De Gregorio, J. F. (A)

Loveland
Kelley, E. K. (M)

Pueblo
Brown, P. A. (A)
Elam, E. M. (A)
George, J. E. (A)
Middleton, D. S. (M)
Uffelman, K. F. (A)

Rifle
Moore, H. S. (A)

Salida
James, V. N. (SM)
Sachs, J. (A)

Sedalia
Carter, F. W. (A)

Trinidad
Walker, W. G. (A)

Wheatridge
Clyne, W. E. (SM)

CONNECTICUT

Ansonia
Fitzpatrick, J. J. (A)

Bethel
Beschle, R. G. (A)
Pearlman, L. S. (M)
Warner, F. C. (M)

Bloomfield
Lowderback, C. J. (M)
Whitney, D. J. (A)

Branford
Nettleton, E. L. (A)

Bridgeport
Bruntil, I. M. (M)
Duran, F. A. (A)
Engelberger, J. K. (A)
Frost, R. R. (A)
Gilchrist, E. S. (A)
Hartman, R. B. (A)
Held, R. W. (A)
Koscor, J. H. (A)
Lapinski, C. S. (A)
Merryman, P. (SM)
Mike, J. G. (A)
Mikusky, C. J. (A)
Milliken, B. J. (A)
Paradise, R. Y. (A)
Pensiero, L. R. (A)
Ragonese, P. L. (A)
Rescoe, J. M. (A)
Rosenberg, H. A. (A)
Stanio, D. D. (A)
Stanley, P. F. (A)
Wood, E. W. (A)
Zahn, E. (A)

Bristol
Hildebrandt, W. J. (A)
Jones, M. C. (A)
Nelson, A. B. (SM)
Vaughan, E. W. (SM)
Williams, J. J. (A)

Brookfield
Gordon, T. M. (A)

Brooklyn
Halford, J. H. (M)

Cheshire
Hoffman, G. O. (A)
Thomas, A. R. (A)

Clinton
Passera, A. L. (A)

Danbury
Arendt, E. J. (A)
Boesch, A. H. (A)
Brannian, W. R. (A)
Campbell, C. A. (M)
Elias, L. G. (A)
Henry, E. A. (A)
Johns, N. H. (A)
Minton, W. C. (A)
Rowley, W. E. (A)
Webb, R. H. (A)

Darien
Ghirardi, A. A. (SM)
Liston, M. D. (A)
Mac Gregor, R. R. (A)
McElrath, G. (SM)
Mills, C. A. (M)
Morawetz, F. (M)
Starr, J. O. (M)

East Hartford
Aas, H. G. (A)
Acker, A. E. (A)

East Haven
Clinton, H. H. (A)
Quackenbush, E. C. (A)

East Norwalk
Byington, R. E. (A)
Henrich, W. H. (M)
Randmer, J. A. (SM)

Fairfield
Autouri, V. A. (M)
Bishop, N. (SM)
Brustman, J. A. (SM)
Di Mattia, A. L. (A)
Hutchinson, F. B. (A)
Paneyko, M. (A)
Roper, C. G. (A)

Georgetown
Flynn, T. F. (A)

Glastonbury
Perry, T. (A)
Russell, A. A. (A)
Swain, R. S. (A)
Waterman, A. (M)

Granby
Hodson, J. S. (A)

Greenwich
Anderson, W. C. (VA)
Barrett, E. T. (M)
Burroughs, G. S. (VA)
Marchand, N. (SM)
Quinby, R. E. (A)

Groton
Blaisdell, K. L. (A)
Herrera, J. C. (A)
Jennings, J. L. (A)
Miller, K. K. (M)

Guilford
Von Winkle, W. A. (A)

Hamden
Etter, H. H. (A)
Hewitt, C. D. (A)
Hobey, D. P. (A)
King, F. T. (A)
McNamara, F. T. (A)
Schoor, M. G. (A)
Stancliff, V. A. (A)

Hartford
Bourret, C. J. (A)
Broderick, H. M. (A)
Cronin, C. E. (A)
Doolittle, F. M. (SM)
Eckel, C. C. (A)
French, E. C. (VA)
Galin, J. L. (A)
Lee, J. H. (A)
Moffitt, G. R. (A)
Moses, S. (A)
Piskor, J. (A)
Roth, W. (A)
Shor, N. (M)
Vadersen, C. W. (M)
Waffle, W. M. (M)
Woodward, R. W. (SM)
Zaslow, J. (A)

Kensington
Soloski, J. T. (A)

Lebanon
Smith, A. G. (A)

Manchester
Azinger, R. P. (A)
Britton, R. C. (A)
Dean, C. M. (A)

Meriden
Lavin, H. (A)
Nowakoski, D. B. (A)
Rettenmeyer, P. F. (A)
Schmitz, J. F. (A)

Middlefield
Aleks, E. J. (A)

Middletown
Heinzmann, J. D. (A)
Snow, C. A. (A)
Tuccio, M. S. (A)
Van Dyke, K. S. (F)

Milford
Cohen, H. P. (A)
Hurford, W. L. (VA)
Lyman, H. T. (SM)
Morling, T. W. (A)
Roberts, T. E., Jr. (A)
Seadale, S. A. (A)

Millidale
Fontana, J. A. (A)

Mystic
Atwood, W. A., Jr. (A)
Merritt, N. A. (A)
Wilms, H. J., Jr. (A)

New Britain
Krason, H. C. (A)
Martin, H. E. (A)
Swanson, R. W. (A)

New Canaan
Castle, D. H. (SM)
Gray, J. L. (A)
Hamme, R. D. (A)
Offenhauser, W. H., Jr. (A)
Pichert, J. (A)
Tingley, G. R. (A)
Waldron, T. J. (A)

New Haven
Baltrush, J. J. (A)
Barker, R. C. (A)
Bergmann, H. M. (A)
Black, D. G. (M)
Bloom, T. (A)
Breit, G. (F)
Cannon, J. F. (M)
Cohen, M. H. (A)
Conrad, A. G. (SM)
Corkran, R. L., Jr. (A)
Cunningham, W. J. (M)
Curtis, R. C. (SM)
Fountain, H. F. (A)
Gage, R. T. (A)
Genera, V. A. (A)
Giangarra, B. J. (A)
Giangarra, L. A. (A)
Gibson, J. E. (A)
Grew, L. B. (A)
Heller, J. H. (A)
Hubelbank, S. H. (A)
Izenour, G. C. (M)
Jacobson, E. R. (A)
Kamens, B. R. (M)
Kelly, H. S. (A)
Krauss, H. L. (SM)
Lyons, W. J., Jr. (A)
MacDonald, K. J. (A)
Mauro, A. (A)
May, J. C. (M)
Millard, A. M. (VA)
Oestreicher, D. L. (A)
Ordung, P. F. (SM)
Pagano, E. L. (A)
Popylisen, D. J. (A)
Reich, H. J. (F)
Rohloff, H. E. (M)
Rubin, H. B. (VA)
Schultheiss, P. M. (A)
Shank, R. R. (A)
Sherman, E. W. (A)
Skalnik, J. G. (A)
Sundius, H. W. (SM)
Temple, L. M. (SM)
Thomas, L. E., Jr. (A)
Thompson, G. S. (A)
Thompson, L. (A)
Turner, H. M. (L)
Tuteur, F. B. (A)
Wakeman, C. B. (A)
Wogrin, C. A. (A)

Newington
Bliss, P. (M)

New London
Adams, W. S., Jr. (A)
Bangs, G. A. (A)
Barry, C. J. (A)
Berg, R. A. (M)
Bishop, H. M. (A)
Brace, L. H. (A)
Duker, J. M. (A)
Fahy, E. J. (A)
Fournier, R. V. (A)
Friedman, S. (A)
Fucci, S. (A)
Haefner, S. J. (VA)
Hazard, W. R. (A)
Heindsmann, T. E. (M)
Herchenreder, H. (A)
Hoag, J. B. (SM)
Horton, J. W. (F)
Ide, J. M. (SM)
Jefferson, F. R. (A)
Kroenert, J. T. (A)
Merrill, J. (M)
Norris, C. B. (A)
Olson, C. L. (A)
Pfautz, C. E. (A)
Pollack, D. (SM)
Rager, G. T. (A)
Sando, J. R. (A)
Schaechter, S. (A)
Schulkin, M. (A)
Smith, B. M. (A)
Terkanian, H. (A)
Turner, R. W. (A)
Videberg, J. (A)
Weatherlow, H. R. (A)
White, C. E. (M)
White, D. M. (A)

Newton
Geary, L. W. F. (A)

Niantic
Pearson, C. A. (M)
Versoy, I. R., Jr. (A)
Mason, H. L. (A)

Noroton
Tisdale, G. E. (A)

Noroton Heights
Wood, W. A. (A)

Northford
Baker, R. R. (A)

North Stamford
Doolittle, H. D. (M)

North Woodbury
Petit, F. W. (A)

Norwalk
Gabor, W. D. (A)
Harris, R. V. (A)
Jeffries, D. W. (A)
Magida, N. H. (A)
Mehr, M. H. (A)
Miller, T. W. (A)
Neuman, G. J. (A)
Parker, E. J. (A)
Roggenstein, E. O. (M)
Schulz, H. R. (SM)
Von Kummer, F. G. (A)
Warner, E. J. (A)
Wines, W. R. (A)

Norwich
LaVallee, G. E. (A)

Oakdale
Whannel, R. L. (A)

Old Greenwich
Cassidy, J. J., Jr. (A)
Fenn, W. W. (A)
Filgate, J. T. (SM)
Fulton, O. H., Jr. (M)
Harrington, R. H., Jr. (A)
Harris, J. S. (SM)
Lott, A. L. (M)
Van Dyck, A. F. (F)

Old Saybrook
Radom, R. (A)

Plainville
Cutler, M. A. (A)
Forman, J. (M)
Moreno, V. N. (A)
Post, R. F. (M)

Portland
Pollock, A. H. (A)

Putnam
Bernier, E. J. (A)
Bosworth, C. D. (A)
Roller, E. R. (A)

Quaker Hill
Gubin, S. (SM)
Nash, H. (A)
Sentell, F. N. (A)
Wilkinson, C. W. (A)

Redding Ridge
Rand, P. S. (M)

Ridgefield
Baker, J. H. (A)
Doll, H. G. (SM)
Ferre, M. C. (M)
Frey, H. B., Jr. (M)
Hering, K. W. (A)
Huston, O. H. (VA)
Kunz, K. S. (A)
McFee, R. (A)
Peck, W. D. (A)
Resides, W. C. (SM)
Runyan, R. A. (M)
Segesman, F. F. (A)
Sloughter, G. S. (SM)
Sloughter, W. J. (SM)
Stewart, T. E. (A)
Wesley, C. A. (A)

Riverside
Budelman, F. T. (A)
Fingerle, W., Jr. (SM)
Henchcliffe, A. L. (A)
Lemmon, W. S. (SM)
Long, R. (A)
Ryan, W. R. (M)
Smith, N. F., Jr. (SM)
Sontheimer, C. G. (A)

Rockville
Schinn, B. J. (A)
Toth, W. E. (A)
Weston, F. B. (VA)

Seymour
Fryncko, P. (A)

Shelton
Beatrice, F. J. (A)
Zaskalicky, J. J. (M)

Simsbury
Griffin, D. C. (A)
Somers, B. A. (VA)
Stocking, M. H. (A)

Southbury
Harris, W. T. (SM)

Southington
Raymond, G. H. (M)

South Norwalk
Benson, K. B. (M)
Carne, E. B. (A)
Crosman, L. P. (A)
Day, J. N. (A)
Duncan, H. S. (SM)
Greunke, O. V. (A)
Karg, L. A. (A)
Kaye, M. (A)
Kohn, S. T. (A)
Lamb, J. J. (SM)
Sattem, I. (A)
Schilling, C. R. (A)
Winter, C. W. (A)
Yellin, H. (M)

Southport
Bachman, W. S. (M)
Evans, R. E. (A)

Springdale
Couch, W. M., Jr. (A)
Klyce, B. H. (SM)
Lefferson, J. (A)
Weden, C. V., Jr. (A)
Yanagisawa, S. T. (SM)

Stamford
Bailey, E. M. (A)
Baker, G. W. (A)
Basim, D. S. (SM)
Beeny, L. S. (A)
Bozak, R. T. (SM)
Branson, N. G. (A)
Buckley, R. E. (A)
Content, E. J. (SM)
Geist, H. J. (SM)
Helterline, L. L., Jr. (A)
Kramer, A. (A)
Leftwich, R. F. (A)
Mintzer, L. (A)
Molday, B. V. (SM)
Muckenhoupt, F. W. (A)
Rendell, G. (A)
Rider, P. Z. (M)
Roberts, F. B. (A)
Ruddock, W. F. (A)
Sackler, A. A. (A)
Salzman, C. F., Jr. (A)
Schwarz, F. (A)
Siegel, J. R. (A)
Silver, N. (A)
Singer, E. (A)
Skehan, J. W. (A)
Smith-Vaniz, W. R., Jr. (A)
Steinberg, E. R. (SM)
Tabisz, S. C. (A)
Van Breems, A. (A)
Wahlberg, E. C. (A)
Wilder, M. P. (A)

Stepney
Weller, B. L. (A)

Stonington
York, E. P. (A)

Storrs
Haas, V. B., Jr. (M)
Kay, M. (A)
Knauss, H. P. (M)
Kochenberger, R. J. (SM)
Lindorff, D. P. (A)
Robb, E. J. (A)
Timoshenko, G. S. (A)
Williams, L. E. (SM)

Stratford
Detar, D. R. (SM)
Fox, F. J. (M)
Hubbard, R. G. (A)
Kaiser, A. (A)
Prokop, F. J. (A)

Terryville
Krenicki, J. (A)
Parry, W. W. (A)

Thomaston
Brazee, J. A. (A)

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Silver, L. (A)

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Dresser, W. R. (SM)
Lahana, P. (M)

Unionville
Neill, G. W. (A)

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Ehler, A. F. (A)
Tuttle, R. W. (M)

Warehouse Point
Frame, N. R. (A)

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Bryson, R. W. (A)
Cannizzaro, M. (A)
Hales, F. B. (A)
Jensen, J. A. (A)
McLeod, K. A. (A)
Nicholson, W. E. (A)
Pichard, L. A. (A)
Quinn, Q. Q. (M)
Siff, A. W. (A)
Somers, D. L. (A)
Winchell, A. M. (VA)

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Bastow, J. G., Jr. (A)
Dunn, C. M. (M)
MacPhee, J. (A)
Smith, R. H. (A)

West Hartford
Andersen, W. A. (M)
Block, A. V. (A)
Ferla, S. J. (A)
Grammer, G. (A)
Hall, G. M. (A)
Handy, F. E. (VA)
Harris, D. J. (A)
Hatton, A. T. (A)
Holt, H. W. (SM)
Mathes, R. E. (SM)
Rich, L. G. (M)
Shelton, C. T. (A)
Shuskus, A. J. (A)
Warner, S. E. (SM)

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Burleson, C. T. (A)
Kricek, J. V. (A)
Parker, R. H. (A)
Zweig, F. (A)

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Brumbraugh, G. M., Jr. (A)
Chadwick, M. P. (SM)
Dewitz, G. H. (M)
Ellis, L. W., Jr. (A)
Haggott, J. C. (A)
Rackey, C. A. (SM)
Roshkind, H. (A)
Vasques, H. A. (A)

Wethersfield
Avery, S., Jr. (A)
Beal, E. W. (M)
Bernard, D. T. (A)
Cox, N. W. (A)
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Mitchell, J. A. (A)
Quayle, G. (A)
Szegda, A. (A)

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Erstad, J. (A)
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Miller, A. C. (SM)

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White, J. A. (A)

Windsor Locks
Aldrich, H. P. (A)
Kidwell, N. E. (M)

Winsted
Lescarbeau, R. F. (M)

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Meier, A. S. (A)

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Hughes, R. M. (A)

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Liddicoat, C. A. (A)

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Drummond, W. D. (A)

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Lutz, B. C. (A)
Toivonen, I. A. (A)
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Elliott, H. H., Jr. (A)
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Erwin, V. R. (M)
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Feinstein, J. (M)
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Figer, W. (A)
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Fine, H. (A)
Finkel, A. (A)
Finn, P. L. (M)
Finney, W. J. (SM)
Fleischer, A. (A)
Fleming, E. W. (A)
Fleming, H. D. (A)
Fleming, J. (A)
Floegel, M. E. (A)
Florman, E. F. (A)
Fluhr, F. R. (A)
Franklin, P. J. (SM)
Franks, H. J. (A)
Franta, A. L. (A)
Fraser, G. R. (M)
Fratlanni, S. V. (A)
Fraumann, J. W. (A)
Frazier, H. S. (SM)
Freeburger, B. P. (A)
Freeman, J. J. (SM)
Fuller, G. R. (A)
Fuller, I. W., Jr. (A)
Gabriel, W. F. (A)
Galane, I. B. (SM)
Gall, J. E. (VA)
Gallant, C. J. (A)
Garrison, M. M. (SM)
Gautney, G. E. (M)
Gayer, J. H. (M)
Gaylord, R. E. (M)
Gebhard, L. A. (F)
George, S. F. (SM)
George, W. D. (VA)
Gessner, R. J. (A)
Gignoux, F. E., Jr. (A)
Gillette, K. G. (VA)
Gladding, E. B. (M)
Glaze, G. O. (M)
Gleason, R. F. (A)
Glorioso, A. R. (A)
Goldberg, H. (SM)
Good, C. A., Jr. (A)
Gordon, S. H. (A)
Gormley, P. N. (A)
Goumas, N. P. (A)
Gourrich, G. E. (M)
Grady, D. F. (A)
Grady, T. J. (A)
Graham, H. U. (SM)
Grain, R. J. (A)
Grantham, R. W. (A)
Gratton, R. E. (A)
Greathouse, D. E. (A)
Grebenkemper, C. J. (A)
Green, D. G. (A)
Green, W. L. (M)
Green, W. C. (VA)
Greene, B. (A)
Greene, R. M. (A)
Greene, W. E. (M)
Greer, J. W. (SM)
Grenier, T. J. (A)
Gridley, D. H. (A)
Grimm, R. E. (M)
Grobowski, Z. V. (A)
Groverman, A. B. (M)
Gruber, J. R. (A)
Guarino, P. A. (SM)
Gunn, R. (F)
Guthrie, F. P. (SM)
Guthrie, R. C. (VA)
Haag, S. J. (SM)
Hadady, R. E. (M)
Haddock, F. T., Jr. (A)
Hadjidemetriou, D. S. (A)
Hafstad, L. R. (SM)
Hagerty, G. E. (M)
Hall, E. L. (SM)
Hallenstein, N. A. (VA)
Hamid, M. (A)
Hammer, I. W. (A)
Hanley, T. E. (SM)
Hare, C. M. (A)
Harmon, R. N. (F)
Harrison, H. (SM)
Harter, J. R. R. (M)
Haskins, R. L. (SM)
Hastings, H. F. (VA)
Haueter, R. C. (A)
Hayden, F. L. (A)
Head, H. T. (A)
Heaton, V. E. (SM)
Hebert, E. J., Jr. (A)
Hedberg, R. W. (A)
Hedge, L. B. (A)
Heilprin, L. B. (A)
Heinmiller, D. R. (A)
Hekimian, N. C. (A)
Held, J. C. (A)
Helt, F. R., Jr. (A)
Hemenway, D. F. (A)
Hennessy, R. G. (A)
Hens, R. J. (A)
Hepler, D. S. (A)
Herbert, L. G. (A)
Herman, H. (A)
Herring, R. A., Jr. (A)
Herson, J. L. (M)
Hickley, T. J. (SM)
Hickock, C. H. (A)
Himmelstein, S. (A)
Hillstrom, W. B. (A)
Hipson, L. J. (M)
Hodge, M. H., Jr. (A)
Hodges, M. F. (SM)
Hoffman, L. (A)
Holmboe, L. W. (M)
Hollingsworth, K. M. (A)
Hollis, J. L. (SM)
Hood, E. B. (A)
Hopkins, C. (M)
Hornung, J. L. (SM)
Hotchkin, E. E. (A)
Howard, D. D. (A)
Howe, E. R., Jr. (A)
Howe, W. E. W. (M)
Hunt, C. M. (SM)
Hurvitz, H. (M)
Hutchinson, H. P. (SM)
Isely, F. C. (SM)
Isenhour, C. N. (A)
Jablonski, R. E. (A)
Jacob, F. (A)
Jacobsen, I. J. (A)
Jacoby, A. (A)
Jacocks, T. B. (VA)
Jansky, C. M., Jr. (F)
Jennings, A. L. (A)
Jensen, P. A., Jr. (A)
Joffe, J. (A)
Joffe, N. (A)
Johnston, E. L. (VA)
Jones, A. E. (A)
Jones, A. B. (SM)
Jones, C. L. (A)
Jones, H. St. C., Jr. (A)
Kales, M. L. (M)
Kalmus, H. P. (SM)
Kaufman, J. (SM)
Kaufman, M. G. (M)
Kear, F. G. (F)
Keller, J. W., Jr. (M)
Keller, J. E. (A)
Kellerman, K. F. (SM)
Kelly, G. E., Jr. (A)
Kennedy, R. L. (SM)
Kershner, S. W. (A)
Keys, C. A. (A)
King, A. F. (A)
King, A. M. (A)
Kinyon, R. T. (A)
Kirby, R. C. (A)
Kirsch, R. A. (A)
Kirvida, L. (A)
Kohler, H. W. (SM)
Klamm, G. E. (A)
Klima, W. M. (A)
Kolkedy, J. G. (M)
Kouchnerkavich, T. A. (VA)
Kramer, E. R. (A)
Krasnick, B. (A)
Kraus, D. G. (A)
Kraus, R. W. (A)
Kray, E. (A)
Kropf, R. G. (A)
Krupen, P. (M)
Kube, H. D. (A)
Kuder, M. L. (A)
Kunetz, G. J. (A)
Kurner, C. J. (A)
Kyser, R. H. (A)
Lacey, H. F. (A)
Laker, E. F. (A)
Landsman, L. (A)
Lantz, P. A. (A)
Larson, R. E. (A)
Latt, H. A. (A)
Lawsine, L. (M)
Leavitt, W. E. (A)
Le Craw, R. C. (A)
Lederman, A. (A)
Lee, W. (M)
Lehfeldt, H. J. (A)
Leibowitz, R. C. (A)
Leidy, K. L. (A)
Leinbach, H. J., Jr. (A)
Leiphart, J. P. C. (A)
Lennard, R. L. (A)
Leppert, M. L. (VA)
Levy, L. J. (A)
Light, L. (A)
Liimatainen, T. (M)
Lilly, R. G. (M)
Lide, A. M. (A)
Link, J. H. (VA)
Link, J. C. (A)
Lipscomb, J. L. (A)
Liss, F. T. (A)
Little, R. P. (M)
Loeber, C. W. (M)
Lohnes, G. M. (SM)
Long, M. C. (A)
Looney, C. H., Jr. (A)
Lorentz, E. F. (A)
Lorenzen, H. O. (VA)
Loucks, P. G. (VA)
Love, S. D. (A)
Lovejoy, E. W. (SM)
Lowell, R. (A)
Lowy, W. M. (A)
Luecker, G. (A)
Lund, C. O. (A)
Luttrell, N. H., Jr. (A)
Lyons, H. (SM)
Lynch, D. W. (M)
Machlin, A. (A)
Mackenzie, C. M. (A)
Maddox, C. H. (SM)
Malden, R. M. (SM)
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Martin, J. F. (A)
Martin, K. L. (A)
Martin, P. J. (A)
Martin, T. J. (A)
Maskaleris, C. L. (A)
Massey, M. M. (M)
Mathes, R. H. (A)
May, J. C. (A)
Mayer, C. H. (M)
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Mayo-Wells, W. J. (SM)
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Renner, J. J. (M)
Reynard, A. I. (A)
Riccobono, S. (VA)
Rice, C. I. (SM)
Richards, A. P. (SM)
Richardson, W. M. (SM)
Richter, A. R. (M)
Rider, L. S. (A)
Rietzke, E. H. (SM)
Rigby, S. (A)
Ripnitz, A. (A)
Ritz, W. A. (M)
Robertson, B. S., Jr. (A)
Rockowitz, J. B. (A)
Rodenhi, D. L. (A)
Rogers, C. H. (A)
Rohlfs, D. C. (A)
Rohrer, R. E. (M)
Rohrich, G. J. (VA)
Rosenberg, H. L. (A)
Rosenberg, J. D. (M)
Rosenthal, S. (A)
Ross, I. T. (A)
Rowland, H. L. (A)
Royce, R. K. (A)
Rubin, S. (A)
Russ, J. A. (VA)
Ryan, A. H. (SM)
Ryan, W. E. (A)
Ryssy, J. W. (VA)
Sakiotis, N. G. (A)
Salerno, J. (A)
Salin, J. A. (M)
Salisbury, L., Jr., (A)
Salzberg, B. (F)
Samuel, J. (A)
Sarbacher, G. W., Jr. (A)
Sarbacher, R. I. (SM)
Sawtelle, E. M. (A)
Scal, R. K. F. (SM)
Schairer, N. J. (A)
Schenk, P. J. (SM)
Schlesman, C. H. (SM)
Schleter, G. C. (VA)
Schmalbach, S. (M)
Schooley, A. H. (SM)
Schrack, R. A. (A)
Schrenk, M. H. (SM)
Schuttig, L. A. (SM)
Schuyler, W. E., Jr. (M)
Segal, P. M. (SM)
Segal, R. L. (A)
Selby, M. C. (SM)
Selgin, P. J. (A)
Shapiro, G. (A)
Sharp, N. S. (A)
Sheets, M. J. (A)
Sherertz, P. C. (A)
Sherman, W. R. (SM)
Sherman, W. K. (VA)
Sidorov, A. G. (A)
Sigman, M. (A)
Silberstein, R. (SM)
Siling, P. F. (F)
Siller, J. (A)
Silliman, R. M. (SM)
Silver, S. H. (A)
Simas, V. R. (A)
Simmons, A. J. (A)
Simon, A. (A)
Simonton, L. J. (A)
Simpson, P. A. (A)
Simpson, R. L. (A)
Simpson, S. H., Jr. (SM)
Sing, M. L. (A)
Slaughter, J. E. (A)
Small, C. F. (M)
Smeltzer, J. C. (A)
Smith, C. N. (A)
Smith, E. R. (A)
Smith, F. A. B. (A)
Smith, J. E. (SM)
Smith, N. (F)
Smith, P. L. (M)
Smoot, W. S., III (A)
Snider, C. C. (A)
Snyder, E. O. (A)
Snyder, S. S. (A)
Sogn, L. T. (A)
Sommer, J. G. (A)
Sorensen, G. L. (A)
Sorensen, R. L. (A)
Sorrows, H. E. (A)
Spatz, S. (A)
Spencer, S. W. (M)
Sprinkle, M. C. (A)
Sreb, J. H. (A)
Stafford, B. H. (M)
Stair, R. (SM)
Staub, D. W. (A)
Stecca, A. J. (A)
Stein, M. (A)
Stewart, R. B. (SM)
Stine, P. T. (M)
Stoddard, R. N. (A)
Stormer, W. J. (A)
Stroble, R. R. (A)
Strothers, H. (A)
Sugar, G. R. (A)
Sumawong, W. (A)
Summerfield, P. N. (A)
Summers, S. D. (SM)
Suski, H. M. (SM)
Sutherland, J. A. (A)
Svechnikov, V. A. (A)
Taber, H. E. (SM)
Taishoff, S. J. (A)
Talkin, A. I. (A)
Tall, R. E. (A)
Tasaka, T. (A)
Temple, F. B. (A)
Tersoff, A. I. (A)

Thomas, L. W. (SM)
Thompson, D. G. (A)
Thompson, L., Jr. (SM)
Thompson, R. T., Jr. (A)
Thornhill, A. F. (A)
Tichenor, W. B. (A)
Titcomb, F. C. (A)
Tozzi, L. M. (A)
Trafton, D. C. (SM)
Trexler, J. H. (A)
Trogdon, F. H. (A)
True, V. (A)
Trumpfheller, L. W. (A)
Tun, M. T. (A)
Turnage, H. C. (A)
Turner, G. S. (SM)
Tuve, M. A. (F)
Upp, C. B. (SM)
Vignali, J. A. (A)
Vincent, A. M. (A)
Vleck, D. H. (A)
Voznak, E. (M)
Wade, D. A. L. (A)
Wagner, T. C. G. (A)
Walden, G. R. (A)
Waldschmitt, J. A. (SM)
Wallace, J. D. (SM)
Waterman, P. (A)
Watkins, W. H. (M)
Watts, F. C. (A)
Watts, J. M. (M)
Weber, W. J., Jr. (A)
Webster, E. M. (F)
Weedman, W. F. (M)
Weidemann, H. K. (A)
Weimer, E. W. (M)
Weinberg, M. (A)
Weinberger, A. (A)
Weinstein, M. S. (A)
Weiss, F. (A)
Weiss, G. H. (A)
Wells, H. W. (F)
Wells, W. B. (VA)
Wernz, G. L. (A)
Werth, M. W. (M)
West, J. S. (A)
White, C. F. (M)
White, D. R. J. (M)
White, W. A. (A)
Whitelock, L. D. (SM)
Whitlock, M. B., Jr. (A)
Wieder, H. H. (A)
Wilcox, R. H. (A)
Wilcox, R. L., Jr. (M)
Wildermuth, J. L., Jr. (A)
Wilkinson, D. A. (A)
Willard, J. M. (A)
Williams, C. H. (VA)
Williams, J. R. (M)
Williams, R. E. (M)
Williston, S. S. (A)
Willoughby, J. A. (SM)
Wilmotte, R. M. (F)
Wimmer, P. L. (A)
Winslow, R. B. (A)
Winston, G. C. (A)
Winter, R. E. (A)
Works, H. A. (A)
Wright, J. H. (M)
Wright, R. B. (VA)
Wunderley, R. H. (A)
Yagelowich, J. J. (A)
Yancey, J. D., Jr. (A)
Yaplee, B. S. (A)
Yeager, H. (SM)
Young, E. W. (A)
Young, H. M. (A)
Young, J. D. (A)
Young, J. S. (A)
Young, L. C. (F)
Zandonini, E. M. (M)
Zastrow, K. D. (A)
Zeck, R. W. (M)
Zielinski, C. A. (A)
Zirm, R. R. (A)

FLORIDA

Arlington
Kenyon, T. N. (A)

Bartow
Morrison, H. G. (A)

Belle Glade
Clemans, C. S. (SM)
Miles, F. R. (A)

Bradenton
Brown, J. M. (A)
Lampkin, G. F. (VA)
Whitehead, C. C., Jr. (A)

Clearwater
Abernathy, T. C. (A)
Reynolds, G. E., Jr. (A)

Cocoa
Bower, G. E. (A)
Browen, J. H., Jr. (A)
Compton, B. J. (A)
Dann, J. A. (A)
Dollar, J. H. (A)
George, T. S. (SM)
Gunderson, R. O. (A)
Majcher, C. L. (A)
Martin, G. E. (A)
Morris, H. N. (M)
Murakami, P. K. (A)
Olson, R. E. (A)
Petersen, J. A. (A)
Richards, J. R. (A)
Summer, C. F., Jr. (M)
Williams, A. F., Jr. (A)
Wilson, H. C. (A)

Cocoa Beach
Finke, H. G. (A)
Hopper, F. E. (A)
Thoman, C. A. (M)
Wever, L. R. (M)

Coral Gables
Birch, R. S., Jr. (A)
Burns, M. C. (A)
Chiles, W. R. (A)
Craig, P. H. (SM)
Epperson, W. H. (VA)
Gebhart, J. H. (A)
Harris, V. E. (A)
Jonas, A. (A)
Rogers, C. E. (A)
Wise, D. O., Jr. (A)
Wubanks, J. M. (A)

Dania
Young, P. A. (M)

Daytona Beach
Emmons, A. W. (A)
Fisher, D. E. (A)
George, E. M. (M)
Rolfe, H. D. (A)

De Barry
Alley, W. D. (A)

De Land
Kelsey, E. L. (A)

Delray Beach
Muse, D. W. (A)

Eau Gallie
Beach, A. R. (SM)
Bernard, E. E. (A)
Chrisman, D. W. (M)
Coapman, J. W. (SM)
Doane, H. J. (M)
Hines, W. S. (A)
Holmes, T. G. (A)
McFarland, D. J. (A)
Moline, J. C. (A)
Neff, R. R. (A)
Preece, B. P. (A)
Preece, R. G. (A)
Shupe, P. G. (A)
Weiss, H. R. (A)
West, K. A. (M)
Wynn, J. B., Jr. (A)

Eglin AFB
Branch, G. E. (SM)
Dille, A. C. (A)
Heyroth, J. W. (A)
Kirlin, W. F. (A)
Robinson, W. J., Jr. (A)
Snyder, G. H. (VA)
Stewart, C. O. (A)
Winslow, R. G. (A)
Wright, R. K. (A)

Fort Lauderdale
Bassett, R. E., Jr. (VA)
Menefee, H. R. (A)
Stetson, H. T. (VA)
Stone, F. C. (A)
Thompson, H. V. (SM)

Fort Meyers
Dashiell, E. V. (M)
Lynch, A. H. (SM)

Fort Pierce
Braden, J. R. (A)

Fort Walton
Basham, R. S. (A)
Boedy, D. D. (A)
Brown, M. J. (A)
Clark, L. E. (A)
Edstrom, C. A. (A)
Falkenberg, H. R. (M)
Fleming, G. C. (A)
Reed, R. C. (M)

Gainesville
Bliss, G. B. (A)
Brown, R. F. (A)
Chamberlin, R. M. (M)
Chen, W. H. W. (A)
Dietz, D. P. (A)
Eadie, D. (A)
Johnson, R. C., Jr. (A)
Larsen, M. J. (SM)
Latour, M. H. (A)
Lear, W. E. (SM)
Nelson, P. H. (SM)
Priem, E. S. (A)
Pumphrey, F. H. (SM)
Sashoff, S. P. (SM)
Schrader, G. F. (A)
Shaffer, C. V. (SM)
Tedder, P. M. (A)
Weil, J. (SM)
Zetrouer, W. F., II (A)

Greenville
Marshall, H. A. (A)

Hialeah
Jamieson, J. G. (A)
Kinney, W. E. (M)

Hollywood
Hieronymus, T. G. (SM)
McWilliams, L. C. (A)
Smith, W. N. (M)

Indian Rocks
Andrews, E. F. (VA)

Indian Rocks Beach
Smith, F. S. (VA)

Jacksonville
Boyer, L. R. (A)
Brand, C. W. (A)
Conover, W. V. (A)
Dandelake, J. (M)
Ffoulkes, C. E. (M)
Franks, B. W. (M)
Martindale, N. B. (A)
Newberry, D. A. (M)
Newnham, J. A. (A)
Randles, W. C. (M)
Vordermark, E. B. (M)

Keystone Heights
Browning, R. H. (A)

Key West
Brooks, J. F. (M)
Chandler, R. D. (A)
Forman, A. H., Jr. (A)
Hollis, R. H. (A)
Kemp, J. C., Jr. (A)
McMasters, P. A. (M)
Nairn, J. B. (A)
Rohrer, C., Jr. (A)
Sims, D. S. (A)
Vallandigham, W. W. (A)
Vette, W. J. (M)
Wineman, T. S. (A)

Lakeland
Cromer, E. G. (A)

Lake Wales
Kimbrel, G. M. (M)

Lake Worth
Larkin, J. P. (M)
Wood, W. H. (M)

Lynn Haven
Kittle, M. O. (A)

Mary Esther
Huntley, K. L. (M)
Lynch, F. R. (A)

Melbourne
Anderson, G. F. (A)
Barnett, B. E. (A)
Bishop, R. P. (A)
Bratcher, A. L. (A)
Carroll, L. O. (A)
Cohen, P. (A)
Culver, L. R. (SM)
Denius, H. R. (SM)
Dillon, J. D. (M)
Dorsett, D. A. (M)
Dryden, R. E. (M)
Gilbreath, R. E., Jr. (A)
Hicks, W. S. (A)
Howard, D. C., Jr. (M)
Jenkins, J. L. (M)
Johnson, A. (M)
Keith, C. E. (M)
Little, W. E. (A)
Painter, P., Jr. (M)
Pierce, W. E. (A)
Preston, L. S. (A)
Price, H. J. (SM)
Saari, E. S. (A)
Scharla-Nielsen, H. (M)
Shaw, G. S. (SM)
Vansant, F. T. (VA)
Weber, D. C. (M)
West, C. F. (M)
Wicker, G. E. (A)
Wisner, R. M. (SM)

Melrose
Gano, O. R. (A)

Miami
Adcock, S. E. (VA)
Ashley, C. L. (M)
Barwick, M. N. (A)
Bernard, H. F. (A)
Bryant, C. S. (A)
Buckler, D. R. (M)
Carlton, C. (A)
Cheng, K. Y. (A)
Cohen, L. D. (A)
Driest, C. W. (A)
Easterbrook, L. J., Jr. (A)
Evans, H. (A)
Goetz, O. E. (A)
Greene, A. N. (A)
Greene, N. E. (A)
Hart, E. D. (A)
Hastings, L. E. (M)
Herrmann, N. P. (A)
Hollander, A. G. (A)
Jones, R. M. (M)
Jones, T. J. (A)
Jorgensen, O. J. (A)
Kimball, E. W. (A)
Koivu, H. I. (A)
Larkins, G. L. (A)
Lee, W. M. (A)
Lewis, E. W. (VA)
Malone, E. P. (A)
Mangus, G. (A)
McGlade, D. J. (A)
Morphonios, A. G. (A)
Palmer, R. P. (A)
Reid, T. D. (A)
Rider, F. E. (SM)
Roberts, F. G., Jr. (VA)
Rondel, V. D. (A)
Sammon, P. J. (M)
Sanders, A. W. (A)
Scott, M. C., Jr. (SM)
Shamblin, H. D. (M)
Shattuck, J. C. (A)
Shay, J. A. (M)
Shearer, S. L. (A)
Smith, A. P. (M)
Snyder, A. D. (A)
Stephens, F. H., Jr. (A)
Taylor, J. C. (M)
Ware, P. (SM)
Wicks, C. E. (A)
Williams, G. P. (A)

Miami Beach
Hooper, S. C. (F)
Rosenson, A. H. (A)
Senauke, A. (SM)

Miami Springs
Atkins, G. T. (M)
Cook, C. (A)
Mehrling, H. W. (M)
Murr, V. E. (VA)
Olson, M. S. (A)

Monticello
Bridges, J. K. (A)

North Miami
Gunn, C. R. (A)
Lockwood, E. C. (SM)
Sawyer, J. L. (A)

Orlando
Adams, I. D. (A)
Gober, R. H. (A)
Hawley, D. T. (M)
Holleman, R. W., Jr. (A)
Lantz, J. D. (A)
Mantey, W. F. (A)
Yarbrough, J. E. (SM)

Panama City
Bell, L. W. (A)
Conner, J. F. (A)
Erickson, E. E. (A)
Hawkins, E. M. (A)
Koesy, C. B. (A)
Marley, S. B. (A)
Miller, C. E., Jr. (A)
Moody, J. G. C. (A)
Neff, R. W. (A)

Patrick AFB
Baxter, W. D. (A)
Crapo, S. T. (A)
Doerr, W. H. (A)
Friedland, M. S. (A)
Westerfield, E. E. (A)

Pensacola
Mason, J. S. (M)
Sprunk, W., Jr. (A)

Plant City
Cockrell, J. H. (A)
Sipple, R. L. (A)

Port Orange
Rast, G. J., Jr. (A)

Rockledge
Sarte, V. J. (A)

St. Augustine
Berger, M. (A)

St. Cloud
Ryder, P. E. (A)

St. Petersburg
Herb, J. W. (M)
Horner, G. F. (A)
Kent, R. (SM)
Link, L. J. (VA)

Sanford
Wright, J. C. (A)

Shalimar
Overton, B. H. (SM)

South Miami
Lucas, F. B. (M)
Rich, R. S. (A)

Tallahassee
Ford, H. P., Jr. (A)

Tampa
Brice, J. R. (A)
Evans, J. F. (A)
Harnett, C. E. (A)
Heidgen, B., Jr. (A)
Jean, R. P. (VA)
King, C. J. (M)
Meksraitis, J. J. (A)
Mitchell, J. H. (M)
Moor, W. L. (A)
Murphy, R. (M)
Russell, L. A. (A)
Straubel, E. P. (A)

Titusville
Morford, T. H. (A)

Tyndall AFB
Chambers, G. R. (A)

Ueta
Knowles, D. M. (A)

Umatilla
Vossberg, C. A. (A)

Valpariso
Hlavaty, E. M. (A)
Vermillion, R. K. (A)

Vero Beach
Chorpening, C. M. (M)
Paddock, D. G. (M)

Warrington
Richard, J. D., Jr. (A)

West Miami
Speirs, G. E. (A)

West Palm Beach
Campbell, C. A. (SM)
Cohen, M. J. (SM)
Coleman, J. H. (A)
Edleman, V. W. (A)

Winter Park
Gay, J. L. (A)
Rhein, G. W. (M)

GEORGIA

Albany
Muse, A. W. (A)
Thibodeau, J. E. (A)

Atlanta
Aderhold, H. J. (A)
Akerman, B. (SM)
Badgett, A. F. (A)
Bangs, P. C. (M)
Barr, E. W. (A)
Berry, G. C. (A)
Bird, R. M. (A)
Bondy, H. A. (VA)
Borman, A. P. (A)
Boyd, J. E. (SM)
Bradley, W. H. (M)
Branch, B. S. (A)
Bromfield, G. M. (M)
Buchanan, D. B. (M)
Bugg, K. W. (M)
Butterfield, J. L. (A)
Bylander, E. G. (A)
Clary, W. T., Jr. (A)
Clayton, L., Jr. (A)
Cole, J. C., Jr. (A)
Corriher, H. A., Jr. (A)
Craddock, H. C., Jr. (A)
Dasher, B. J. (A)
Daugherty, C. F. (M)
Fausett, F. (SM)
Fielder, D. C. (SM)
Finn, D. L. (A)
Foster, H. O. (A)
Flynt, E. R. (A)
Geeslin, J. W. (M)

Gentry, W. E. (A)
Grivet, P. E. (M)
Hawthorne, G. B., Jr. (A)
Henry, C. A. (A)
Herndon, P. H., Jr. (SM)
Hiatt, W. C. (A)
Hogg, J. C., Jr. (A)
Holder, F. P. (A)
Holmes, E. G. (M)
Honnell, M. A. (SM)
Howard, G. M. (SM)
Huddleston, T. E. (A)
Jenkins, P. M. (A)
Johnson, W. D. (M)
Jones, C. T. (A)
Jones, W. B., Jr. (M)
Lammers, E. S., Jr. (SM)
Lenoir, S. P., Jr. (A)
Lindsey, E. B., Jr. (M)
Livingston, J. L. (A)
Long, M. W. (A)
Marquand, R. E. (A)
Marshall, J. G., Jr. (A)
Martin, R. A. (M)
Mauldin, H. W., Jr. (A)
Meek, R. E. (A)
Murphy, B. (A)
Parkins, F. A. (M)
Parris, R. D. (A)
Prince, M. D. (A)
Ragsdale, H. W. (SM)
Reid, H. L. (VA)
Rice, L. P. (A)
Rivers, T. A. (A)
Robinson, G. P., Jr. (A)
Sarver, J. R. (A)
Shortley, W. M. (A)
Smith, A. G. (A)
Smith, S. R. (SM)
Stone, E. W. (A)
Strain, C. E. (A)
Sutton, G. L. (A)
Tolan, J. H. (A)
Totman, S. (M)
Turner, C. J., Jr. (A)
Wallace, J. M., Jr. (A)
Walsh, J. R., Jr. (A)
Walters, J. M. (A)
White, W. H. (M)
Widerquist, V. R. (M)
Wright, W. W. (A)
Voegeli, F. E. (A)

Augusta
McKewen, W. R. (A)
Newton, R. L. (A)
Roder, C. C. (VA)
Tarpley, M. W. (A)

Brookhaven
Boland, C. E. (A)
Gunson, D. O. (M)
Honer, R. E. (A)

Camp Gordon
Flewelling, J. D. (SM)
Goble, A. S., III (A)
Janes, C. W. (SM)
Ryason, R. R. (A)

Camp Stewart
Davison, R. E. (A)

Carrollton
Crawford, E. W. (A)

Chamblee
Bratcher, W. H. (A)
Carter, R. C. (A)
Hollis, J. S. (A)
Needs, W. R. (A)

College Park
Billings, R. H. (A)
Jeter, W. C. (A)

Columbus
Bunn, C. N. (A)
Gamble, J. A. (M)
Hogencamp, H. C. (SM)
Jenkins, S. P., Jr. (A)

Commerce
Carson, J. R. (A)

Dalton
Andrews, J. S. (A)

Decatur
Dewar, H. D. (A)
Hammond, W. M. (A)
Holbrook, R. A. (M)
Jones, H. D., Jr. (A)
McCorvey, A. (M)
Morris, R. B. (A)
Robertson, D. W. (A)
Sorelle, J. L. (A)

East Point
Brewer, R. V. (A)

Emory University
Dailey, R. S. (A)
Fattig, W. L. (M)

Forest Park
Adamson, H. D. (A)

Fort Benning
Clarke, A. C. (A)

Hapeville
White, L. E. (M)

Macon
Diener, H. C., Jr. (A)
Farber, E. (A)
Merrihew, H. W. (A)
Speights, M. T. (A)

Marietta
Dumphey, H. B., Jr. (A)
Holliday, F. S. (M)
Hunter, H. A. (M)
McCurley, E. A. (A)
Toole, P. C. (M)
Wrigley, W. B. (A)

Port Wentworth
Wagner, F. D., Jr. (A)

Powder Springs
Luedtke, A. (A)

Rome
Jones, A. E. (M)
Starr, R. A. L. (M)

Savannah
Bahlay, A. (M)
Goodman, K. E. (A)
Jenkins, E. A. (A)

Smyrna
Hurst, H. C. (A)
Parker, H. W. (M)
Riley, J. M. (A)
Speer, T. K. (A)

Thomasville
Poole, J. W. (A)

Valdosta
Salter, N. H. (A)

West Point
Strother, F. P. (A)

IDAHO

Bayview
Price, V. G. (M)

Boise
Hinshaw, R. M. (A)
Oberbillig, D. D. (M)
Ryman, J. L. (A)
Sutton, R. B. (A)

Fish Haven
Kearl, J. A. (A)

Hagerman
Tucker, M. (A)

Idaho Falls
Chapman, H. R. (A)
Criddle, C. B. (M)
Purcell, R. B. (A)
Thomas, M. E. (A)
Thompson, J. B. (A)

McCall
Leavitt, R. F. (A)

Meridan
Johntz, J. A., Jr. (A)

Moscow
Craine, L. B. (M)

Mountain Home AFB
Dawson, W. S. (A)

Nezperce
Wysong, G. H. (A)

Pingree
Judge, H. (M)

Pocatello
Heinrich, F. (A)
Kuehne, A. (A)
Ritland, H. O. (A)

Twin Falls
Foss, M. L. (A)

Weiser
Miller, E. C. (A)

ILLINOIS

Abingdon
Weir, E. J. (A)

Algonquin
Tanrath, E. G. (A)

Alton
Cochran, H. E. (A)
Day, R. T., Jr. (A)
Ullrich, D. P. (A)

Antioch
Balsamello, J. (A)
Pechousek, T. W. (A)
Zale, W. J. (A)

Arenzville
Ore, F. R. (A)

Arlington Heights
Abfalter, H. F. (A)
Gaarder, K. M. R. (M)
Heisig, G. J. (A)
Kopp, C. J. (M)
Kuykendall, J. H. (A)
Lee, W. (A)
McCarty, J. M. (A)
Mueller, A. A. (A)
Patterson, W. S. (VA)
Ross, E. O. (M)
Weed, A. C., Jr. (M)

Atlanta
Speciale, J. S. (A)

Aurora
Dieter, R. E. (A)
Lamb, C. W. (A)
Seid, H. R. (A)

Barrington
Aram, N. W. (M)
Price, R. L. (M)

Batavia
Griffin, W. F., Jr. (M)
Poons, A. L. (A)

Belleville
Fitzsimmons, R. S. (M)
Friedrich, W. J. (A)
Germain, R. C. (A)
Gilfilen, L. J. (M)
Johnson, P. B. (M)
Joseph, E. L. (A)
Peck, G. B. (A)
Pfister, R. C. (A)
Reiniger, R. A. (A)
Steward, R. H. (A)
Stewart, J. H. (A)
Swantz, F. W. (M)
Wills, J. R. (A)

Bellwood
Baltezore, R. C. (A)
Coolidge, J. E. (A)
Hauptli, J. T. (A)
Kafka, N. (A)
Marik, E. (A)

Belvidere
Marshall, T. G., Jr. (A)

Bensenville
Hilton, F. L. (A)
Landeck, J. H. (M)
Ripperger, W. A. (A)
Sullivan, E. F. (M)
Swanson, C. W. (A)

Berkeley
Eckmann, L. G. (A)

Berwyn
Callahan, B. E. (A)
Cermak, C. W. (M)
Datwyler, W. F. (A)
Fanta, F. A., Jr. (A)
Fligel, F. J. (A)
Gago, W. J. (A)
Glozer, A., Jr. (A)
Hajic, E. J. (A)
Heiner, T. D. (A)
Jarrette, V. (SM)
Jennings, J. J. (A)
Jiral, J., Jr. (A)
Komarek, E. E. (A)
Kovar, G. F. (A)
Mrazek, W. F. (M)
Prentiss, J. G. (SM)
Russ, W. E. (M)
Schimpf, R. G. (M)
Sirvatka, W. E. (A)
Strachota, E. F. (A)
Stubbings, W. E. (A)
Valach, C. F. (M)
Veverka, G. C. (A)
Weiss, H. (A)
Wittmann, R. C. (A)

Bloomington
Moulic, W. E., Jr. (M)

Blue Island
Damm, G. J. (A)
Schmied, W. F., Jr. (A)

Bourbonnais
Keast, D. E. (A)

Broadview
Gray, R. O. (M)
Pallissard, J. W. (A)
Ross, H. M. (A)

Brookfield
Clark, J. M. (A)
Collins, E. A. (M)
Dyke, E. (SM)
Foeste, W. E. (SM)
Frihart, H. N. (M)
Hathaway, V. C., Jr. (A)
Holpuch, D. J. (A)
Keranen, E. W. (M)

Calumet City
Thomas, R. R. (A)

Canton
Miller, H. E. (A)

Carlinville
Ferketich, G. (A)

Carmi
Johnson, R. N. (A)

Catlin
Lindberg, A. C. (A)

Champaign
Albright, W. G. (M)
Annis, R. W. (A)
Coleman, P. D. (A)
Dunn, E. J. (A)
Ernst, E. W. (A)
Fry, W. J. (A)
Howard, L. L. (M)
Hundley, T. C. (A)
Jakowatz, C. V. (A)
Johnson, M. S. (A)
Leichner, G. H. (A)
Meagher, R. E. (M)
Wainscott, J. M. (M)
Williams, D. G. (A)
Wu, H. S. (A)

Chester
Rockwell, D. A. (A)

Chicago
Abraham, J. (A)
Ackerman, N. A. (A)
Adams, K. (M)
Adamson, A. C. (A)
Addison, W. G. (A)
Adison, J. C. (A)
Adler, H. J. (SM)
Adler, R. (F)
Aklinski, M. J. (A)
Alessio, S. A. (A)
Alexanoff, E. (A)
Ambos, C. (A)
Anderson, G. W. (A)
Anderson, R. L. (A)
Anderson, R. S. (A)
Anderson, T. W., Jr. (M)
Anderson, W. J. (A)
Andres, L. J. (SM)
Andresen, E. H. (SM)
Aoyama, F. S. (A)
Apger, F. E. (A)
Argall, G. J. (A)
Arnow, C. L. (A)
Aronson, H. A. (A)
Audo, P. D. (A)
Avella, P. S. (A)
Azelickis, A. N. (A)
Bachhuber, R. A. (A)
Backman, K. E. H. (A)
Baker, G. M. (A)
Ball, R. M. (A)
Balousek, M. W. (A)
Ban, G. R. (A)
Banks, D. S. (A)
Baptist, W. G. (M)
Baron, T. (A)
Basko, A. (A)
Bastian, E. (A)
Bauman, H. W. (M)
Becker, H. W. (M)
Beane, G. F., Jr. (A)
Bee, R. E. (M)
Beeson, W. E. (A)
Beier, L. W. (M)
Belville, J. R. (A)
Bennett, G. T. (SM)
Berg, H. O. (A)
Berger, D. (A)
Bergen, H. A. (A)
Bergo, E. S. (A)
Berkey, W. E. (M)
Bernat, L. (A)
Bernreuter, H. A. (SM)
Bialek, S. T. (A)
Biernat, W. M. (A)
Beneke, E. H. (A)
Bigelow, R. P. (A)
Blahna, C. (SM)
Bloomenthal, S. (M)
Bluzat, C. R. (A)
Boesen, G. F. (A)
Bonnell, D. W. (A)
Borchardt, R. L. (A)
Borman, W. M. (A)
Borsi, P. N. (A)
Borth, J. W. (A)
Bouska, J. F. (A)
Bouwman, B. J. (A)
Bowen, J. L. (VA)
Boyajian, J. A. (SM)
Boyd, G. M. (A)
Boyll, L. O. (A)
Bradford, C. E. (A)
Branscome, E. O. (A)
Brauer, H. H. (SM)
Brennan, L. E. (A)
Brittain, G. H. (M)
Brittin, F. L. (SM)
Brock, W. R. (A)
Brown, H. K. (A)
Brown, J. O. (A)
Brown, J. S. (SM)
Brown, J. W. D. (M)
Brown, R. V. (A)
Browne, B. (A)
Bruch, R. (VA)
Brugliera, F. J. (A)
Brymer, D. B. (A)
Buchholz, F. G. (A)
Buckley, J. K. (A)
Bull, R. W. (A)
Burgwald, G. M. (A)
Buri, F. J. (A)
Burns, E. E. (SM)
Burns, R. P. (A)
Buzzard, C. R. (A)
Bryne, W. C., Jr. (A)
Byrnes, W. P. (M)
Callahan, H. R. (M)
Callanan, J. A. (SM)
Callegari, P. B. (A)
Camillo, C. (A)
Camras, M. (F)
Cape, H. J. (A)
Cape, K. E. (A)
Cappels, J. L. (M)
Carlson, D. A. (A)
Carlson, E. V. (A)
Carlson, G. L. (A)
Carr, R. W. (A)
Carroll, C. T. (M)
Carter, A. J., Jr. (A)
Casciotti, R. J. (A)
Casey, E. A. (A)
Catlin, L. F. (A)
Cesario, D. J. (A)
Chalberg, H. W. A. (SM)
Chalmers, E. D. (A)
Chandler, J. F. (A)
Chang, H. (A)
Chapp, J. M. (A)
Chittenden, G. W. (A)
Chodl, C., Jr. (A)
Christensen, R. T. (A)
Chu, C. J. (A)
Chulsky, I. (A)
Claras, C. W. (M)
Clardy, L. (M)
Clark, D. E. (SM)
Clark, R. A., Jr. (M)
Cohan, O. (A)
Cohen, T. A. (SM)
Cohn, C. M. (A)
Cohn, J. (A)
Contos, P. G. (A)
Contri, A. (A)
Cook, R. H. (M)
Correia, F., Jr. (A)
Coulter, W. H. (A)
Cox, B. O. (A)
Cox, C. R. (SM)
Craig, L. E. (A)
Craine, W. P. (A)
Crampton, G. W. (M)
Crane, S. D. (SM)
Cunningham, B. B. (A)
Currier, M. G. (M)
Czepopski, W. P., Jr. (A)
Daly, W. E. (A)
D'Arcy, E. W. (A)
Darsch, A. P. (A)
Davidson, P. (A)
Davis, G. L. (A)
Davis, S. (A)
Decho, K. R. (A)
Deck, G. J. (A)
DeHaan, J. (A)
Dell, H. R. (A)
DeRose, R. A. (A)
Dervishian, E. (M)
Devine, W. F. (SM)
Dezettel, L. M. (A)
Dimmer, R. P. (SM)

Dirkers, N. A. (A)
Donaldson, R. J. (SM)
Doremus, J. A. (SM)
Dover, J. (A)
Drozt, P. (A)
Druz, W. S. (SM)
DuChatellier, R. (A)
Duncan, C. W. (M)
Dunlap, J. F. (A)
Elbinger, L. P. (SM)
Elfman, R. S. (A)
Ellett, A. (SM)
Ellis, C. O. (M)
Eness, O. M. (A)
Everett, J. E. (M)
Fablan, S. H. (A)
Fasick, R. C. (SM)
Fassl, F. R. (A)
Faulkner, A. H. (M)
Feldman, H. (A)
Ferris, W. T. (VA)
Fetterman, D. M. (VA)
Fields, T. (A)
Figlewicz, R. C. (A)
Filips, R. P. (A)
Finison, H. J. (M)
Finlay, G. E. (A)
Fischer, J. (A)
Fisher, B. A. (SM)
Fitzpatrick, J. V. (A)
Flesher, G. T. (A)
Flocken, L. H. (SM)
Flour, W. (A)
Flowers, A. A. (A)
Floyd, E. C. (M)
Fonte, G. (A)
Foster, G. E. (M)
Fox, M. L. (A)
Franklin, H. B. (A)
Franklin, W. S. (SM)
Frantz, N. (A)
Freeman, R. L. (SM)
Friedman, I. B. (A)
Fritchle, F. P. (A)
Fudaley, S. L. (A)
Fuglestad, K. R. (A)
Fujimoto, J. J. (A)
Fujimoto, K. K. (A)
Fukuhara, K. K. (A)
Fuller, F. C. (A)
Furst, U. R. (M)
Gabriel, R. R. (A)
Galejs, J. (A)
Gardberg, J. (A)
Garstang, W. W. (SM)
Gassner, F. (A)
Gates, H. A. (SM)
Gawel, E. W. (A)
Gehmlich, A. P. (A)
Geist, G. W. (A)
Gemulla, W. (A)
Genovese, A. N. (A)
Gens, H. J. (A)
Gerlach, A. A. (SM)
Germain, J. (A)
Gershater, S. H. (M)
Gershon, J. J. (M)
Gerstein, B. (A)
Giacchetti, A. C. (A)
Giolitto, A. P. (A)
Gimpel, D. (A)
Glasby, W. E. (M)
Glenn, R. J. (A)
Glentzer, K. V. (SM)
Glyptis, N. (A)
Goh, C. C. (A)
Goldfus, S. M. (A)
Goldsmith, P. (A)
Goldstein, M. (M)
Gooch, M. W. (A)
Gornick, S. A. (A)
Gorozdos, R. E. (A)
Gosiovich, S. J. (A)
Graf, A. W. (SM)
Graffam, P. S. (A)
Gray, D. (VA)
Green, L. H. (A)
Grisanti, J. L. (A)
Gronemeir, H. J. (A)
Gross, E. J. (A)
Gruen, H. E. (A)
Gruenloh, G. J. (A)
Grunwald, R. (M)
Guzzey, J. E. (M)
Halinton, H. (M)
Halverson, S. L. (A)
Hamilton, V. P. (A)
Hamme, R. J. (A)
Hamre, H. G. (A)
Hanik, P. (VA)
Hanner, J. B. (A)
Hansen, W. H. (VA)
Hardy, H. C. (SM)
Harrigan, G. S. (SM)
Harris, B. J. (A)
Harris, E. F. (A)
Hartmann, G. L. (A)
Hassler, E. B. (A)
Hassel, K. E. (SM)
Hay, E. (A)
Hayes, H. D. (SM)
Heathershaw, R. T. (A)
Hencke, J. M. (A)
Henke, W. G. (M)
Henkle, H. H. (A)
Hennings, H. H. (A)
Hercher, F. J. (A)
Herst, R. J. (A)
Herz, A. J. (M)
Hess, D. C., Jr. (A)
Higgins, P. W. (A)
Hill, C. F. (A)
Hines, J. W. (M)
Hingson, G. D. (A)
Hjermstad, H. (VA)
Hoehn, A. J., Jr. (SM)
Hoffman, H. E. (M)
Hollandsworth, W. J. (A)
Hollich, F. J. (A)
Holpuch, C. J. (M)
Holubow, H. (M)
Honda, M. (A)
Horde, J. W. (A)
Hori, S. (A)
Horn, L. H. (SM)
Hotz, M. (A)
Howe, J. K. (M)
Huber, R. H. (A)
Huston, P. D. (A)
Hutcheon, R. S. (A)
Hynes, E. A. (A)
Ihde, W. M. (SM)
Imerson, H. E. (A)
Ingram, C. (A)
Inman, J. F. (SM)
Jaberner, M. P. (A)
Iverson, F. A. (A)
Jablonsky, J. G. (A)
Jackson, J. J. (A)
Jacob, F. N. (SM)
Jacobsen, I. (A)
Jacobson, L. (A)
Jacobson, S. (A)
Jahnigen, F. W. (A)
Jahnke, C. E. (A)
Jensen, J. O. (VA)
Jensen, R. E. (A)
Jezek, J. E. (A)
Johnson, J. T. (A)
Johnson, M. C. (A)
Johnson, W. S., Jr. (A)
Jones, T. E. (A)
Jorgensen, N. A. (A)
Kahn, J. J. (A)
Kalman, J. (A)
Kaluzna, I. J. (A)
Kaminsky, L. M. (A)
Kampschoer, J. F. (A)
Kamya, J. E. (A)
Kantner, H. H. (M)
Kaplan, H. (A)
Karel, L. G. (A)
Karet, R. M. (A)
Karr, R. J. (A)
Kayser, D. R. (A)
Kearse, G. P. (SM)
Keller, W. P. (A)
Kelly, E. P., Jr. (M)
Kelsey, L. C. (A)
Kemnitz, W. F. (A)
Kennedy, J. P. (SM)
Kennedy, J. A. (M)
Kenney, M. W. (SM)
Kiciak, C. J. (A)
Kiefer, J. C. (M)
Kilburn, A. B. (A)
Kingwill, H. S. (A)
Kiver, M. S. (A)
Klapperich, A. J. (VA)
Kloga, P. J. (A)
Kmiec, J. (A)
Kneen, W. (M)
Koenig, H. G. (A)
Koerner, F. A. (A)
Kohner, M. (SM)
Kolberg, E. G. (A)
Komm, J. (A)
Kopeny, L. J. (A)
Kortright, F. U. (A)
Koutsoukos, F. (A)
Kowitz, A. E. (A)
Krahe, L. R. (M)
Kraitalk, N. I. (A)
Krakora, J. J., Jr. (SM)
Kramer, A. W. (VA)
Kramer, K. (SM)
Kransz, P. A. (M)
Kravitz, J. S. (A)
Kre, P. S. (A)
Krefft, H. H. (M)
Krempel, F. M. (A)
Krieg, B. E. (A)
Kroll, J. B. (A)
Krstenansky, J. S. (A)
Krueger, R. M. (SM)
Krueger, W. F. (A)
Krumhardt, C. (A)
Krus, G. D. (A)
Kuffel, L. A. (M)
Kulik, L. (A)
Kuniyuki, R. M. (A)
Kunst, A. F. (A)
Kurinsky, J. S. (A)
Kurland, J. J. (A)
Kusack, W. P. (A)
Kwiatek, W. K. (A)
Lange, W. W. (A)
Lapin, S. P. (A)
LaRocca, J. J. (A)
LaRose, A. F. (M)
Larsen, P. J. (SM)
Larson, R. J. (A)
Larson, R. P. (A)
Larson, R. W. (A)
Lassila, A. A. (A)
Laythe, R. F. (A)
Leedy, H. A. (SM)
Lencioni, C. C., Jr. (A)
Leonhardi, J. O. (A)
Leoni, A. J. (M)
Leopold, L. (A)
Lerner, I. S. (M)
Leslie, W. A. G. (A)
Leszko, N. J. (A)
Levine, J. M. (A)
Lewin, H. (A)
Lewis, R. E. (M)
Lewis, W. A. (SM)
Liberman, A. (SM)
Liepelt, E. E. (A)
Lipinski, W. C. (A)
Liston, K. L. (A)
Littlewood, W. N. (A)
Lockhart, R. W. (SM)
Loftus, W. E. (A)
Loizzo, V. J. (A)
Lopez, J. L. (A)
Lorenc, R. M. (A)
Lubeck, W. A. (A)
Lucas, D. T. (A)
Luecke, G. N. (A)
Luttgens, H. C. (SM)
Lynch, T. H. (A)
Lytle, C. W. (SM)
MacAskill, R. B., Jr. (A)
Macres, G. S. (A)
Maidak, A. M. (A)
Magnuski, H. (SM)
Magnuson, R. J. (M)
Malinowski, S. (A)
Mankin, A. H. (M)
Mansfield, R. (M)
Maravich, R. (A)
Margowsky, H. (M)
Mariner, T. H. (A)
Markarian, M. V. (A)
Marquardt, J. A. (A)
Marsh, S. Y. (A)
Marshall, C. E. (VA)
Marsland, H. W. (A)
Marszalek, H. L. (A)
Martin, L. (SM)
Martin, R. F. (A)
Masters, E. W. (SM)
Massie, H. B. (A)
Mathia, H. F. (M)
Matthews, L. E. (A)
Maximoff, B. S. (A)
McCarthy, H. J. (A)
McClelland, W. B. (M)
McCoy, J. G. (A)
McDonald, J. J. (A)
McDonell, W. J. (VA)
McDougall, D. S. (M)
McFarland, R. B. (A)
McKnight, R. W. (A)
McLean, A. R. (A)
McMahon, G. V. (M)
McManus, J. E. (A)
McNeill, H. N. (A)
Medkeff, R. J. (A)
Meehan, E. L. (A)
Meinema, H. (A)
Meixner, E. J. (A)
Merrill, H. M. (VA)
Messinger, H. P. (A)
Meuer, A. (A)
Meyer, A. (A)
Michalski, R. A. (A)
Michels, J. A. (A)
Mikos, E. J. (A)
Miller, E. L. (A)
Miller, R. J. (A)
Minkus, F. (A)
Mitchell, L. W. (A)
Mitchell, T. E. (A)
Mittelmann, E. (SM)
Mnichowicz, J. S. (A)
Mohler, R. D. (A)
Molnar, I. (SM)
Molyneaux, R. J. (A)
Moon, R. J. (SM)
Moore, W. T. (A)
Morgan, G. M. (M)
Morris, L. P. (VA)
Moulton, G. E. (A)
Moynihan, J. F. (M)
Mueller, E. L. (A)
Mueller, F. L. (A)
Murphy, J. L. (SM)
Myers, J. A., Jr. (M)
Myers, J. J. (SM)
Myse, A. G., Jr. (A)
Nakata, C. K. (A)
Neben, H. M. (M)
Nelson, R. A. (A)
Nerwin, H. N., Jr. (A)
Neumark, J. (A)
Newman, J. E. (A)
Niederman, B. (A)
Nienaber, F., Jr. (A)
Nierman, L. G. (A)
Noble, D. E. (F)
Novak, E. K. (A)
Novic, R. H. (A)
Obog, L. F. (M)
O'Brien, E. (VA)
O'Brien, E. G. (A)
O'Connor, C. J. (A)
Offner, F. (SM)
Ogasawara, T. B. (A)
Oldfield, R. L. (A)
Olson, E. L. (M)
Olson, V. W. (M)
Orr, B. B. (A)
Osterlund, S. G. (M)
Ostrand, K. T. (A)
Owca, A. E. (A)
Owen, G. E., Jr. (A)
Ozker, T. (M)
Pacholke, F. (SM)
Padva, P. D. (A)
Paisley, M. R. (A)
Palm, H. A., Jr. (A)
Panec, G. A. (M)
Parker, N. W. (A)
Parkinson, J. A. (A)
Parmet, B. S. (SM)
Parry, H. J. (A)
Patrick, A. L. (A)
Paulos, L. B. (A)
Pavela, H. W. (M)
Pendleton, J. R. (A)
Pepperberg, L. (M)
Perlin, H. (A)
Perlman, M. (A)
Peterson, C. D. (A)
Peterson, C. H. (M)
Peth, R. (A)
Petrovick, M. L. (A)
Petitto, S. D. (A)
Peto, C. (A)
Petzing, E. W. (VA)
Pfaff, E. R. (SM)
Phinney, T. W. (A)
Pickens, D. H. (M)
Pitalis, P. H. (A)
Pocius, J. B. (A)
Podlusky, M. V. (A)
Pollack, I. H. (M)
Pospisil, J. F. (A)
Post, J. W. (A)
Potocki, F. E. (A)
Potter, J. D. (A)
Powell, C. S. (A)
Powell, J. M. (A)
Powell, R. W. (A)
Prince, R. T. (A)
Procter, S. A. (A)
Pryst, T. S. (M)
Quarfoot, H. B. (VA)
Quateman, M. H. (A)
Quinn, B. O. (A)
Rasins, W. L. (A)
Race, R. T. (A)
Radcliffe, A. J., Jr. (A)
Rahmel, H. (SM)
Rahnert, R. G. (A)
Rattray, A. I. (M)
Raucher, W. I. (A)
Read, C. T. (A)
Redfield, S. I. (A)
Reed, W. O. (VA)
Reinhold, W. D. (A)
Rennick, J. L. (SM)
Rett, H. C. (A)
Revor, R. J. (M)
Rice, P. (A)
Richter, F. A. (M)
Riddel, O. A. (VA)
Roach, W. E. (A)
Roberts, E. A. (SM)
Robins, H. M. (A)
Robinson, B. H., Jr. (A)
Rockwood, C. C. (A)
Rodriguez, A. E. (VA)
Rokes, N. W. (A)
Ronning, H. (A)
Roschke, E. M. (A)
Rose, J. K. (VA)
Rosencranz, R. (A)
Rosenman, L. (A)
Ross, E. H. (SM)
Rossetti, A. (A)
Rossi, C. V. (M)
Rotter, A. (A)
Rowe, T. L. (SM)
Rubinfien, D. (M)
Rusnak, M. (A)
Rymas, S. J. (A)
Saffro, V. L. (A)
Saltzberg, T. (A)
Sammons, F. D. (A)
Sanabria, J. M. (A)
Saudinaitis, E. (A)
Savage, L. E. (M)
Schaffner, G. (A)
Scharding, R. M. (A)
Schiffelbein, W. L. (A)
Schlesinger, W. A. (VA)
Schlote, R. H. (A)
Schmidt, L. D. (A)
Schmidt, W. E. (A)
Schnell, F. H. (SM)
Schoeneck, W. H. (A)
Schor, F. W. (SM)
Schover, D. S. (SM)
Schram, P. J. (A)
Schreiner, L. W. (SM)
Schrot, E. H. (A)
Schultz, C. W. (M)
Schulz, E. H. (SM)
Schumacher, H. W. (A)
Schumacher, J. H. (SM)
Schurak, K. M. (A)
Schwartz, B. S. (A)
Schwartz, J. (A)
Schwarzenbach, E. E. (VA)
Sedor, W. J. (A)
Seestedt, H. C. (A)
Segal, A. A. (M)
Seligmann, P. (A)
Seow, L. (A)
Shallcross, G. P. (A)
Shallon, S. C. (A)
Shapin, T., Jr. (A)
Shapira, F. M. (A)
Shapiro, L. (A)
Shapiro, M. B. (A)
Sherman, J. (A)
Shevick, P. (A)
Shonerock, R. C. (M)
Shulman, A. (M)
Shuppert, W. G. (A)
Shure, S. N. (VA)
Siegel, D. T. (M)
Sienkiewicz, S. V. (A)
Simpson, C. E. (A)
Sinclair, D. C. (A)
Sivin, L. (A)
Sjoholm, E. M. (A)
Skrip, E. D. (A)
Sloan, A. C. (A)
Slugodzki, L. K. (VA)
Smith, A. B. (SM)
Smith, C. H., Jr. (A)
Solomon, J. L. (SM)
Soma, R. (A)
Soria, R. M. (SM)
Spano, A. (A)
Sprayberry, F. L. (VA)
Stadler, R. (A)
Stahl, J. E., Jr. (A)
Stan, J. (A)
Starzec, F. (A)
Stauverman, R. J. (A)
Steele, A. J. (A)
Steen, W. J. (M)
Steinberg, E. E. (A)
Steinberg, P. S. (A)
Steinman, R. E. (A)
Stemm, R. E. (M)
Stene, W. M. (A)
Stenerson, C. K. (A)
Stettler, C. O. (A)
Stone, C. H. (SM)
Stone, R. S. (A)
Stonevic, V. R. (A)
Stout, E. R. (A)
Sugimoto, J. (A)
Surowiec, D. S. (A)
Suson, L. (A)
Sussman, M. (A)
Swain, J. E., Jr. (A)
Swan, L. L. (A)
Swanson, C. (M)
Swanson, W. G. (A)
Swinyard, W. O. (F)
Switzenberg, E. A. F. (M)
Szegho, C. S. (F)
Takahashi, K. (A)
Tanana, E. J. (A)
Tenenberg, L. (A)
Terleckyl, J. (A)
Teslik, J. A. (A)
Thompson, J. E. (A)
Thompson, O. I. (M)
Timmings, G. H. (SM)
Tlapa, J. A. (M)
Toback, P. L. (A)
Todd, S. R. (SM)
Tornheim, H. (A)
Torode, S. W. (A)
Toy, T. G. (A)
Trimarco, F. J. (A)
Trittenbach, J. M. (A)
Turner, J., Jr. (VA)
Tutle, E. G. (A)
Unger, E. E. (M)
Uyeda, M. M. (A)
Vale, S. D. (A)
Vance, W. H., Jr. (M)
Vanderwerf, J. L. (A)
Varone, R. A. (SM)
Verbanec, W. R. (A)
Vernon, R. R. (A)
Vogt, A. R. (A)
Wachowski, H. M. (M)
Wajda, J. P. (A)
Wakabayashi, G. J. (A)
Walding, E. C. (A)
Waller, E. E. (A)
Wallace, H. S. (A)
Wallin, G. (A)
Walling, G. P. (A)

Walovich, J. J. (M)
Warnke, G. F. (M)
Waterman, H. C. (A)
Watstein, J. I. (M)
Wazlo, C. J. (A)
Webb, E. M. (A)
Weber, J. P., Jr. (M)
Weber, L. J. (SM)
Weber, R. I. (VA)
Webster, S. K. (M)
Wein, F. (A)
Weir, A. G. (A)
Weirich, E. M. (A)
Weisenburger, F. M. (A)
Welcome, W. W. (A)
Wells, R. E. (A)
Weninger, F. L. (M)
West, R. E. (A)
Westwick, J. (A)
Wheeler, G. D. (M)
White, J. F., Jr. (A)
Whitman, M. R. (A)
Whitney, S. D. (A)
Wickline, B. D. (M)
Wickstrom, S. T. (M)
Wiencek, Z. (M)
Wike, E. A. (A)
Wilby, E. W. (M)
Wildman, A. J. (A)
Williams, C. E. (A)
Wingert, R. R. (A)
Wischnia, H. F. (A)
Wise, G. H. (M)
Wisner, C. V., Jr. (A)
Wisnowski, W. C. (A)
Wolf, M. (A)
Wolff, J. R. (A)
Wolken, I. I. (A)
Wood, C. E. (A)
Wood, P. E. (A)
Woodland, J. M. (A)
Woodman, A. J. (A)
Woodruff, A. E. (VA)
Woods, A. A. (VA)
Woolsey, R. J. (M)
Wszolek, W. (A)
Yeslin, A. (A)
Zelinski, F. P. (A)
Zeller, H. R. (A)
Zilis, G. S. (A)
Zimmerman, A. A. (A)
Zupansky, M. (A)
Zusman, D. (A)

Chicago Heights
Brown, W. (A)

Cicero
Biba, R. J. (A)
Davis, C. J. (A)
Hajek, A. F. (A)
Jucius, S. W. (A)
Rous, W. H. (A)
Siad, G. F. (A)
Whiting, R. F. (A)

Clarendon Hills
Hessler, O. G. (SM)
Jurnecka, J. E. (A)
Marks, M. (SM)
Silberg, W. F. (A)

Collinsville
Sobotka, H. J. (A)

Congress Park
Ives, G. M., Jr. (SM)

Crystal Lake
Friend, H. H. (SM)
Hawkins, B. C. (A)
Smith, G. B. (A)

Decatur
Cupp, E. W. (A)
Hines, H. H. (A)

Deerfield
Carr, D. G. (A)
Clough, K. (VA)
Phillips, W. E. (VA)

Des Plaines
Bernin, V. M. (A)
Brooks, W. L. (M)
Bushman, S. F. (M)
Cortright, R. D. (M)
DeBusman, D. J. (A)
Doering, J. H., Jr. (A)
Fountain, B. C., Jr. (A)
Goldstein, R. (A)
Henrich, C. A. (A)
Hills, E. G. (A)
Himebrook, F. C. (A)
Koenig, G. (A)
Langstaff, R. H. (M)
Lauffenburger, H. A. (A)
Marco, P. (SM)
McIlvaine, D. K. (A)
Medal, R. J. (M)
Remley, H. L. (M)
Selez, L. C. (A)
Smith, P. A. (A)
Sundt, E. V. (SM)
Taylor, E. H. (M)
Utter, R. A. (A)

Downers Grove
Bateman, L. A. (A)
Brookshier, W. K. (A)
Courchene, H. B. (SM)
Eddy, W. L. (A)
Gerhard, W. J. (A)
Harder, R. B. (VA)
Johnson, A. R. (A)
Peckhart, M. A. (A)
Prokes, P. H. (M)
Wood, R. E. (SM)

Dundee
Boswau, H. P. (SM)

Dwight
Seabert, F. (A)

East St. Louis
Kenney, C. L. (A)
Wise, H. G. (M)

Edwardsville
Viere, A. J. (A)

Effingham
Delong, W. A. (A)
Isear, J. A., Jr. (A)

Elgin
Irelan, H. F. (A)
Kadow, A. C. (A)
Lang, G. W. (VA)
Soper, G. T. (A)

Elmhurst
Aberer, J. C. (A)
Arnold, G. G. (A)
Beier, M. G. (M)
Blum, G. E. (A)
Byrne, J. F. (F)
Chelgren, A. E. (A)
Davis, J. (SM)
DeShong, J. A., Jr. (SM)
Disney, V. H. (SM)
Foot, N. J. (A)
Grimaila, A. G. (A)
Haines, D. G. (SM)
Hissong, A. L. (M)
Jacker, E. W. (SM)
Kasmar, R. A. (M)
Kearney, L. E. (A)
Lindsay, W. R. (M)
Madland, G. R. (A)
Mittman, E. E. (A)
Moore, G. F. D. (A)
Ramler, W. J. (A)
Ronzheimer, S. P. (M)
Russell, W. W. (M)
Schultz, C. J. (A)
Seavey, R. W. (A)
Steinhoff, I. J. (A)
Troxel, R. E. (A)
Winemiller, H. R. (M)

Elmwood Park
D'Orio, A. F. (A)
Githens, T. A. (A)
Laban, J. (M)
Scheffel, A. G. (A)

Evanston
Beam, R. E. (SM)
Bronwell, A. B. (SM)
Brown, A. C. L. (M)
Burroughs, H. A. (SM)
Busch, A. E. (M)
Calvert, J. F. (SM)
Christian, H. S. (A)
Clark, J. T. (SM)
Cook, S. M. (A)
Cotter, W. F. (SM)
Cozzens, W. B. (A)
Crossley, A. (SM)
Davis, H. G., Jr. (A)
Deal, H. B. (SM)
Dere, G. B. (A)
Fisher, F. E. (A)
Hammond, C. R. (A)
Hopkin, A. M. (A)
Horwitz, S. J. (M)
Huxtable, C. K. (SM)
Lawton, B. E. (M)
Lindholm, C. R. (A)
Lyon, J. A. M. (SM)
Maltby, A. J. (A)
Mathews, K. C. (M)
Miles, C. L. (A)
Nitchals, J. L. (A)
Nordby, R. M. (A)
Orner, R. J. (M)
Osborn, R. L. (A)
Peck, E. R. (A)
Prell, G. A. (A)
Reichenbach, R. K. (A)
Rollefson, K. E. (SM)
Saberson, C. J. (A)
Smythe, E. H. (SM)
Spiegel, L. (M)
Tempka, J. A. (A)
Toth, W. S. (M)
Van Ness, J. E. (A)
Weltin, O. K. (SM)
Wendt, R. H. (VA)
Wihtol, W. (A)
Williams, J. T. (A)
Wing, A. H., Jr. (SM)
Ziegler, G. E. (SM)

Evergreen Park
Hirsch, A. (A)
Kostyal, S. P. (A)

Fairbury
Eilers, C. G. (A)

Flossmoor
Caywood, T. E. (M)

Forest Park
Willyard, C. H. (A)
Wood, R. D. (A)

Franklin Park
Brewster, F. C. (SM)
Bridges, J. E. (A)
Brumbach, J. F. (M)
Reges, A. (A)
Stroh, W. J. (A)

Freeport
Dehmlow, L. L. (A)
Nestlerode, B. W. (A)
O'Connell, G. (VA)

Gary
Ireland, R. P. (M)

Geneva
Brandt, I. L. (A)
Ewald, E. R. (A)
Junkins, A. H. (M)
Soderquist, R. K. (A)

Glencoe
Brown, J. E. (F)
Carlson, G. R. (A)
Perry, J., Jr. (A)
Kurland, J. J. (A)
Pollen, L. K. (A)
Spiegel, G. W. (M)

Glen Ellyn
Christensen, A. (M)
Cisne, L. E. (A)
Dymond, C. (VA)
Hupert, J. J. (SM)
Kidd, W. E. (SM)
Knowles, H. S. (F)
Lincicome, J. R. (A)
Tingley, E. M., Jr. (A)
Wolff, K. A. (A)

Glenview
Bell, J. F. (A)
Dunn, W. L. (SM)
English, W. C. (M)
Ferguson, J. C., Jr. (M)
Freeman, W. H. (M)
Goss, C. G. (A)
How, F. B. (A)
Jorgensen, C. M. (SM)
Lewis, G. E. (A)
Pivan, D. B. (M)
Stiles, J. E. (M)
Stubner, J. W. (A)

Granite City
Kozma, E. Z. (A)
Rasche, D. O. (A)
Tatosian, V. (A)

Grays Lake
Olson, C. F. (A)

Great Lakes
Bishop, R. I. (M)
Faulks, H. R. (A)
Kuranko, C. G. (A)
Ress, J. (A)
Roeschlein, E. R. (A)
Shoemaker, W. F. (A)
Smith, F. A. (A)

Hanna City
Meyer, J. C. (A)

Harvey
Boyers, J. S. (SM)
Karlson, A. T. (M)

Highland
Wood, H. C. (A)

Highland Park
Arnolt, A. K. (A)
Cherry, W. L., Jr. (A)
Darlington, H. T., Jr. (A)
Durkee, C. E. (M)
Firestone, W. L. (SM)
Glasel, W. B. (A)
Hudgins, W. D. (SM)
Miller, E. S. (M)
Schwalm, W. A. (SM)
Tinkham, R. J. (M)

Hillside
Eidem, R. H. (A)
Sedik, J. J. (A)

Hinsdale
Conn, R. A. (A)
Doyle, E. J. (SM)
Dumanowski, R. J. (A)
Hanson, A. N. (A)

Hollywood
Poll, V. M. (A)
Zenner, R. E. (SM)

Homewood
Berry, R. F. (A)
Crotty, R. E., Jr. (A)
Hall, H. H. (A)
Powell, C. L. (A)

Ingleside
Eick, M. K. (A)
Reese, K. E. (M)

Itasca
Florman, L. W. (M)

Joliet
Kramer, R. F. (M)
Weatherford, H. L. (A)

Jonesboro
Kinder, H. R. (A)

Kansas
Lacy, L. Y. (SM)

Kenilworth
Howell, E. R., Jr. (A)

La Grange
Brodie, G. H. (M)
French, J. C. (A)
Hagey, W. C. (SM)
Kikta, J. M. (A)
Knouf, R. J. (SM)
Kongable, L. S. (A)
Medill, J. W. (M)
Read, R. A., Jr. (A)
Richie, S. M. (SM)
Sander, W. E. (A)
Sayles, H. L. (A)
Snelling, E. A. (M)
Wakefield, S. J. (A)

La Grange Park
Hansen, C. A. (M)
Wehrle, R. (A)
Weill, A. E. (A)

Lake Forest
Barrett, A. M., Jr. (A)
Cohn, G. I. (SM)
Heffner, R. W. (A)

Lake Zurich
Barter, L. D. (A)

Lemont
Brar, S. S. (A)
Goertz, R. C. (A)
Purinton, R. M. (M)
Schaefer, J. H. (A)

Libertyville
Bottorff, P. A. (VA)
Bruna, R. F. (A)
Henderson, M. C. (A)
Martin, W. S. (M)
Perkins, H. T. (A)

Lincoln
Deal, J. H. (A)
Knochel, R. F. (M)

Lincolnwood
Beusman, R. M. (SM)
Moskow, H. J. (M)

Litchfield
Ehret, J. R. (A)

Lockport
Carter, O. M. (VA)
Moffatt, V. J. (A)

Lombard
Baroch, G. F. (A)
Bartha, S. J. (A)
Berry, R. E. (A)
Clark, B. H. (A)
Dunbar, E. A. (A)
Dyer, J. H. (M)
Finke, W. W. (A)
Fyler, G. W. (SM)
Haggstrom, R. W. (A)
Hotchkiss, C. S. (M)
Jackson, W. C. (SM)
McCleary, H. J. (SM)
Patchell, J. T. (A)
Pomon, J. D. (A)
Puhalski, D. (A)
Tschannen, R. F. (SM)
Witt, C. E. (M)

Lyons
Albert, A. A. (A)

Macomb
Wilcox, S. R. (A)

Marengo
Arnold, R. M. (VA)

Marion
Kenyon, F. R. (VA)
McGee, K. (M)

Marissa
Church, C. J. (M)

Matteson
Miller, G. E. (A)

Maywood
Del Camp, S. M. (A)
Forst, P. P., Jr. (A)
Komm, P. M. (VA)
Mages, L. J. (A)
Richards, H. F. (A)
Schlesinger, K. (SM)
Tahl, J. E. (A)

McHenry
Butler, J. J. (A)
Pakan, J. J. (M)

Melrose Park
Fetzner, R. W. (A)
Hulla, E. L. (M)
Jaster, D. R. (A)
Nowlin, D. K. (A)
Zimmerman, J. (A)

Mendota
Sprunger, R. W. (A)

Mokena
McCain, G. (A)

Monmouth
Ekblaw, W. E., Jr. (A)

Morrison
Van Osdol, R. L. (VA)

Morton Grove
Trowbridge, F. (A)

Mt. Prospect
Bierwirth, R. A. (M)
Buterbaugh, J. N. (A)

Mount Vernon
Burlingame, C. W. (A)

Mundelein
Chudd, R. G. (A)

Northbrook
Hoffman, R. Y., Jr. (M)
Sherman, J. M. (A)

North Chicago
Jefferson, J. E. (A)
Nevin, M. E. (A)

Northfield
Green, L. F. (A)
Lang, J. A. (A)

Northlake
Cawthon, E. F. (A)
Rathbun, E. R., Jr. (A)

North Lake City
Dolhar, J. L. (A)
Romano, S. S. (A)

North Riverside
Tofani, H. D. (A)

Oak Lawn
Blevins, E. L. (A)
Hultberg, R. M. (A)
Sukup, J. P. (A)
Zoubek, C. M. (M)

Oak Park
Anderson, C. M. (A)
Armstrong, M. M. (A)
Bauer, B. B. (F)
Beltz, R. E. (A)
Boekelheide, A. W. (A)
Bryan, R. H. (VA)
Cameron, S. H. (A)
Cotsworth, A., III (A)
Danz, E. J. (A)
Dore, A. J. (A)
Drobish, R. W. (A)
Duffy, E. J. (M)
Everitt, B. W. (A)

Fitch, W. M., Jr. (M)
Foley, R. R. (A)
Goebel, E. S. (M)
Graziano, V. (A)
Hartley, R. L. (A)
Kroger, M. G. (A)
Laube, W. C., Jr. (A)
Le Baron, T. (A)
Leiner, F. C. (A)
Lind, H. V. (A)
Linell, C. S. (A)
Marsh, R. E. (A)
Marsh, W. F. (A)
May, H. E. (SM)
Mehaffey, W. R. (SM)
Murphy, O. R. (A)
O'Sullivan, W. T. (A)
Petersen, E. H. (M)
Peterson, R. M. (M)
Pye, H. C. (VA)
Sinninger, D. V. (SM)
Smith, A. P. (A)
Staunton, J. J. J. (A)
Van Scoyoc, J. N. (SM)
Walker, L. G. (SM)
Welker, J. J. (A)
Yoder, R. S. (SM)
Zender, R. G. (SM)

O'Fallon
Chamberlain, P. E. (M)
Eike, O. M. (M)
Longley, J. K. (A)

Olney
Miller, A. M. (A)

Orient
Sakonyi, F. W. (A)

Orland Park
Yang, R. F. H. (A)

Oswego
Wallace, G. A., Jr. (A)

Ottawa
Ftacek, J. J. (A)
Meyer, C. H. (A)

Palatine
Currey, C. H. (A)
Leger, R. M. (A)
Powers, J. S. (M)
Ryan, R. J. (A)
Thompson, R. T. (A)
Warner, T. R. (A)

Palos Heights
Witzel, A. B. (A)
Scheldorf, M. W. (SM)

Palos Park
Cairnes, W. E. (SM)

Park Forest
Connor, D. W. (A)
Ducker, J. D. (A)
Gartner, A. J. (A)
King, H. E. (A)
Kubilius, A. A. (M)
Lynch, R. G. (A)
MacDonald, J. R. (A)
Mirkin, M. (A)

Park Ridge
Crow, R. P. (M)
De Cola, R. (SM)
Edwards, F. W. (M)
Erwood, J. (SM)
Fischer, F. C., Jr. (A)
Fredine, E. L. (M)
Gannaway, R. (SM)
Hansen, T. A. (SM)
Hooper, P. B. (A)
Knauss, R. G. (A)
Mead, L. R. (SM)
Mroz, M. (SM)
Mueller, A. J. (A)
Ralph, J. T. (M)
Silver, J. F. (VA)
Smith, P. S. (SM)
Thrun, A. G. (VA)
Watson, P. C. (A)
Whitlock, M. C. (A)

Paxton
Foote, G. A. (A)

Pecatonica
Van Antwerp, M. C. (VA)

Peoria
Royal, D. E. (A)

Plainfield
Hartong, H. H. (A)

Prairie View
Barr, L. V. (A)

Prospect Heights
Blinoff, W., Jr. (A)
Carmody, T. P. (A)
Drechsel, R. E. (A)
Mitchell, W. T. (A)

Quincy
Damm, F. (A)
Hoyt, W. A. (A)
Oliver, G. W. (A)
Parker, B. E. (SM)
Stratman, H. G. (A)
Weibler, C. T. (SM)

Rantoul
Brown, H. W. (VA)

Reevesville
Choate, R. L. (A)

River Forest
Cusack, J. A. (A)
D'Orio, P. A. (SM)
Gustafson, G. E. (F)
Maciszewski, A. H. (SM)
Orwin, R. J. (M)
Schultz, A. A. (M)

River Grove
Augustine, A. F. (A)
Bousky, S. (SM)
Iversen, R. L. (M)
Tarantur, S. (A)

Riverside
Bigelow, J. F. (SM)
Cihak, W. E. (A)
De Both, R. F. (A)
Farley, J. E. (A)
Fligel, W. P. (A)
Kean, W. F. (SM)
Modry, J. F. (A)
Novy, J. F. (SM)
Wesselman, E. (VA)

Rochester
Kessler, W. D. (A)

Rockford
Bullen, C. V. (M)
Campbell, R. H. (A)
Hand, C. A. (VA)
Kyburz, U. L. (A)
Morreal, J. A. (A)
Steiner, J. E. (A)
Tveit, T. J. (A)
Ward, L. A. (A)

Rock Island
Cone, J. H. (M)
Lynch, L. J. (A)
Pierce, F. W. (SM)
Roberts, J. O. (A)
Sinnett, R. J. (M)

Sailor Springs
Shore, J. D. (A)

Saint Anne
Bernier, V. A. (A)

Saint Charles
Nelson, D. A. (A)
Winston, R. H. (SM)

Sandwich
Newell, C. J. (A)

Scott AFB
Goodman, S. N. (A)
Nielsen, A. H. (A)
Vigen, M. E. (A)

Skokie
Bixler, O. C. (SM)
Carter, R. W. (A)
De Janovich, C. R. (A)
Fruth, H. F. (SM)
Galitz, R. J. (A)
Kelley, W. A. (A)
McDonald, D. C. (SM)
O'Callaghan, J. J. (SM)
Pawlowski, F. L. (A)
Petersen, C. C. (M)
Pierce, C. B. (M)
Schafer, W. W. (A)
Schwennesen, D. (A)
Stanonis, A. F. (A)
Weiland, R. L. (A)
Weisz, W. J. (A)
Zarky, B. (M)

South Chicago
Kahn, L. (VA)

Sparta
Richard, C. W. (SM)

Springfield
Clement, I. C. (A)
Leach, E. A. (SM)
McCormick, J. E. (A)
Oram, D. K. (VA)

Streator
Gotch, J. X. (A)
Martin, H. R. (A)

Table Grove
Harlan, J. R. (A)

Taylorville
De Vore, G. D. (A)
Trapp, R. R. (A)

Trenton
Eisenmayer, A. L. (A)
Waigand, L. E. (A)

Urbana
Anner, G. E. (A)
Barkson, J. A. (SM)
Bauman, P. A. (A)
Bertin, E. P. (M)
Brearley, H. C., Jr. (A)
Chin, T. (A)
Crothers, M. H. (M)
Dahms, L. B. (A)
Dougal, A. A. (A)
Du Hamel, R. H. (A)
Dyson, J. D. (A)
Emery, W. L. (SM)
Everitt, W. L. (F)
Farnsworth, G. W. (A)
Fett, G. H. (SM)
Ghose, R. N. (M)
Gilden, M. (A)
Gooch, J. D. (A)
Hansen, R. C. (A)
Hayden, E. C. (A)
Holman, W. S. (A)
Holshouser, D. F. (M)
Hudson, P. K. (M)
Inoue, N. S. (A)
Jensen, R. S. (A)
Johnk, C. T. (M)
Johnston, R. H. (M)
Jordan, E. C. (SM)
Kaufman, I. (A)
Kirkwood, B. D. (A)
Knoebel, H. W. (A)
Kudlich, R. A. (A)
Martin, C. B. (A)
Mast, P. E. (A)
McVay, M. S. (SM)
Murrell, T. A. (A)
Reed, M. B. (SM)
Rheams, C. J. B. (M)
Robertson, J. E. (A)
Ryder, J. D. (F)
Sandquist, J. W. (A)
Schwarzlose, P. F. (M)
Silverman, B. (A)
Smith, R. S. (A)
Trogdon, R. L. (A)
Tykociner, J. T. (SM)
Wainwright, R. M. (SM)
Wax, N. (M)
Webb, H. D. (M)
Welkowitz, W. (A)
Wier, J. M. (A)

Villa Park
Beck, V. R. (SM)
Fernandez, D. T. (VA)
Gorbunoff, A. (VA)
Kimmel, L. D. (A)
Kirby, T. H. (A)
Mathews, C. A., Jr. (A)
Norberg, L. R. (M)
Sparf, W. H. (A)
Voss, H. J. (A)
Zaruba, E. J. (SM)

Washington
Ebel, A. J. (SM)
Planck, R. M. (VA)

Watseka
Cox, L. H. (M)

Waukegan
Anderson, C. A. (A)
Jensen, H. R. (A)
Krasovec, A. C. (A)

Westchester
Beckwith, J. R. (SM)
Frankart, W. F. (M)

West Chicago
Hummel, H. J. (A)

Western Springs
Bracken, J. F. (A)
Cottrell, B. P. (A)
Dondanville, R. V. (SM)
Duncan, D. C. (VA)
Hungerford, N. C. (A)
Kallus, P. (A)
Levy, G. F. (SM)
Weeks, R. R. (M)
Whitney, M. E. (SM)

Wheaton
Bruce, L. G. (A)
Dickinson, R. V. C. (A)
Frank, C. W. (M)
Gaskins, S. M. (A)
Hayworth, D. F. (SM)
Klem, R. F. (M)
Kunde, W. W., Jr. (A)
Matthews, G. D. (M)
Mayberry, L. A. (SM)
Quist, W. G. (A)
Sengel, P. A. (VA)
Squires, E. G. (M)
Stanley, E. R. (A)
Upton, E. C., Jr. (A)
Ward, A. G. (A)

Wheeling
Naber, J. S. (M)

Wilmette
Bercaw, O. M., Jr. (A)
Crossley, R. C. (A)
Gorder, L. O. (A)
Hale, E. H. (A)
Schnell, W. J. (SM)
Sorsen, S. L. (A)
Thomas, L. R. (M)
Waterfall, F. E. (SM)

Winnetka
Hart, J. W. (A)
Heuer, C. H. (M)
Jarvis, G. R. (A)
Jarvis, K. W. (F)
Morrison, R. T. (M)

Winfield
Stillman, M. C. (M)

Wood Dale
Bierach, K. F., Jr. (M)
Noskowicz, T. S. (A)
Washburn, C. A. (A)

Woodstock
Thompson, A. C. (M)

Zion
Craig, J. D. (A)

INDIANA

Advance
Waters, F. J. (A)

Anderson
Gardner, R. A. (A)
Hart, J. M. (A)
Heller, R. E. (A)
Holt, D. L. (M)
Phlegar, C. L., Jr. (M)
Raymond, H. A. (A)
Reynolds, B. G. (A)

Angola
James, F. J. (A)
Kline, A. J. (A)
Milkie, R. W. (A)
Rugg, D. A. (A)
Southern, C. D. (A)
Westenhaver, M. E. (A)

Arcadia
Nightenhelser, K. W. (A)

Auburn
Capen, G. A. (A)

Aurora
Achatz, R. V. (VA)

Bedford
Rothrock, H. B. (VA)

Bloomington
Cameron, E. G. (M)
Cummings, M. M. (M)
Gelzer, J. R. (M)
Grimmett, L. J. (A)
Hahn, J. H. (A)
Krepps, J. E., Jr. (A)
Siddons, G. F. (A)
Sonntag, W. A. (M)
Tarzian, S. (SM)
Trumpy, J. W. (A)

Bluffton
Wolfgang, L. G. (A)

Bridgeport
Abel, F. W. (A)
Flint, R. B. (A)

Brookston
Todd, A. C. (M)

Cedar Grove
Verkley, B. M. (A)

Chesterfield
Hallenbeck, S. M. (A)

Clayton
Winton, H. J. (A)

Columbia City
Long, J. A. (A)

Columbus
Ashby, A. T. (A)
Harden, R. D. (A)
Hurlbut, P. R. (A)
McGregor, R. B. (M)
Silva, A. D., Jr. (A)
Stambaugh, D. W. (A)
Warren, R. (M)

Connersville
Gray, F. (A)
Sasser, T. (A)
Wulliman, J. C. (A)

Crawfordsville
Bechtel, B. (A)

Crown Point
Franz, B. E. (A)

Dayton
Yost, K. E. (A)

East Chicago
Olivotto, A. J. (A)

East Columbus
Hertzog, W. K. (A)

Elkhart
Best, J. G. (A)
Budd, W. H. (M)
Harrell, J. B. (A)
Houck, H., Jr. (A)
Hudock, E. (A)
Kent, E. L. (SM)
Krauss, S. L. (A)
Lindahl, H. C. (A)
McDonald, L. J. (A)
Moore, C. C. (M)
Smith, R. A. (A)
Turner, B. S. (M)
Vaksvik, A. J. (A)

Evansville
Baldridge, B. H. (M)
Barrick, W. E. (A)
Brannon, D. L. (A)
Decker, R. H. (A)
Driggers, B. H. (A)
Fischer, N. C. (A)
Flackbert, W. D. (A)
Gehres, F. A. (SM)
Gregory, E. C. (A)
Hatfield, P. E. (A)
Hennel, J. R. (A)
Joest, R. L. (A)
Kappes, A. V. (A)
Kees, H. (SM)
Kellough, S. H. (A)
Margulies, I. (A)
McGhee, G. L. (A)
Miegl, A. K. (A)
Quirk, J. A. (A)
Raburn, L. E. (SM)
Schoene, R. L. (SM)
Schoeny, E. P. (A)
Schwartz, B. A. (A)
Spencer, J. M., Jr. (A)
Stoltz, G. F. (A)
Thompson, R. D. (A)
Williams, W. A. (A)
Willis, H. W. (M)

Floyd Knobs
Marven, E. L. (M)

Ft. Wayne
Ackworth, D. L. (A)
Adams, G. E. (A)
Armstrong, R. H. (A)
Barrett, A. J. (A)
Bartel, R. C. (A)
Beach, H. W. (A)
Beauchemin, A. (M)
Bickel, S. O. (A)
Boucheron, P. (SM)
Brent, C. H., Jr. (A)
Broseghini, B. L. (A)
Busse, C. A. (A)
Carpenter, D. L. (A)
Cutler, G. W. (A)
Cawein, M. (SM)
Clements, L. E. (A)
Collier, R. E. (M)
Conway, J. F., Jr. (SM)
Cronkwright, R. E. (A)
Davis, D. W. (A)
Dixon, D. E. (A)
Dreisbach, R. H. (VA)
Eastwood, W. J. (A)
Eiden, G. E. (A)
Farnsworth, P. T. (F)
Fisher, H. F. (VA)
Foley, J. S. (A)
Fong, S. G. (M)
Freimann, F. (A)

Friedman, S. (A)
Fromm, K. N. (M)
Giffin, G. S. (A)
Goss, C. B. (A)
Gough, L. E. (A)
Grosvenor, H. D. (A)
Guichard, R. S. (A)
Guthrie, D. (A)
Haack, R. W. (A)
Hardwick, C. L. (A)
Harris, A. S. (A)
Harris, S. J. (SM)
Hart, J. M. (A)
Hawkins, W. G. (M)
Henderson, J. A. (A)
Hislop, A. Q. (A)
Hoekstra, C. E. (SM)
Houser, N. W. (A)
Huwe, R. A. (A)
Iffland, H. L. (A)
Iffland, J. J. (SM)
James, D. C. (M)
Johnson, L. (A)
Kampf, H. A. (M)
Kelman, F. J. (A)
Keithley, R. D. (A)
Kiltie, O. (M)
Kleist, R. A. (A)
Koenig, E. W. (A)
Lambert, V. L. (A)
Larson, C. C. (SM)
Lawburgh, R. H. (A)
Lawrence, A. H. (A)
Leahy, F. N. (A)
Lima, E. J. T. (A)
Lovegren, P. B. (A)
Martin, D. W. (SM)
Mayle, A. T., Jr. (SM)
Mayle, L. F. (SM)
McDirmit, E. L. (A)
McGregor, G. L. (A)
Meyer, R. J. (A)
Neill, W. J. (A)
Nelson, D. F. (A)
Nelson, G. L. (A)
Newman, J. H. (M)
Norris, B. J. (A)
Norton, F. R. (SM)
O'Connor, R. A. (A)
Ozzy, A. J. (M)
Ozaki, G. K. (A)
Pantazin, T. (A)
Paxton, R. W. (A)
Price, A. B. (A)
Rankin, J. A. (SM)
Rasley, D. R. (SM)
Ratts, B. H. (M)
Rhodes, R. D. (A)
Richards, C. A. (A)
Rodgers, P. D. (A)
Root, C. S. (SM)
Rudnick, P. (SM)
Russell, R. S. (A)
Sabo, J. (A)
Salinger, H. W. G. (F)
Samuels, J. C. (A)
Saxe, R. E. (A)
Scott, H. B. (A)
Sessler, J. G. (A)
Sharp, J. W. (SM)
Shaw, L. E. (A)
Silvey, J. O. (A)
Slater, T. L. (M)
Slick, E. P. (M)
Sloan, W. R. (A)
Soja, M. (M)
Spradlin, K. M. (A)
Stanley, C. V. (A)
Stoakes, W. L. (A)
Swartwout, R. E. (A)
Valentine, F. C. (A)
Wexler, M. P. (A)
White, E. A. (A)
Whitney, J. A. (A)
Whittington, R. C. (A)
Worsham, R. E. (A)
Woodward, G. F. (A)
Wright, A. (M)
Yoder, L. E. (M)
Zieger, C. H. (A)
Zwayer, B. E. (A)

Gary
Buccicone, V. S. (M)
Hesky, E. A. (A)
Jones, W. V. (A)
Moran, L. L. (A)
Shirk, K. C. (VA)
Thanos, H. (A)
Vedo, J. B. (A)

Goshen
Brown, R. (A)
Corporon, R. P. (A)
Webber, L. E. (A)

Hammond
Boyan, M. J. (A)
Kaprocki, F. E. (A)
Pozdol, A. J. (A)
Roedel, J. (A)
Whiteaell, L. G. (A)

Hoagland
Gabrielsen, F. T. (A)

Hudson
Tressler, J. B. (A)

Indianapolis
Alden, E. E. (M)
Anderson, S. R. (A)
Arvin, M. J. (A)
Askren, P. S. (A)
Astholz, P. T. (M)
Aust, R. J. (M)
Barnes, R. E. (A)
Batts, R. L. (SM)
Berntsen, W. H. (A)
Boyle, B. H. (M)
Braunagel, M. V. (A)
Breitwieser, C. J. (VA)
Brown, H. J. (A)
Bruning, A. M. (A)
Carson, H. E. (A)
Clinger, E. C. (A)
Coatney, A. E. (M)
Cox, J. A. (A)
Crawford, A. L. (A)
DeVoe, L. M. (A)
Drilling, N. G. (A)
Dunn, J. V. (A)
Easterday, R. B. (A)
Erwood, R. G. (M)
Evans, A. G. (A)
Farley, W. W., III (SM)
Farrell, C. (A)
Fathauer, G. H. (SM)
Fischer, J. W. (A)
French, A. B. (A)
Garrigus, W. E. (A)
Gribben, J. C., Jr. (A)
Gross, F. J. (A)
Harden, J. G. (SM)
Harris, H. F. (A)
Harrison, R. E. (A)
Holland, H. A. (A)
Holland, H. S. (A)
Hromada, J. C. (SM)
Hurley, H. C. (A)
Jackson, W. E. (F)
Jones, M. N. (A)
Judkins, J. R. (A)
Kerney, R. W. (A)
Kittrell, R. L. (A)
Koch, R. C. (A)
Kocher, M. E. (A)
Kuehr, R. C. (A)
Macnabb, V. C. (A)
Mallory, H. R. (A)
Mann, R. W. (A)
Marasco, F. A. (M)
Marshall, L. C. (SM)
Maxwell, J. W. (SM)
McCormick, R. E. (M)
McGillem, C. D. (M)
McLawler, M. S. (A)
McWhortor, W. F. (A)
Meadows, F. D. (SM)
Miller, F. (A)
Miller, W. E. (A)
Minton, R. W. (A)
Montgomery, J. L. (A)
Morton, K. L. (A)
Nelson, J. B. (A)
Norsell, H. C. (A)
Peoples, J. F. (M)
Ray, J. (A)
Reager, A. M. (VA)
Relskind, H. I. (SM)
Reynolds, J. H. (M)
Rosser, T. N. (SM)
Schafer, G. E. (A)
Schager, R. J. (A)
Schultz, A. J. (SM)
Schulz, E. A. (A)
Selig, B. L. (A)
Shelton, P. J. (A)
Stuart, D. M. (SM)
Taggart, S. E. (M)
Trout, C. C. (M)
Tudor, E. C. (M)
Tulauskas, L. (SM)
Vizanko, D. J. (A)
Watson, J. T. (M)
Weaver, R. J. (A)
Weige, V. (SM)
Wolff, H. R. (SM)
Young, E. A. (A)

Kokomo
Atkinson, J. R. (A)
Busby, L. A. (A)
Carlson, E. C. (A)
Gaiser, M. W. (VA)
Guyton, J. H. (A)
Holmes, J. S. (A)
Jenkins, R. L. (A)
Laitinen, L. K. (A)
Martin, D. W. (A)
Prewitt, T. A. (A)
Pyle, H. (A)
Rector, C. V. (A)
Rieth, H. F. (A)
Ruff, D. O. (A)
Schwarz, B. A. (SM)
Vogt, K. S. (A)

Lafayette
Bohnstedt, C. E. (A)
Clark, J. R. (SM)
Evans, H. R. (M)
Haxby, R. O. (SM)
Oorthuys, H. J. (M)
Siskind, R. P. (SM)
Truxal, J. G. (A)

Lawrence
Manning, W. L. (SM)

Lawrenceburg
Beehler, J. (A)

Liberty
Bethge, C. E. (A)

Logansport
Harrell, D. H. (M)

Marion
Konrad, R. J. (A)

Michigan City
Wittke, R. F. (A)
Zerber, F. A. (A)

Mishawaka
DeRuyck, A. R. (A)
Ewing, R. D. (M)
Koch, W. J. (A)
Ohlemacher, R. F. (A)
Pilcher, R. M. (A)
Webb, W. L. (SM)
Wood, D. F. (M)
Wright, C. R. (A)

Muncie
Burton, D. A. (A)
Van Arsdol, F. L. (A)

New Albany
Frakes, S. E. (A)
Richards, W. W. (A)

New Haven
Fullerton, R. D. (M)
Hallmark, C. E. (SM)

North Liberty
Adams, A. W. (M)

Notre Dame
Coomes, E. A. (SM)
Ellithorn, H. E. (SM)
Kempf, K. R. (A)
Pilp, A. T. (A)
Ross, A. E. (SM)

Orleans
Friedman, E. (A)

Osceola
Ludwig, A. R. (A)

Ossian
Penn, W. D. (M)

Plymouth
Orlowski, E. (A)

Rensselaer
Boesch, R. (A)

Richmond
Maddox, R. D. (M)
Young, K. W. (A)

Saint Meinrad
Ringeman, O. E. (A)

Sandborn
Begeman, R. H. (A)

Seymour
Beldon, R. R. (A)
Bennett, E. Y., Jr. (A

South Bend
Briggs, R. H. (A)
Durbin, H. M. (A)
Grant, J. H. (A)
Halpin, E. P. (SM)
Harding, R. L. (A)
Jacobs, B. (A)
Knoblock, E. C. (A)
Kunz, W. J., Jr. (SM)
LaSalle, E. (A)
Mauk, M. E. (A)
Modesitt, M. B. (A)
O'Neil, A. R. (A)
Quigley, A. J. (A)
Reynick, D. A. (A)
Smith, A. J., Jr. (A)
Stauder, L. F. (A)
Strauss, J. W. (A)
Sutton, J. R. (A)
Weiler, G. (A)

South Whitley
Harger, W. W. (SM)

Speedway
Setzer, L. E. (A)
Watts, C. B., Jr. (A)

Sullivan
Nash, W. L. (A)

Tell City
Hall, J. M., Jr. (A)

Terre Haute
Moench, H. A. (SM)

Valparaiso
Alinsky, J. W. (A)
Book, E. G. (A)
Bullis, E. E. (A)
Harris, W. C. (A)
Hershman, J. B. (SM)
Long, J. E. (A)
Maynard, C. A. (SM)
Packman, M. E. (VA)
Plamondon, A. D., Jr. (SM)
Shewan, W. (M)

Waldron
Miller, D. C. (A)

Warsaw
Daniel, L. E. (A)

Waynedale
French, I. F. (M)

West Lafayette
Burnett, J. R. (A)
Butt, N. C. (A)
Cage, J. M. (SM)
Cooper, G. R. (A)
DeAndrade, W. C. (M)
Donovan, R. F. (A)
George, R. H. (SM)
Happell, G. E. (A)
Hardesty, G. A. (M)
Hayt, W. H., Jr. (M)
Heim, H. J. (VA)
Hesselberth, W. M. (A)
Partridge, G. R. (A)
Rockwood, C. H. (A)
Ticen, W. E. (A)

Whiting
Oster, W. (A)
Walter, G. W. (A)

Woodburn
Bertsche, G. (A)

Zionsville
Heimburger, W. M. (A)

IOWA

Ames
Cassell, W. L. (SM)
Coover, M. S. (SM)
Evans, W. H. (A)
Gade, D. W. (M)
Griffin, J. E. (A)
Haas, M. L. (M)
Harper, C. E. (A)
Harris, E. B. (A)
Hughes, W. L. (A)
Jeffery, T. H. (A)
Keeney, M. G. (A)
Murphy, G. L. (A)
Prudhom, A. L. (A)
Read, A. A. (A)
Richardson, G. A. (M)
Stewart, R. M., Jr. (M)
Town, G. R. (F)
Tuma, G. (A)
Von Tersch, L. W. (SM)

Bettendorf
Fischer, L. A. (A)
Hutchison, R. P. (A)
Ramsey, R. C. (A)

Boone
Bowes, J. D. (A)
Garretson, D. (A)

Burlington
Allen, J. W. (A)
DeMott, J. (A)
Ertz, C. S. (A)
Hawk, J. M. (A)
Loomis, G. L. (SM)
Miller, R. C. (SM)
Olson, B. A. (A)
Ross, K. B. (VA)
Sechler, A. J., Jr. (M)
Taylor, D. L. (A)

Bussey
Bussey, J. D. (A)

Carroll
Polking, U. H. (A)

Cedar Rapids
Abrams, H. T. (A)
Anderson, A. E. (A)
Anderson, W. G. (A)
Andrade, E. A. (M)
Antrim, G. H. (A)
Arcand, R. T. (A)
Arens, R. P. (A)
Arnold, D. C. (A)
Babillus, J. (SM)
Bellew, R. W. (A)
Bellville, W. H. (A)
Beranek, W. J. (A)
Bettin, R. (A)
Bigger, W. H. (A)
Biggs, J. A. (M)
Blair, R. O. (A)
Branstad, D. H. (A)
Breed, W. M. (A)
Bright, M. D. (A)
Bruene, W. B. (SM)
Buffington, L. R. (A)
Caquelin, M. W. (A)
Carlson, D. V. (A)
Carlson, K. L. (A)
Cassutt, R. J. (A)
Coble, R. B. (A)
Collins, A. A. (SM)
Cox, R. T. (SM)
Craft, L. M. (M)
Craiglow, R. L. (A)
Crawfis, E. D., Jr. (A)
Cribbs, R. D. (A)
Dalton, J. L. (M)
Davenport, K. R. (A)
DeLong, V. R. (A)
Dickens, J. A. (A)
Dill, F. J. (A)
Duff, R. E., Jr. (A)
Dunn, R. S. (A)
Eckess, W. S., Jr. (A)
Elliott, W. S. (A)
Emerson, R. E. (A)
England, L. C. (A)
Findley, L. K. (SM)
Finger, P. R. (A)
Fink, J. G. (M)
Fletcher, K. L. (A)
Follensbee, W. M. (A)
Ford, D. W. (A)
Foster, J. W. (M)
Frey, H. B. (A)
Friedrichs, J. P. (A)
Fritze, E. H. (M)
Gallagher, D. C. (A)
Gates, R. S. (A)
Gerks, I. H. (SM)
Giacoletto, J. P. (A)
Gillett, R. L., Jr. (A)
Goetz, J. L. (A)
Graham, N. L. (A)
Hancock, N. W. (M)
Hargis, R. N. (A)
Hausten, D. R. (A)
Hawley, A. A. (A)
Heath, J. W. (A)
Hedgcock, W. T., Jr. (A)
Henrici, C. R. (SM)
Hileman, D. L. (A)
Hime, N. S. (A)
Hirsch, H. D. (A)
Hixenbaugh, G. P. (M)
Hodgin, D. M. (A)
Hoeft, R. H. (A)
Hollister, R. H. (A)
Holmes, D. W. (A)
Hubbard, M. R. (M)
Hudek, V. R. (M)
Hulce, R. L. (A)
Johnson, F. W. (A)
Johnson, L. E. (A)
Jones, W. B. (A)
Jordan, C. F. (A)
Klehfoth, W. G. (M)
Kopp, R. W. (A)
Lehman, H. W. (A)
Lieske, E. W. (M)
Loop, D. E. (A)
Ludvigson, M. T. (A)
March, G. W. (A)
Mark, J. G. (A)
Martin, E. L. (A)
Martz, F. W. (A)
Mayer, A. F. (A)
McConnell, T. E. (SM)
McCoy, D. O. (SM)
McCreary, R. L. (SM)
McElroy, J. C. (A)
McGraw, R. C. (A)
Miedke, R. C. (A)
Mitchell, A. T. (A)
Mitchell, R. M. (SM)
Morrison, S. M. (A)
Most, N. S. (A)
Nelson, N. P. (A)
Newell, D. E. (A)
Nordstrom, G. J. (M)
Oleson, F. C. (A)
Pappenfus, E. (SM)
Patton, H. W. (A)

Perry, R. A. (A)
Perry, V. G. (A)
Pickering, R. F. (A)
Pierce, R. J. (SM)
Plotkin, L. E. (M)
Pringle, D. L. (A)
Read, E. F. (A)
Rector, J. D. (A)
Rennekamp, E. E. (A)
Rennels, J. R. (A)
Repp, D. E., Jr. (A)
Ringoen, R. M. (M)
Roberts, B. W. (A)
Robson, C. A. (M)
Rowley, R. J. (A)
Sauer, W. F. (A)
Schulte, F. E. (A)
Schuster, H. E. (A)
Schwittek, E. W. (A)
Shanklin, J. P. (M)
Skar, R. C. (A)
Smedley, J. A. (A)
Smith, J. W. (SM)
Spalti, J. K. (A)
Stephens, T. C. (SM)
Stewart, C. (A)
Stimson, R. L. (A)
Stover, H. A. (A)
Thompson, P. (A)
Thornley, E. B. (A)
Tinch, C. S., Jr. (A)
Tollefson, R. D. (A)
Truesdell, R. M. (A)
Van Caster, J. C. (A)
Vander-Hamm, R. L. (A)
Van Tilbury, J. D. (A)
Vaughn, K. E. (M)
Vrbik, J. (A)
Wainwright, L. F. (M)
Ware, L. A. (SM)
Western, R. E. (A)
Westcot, J. L. (A)
Wetzel, G. N. (A)
White, R. C. (A)
Wilson, M. F. (A)
Windus, W. A. (A)
Winter, L. E. (A)
Wirkler, W. H. (M)
Wulfsberg, P. G. (SM)
Wulfsberg, A. H. (SM)

Council Bluffs
Copeland, J. H. (A)
Hansen, B. P. (M)
Moss, T. L. (VA)
Snyder, E. H. (A)

Crawfordsville
Cherryholmes, C. D. (A)

Cresco
Polashek, E. J. (A)

Davenport
Arvidson, P. G. (M)
Karwath, A. A. (A)
Keefe, J. W. (A)
Petersen, V. L. (A)

Des Moines
Amoo, L. R. (A)
Bartlett, F. E. (M)
Bobenhouse, C. J. (M)
Clark, R. V. (A)
Eastman, J. W. (M)
Foster, F. H. (A)
Graves, H. C. (A)
Graves, W. H. (A)
Gusler, F. C. (A)
Loyet, P. A. (SM)
Luther, R. E. (A)
Miller, O. M. (A)
Patterson, J. L. (A)
Price, R. E. (A)
Quentin, C. F. (A)
Rissler, H. D. (VA)
Snyder, R. E. (A)
Sparks, W. J., Jr. (A)
Sperelakis, P. (A)
Stauffer, R. E. (VA)
Tennant, O. A. (M)

Dubuque
Hancock, R. I. (A)

Ft. Dodge
Smith, O. H. (A)

Gilmore City
Seaver, G. E. (M)

Grinnell
Buckabaum, A. M. (A)
Denny, W. B. (A)

Independence
Blank, W. A. (A)

Iowa City
Edberg, R. A. (M)
Essler, W. O. (A)
Fankhauser, J. E. (M)
Hunter, T. A. (SM)
Lonsdale, E. M. (SM)
Malmberg, P. (A)
Menzer, C. H. (SM)

Marion
Brandon, W. S. (A)
Moorhead, P. E. (A)
Rooks, H. B. (A)
Smith, M. S. (SM)
Sterner, E. L. (A)
Strebe, A. C., Jr. (A)

Mechanicsville
Bates, L. D. (A)

Morning Sun
Sheafor, J. D. (A)

Mt. Vernon
Parker, G. W. (M)

Mt. Zion
Campbell, D. B. (A)

Muscatine
Hansen, W. N. (A)

North Liberty
Hartsock, R. D. (A)

Oelwein
Hecht, R. K. (A)
McGinnis, S. E. (A)

Sioux City
Call, G. R. (A)
Smith, A. H. (A)

Unionville
Heckart, H. A. (A)

West Burlington
Faulkner, H. E. (A)

KANSAS

Augusta
Green, J. W. (A)

Bethel
Barnes, O. C. (A)

Boicourt
Witcher, J. F. (A)

Cherryvale
McGinness, C. C. (A)

Colby
Riepl, C. W. (A)
Snider, V. E. (A)
Unruh, S. W. (A)

Council Grove
Wilson, R. R., Jr. (A)

Derby
Swift, H. G. (M)

Detroit
Canfield, E. R. (A)

Dodge City
Patrick, D. J. (A)

Eudora
Joslin, D. E. (A)

Fort Leavenworth
Johnson, R. M. (A)

Gardner
Gault, W. E. (A)
Reed, D. M. (M)

Hutchinson
Manship, J. F. (M)

Independence
Johnson, R. W. (A)

Kansas City
Ayres, R. C. (SM)
Curtis, G. L. (A)
Davis, V. M. (A)
Dunwoodie, D. E. (A)
Fischer, E. (A)
Fisher, G. F. (A)
Gardner, C. L. (A)
Hanson, P. C. (A)
Hope, D. L. (M)
Mathews, V. M., Jr. (A)
McCoy, J. L. (A)
Morrell, P. W. (A)
Pool, M. A. (A)
Rader, D. F. (A)
Rogers, A. L. (A)
Stillson, J. W. (A)
Wade, E. A. (A)
Watt, E. M. (A)
Williams, C. S. (A)
Wilson, D. R. (A)

Larned
Hewson, K. D. (A)
Wallack, C. A. (M)

Lawrence
Ashley, J. R. (A)
Brown, H. B. (M)
Lukenbill, R. S. (A)
Reed, A. C. (A)
Wilson, D. G. (SM)

Lincoln
Sheppard, G. E. (M)

Manhattan
Allen, C. D. (A)
Ax, L. S. (M)
Burns, L. V. (A)
Ford, W. R. (M)
Kloeffler, R. G. (F)
Lavin, H. P. (A)
Wolfe, J. E. (SM)

Marysville
Brega, L. B. (A)
Parker, H. L. (A)

Merriam
Ellis, T. H. (A)

Mission
Battey, H. B. (SM)
Fayman, D. L. (A)
Fellhauer, H. E. (A)
Jones, M. R. (SM)
Louk, G. V. (A)
Omer, C. L. (SM)
Wearth, A. W. (M)
Wolfe, C. L. (A)

Mulvane
Ruppe, K. E. (A)

Olathe
Krout, H. L. (A)

Overland Park
Betros, L. A. (A)
Fetter, R. W. (A)
Files, C. O. (M)
Gay, W. D. (M)
Jaedicke, E. R. (A)
Kroencke, E. A., Jr. (A)
Lane, J. W. (A)
Rode, J. J. (A)
Wagner, F. R. (M)

Pittsburg
Johnston, J. L. (A)

Prairie Village
Babbit, E. B. (A)
Chester, W. G. (M)
Collins, M. F. (M)
Gessert, E. C., Jr. (A)
Hoffman, G. R. (A)
Hoyt, W. S. (M)
Inderwiesen, F. H., Jr. (M)
Jacobson, R. E., Jr. (M)
Johnson, D. E. (A)
Love, B. E. (VA)
Nigg, D. J. (A)
Peterson, R. A. (M)
Robinett, L. L., Jr. (A)
Smith, L. R. (A)
Spannuth, W. H. (M)

Russell
Willman, R. B. (A)

Salina
Clarke, R. L. (A)

Shawnee
Goll, W. E. (A)

Topeka
Brown, E. B. (A)
Bryan, W. C. (A)
Costelow, J. A. (A)
Dickensheets, L. (A)
Francis, M. C. (A)
Grantham, R. B. (A)
Hole, W. G. (A)
James, E. (A)
Kersten, P. M. (A)
Mannell, L. H. (A)
McHugh, J. E. III, (A)
Meyer, M. T. (A)
Thompson, J. D. (A)
Thompson, R. L. (A)

Vliets
Backman, H. D. (A)

Wamego
Buatte, L. A., Jr. (A)

Wichita
Abramson, C. R. (A)
Beener, M. A. (A)
Bennett, A. I. (A)
Bereman, E. W. (A)
Black, H. L. (A)
Boedeker, H. F. (A)
Bubb, W. J. (A)
Bunyar, P. A. (M)
Byers, G. D. (A)
Byers, H. O. (M)
Carttar, G. L. (A)
Cord, C. E. (A)
Courtney, I. E. (A)
Delk, E. T. (M)
Dole, J. (A)
Eberle, R. W. (A)
Geiser, D. T. (M)
Harper, J. M. (A)
Haupt, C. D. (A)
Hill, A. L. (A)
Hink, K. G. (M)
Hutton, L. I. (A)
Johnson, V. N. (A)
Johnson, W. C. (A)
Keene, A. W., Jr. (A)
Kidd, T. L. (M)
Knowlton, R. F. (M)
Kramer, L. V. (A)
La Barge, R. A. (A)
Leighton, C. P. (A)
Logan, W. L. (A)
Lundgren, P. L. (A)
McAlearney, P. H. (A)
McFadin, R. L. (A)
Miller, C. E. (A)
Miller, M. D. (M)
Moody, R. E. (A)
Newby, H. H. (M)
Patterson, D. L. (A)
Patterson, J. W. (A)
Piper, E. (A)
Probert, D. C. (A)
Pyle, K. W. (M)
Raaen, H. W. (A)
Roark, G. L. (A)
Rogers, L. W. (A)
Root, M. R. (A)
Thiel, J. E. (A)
Warner, D. E. (A)
Wehrman, P. G. (A)
Weigel, E. (A)
Womack, R. H. (A)

KENTUCKY

Anchorage
Williams, L. A. (M)

Ashland
Curry, J. W. (A)
Weaver, C. W. (A)

Bellevue
Rohrer, R. S. (A)
Werrmann, C. A. (A)

Bowling Green
Logsdon, H. E. (A)

Buechel
Barlow, D. P. (A)
Henson, C. E. (M)
Ryckman, W. D., Jr. (A)

Burlington
Conner, J. C. (A)

Campbellsville
Crawley, J. B. (A)

Corbin
Bennett, A. O. (A)

Covington
Curtis, W. T. (A)
Goode, J. P. (A)
Jeffries, C. E. (A)
Odenthal, L. H. (A)
Rivers, J. L. (A)
Schipper, R. J. (M)
Taglauer, E. R. (A)
Topmiller, C. H. (VA)

Danville
Shaw, M. R., Jr. (M)

Elsmere
Roth, H. B. (A)

Erlanger
Lee, R. A. (A)
Schultz, R. L. (A)
Weaver, J. A. (A)

Fort Knox
Ross, W. C. (A)
Winterberger, H. P. (A)

Fort Thomas
Fowler, N. B. (SM)
Kolo, R. E. (SM)
Sims, T. W. (A)

Frankfort
Johns, K. B. (A)
Webster, R. S. (A)

Hartford
Taylor, C. L. (A)

Hopkinsville
Porter, B. E. (A)

Jeffersontown
Hewitt, L. G. (M)
Lyle, I. W., Jr. (M)

Lexington
Allison, N. B. (A)
Graham, P. J. M. (A)
Helt, S. (M)
Lang, E. T. (A)
Rafajko, M. (A)
Smith, G. E. (A)

Louisville
Alpiger, W. E. (A)
Bell, R. V. (A)
Burdg, C. E. (A)
Cart, R. E. (A)
Covert, J. L. (A)
Fife, S. T. (SM)
Fox, J. C. (M)
Gates, S. H. (A)
Hill, E. C. (M)
Hope, C. R. (M)
Hudson, W. E. (M)
Koller, O., Jr. (A)
La Vielle, W. R. R. (M)
Maine, R. E. (A)
McAfee, C. S. (A)
McIntosh, D. (A)
Miller, E. J. (A)
Miller, L. A. (A)
Mills, R. W. (A)
Morrison, W. J. (A)
Neher, B. (A)
Nevitt, R. G. (A)
Probst, M. C. (M)
Relling, G. E. (A)
Ryan, W. J. (A)
Sadler, C. C. (A)
Schwalbe, M. I. (SM)
Skaggs, E. P. (A)
Smith, H. T. (M)
Summerford, A. C. (SM)
Sweets, F. M. (M)
Towner, O. W. (SM)
Wilson, R. A. (A)
Winges, C. D. (A)

Ludlow
Reynolds, D. J. (VA)

Newport
Fields, G. S. (A)
Humphrey, H. A. (A)
Rothfuss, R. G. (A)

Olive Hill
Barker, E. E. (A)

Owensboro
Bailey, R. L. (A)
Boeckman, J. F. (A)
Bowie, W. S. (SM)
Bryant, J. A. (A)
Byars, W. F. (A)
Carter, M. G. (SM)
Coomes, P. S. (A)
Davis, E. L. (M)
Field, R. W. (M)
Freeman, H. H. (A)
Gage, G. H., Jr. (M)
Haase, A. P. (SM)
Hayes, F. L. (A)
Horton, C. E. (M)
Hsu, H. (A)
Lattin, W. J. (A)
Madole, J. F. (M)
McCulley, C. R., Jr. (A)
McKinnis, C. E. (A)
Mickey, D. D., Jr. (A)
Moe, R. E. (SM)
Niehaus, E. H. (A)
Robb, J. H. (A)
Rush, J. W. (A)
Ryan, J. D. (A)
Somerville, J. R., Jr. (A)
Thorson, H. L. (SM)
Tucker, J. G. (A)
Wofford, D. R. (A)

Paducah
Aurand, J. A. (A)
McNeill, L. P. (A)

Paris
Miller, L. W. (A)

Philpot
Jackson, J. E. (A)

Salvisa
Gritton, D. M. (A)

Somerset
Parsons, J. A. (A)

South Fort Mitchell
Schonk, K. W. (M)

LOUISIANA

Arabi
Brown, R. G. (A)
Mondy, H. C. (M)

Barksdale AFB
Derey, C. H. (A)

Bastrop
Green, W. M., Jr. (A)

Baton Rouge
Allan, D. K. (M)
Case, E. E. (A)
Crum, F. M. (A)
McLean, L. V. (M)

Bossier City
Gago, F. J. (A)
Nicholson, C. L. (A)

Camp Polk
Falk, B. (A)

Crowley
Bailey, C. L. (A)

Dodson
Erholm, W. H. (M)

Golden Meadow
Brady, J. A., Sr. (A)

Gretna
Hero, G. A., III (A)

Harvey
Karney, T., Jr. (A)

Jennings
Dahse, C. A. (A)

Lacombe
Rust, J. J. (A)

Lafayette
Boudreaux, F. J. (A)

Lake Charles
Anderson, H. V. (SM)
Filzen, J. N. (A)
Moses, E. C. (A)
Pidgeon, R. E., Jr. (A)
Webb, E. J. (A)
White, R. A. (A)

New Orleans
Allen, G. (A)
Becker, H. C. (A)
Bloom, J. D., Jr. (SM)
Byrd, H. F. (A)
Chapin, M. F. (M)
Craig, G. H. (A)
Cronvich, J. A. (VA)
Domec, J. D. (A)
Du Treil, L. J. N. (SM)
Fahrmeier, M. L. (A)
Freeland, W. T. (M)
Haller, M. N. (A)
Landry, N. R. (A)
Lehde, P. E. (F)
Lodato, J. S. (A)
Melancon, N. J. (A)
Monroe, W. J. (M)
Morris, J. C. (A)
Otto, J. L. (A)
Padwa, M. N. (A)
Peirce, G. H. (VA)
Perkins, C. C. (A)
Price, G. A., Jr. (M)
Riddle, L. G. (SM)
Rooney, J. D. (M)
Spencer, J. C. (A)
Talbot, W. S. (A)
Tong, E. (A)
Tyroff, E. O. Jr. (A)
Woods, T. D. W. (VA)

Pineville
Pulliam, P. E. (A)

Rayne
Bailey, B. H., Jr. (M)

Ruston
Owen, W. E. (A)

Shreveport
Benson, M. C. (A)
Craig, W. H. (A)
Garrett, E. D. (A)
Hurley, L. (A)
Long, F. V. (SM)
Lyon, D. J. (A)
Maddox, C. H. (VA)
Murray, J. M. (A)
Murray, J. W. (A)
Nuttall, E. D. (M)
Randolph, A. M. (A)
Turley, J. R. (A)
Whitley, J. P. (A)

Sligo
Schiess, M. C. (A)

Sulphur
Albright, A. L. (M)
McNamara, J. E. (A)

Vivian
Janik, J. L. (A)

MAINE

Auburn
Nichols, G. P., Jr. (A)

Augusta
Parker, R. H. (M)

Bangor
Creamer, W. J. (SM)
Libbey, W. M. (A)

Biddeford
Deters, A. A. (A)

Brunswick
Haushalter, C. H. (A)
Little, N. C. (VA)

Calais
Reynolds, J. C. (M)

Camden
Tibbetts, G. C. (A)

Cape Cottage
Smith, D. H. (SM)

Cumberland Center
Baldwin, R. L. (A)

Cumberland Mills
Wellcome, F. L., Jr. (A)

Kennebunkport
Reoch, A. E. (F)

Limestone
Egger, S. L. (A)
Robinson, W. C. (A)

Orono
Blake, C. (A)
Seal, P. M. (SM)

Portland
Brewer, L. F. (A)
Chandler, J. (A)
Hodgkins, R. W. (SM)
Karcher, R. W. (A)
Kozineski, W. (A)

Randolph
Newell, G. R. (A)

Raymond
Marshall, J. R. (A)

Saco
Kozloff, J. (A)

Union
Whitney, L. E. (M)

Waldoboro
Cooney, J. R. (A)

Westbrook
Knight, R. H. (A)
Shaw, H. S. (F)

York Beach
Wagner, B. F. (A)

MARYLAND

Aberdeen
Bowne, W. L. (M)
Frasher, M. M. (A)
Hodge, A. H. (VA)
Kaye, M. (A)
Klingler, R. (A)
Martin, W. W. (A)
Misey, J. J. (A)
Seewald, E. C. (A)
Spence, H. W. (A)
White, E. A. (A)
Wolff, G. (A)

Accident
Friend, C. K. (A)

Accokeek
Harris, F. H. (A)

Annapolis
Albright, E. L. (M)
Cockaday, L. M. (M)
Daley, J. L. (M)
Dalyrimple, H. C. (A)
Davis, D. W. (SM)
Estelle, W. E. (M)
Goodhue, W. W. (VA)
Kurtz, S. K. (A)
Lamartin, F. H. (A)
Leydorf, G. E. (A)
Maling, H. F., Jr. (M)
Mumford, E. R. (A)
Watts, G. J. (A)

Arbutus
Donsbach, W. R. (A)

Arnold
Brady, D. J. (A)
Gregory, L. W. (SM)
Parnell, W. S. (A)

Baldwin
Morgan, R. H. (A)

Baltimore
Abel, A. E. (SM)
Allen, J. E. (A)
Andersen, A. (M)
Anderson, C. F. W. (M)
Anderson, E. A., Jr. (A)
Andreatta, J. H. (A)
Axelby, G. S. (A)
Bailey, C. W., Jr. (A)
Bailey, R. T. (M)
Baker, E. E., Jr. (M)
Baker, R. H. (M)
Balthis, D. L. (M)
Bark, R. S. (M)
Barlow, A. D. (A)
Barnes, A. E. (A)
Barrack, C. M. (A)
Barthel, D. R. (A)
Bartlett, R. A. (A)
Basil, I. T. (A)
Bateman, L. J. (A)
Bauder, G. E. (A)
Betsh, K. W. (A)
Bias, G. H., Jr. (A)
Bidne, R. D. (A)
Bills, R. (A)
Blasbalg, H. (A)
Bloom, L. (A)
Bloomer, T. M. (SM)
Bondy, M. F. (A)
Booth, J. D. (VA)
Bosse, M. L. (A)
Boykin, J. R. (SM)
Bradley, E. J. (A)
Briggs, M. R. (SM)
Broady, S. N. (A)
Brodwin, M. E. (A)
Bucy, P. T. (A)
Bulik, C. (A)
Burr, W. E. (A)
Byerly, E. H. (A)
Callahan, J. F. (A)
Carr, F. P. (A)
Chapin, E. W. (M)
Cheek, R. C. (M)
Chenoweth, W. G. (A)
Chioma, L. D. (A)
Chrzanowski, E. J. (A)
Chuma, N. (A)
Clark, C., Jr. (A)
Clark, G. E., Jr. (A)
Claus, O. R., Jr. (A)
Clifford, R. F. (A)
Clifford, R. W. (M)
Clotworthy, J. H. (A)
Cohen, H. A. (M)
Cohn, M. (A)
Cole, A. E., Jr. (A)
Congdon, K. P. (A)
Cooper, S. (A)
Cosman, A. (A)
Cottingham, J. H. (A)
Coulter, E. L. (A)
Crane, R. B. (A)
Crocker, G. M., Jr. (A)
Crosby, E. L., Jr. (M)
Csepely, J. A. (A)
Cullom, J. H. (A)
Dalle, Mura, P. H. (A)
Danner, R. V. (A)
Darnowsky, M. (A)
Darr, J. E. (A)
Davenport, F. S. (A)
Davies, L. E. (A)
Davis, J. S., Jr. (A)
Davis, J. W. (M)
Deal, D. L. (A)
Deise, L. F. (M)
De Socio, G. (SM)
Dillow, J. C. (A)
Disney, J. G., Jr. (A)
Dobyns, H. B. (A)
Doroshow, S. R. (A)
Doyle, R. E. (A)
Duff, J. S. (A)
Duquet, E. A. (A)
Durham, B. H. (A)
Eby, J. T. (A)
Eckels, A. E. (VA)
Eckenroth, H. F. (A)
Eckstein, G. (A)
Ellen, S. T. (M)
Ellert, C. A. (A)
Epstein, R. A. (A)
Fallon, G. P. (SM)
Farmer, W. C., Jr. (A)
Fasulo, J. L. (A)
Fell, T. T. (A)
Felt, N. E., Jr. (A)
Fenichel, I. (A)
Ferris, R. C. (A)
Field, F. W. (A)
Fino, J. J. (A)
Fischer, F. W. (SM)
Fitch, J. A. (M)
Foley, W. V. (A)
Frankenfield, C. C. (A)
Franz, W. J. (A)
Frattali, F. A. V. (A)
Frederick, L. G. (A)
Friedmann, D. C. (A)
Friesser, J. M. (A)
Frisco, L. J. (A)
Fuller, F. J. (SM)
Fuqua, H. G. (M)
Gable, M. L. (A)
Gambrill, R. D. (A)
Garrett, W. O. (A)
Gault, A. A. (A)
Gault, C. W. (A)
Gershberg, D. N. (A)
Getsinger, W. J. (A)
Gigante, G. A. (A)
Glaser, E. M. (A)
Godsey, W. I. (M)
Goldenthal, S. (A)
Goodnow, A. C. (VA)
Gore, W. C. (M)
Gott, E. (A)
Graf, H., Jr. (VA)
Grauberger, W. E. (A)
Grauling, C. H., Jr. (M)
Griffith, B. H. (M)
Griffiths, W. W., Jr. (A)
Grossman, D. (A)
Hagelgans, E., Jr. (A)
Hagopian, R. H. (M)
Hale, W. B. (A)
Hall, O. C. (A)
Haller, E. J. (A)
Hamburger, F., Jr. (SM)
Hamilton, J. W., Jr. (A)
Hammond, J. G. (M)
Hanks, H. C. (A)
Hardy, F. S. (A)
Harris, B. L. (A)
Harris, H. N. (A)
Harris, J. F. (SM)
Harris, R. H. (A)
Harrop, I. H. (A)
Hauck, V. D. (SM)
Hayden, H. P. (A)
Haydon, G. W. (A)
Haynes, F. B. (SM)
Hazel, W. M. (A)
Heath, G. F. (A)
Heck, J. R. (SM)
Hedeman, W. R., Jr. (SM)
Hemphill, A. (M)
Henry, R. M., Jr. (A)
Henthorn, J. E. (A)
Hervey, J. P. (VA)
Herwald, S. W. (SM)
Hetchler, L. F. (A)
Higby, R. F. (A)
Hing, A. O. (A)
Hirsch, A. E., Jr. (A)
Hlavka, L. F. (A)
Hoffman, C. P. (A)
Hoffman, P. A. (A)
Hogue, G. E. (A)
Holdt, D. H. (A)
Hollis, T. W., Jr. (A)
Holman, J. G. (A)
Hom, W. R. (A)
Hornstein, L. (A)
Houck, J. W. (A)
Houghton, R. B. (A)
Houston, G. P. III (SM)
Houston, J. A. (A)
Hrybyk, W. L. (A)
Hurley, W. A. (M)
Hutchinson, J. O. (A)
Hyder, H. R., III (M)
Jackson, H. L. (M)
James, J. L. (A)
Janssen, H. K. (A)
Jefferson, O. H. (A)
Jenkins, J. (SM)
Jett, E. K. (F)
Johnson, M. P. (A)
Jones, M. L. (A)
Jones, O. J. (SM)
Jordan, W. D. (A)
Juchno, E. A. (A)
Kammerman, P. E. (A)
Kardos, M. (A)
Keary, H. F. (A)
Kegel, A. G. (M)
Kempf, R. A. (VA)
Kent, L. L. (A)
Kephart, D. C. (A)
Kerr, D. E. (VA)
Khoury, N. (A)
Kiley, W. H., Jr. (A)
Killman, R. T. (A)
King, D. D. (M)
Kinn, T. P. (SM)
Klaasen, B. J. (A)
Klemer, E. M. (A)
Kline, C. R. (A)
Klitsch, L. L. (A)
Knipp, A. R. (SM)
Konigsberg, R. L. (A)
Kornfield, M. (A)
Kovasznay, L. S. G. (M)
Kovaki, J. J. (SM)
Kreager, P. H. (M)
Krebs, W. N. (VA)
Kreis, J. F. (A)
Kumm, W. H. (A)
Kuss, P. W. (A)
Lzrson, K. T. (A)
Lau, C. B. (A)
La Vier, E. C. (A)
Lawson, E. J. (A)
Leap, G. A. (A)
Lee, F. G. (A)
Lee, R. L. (A)
Lee, W. J. (A)
Lees, R. E. (A)
Leone, H. A. (A)
Lindemann, H. B. (A)
Linsenbardt, A. E. (A)
Lisiecki, M. (A)
Little, D. G. (F)
London, C. (SM)
Lubbert, G. L. (M)
Lulofs, J. R. (A)
Luse, J. D. (A)
Macewka, N. (M)
Mack, K. M. (M)
Mackes, D. V. (A)
Mannas, R. G. (A)
Marcroft, H. C. (SM)
Markham, A. S. (M)
Martin, G. E. (A)
Martin, J. A. (A)
Masters, H. M. (A)
Mattausch, A. J. (A)
Mattern, J. (A)
Mauro, E. A. (A)
Maxwell, R. F., Jr. (A)
Mayer, R. H. (A)
Mazurkiewicz, H. G. (M)
McBride, J. F. (A)
McCombe, D. H. (A)
McDonald, H. S. (A)
McDonough, J. T. (A)
McNally, H. R. (A)
Meier, W. M. (A)
Mester, J. C. (A)
Meyer, A. W. (A)
Miller, C. F. (M)
Miller, C. R. (A)
Miller, J. M. (SM)
Miller, L. A. (A)
Mitchell, W. C. (A)
Molloy, G. C. (A)
Molz, K. F. (M)
Mooney, D. H. (A)
Moore, C. R., Jr. (A)
Mott, O. B. (M)
Mueller, E. J. (A)
Mueller, M. T. (A)
Mullins, F. G. (A)
Mundell, K. C. (A)
Munnell, E. T. (A)
Munson, L. A. (A)
Mutch, J. J. (A)
Nesbitt, W. E. (A)
Newton, H. C. (M)
Nims, A. A., Jr. (SM)
Nobles, C. E. (SM)
Nopper, C. G. (A)
Nupp, R. E. (A)
O'Donnell, R. J. (A)
Olha, W. R. (A)
Orr, R. V. (A)
Oster, E. W., Jr. (A)
Page, F. T. (A)
Palmer, W. D. (A)
Parrish, W. F. (A)
Paska, R. A. (A)
Paxton, C. A. (A)
Pearce, J. M. (SM)
Perlin, A. I. (A)
Pierson, C. D., Jr. (SM)
Pipkin, J. E. (M)
Pullen, K. A., Jr. (M)
Rambo, S. I. (SM)
Ranft, W. Q. (A)
Rask, O. N. (A)
Raymond, J. L. (A)
Raynes, H. D. (A)
Rice, W. M. (A)
Richardson, W. R. (A)
Ridgely, N. R., Jr. (A)
Riegel, R. E. (A)
Riley, R. N. (A)
Ringenback, M. E. (A)
Roberts, H. D. (A)
Rockwell, P. (SM)
Roedel, S. (A)
Rohner, A. J. (M)

Rooten, A. (A)
Rosenblum, I. I. (A)
Roth, S. A. (A)
Roush, R. G. (M)
Ruark, A. E. (M)
Rundlett, L. M. (M)
Russell, W. J., Jr. (A)
Ruthenberg, W. G. (A)
Sanford, R. W. (A)
Sanner, G. E. (A)
Sargent, C. R. (M)
Savoy, H. J. (A)
Scanga, W. A. (A)
Scharfman, H. (A)
Scheiner, S. R. (M)
Scheneman, E. E. (A)
Schillo, T. B. (SM)
Schreyer, S. D. (A)
Schutz, H. (SM)
Schwarzkopf, J. (A)
Sefton, H. B., Jr. (A)
Seldon, W. Z. (A)
Seman, A. E., Jr. (A)
Senger, F. A. (A)
Shaw, G. D. (A)
Sheckells, C. R. (A)
Shoenberger, G. C. (A)
Siegell, W. (A)
Silverman, H. M. (A)
Sion, E. (A)
Skolnik, M. I. (A)
Slavin, M. (A)
Slottow, H. G. (A)
Smeltzer, R. F. (A)
Smith, E. L., Jr. (A)
Smith, J. G. (A)
Smith, J. S. (M)
Soroka, B. (A)
Spicer, W. T. (M)
Spiegel, S. S. (M)
Stein, E. F. (A)
Stephenson, J. O. (A)
Stout, G. P. (SM)
Stout, J. V. (M)
Strandberg, P. R. (A)
Strong, M. E. (A)
Sturtevant, C. E. (M)
Sullenger, J. E., Jr. (A)
Sussman, M. M. (A)
Tarkoff, P. B. (M)
Tashjian, D. R. (SM)
Taylor, M. (VA)
Teres, B. W. (A)
Thomas, A. G. (A)
Thomas, C. E., Jr. (A)
Thomas, C. V. (A)
Thompson, F. J. (A)
Tischler, M. (M)
Titus, C. K. (A)
Todes, R. S. (A)
Tolj, H. D. (A)
Towles, W. B. (A)
Travis, J. B., Jr. (A)
Trent, J. E. (A)
Trinite, G. M., Jr. (A)
Trinter, V. E. (A)
Tuttle, L. (VA)
Van Meter, J. L. (A)
Viener, A. H. (A)
Vitek, W. J. (A)
Vore, M. P. (A)
Waldorf, S. K. (SM)
Walker, H. L. (SM)
Warner, H. V. (A)
Waters, R. H. (A)
Waters, W. M. (A)
Watts, H. M. (SM)
Webb, G. N. (M)
Whitcomb, M. F. (A)
Whitney, A. (SM)
Wilkes, L. D. (A)
Wilkins, R. P. (A)
Wilkinson, R. L. (A)
Williams, A. D. (A)
Williams, R. T. (A)
Williams, W. S. (A)
Wilner, J. T. (SM)
Windley, W. D. (A)
Wissman, A. J. (A)
Wolf, F. H. (A)
Wolfe, B. (M)
Wolfe, R. E. (A)
Woodward, W. W. (M)
Yaffe, T. H. (A)
Yarbrough, H. B. (M)
Yates, L. R. (A)
Young, M. C. (A)
Young, R. L., Jr. (A)
Zacharia, H. (A)
Zimmerman, R. (A)

Bel Air
Dunn, D. J., Jr. (A)

Beltsville
Biggerstaff, W. F. (A)
Norris, K. H. (M)
Weber, P. J. (A)

Bethesda
Anderson, A. W. (A)
Apstein, M. (SM)
Astin, A. V. (SM)
Atwood, N. A. (SM)
Baluta, R. E. (A)
Battison, J. H. (SM)
Bedford, P. L. (M)
Boese, W. C. (SM)
Bush, G. P. (SM)
Calhoon, T. G. (A)
Cannon, R. E., Jr. (M)
Curtis, R. W. (SM)
Dalke, J. L. (SM)
Delort, R. (M)
Distad, M. F. (SM)
Doyle, E. M. (M)
Dubois, H. F. (A)
Ellsworth, W. C. (SM)
Fong, L. B. C. (SM)
Grant, C. R. (A)
Grantham, R. E. (SM)
Hall, R. M. (A)
Hartz, J. E. (SM)
Hoff, R. S. (M)
Huffman, R. E. (A)
Ikelman, G. J. (A)
Jacobs, D. H. (A)
Jervis, E. R. (SM)
Karr, P. R. (A)
Kelley, J. J. (A)
Lent, W. C. (SM)
Loucks, I. H. (SM)
Mahaffey, G. N. (VA)
McBirney, H. R. (A)
McInteer, W. H. (A)
McKenna, J. R. (A)
Meissner, P. (A)
Melton, B. S. (SM)
Mickey, L. (VA)
Montgomery, G. F. (M)
Noble, F. W. (A)
Noble, J. S. (A)
Pendleton, T. A. (A)
Queen, J. L. (A)
Ring, A. D. (VA)
Roddy, V. S. (VA)
Senf, H. R. (SM)
Shulz, R. S. (A)
Siewers, D. C. (A)
Smith, K. A. H. (A)
Sommer, H. (A)
Stinchfield, J. M. (SM)
Viera, F. Jr. (A)
Ware, R. S. (A)
Wenzinger, C. J., Jr. (A)
Wheeler, L. B. (M)
Wolzien, E. C. (M)
Youden, W. W. (A)

Bladensburg
Hiller, A. J. (A)

Braddock Heights
Sausser, J. M. (A)

Brandywine
Conner, L. M. (A)

Brooklyn Park
Gerych, W. E. (A)

Burtonsville
Claypool, W. S. (VA)

California
Cook, K. S. (A)

Cambridge
Orr, G. M. (A)

Capitol Heights
Hengstler, J. J. (A)

Carderock
Rothenberg, N. B. (A)

Catonsville
Barnhart, E. F. (A)
Burnside, C. J. (SM)
Cole, D. P. (A)
Combellick, T. A. (A)
Des Lauriers, E. L. (A)
Hoffman, H. C. (A)
Jacob, M. I. (M)
Johnson, J. L. (SM)
Kinsman, W. D. (M)
MacDonald, A. A. (SM)
Miller, C. J. (A)
Miller, C. W. (M)
Norris, R. N. (A)
Sima, R. L. (A)
Singel, J. B. (A)
Smith, H. B. (M)

Charlestown
Cherney, J. F. (A)

Cheltenham
Meyer, J. A. (A)

Chesapeake Beach
Adams, H. E. (A)
Goetze, A. J. (A)
Grosvenor, A. C. (M)
Lesko, N. J. (A)
Mickelson, T. H. (A)
Pavetto, J. C. (A)
Rusenko, G. (A)
Whiting, W. K. (A)

Cheverly
Beegle, D. H. (SM)
Davis, R. E. (M)
Sly, R. D. (A)
Waldo, G. V. (VA)
Woolley, P. V. (A)

Chevy Chase
Alexander, S. N. (A)
Apuli, J. A. (SM)
Arsem, C. (A)
Brady, J. B. (SM)
Camp, G. D. (SM)
Caporale, P. (SM)
Cottony, H. V. (SM)
Dougherty, J. G., Jr. (A)
Engel, F. H. (SM)
Frederick, C. L. (M)
Gordon, D. I. (A)
Henry, J. H. (A)
Hummel, C. F. (A)
Inglis, A. F. (SM)
Kelley, G. W., Jr. (VA)
Michalowicz, J. C. (M)
Mills, M. H. (SM)
Morton, R. C. (A)
Nuckolls, R. G. (SM)
Piore, E. R. (F)
Rahal, N. S. (A)
Reamer, E. D. (A)
Saito, S. (A)
Schafer, R. H. (A)
Tanke, H. F. (VA)
Walls, H. J. (SM)
Williams, S. B. (A)
Wright, J. W. (VA)

Chillum
Hirschel, L. R. (A)
Price, J. F. (A)
Rattner, S. (SM)
Turner, W. R. (M)

Clinton
Hortman, J. D. (A)
Karsh, H. (A)
Kirk, D. Jr. (A)

Cockeysville
Healey, D. J. III (A)
McComas, A. D., Jr. (A)

Colesville
Davis, W. L. (A)

College Park
Beyer, G. L., Jr. (M)
Bowers, M. D. (A)
Brown, J. (M)
Cook, M. F. (A)
Corcoran, G. F. (SM)
Etzweiler, G. A. (A)
Headrick, J. M. (M)
King, C. L. (A)
Lewis, J. K. (A)
Morse, W. R. (VA)
Pear, C. B., Jr. (VA)
Price, H. W., Jr. (M)
Reed, H. R. (SM)
Weber, J. (M)

Cumberland
Knieriem, R. A. (M)
Stern, H. (SM)

District Heights
Ross, H. C. (A)

Dundalk
Hanley, N. B. (A)

East Riverdale
Gran, R. W. (A)
McCann, R. T. (A)
Moody, W. R. (M)
Owen, E. A. (SM)
Sikes, R. E. (A)
Sonnabend, J. S. (A)

Edgewater
Rosenberry, W. W. (A)

Edgewood
Jacobs, R. (A)

Ednor
Dinunno, J. J. (A)

Elkridge
McCoy, H. L. (A)
Robinson, W. (A)

Elkton
Merrill, R. E. (A)

Ellicott City
Goldbach, A. C. (A)
Mabry, F. S. (SM)
Tharp, N. B. (SM)

Essex
Cook, H. A. (M)
Goldsmith, J. (SM)
Strickroth, G. J. (SM)
Watson, J. E. (A)

Frederick
Price, O. I. (A)
Price, O. I., Jr. (A)

Gaithersburg
Adams, J. T. (A)
Freienmuth, W. L. (A)
Van Horn, J. E. (M)

Garrett Park
Aylor, R. P., Jr. (VA)

Glen Arm
Borden, E. L. (A)
Hershfield, S. (SM)
Wood, L. E. (M)

Glen Burnie
Allison, E. (A)
Arnold, D. E. (M)
Asaki, G. G. (A)
Baker, F. A. (A)
Brown, E. A. (A)
Chauvin, D. M. (A)
Frame, T. E. (A)
Granger, C. E. (A)
Heazel, V. M., Jr. (A)
Koether, G. H., Jr. (A)
Lee, R. E. (M)
Mathieu, R. E. (M)
McClellan, C. E. (SM)
Musk, H. A. (M)
Shiely, A. R., Jr. (A)
Valenta, M. F. (A)
Welch, C. M. (M)
Willis, A. H. (M)
Wimer, A. G., Jr. (M)
Winter, G. W. (M)

Glencoe
Raboy, B. (A)

Greenbelt
Justman, S. (A)
Seaward, P. E. (A)

Glyndon
Macnichol, E. F., Jr. (A)

Hagerstown
Maycock, J. C. (A)
McIntire, G. W. (A)
Pitzer, C. L. (A)
Pitzer, H. B. (A)

Harman
Rix, E. H. (M)

Harundale
Miller, W. E. (A)

Havre De Grace
Arnold, N. W. (M)
DeLand, R. E. (A)
Putnam, R. E. A. (VA)
Richard, V. W. (A)
Roediger, F. E. (A)
Zancanata, H. W. (A)

Hollywood
Young, C. H. (A)

Huntingtown
Voisich, J. (A)

Hyattsville
Attmore, R. G. (A)
Ballard, A. H. (A)
Becker, W. E., Jr. (A)
Bers, G. M. (A)
Bevitt, W. D. (VA)
Bloom, R. A. (A)
Blumenthal, L. J. (A)
Bonwit, K. S. (A)
Borden, T. G. (A)
Breeskin, S. D. (A)
Byrd, R. E. (A)
Campbell, L. E. (A)
Chitty, H. W. (A)
Chwastyk, A. M. (A)
Cohen, C. L. (A)
Cooperman, J. I. (A)
Copeland, A. L. (A)
Davis, J. J. (A)
DeBolt, H. E. (A)
Fagin, S. L. (A)
Fisher, E. M. (A)
Flyer, I. N. (A)
Gager, F. M. (SM)
Gale, M. (A)
Gipe, R. C. (A)
Globe, S. (A)
Goodwin, J. W. (A)
Greenwald, S. (A)
Hickenlooper, M. M. (A)
Kaiser, Q. C. (A)
Kenny, M. (A)
Kordes, R. R. (A)
Kraus, J. (A)
Kuhn, H. T. (A)
Kulikowski, E. F. (SM)
Lane, A. L. (A)
LaPointe, J. C. (A)
Luke, G. W., Jr. (A)
Lyon, H. H. (VA)
Marlon, T. M. (A)
McCool, W. A. (A)
Meister, R. (A)
Messenheimer, A. D. (A)
Moseley, J. C., Jr. (A)
Norwood, H., Jr. (A)
Palasky, E. C. (A)
Pamphilon, L. E. (A)
Peeler, G. D. M. (M)
Pendleton, E. E. (A)
Petkof, B. (A)
Pike, W. N. (M)
Redden, M. S., Jr. (M)
Regnier, R. C. (A)
Riggs, R. N. (A)
Salame, G. (A)
Schuchard, E. A. (M)
Shaw, B. A. (A)
Silverstein, A. (A)
Small, P. (A)
Smokler, M. I. (A)
Spencer, D. L. (A)
Starobin, A. F. (A)
Tall, M. M. (A)
Thalhamer, A. L. (A)
Tucker, J. E., Jr. (A)
Viezbicke, P. P., Jr. (A)
Ward, B. L., Jr. (A)
Waters, J. A., Jr. (A)
Wilder, K. T. (A)

Kensington
Affanasiev, K. J. (M)
Ahern, C. R. (A)
Alexander, F. C. (SM)
Ames, B. C. (M)
Bell, W. S. (M)
Betzer, W. E. (A)
Butenhoff, R. L. (A)
Carpenter, R. C. (M)
Davis, H. B. O. (A)
Horton, B. M. (A)
Joseph, H. M. (A)
Kaiser, J. A., Jr. (A)
Knox, W. B. (A)
Licwinko, L. S. (M)
MacQuivey, D. R. (M)
Mader, D. W. (A)
Meadows, L. A. (SM)
Meese, K. J. (A)
Myrick, J. C. (M)
Nagle, J. J. (A)
Parker, M. J. (M)
Perkins, M. G. (A)
Pincus, S. (A)
Radabaugh, E. L. (M)
Reiser, D. (A)
Riblet, H. B. (SM)
Rosenberg, R. S. (A)
Saunders, E. R. (A)
Sheppard, I. J. (M)
Shirer, H. W. (A)
Spinks, A. W. (A)
Spriggs, J. O. (A)
Sulzer, P. G. (A)
Sweeney, J. F. (A)
Webster, E. (A)
Yaffee, P. (M)

Kingsville
Iribe, P. (A)

Landover
Peshel, R. L. (A)
Sencenbaugh, D. W. (A)

Landover Hills
Moltrup, G. R. (M)

Lanham
Stoops, C. W. (M)

Laplata
Caplan, L. N. (A)

Laurel
Ball, I. D. (SM)
Craig, A. G. (VA)
Mobley, M. C. (A)
O'Connor, G. S. (A)
Roberts, W. K. (M)
Sanders, J. F. (A)
Shinn, E. N. (A)
Straughin, J. B. (M)

Lexington Park
Barnard, G. E. (A)
Bartels, W. S. (A)
Browne, W. M. (SM)

Leopard, G. W. (A)
Russell, C. M. (SM)
Wilson, R. T. (A)

Linthicum
Borski, G. K. (A)
Cheetham, R. P. (A)
Kuehn, H. S. (A)
Petrou, N. V. (SM)
Rustad, L. W. (M)

Linthicum Heights
Collins, Z. L. (M)
Kraeger, G. W. (A)
Lee, R. (SM)

Monkton
McGraw, W. T. (A)

Mt. Rainier
Aucremanne, M. J. (M)
Barton, R. (A)
Flanagan, J. D. (A)
George, N., Jr. (A)
Gilliland, H. W. (A)
Holt, A. W. (A)
Kent, J. S. (A)
Norton, J. M. (A)
Sheitelman, H. D. (M)
Snow, C. E. (A)
Spencer, H. L. (M)
Velgos, P. (A)

North Linthicum
James, C. L. (A)
Kennedy, P. (A)
Mack, M. C. (M)
Scott, J. K. (A)

Owing Mills
Omberg, A. C. (SM)

Pasadena
Fox, R. C. (A)

Patuxent River
Andrews, L. V. A. (A)
Belcher, A. C. (A)
Christian, O. R. (A)
Doughy, G. J. (A)
Dogantzis, B. E. (A)
Fender, F. G. (A)
Henderson, E. C. (A)
Hymowitz, E. W. (A)
Keith, E. N. (A)
Long, M. G. (A)
Martin, W. A., Jr. (A)
Miller, P. G. (A)
Perecinic, W. S. (A)
Solarczyk, F. W. (A)
Sweet, R. A. (A)
Yulo, C. (A)

Phoenix
Davis, R. J. (SM)

Pikesville
Howe, W. F. (A)
Marie, C. S. (M)
McCusker, R. W. (A)
McDade, J. G. (A)
Schrank, H. E. (M)

Potomac Heights
Bissett, E. B. (A)

Prince Georges County
Epstein, A. M. (A)

Randallstown
Dietz, J. H. (A)
Wallace, B. E., Jr. (A)

Reisterstown
Duncan, R. S. (A)
McConnel, W. G. (SM)

Relay
Reynolds, D. W. (A)

Riderwood
Claborn, K. K. (A)

Riverdale
Channon, K. F., Jr. (A)
Davies, G. L. (SM)
Johnson, C. L., Jr. (A)
Kelley, J. R. (M)
Leberington, R. D. (A)
Reukauf, D. C. (A)
Wahle, J. J. (A)
Withrow, W. E. (A)

Rockville
Arnstein, P. B. (A)
Beecher, D. W. (A)
Biser, M. H. (SM)
Blow, T. C. (A)
Brodie, A. H. (M)
Elam, F. E. (A)
Fitzgerald, R. T. (A)
Forsyth, W. A., Jr. (A)
Haliiwanger, J. C. (A)
Hardin, C. D. (M)
Hibberd, P. A. (A)
Jones, M. W. (M)
Kuzminsky, I. (A)
Libby, E. C. (A)
Miller, R. J. (A)
Morse, M. S. (SM)
Sawitz, P. H. (M)
Snyder, S. (A)
Story, V. V. (SM)
Stoville, H. E. (A)
Witt, R. P. (M)

Rogers Heights
Marcus, M. A. (A)

Ruxton
Martin, A. C. (M)

Saint Michaels
Lewis, G. (F)

Salisbury
Smith, W. H. (A)

Severna Park
Hastings, M. S. (A)
Young, A. F. (A)

Silver Spring
Abramovich, M. N. (SM)
Anderson, H. C. (VA)
Anderson, H. W. (SM)
Anspacher, W. B. (M)
Aristei, J. (M)
Barnard, E. H. (A)
Beaulieu, A. J. (A)
Bell, L. F. (A)
Bennett, R. D. (F)
Bernstein, B. (A)
Biosca, L. F. (VA)
Block, K. A. (A)
Bohn, A. L. (A)
Bond, E. G. (M)
Bonwit, S. E. (A)
Bowman, H. A. (A)
Braum, C. M. (VA)
Brimberg, M. M. (SM)
Brown, C. W. (SM)
Brown, J. H. (A)
Brown, V. A. (M)
Buchanan, W. D. (A)
Buckingham, S. A. (A)
Buehler, J. H. (A)
Burke, R. J. (SM)
Bush, G. B. (A)
Byer, D. L. (M)
Campbell, S. S. (A)
Cancro, C. A. (A)
Carleton, H. (A)
Cohen, J. (M)
Cook, F. W. (VA)
Cook, W. F. (M)
Costrell, L. (M)
Cote, A. J., Jr. (A)
Cotts, A. C. (M)
Craig, P. M., Jr. (A)
Culling, E. J. (A)
Dalton, R. A. (A)
Davis, M. F. (A)
Dawley, J. R. (M)
Demarr, J. D. (VA)
Dipell, R. E., Jr. (A)
Dobbins, B. D. (M)
Dorsett, J. W., Jr. (A)
Doud, R. D. (A)
Durkovic, J. (M)
Dye, R. E. (A)
Edwards, P. L. (A)
Ellis, R. T., Jr. (A)
Fannin, B. B. (A)
Fiato, M. (A)
Fund, S. R. (SM)
Funkhouser, R. E., Jr. (A)
Gardenhour, A. J., Jr. (A)
Gilbert, J. N. (A)
Gilford, S. (A)
Gillean, M. E. (A)
Gilliam, F. P. (A)
Gisser, M. (A)
Glassco, P. B. (SM)
Gleason, R. J. (SM)
Goldstein, G. D. (A)
Gordon, H. L. (M)
Gossard, W. H. (A)
Gragnani, O. J. (A)
Greene, E. E. (M)
Greene, F. M. (M)
Greenwald, M. H. (A)
Guida, J. (A)
Haberland, E. R. (M)
Halvorsen, H. W. (A)
Hamblen, J. W. (M)
Hammack, J. W. (A)
Hammond, N. B. (A)
Hardy, A. O. (A)
Hayden, L. O. (A)
Hedrich, A. L. (M)
Henry, R. L., Jr. (A)
Herider, E. D. (M)
Hertz, M. (A)
Hiltner, R. P. (A)
Hoadley, J. C. (SM)
Hoffman, C. W. (A)
Hogan, D. L. (A)
Holbrook, R. O. (A)
Hosea, M. E. (A)
Hurlburt, E. H. (A)
Jacques, A. T. (M)
Johnston, T. F. (M)
Jordan, S. A., Jr. (A)
Kanter, J. I. (A)
Katzin, M. (SM)
Kaufman, B. A. (A)
Keck, A. (M)
Kee, J. W. (A)
King, W. P. (A)
Kirkland, G. I. (M)
Klapper, E. (A)
Klein, W. J. J. (M)
Klink, G., Jr. (A)
Knodle, R. L. (A)
Knowles, R. B. (M)
Kolsrud, E. R. (A)
Kreis, A. L. (VA)
Kreitzer, H. M. (M)
Kuck, J. H. (SM)
Laden, H. N. (A)
Landis, P. E. (A)
Larsen, J. (M)
Larson, R. C. (M)
Latson, F. W. (A)
Leach, J. H. (M)
Leinfelder, E. J. (A)
Leonard, F. M. (M)
Leslie, C. B. (A)
Lewis, H. A. (A)
Longley, P. B. (A)
Looney, H. C. (VA)
Louer, P. E. (A)
Lun, M. J. (A)
Marchetta, P. (A)
Marsh, D. S. (A)
Marshall, B., Jr. (A)
Martin, K. H. (SM)
Mascone, A. A. (A)
McCarter, G. B. (A)
McDonald, L. W. (A)
Melton, G. H. (A)
Melvin, E. A. (A)
Merchant, W. J. (SM)
Mitoma, E. Y. (A)
Muehmore, T. F. C. (M)
Nagy, A. W. (SM)
Oakes, J. B. (A)
Ober, H. E. (A)
Page, C. H. (SM)
Pettingill, S. A. (M)
Plotkin, G. N. (M)
Plotkin, I. (A)
Poritzy, S. B. (A)
Portmann, P. A. (M)
Powell, R. M. (M)
Pratt, H. (F)
Preisman, A. (SM)
Prugh, T. A. (M)
Randolph, J. P., Jr. (A)
Redler, W. M. (A)
Redmond, J. J. (SM)
Reed, H. Z. (A)
Renick, M. R., Jr. (A)
Ribner, M. (A)
Rice, L. W. (VA)
Rice, S. M. (M)
Robel, R. B. (A)
Robertson, T. M. (A)
Robinson, R. O., Jr. (SM)
Rogers, C. J. (A)
Rolfe, R. G. (A)
Rotkin, I. (SM)
Ross, R. R. (M)
Rowland, R. W. (A)
Rudigier, J. J., Jr. (A)
Sackman, R. (A)
Sanders, M. (A)
Scheets, D. F. (A)
Schulman, J. R. (A)
Seaton, J. W. (M)
Seymour, H. A. (A)
Sheppard, T. W. (M)
Sloaf, J. H. (M)
Smith, E. L., Jr. (A)
Smith, L. D. (A)
Smollett, R. J. (A)
Spenser, C. W. (A)
Staake, D. B. (A)
Sterling, G. E. (F)
Swanson, E. E. (A)
Talcott, G. P. (M)
Taylor, R. E. (A)
Tellman, H. A. (SM)
Terrell, R. L. (VA)
Teske, J. A. (A)
Thrasher, P. M., Jr. (A)
Thynell, G. M. (A)
Toense, R. A., Jr. (A)
Totah, E. J. (A)
Trainer, R. F. (A)
Tregidga, A. C. (SM)
Trout, P. A. (A)
Udelson, B. J. (A)
Uglow, K. M., Jr. (A)
Vann, W. L. (A)
Vilas, E. T. (A)
Wales, R. O. (A)
Walters, L., Jr. (M)
Waltz, W. R. (A)
Ward, H. T., Jr. (A)
Weichbrod, J. (SM)
Weinschel, B. O. (M)
White, N. (SM)
Williams, E. M. (A)
Wilson, C. A. (A)
Wise, J. W. (M)
Witow, M. I. (M)
Wyman, R. C. (M)
Zefting, A. H. (M)

Snow Hill
Powell, J. L., Jr. (A)

Solomons
Ikerd, H. M. (A)
Jones, W. C. (M)

Spencerville
Smith, W. L. (SM)

Stevenson
Caplan, N. (M)

Takoma Park
Anderson, L. D. (A)
Armstrong, A. C. (A)
Batten, J. C., Jr. (A)
Black, C. J. (M)
Blackburn, C. A. (A)
Blank, S. (A)
Cassedy, E. S., Jr. (A)
Chaney, A. L., Jr. (A)
Darne, F. R. (A)
Dye, J. E. (A)
Gerber, H. (A)
Gilder, G. (A)
Heising, W. P. (A)
Hibbard, W. D., Jr. (A)
Irons, H. R. (A)
Moore, W. J. (A)
Spalding, J. P. (SM)
Thrift, S. R. (M)
Toth, E. (SM)
Triplett, T. R. (A)
White, P. E. P. (A)
Woodson, H. H. (A)
Yost, C. F. (A)

Timonium
Pfund, C. E. (A)

Towson
Ackerman, W. W. (A)
Allison, D. M., Jr. (A)
Barnhill, R. B. (M)
Bath, C. C. (A)
Bowers, C. E. (A)
Brown, D. (A)
Brown, K. H. (A)
Butler, H. J. (M)
Colvin, J. W. (M)
Cooper, G. (A)
Cosby, J. R. (M)
Coyle, P. L. (A)
Eaton, T. T. (SM)
Ecker, J. L. (A)
Edwards, R. B. (M)
Fales, D., III (A)
Frazier, R. K. (A)
Frazier, R. V. (A)
Frost, F. K. (A)
Gage, D. D. (A)
Giesecke, H. W. (A)
Gimon, E. E. (M)
Graffis, L. F. (SM)
Hammond, J. W. (SM)
Hanna, R. E. (A)
Hatfield, G. I. (A)
Heller, D. M. (SM)
Horsman, J. O. (A)
Isley, C. T., Jr. (A)
King, E. J. (A)
Kochevar, H. J. (M)
Kraft, E. A. (A)
Kudo, F. M. (A)
Laning, W. A. (M)
Leder, A. (A)
Lynch, D. S. (SM)
Markwalter, J. L., Jr. (M)
Prather, W. W. (A)
Pratt, J. W., Jr. (M)
Purinton, H. G. (M)
Randolph, G. W. (M)
Shackelford, H. L. (A)
Shelor, E. G., Jr. (A)
Shropshire, H. C., Jr. (A)
Sims, W. H., Jr. (VA)
Slager, C. M. (A)
Stewart, W. H. (A)
Streisand, J. L. (A)
Taylor, J. H. (SM)
Thomas, R. K. (M)
Vana, C. J. (A)
Welsted, I. G. (A)
West, W. S. (A)
Whiffen, R. E. (M)
White, G. R. (SM)

University Park
Coker, R. H. (M)
Sparrow, E. L. (A)
Von Recklinghausen, D. (A)
Voutselas, T. (A)
Wantuch, E. (M)
Ware, L. R. (A)
Warren, R. M. (A)
Woo, W. D. (SM)

Washington Grove
Seaton, S. L. (SM)

West Hyattsville
Berry, R. J. (A)
Bitz, E. A. (A)
Faram, H. D. (A)
Ingalls, R. S. (A)
Kennedy, E. D. (A)
Sharaf, H. M. (A)
Stahl, B. E. (VA)
Staras, H. (M)

Westminster
Bennighof, R. H. (A)

Wheaton
Cotcher, A. L. (A)
Deacon, N. E. (A)
Slutz, R. J. (A)
Woodside, G. E., Jr. (A)

Wheaton Heights
Baechtel, A. R. (A)

White Marsh
Francis, J. P. (A)

White Oak
Suozzi, J. J. (A)

Woodbine
Mullinix, N. E. (A)

Woodmoor
Smith, C. B. (A)

MASSACHUSETTS

Abington
Mielke, E. S. (A)
Morey, R. F. (A
Pihl, G. E. (A)

Acton
Packard, L. E. (SM)
Searle, R. W. (A)

Agawam
Stefanik, S. M. (A)

Allston
Allen, D. F. (A)
Futran, S. M. (A)
Inouye, G. T. (A)
Luftman, A. S. (A)
Morita, T. (A)
Oliver, J. J. (A)
Reiner, J. (A)
Stadig, S. V. (M)
Stevens, K. N. (A)

Amesbury
Farley, J. L. (A)

Amherst
Langford, J. W. (A)

Andover
Rounds, W. A. (A)
Zink, A. J., Jr. (SM)

Arlington
Aker, C. M. (A)
Benkley, F. G. (A)
Bogart, R. M. (A)
Buuck, W. P. (M)
Breitbord, J. L. (A)
Carlson, A. W. (A)
Carroll, T. J. (M)
Chang, S. H. (SM)
Clark, R. G. (SM)
Cohen, M. S. (A)
Cole, B. R. (A)
Cowie, R. J. (VA)
De Lisle, J. E. (A)
Donnelly, F. J., Jr. (A)
Fritch, D. J. (A)
Granlund, J. (A)
Gustaff, A. J. (A)
Hanson, G. (A)
Hawkins, R. S. (A)
Hiatt, R. E. (M)
Holt, R. B. (SM)
Kessel, B. (A)
Knight, H. M. (A)
Lally, V. E. (A)
Mahler, J. (A)
Maserian, L. (A)
Michaelis, H. P. (M)
Morley, H. B. (M)
Morrow, W. E. (A)
Nelson, J. R. (SM)
Pierce, J. A. (F)
Plotts, E. L. (SM)
Robinson, W. H. (M)
St. Jean, L. E. (A)
Spencer, R. C. (SM)
Stutt, C. A. (A)
Tarbox, E. F., III (A)
Torrey, B. M. (SM)
Trenholme, W. M. (A)

Arlington Heights
Lamson, H. W. (F)

Ashby
Coleman, D. L., Jr. (M)

Ashland
Rice, J. W. (A)
Tanigawa, G. (A)

Assinippi
Cary, T. R., Jr. (M)
Hall, I. A., Jr. (M)

Athol
Hastings, A. E. (A)
Higgins, W. F. (A)

Attleboro
Blottman, J. B., Jr. (A)
Channing, W., Jr. (A)

Auburndale
Crane, J. D., Jr. (A)
Fallows, R. S. (A)
Finneran, W. J. (A)
Hall, R. E. (A)
Ryan, C. E. (M)

Ayer
Erskine, H. E. (A)

Bedford
Barrett, R. M. (M)
Capen, E. B. (A)
Field, W. G. (A)
Hammond, G. H. (SM)
Harrison, J. R. (VA)
Robinson, A. W. (A)
Sears, N. E., Jr. (A)
Sherburne, A. E. (A)
Wulfsberg, K. N. (A)

Belmont
Barry, J. G. (SM)
Blackburn, J. F. (A)
Cox, W. W. (A)
Craig, J. W. (A)
Crosby, C. (M)
Dolbear, B. L. (SM)
Duncan, N. L. (A)
Elliott, C. I. (A)
Faran, J. J., Jr. (A)
Gray, H. L. (A)
Handy, R. A. (A)
Haywood, W. J. (A)
Hellenbrand, C. M. (A)
Hildebrand, J. G., Jr. (VA)
Hunt, F. V. (F)
Johnson, L. T., Jr. (A)
Kirkland, R. E. (A)
Klemperer, H. (A)
Linvill, W. K. (M)
McElroy, P. K. (F)
McVicar, K. E. (A)
Mercer, W. R. (SM)
Neville, D. J. (A)
Ray, G. H., Jr. (A)
Reed, J. (A)
Reintjes, J. F. (SM)
Shoemaker, P. B. (A)
Simons, J. C., Jr. (A)
Teixeira, N. A. (A)
Wagner, C. A. (A)
Wagner, R. W. (M)
Weingarten, J. (A)
Wells, W. J. (A)
White, A. D. (A)
Woodward, R. H. (A)
Zimbel, N. S. (A)

Beverly
Biggs, O. H. (A)
Carter, G. E., Jr. (M)
Dillaby, E. F. (VA)
Flashner, G. (A)
Gysan, R. L. (A)
Odom, G. R. (M)
Perron, R. R. (M)
Porter, R. G. (VA)
Prescott, G. A. (A)
Reash, C. W. (SM)
Straney, K. O. (A)
Twicken, S. (A)

Boston
Adams, G. J. (SM)
Bairsnfather, R. R. (A)
Baptiste, G. F. (A)
Barassi, C. L. (A)
Bardfield, M. L. (A)
Bates, G. F. (A)
Baumann, A. (A)
Benson, E. D. (A)
Berliner, J. M. (A)
Bosch, F. M. (A)
Brodhead, W. M. (A)
Brooking, B. M. E. (A)
Burdick, G. E. (M)
Chin, F. K. (A)
Cohler, E. U. (A)
Cole, A. D. (A)
Coleman, A. F. (M)
Connelly, M. E. (A)
Cowperthwait, F., Jr. (A)
Cross, H. H. (A)
Dallin, E. B. (SM)
Dawson, J. W. (SM)
Dean, N. J. (M)
Di Nossi, A. D. (A)
Dolansky, L. O. (SM)
Dorschug, H. A. (M)
Downes, A. B. (A)
Drake, J. W. (A)
Elkind, J. I. (A)
Ellis, W. R. (A)
Essigmann, M. W. (SM)
Farley, B. G. (A)
Faulkner, W. H., Jr. (A)
Fellows, G. E. (A)
Fidler, R. R. (A)
Foundas, G. J. (A)
Gerber, L. B. (A)
Gianoukos, W. A. (A)
Glynn, J. J. (A)
Golden, N. J. (A)
Gordon, B. M. (A)
Greenburg, P. W. (A)
Hadge, E. (A)
Hall, R. E. (A)
Hannigan, W. T. (M)
Hastings, T. M., Jr. (SM)
Hatch, R. M., Jr. (M)
Heaviside, M. G. (M)
Hom, R. N. G. (A)
Huggins, W. H. (A)
Humphrey, W. S. (A)
Hyland, R. C. (A)
Jorgensen, S. W. (A)
Kadish, J. E. (M)
Kanter, M. M. (A)
Kapsalis, J. N. (A)
Kasowski, S. E. (A)
Keller, E. W. (A)
Kiesling, P. W., Jr. (A)
Kim, V. S. (A)
Laspina, C. A. (A)
Lee, R. H. (A)
Lewis, G. A. (A)
Lewis, P. M. (A)
Loewenthal, M. (A)
Macdonald, C. J. (A)
Madek, J. J. (A)
McPherson, R. R. (A)
Micol, R. L. (A)
Millen, S. G. (A)
Moy, M. (A)
Pendleton, F. C. (A)
Pickett, R. T., III (A)
Plaisance, S. F. (A)
Purnaiya, M. G. (A)
Rines, D. (VA)
Russell, L. (A)
Santelmann, W. F., Jr. (A)
Saunders, A. C. W. (M)
Schindler, J. A. (A)
Schnall, E. (A)
Seaver, W. H. (A)
Segel, H. P. (A)
Sferrino, V. J. (A)
Smith, B. H. (A)
Spitz, H. (A)
Stevenson, L. A., Jr. (A)
Strebach, F. (A)
Waite, S. (VA)
Wild, A. F. (A)
Wilkens, W. B. (SM)
Woods, R. E. (A)
Zaxman, B. (A)

Braintree
Brennen, J. E. (A)
Dionne, J. H. (A)
Myrbeck, E. R. (M)

Bridgewater
Jamison, A. F. (A)
Wilber, L. C. (M)

Brighton
Alpert, E. (A)
Appleman, M. A. (A)
Gada, N. (A)
Hanopol, L. (VA)
Husman, P. A. (A)
Key, E. L. (A)
Montanari, R. E. (A)
Murphy, J. E. (A)
Nishball, J. L. (A)
Riceman, S. (A)
Rochefort, J. S. (A)
Shansky, D. (M)
Sheingold, L. S. (A)
Vanderburgh, A., Jr. (A)
Waldman, M. D. (A)
Wallace, G. S. (VA)
Yurt, F. X. (VA)

Brockton
Fortier, O. V. (A)
James, P. G., Jr. (A)
Macadam, M. L. (M)
MacLeod, A. D. (M)
Sampson, E. J. (A)

Brookline
Bartzoff, B. (A)
Bartzoff, J. S. (A)
Bloom, J. H. (A)
Bowers, W. B. (M)
Cooper, G. (A)
Davidson, D. (A)
Fox, H. M. (A)
Gallagher, E. F. (A)
Gerhardt, R. H. (A)
Gesteland, R. C. (A)
Golembe, S. N. (M)
Hollander, G. L. (M)
Kirshner, H. J. (A)
Lebel, J. D. (A)
Lewis, M. C. (A)
Lourie, N. M. (A)
Lucal, H. M. (A)
Margolin, M. C. (A)
Meher, J. A. (A)
Pendleton, B. W. (A)
Polayes, M. B. (A)
Rappaport, M. B. (VA)
Richardson, D. A. (A)
Rohtstein, R. J. (A)
Schreiber, W. F. (A)
Sirbola, G. (A)
Winitzer, A. J. (A)
Wolf, S. M. (A)
Wong, G. W. (A)

Cambridge
Adams, J. Q. (A)
Adler, R. B. (SM)
Alexander, R. M. (A)
Alford, A. (F)
Allredge, L. R. (M)
Alperin, N. N. (A)
Andereeg, J. S. (A)
Angelo, E. J., Jr. (A)
Arthurs, E. (A)
Ausin, H. A. (M)
Bagley, P. R. (A)
Ba Hli, F. (A)
Baker, A. L. (A)
Barber, B. T. (A)
Bard, R. E. (SM)
Baruch, J. J. (M)
Batchelder, L. (SM)
Benfield, A. E. (SM)
Bennett, R. K. (A)
Berg, R. S. (A)
Beth, E. W. (A)
Bishop, W. B. (M)
Booton, R. C. (A)
Boucher, G. F. (A)
Bousquet, A. G. (SM)
Bowles, E. L. (F)
Bradshaw, E. R., Jr. (A)
Brennen, D. G. (M)
Brown, G. S. (SM)
Brown, J. H. (A)
Buckley, E. F. (M)
Burke, C. T. (F)
Bussgang, J. J. (A)
Busteed, P. E. (A)
Cady, C. A. (SM)
Caldwell, E. E. (M)
Carpenter, C. H. (A)
Carpenter, R. J. (A)
Cerrillo, M. V. (SM)
Chaffee, E. L. (F)
Champeny, J. C. (A)
Clapp, J. K. (F)
Clapp, R. E. (A)
Clayton, J. M. (SM)
Coburn, W. K. (M)
Cook, G. V. O. (A)
Corey, B. W. (A)
Daggett, N. L. (A)
Dawes, H. H. (M)
De Bettencourt, J. (A)
De Blois, S. W. (M)
Dentler, C. E. (M)
Downing, R. E. (VA)
Draper, C. S. (A)
Dudley, B. (SM)
Dunn, B. C., Jr. (A)
Dyett, E. G., Jr. (A)
Eames, A. M., Jr. (M)
Eastham, M. (F)
Easton, I. G. (SM)
Eisenstadt, B. M. (A)
Elias, P. (A)
Elkan, J. (A)
Fallows, E. M. (A)
Fano, R. M. (SM)
Finnegan, F. J. (A)
Flanagan, J. L. (A)
Forgie, J. W. (A)
Frank, R. W. (A)
Garber, T. A. (A)
Gardiner, K. W. (A)
Gilman, M. A. (VA)
Glass, W. G. (A)
Glucksman, H. A. (A)
Goldstein, M. H. (A)
Graham, J. W. (A)
Grande, V. J. (A)
Gray, H. L., Jr. (M)
Gray, T. S. (SM)
Green, P. E., Jr. (A)
Grim, W. M., Jr. (A)
Gross, E. E., Jr. (SM)
Guillemin, E. A. (F)
Hall, H. P. (A)
Hamilton, D. H., Jr. (A)
Harney, P. J. (M)
Hazen, H. L. (SM)
Hellman, G. (A)
Hersh, J. F. (A)
Hickman, R. W. (SM)
Hilgedick, W. C. (SM)
Hill, A. G. (F)
Hillger, R. E. (SM)
Hogan, W. D. (A)
Horn, H. S. (M)
Hughes, A. D. (A)
Irish, F. B., Jr. (A)
James, G. E. (A)
Jayne, A. W. (A)
Jeruis, F. J. (A)
Jervis, E. W., Jr. (A)
Johnson, L. E. (A)
Jones, N. T. (A)
Jones, R. U., Jr. (A)
Kaiser, J. F. (A)
Karplus, E. (F)
Kellner, R. (A)
Kennedy, D. P. (A)
Kennedy, F. (A)
Kessler, J. A. (SM)
King, R. W. (SM)
Kingston, R. H. (A)
Kinnard, K. F. (A)
Kodis, R. D. (A)
Kosowsky, D. I. (A)
Lahanes, C. J. (A)
Lee, F. F. (A)
Leonhard, J. (A)
Lephakis, A. J. (M)
Levin, M. J. (A)
Lewis, F. D. (SM)
Logemann, H., Jr. (M)
Lyman, F., Jr. (VA)
Machnes, B. (A)
Margolin, B. (A)
Martin, D. (VA)
Mason, S. J. (SM)
Matthews, E. W., Jr. (A)
Matz, C. H. (SM)
McCoy, R. T. (A)
McCusker, J. H. (A)
McGee, C. G. (A)
McKee, D. A. (A)
Merk, R. V. R. (A)
Michaud, R. E. (A)
Middleton, D. (M)
Mimno, H. R. (VA)
Mitchell, J. L. (A)
Moores, C. N. (A)
Moritz, C. (A)
Nevins, J. L., Jr. (A)
Newbold, R. F. (M)
Nottingham, W. B. (SM)
O'Day, M. D. (VA)
Olsen, K. H. (A)
Paine, B. B. (A)
Palughi, J. F., Jr. (A)
Parker, E. O., Jr. (A)
Pease, W. M. (A)
Perkins, K. C. (A)
Peterson, A. P. G. (SM)
Pfaff, R. J. (A)
Pierce, G. W. (L)
Pomper, V. H. (M)
Pontecorvo, P. J. (SM)
Portasik, J. P. (A)
Pote, A. J. (SM)
Powers, D. A. (M)
Preston, J. L. (A)
Putter, L. (A)
Quint, A. S. (A)
Radford, W. H. (SM)
Randell, T. C. (A)
Randolph, R. V. (A)
Reza, F. (M)
Richardson, L. D. (A)
Richmond, H. B. (F)
Rogers, J. R. (SM)
Ross, D. A. (A)
Ruplenas, R. J. (M)
Russell, C. R. (A)
Russell, W. J. (A)
Ruze, J. (M)
Saylor, W. R. (SM)
Scotney, J. H. (M)
Sheingold, D. H. (A)
Sinclair, D. B. (F)
Sircar, A. K. (A)
Smith, M. T. (SM)
Smullen, L. D. (SM)
Smulowicz, B. (A)
Soderman, R. A. (SM)
Sokal, N. O. (A)
Spencer, R. H. (A)
Strandberg, M. W. P. (SM)
Stratton, J. A. (F)
Susskind, A. K. (A)
Talley, W. K. (A)
Taylor, J. C. (A)
Thiessen, A. E. (SM)
Toman, K. (A)
Trantham, H., Jr. (M)
Travers, P. (A)
Tucker, C. E. (SM)
Tucker, F. L. (A)
Van Meter, D. (M)
Van Voorhis, S. N. (SM)
Verano, F. (A)
Verzuh, F. M. (M)
Walquist, R. L. (A)
Wang, A. (SM)
Wang, S. (A)
Ward, J. E. (A)
Ward, W. W. (A)
Wargo, J. J. (A)
Webb, H. A. J. (M)
Webster, F. A. (A)
Webster, W. G. (SM)
Weil, T. A. (A)
Weiner, F. M. (SM)
Wentworth, A. M. (A)
Westphal, W. B. (A)
Wheatland, D. P. (A)
Whelan, C. R. (M)
Whelden, J. W. (A)
White, D. C. (A)
White, S. A. A. (A)
Wildes, K. L. (A)
Willenbrock, F. K. (A)
Wingate, S. A. (A)
Wood, R. W., Jr. (M)
Woodward, C. A., Jr. (SM)
Worthen, C. E. (SM)
Yamins, H. G. (M)
Yamron, J. (A)
Youngblood, W. A. (A)
Youtz, P. (A)
Zucker, F. J. (A)

Carlisle
Macmillan, R. R. (A)

Charlestown
Noonan, J. T. (A)

Chelmsford
McCormack, T. L. (A)
Palmer, W. F. (A)

Chelsea
Barabush, A. (A)
Wolfson, W. (A)

Cheshire
Leonard, S. C. (VA)

Chestnut Hill
McFarlan, R. L. (SM)
Miller, A. (A)
Richards, P. I. (A)
Wicks, W. F. (A)

Chicopee
Schumacher, H. (A)
Zdeb, S. E. (A)

Chicopee Falls
Bigda, F. J. (A)
Dulchinos, J. (A)
Guertin, R. J. (A)

Cochituate
Alexander, W. G. (SM)
Faigen, I. M. (A)
Haider, G. W. (M)

Cohasset
Massa, E. A. (SM)
Massa, F. (VA)

Concord
Burley, R. M. (A)
Hague, W. M., Jr. (M)
Harris, J. N. (A)
Hollingsworth, L. M. (SM)
Forrester, J. W. (SM)
Janvrin, W. A., Jr. (SM)
Kelner, R. C. (A)
Kilham, L. F., Jr. (M)
Labounty, J. E. (A)
Lawton, D. C. (M)
Macdonald, W. S. (M)
Mack, R. A. (A)
Mathis, F. (M)
Parke, N. G., III (M)
Penfield, H. (A)
Roberts, G. T. (A)
Scott, R. E. (A)
Seamans, J. O. (A)
Sebring, P. B. (M)
Siebert, W. M. (A)
Slade, M. G. (A)
Tuttle, W. N. (F)
Walen, R. S. (A)
Walworth, W. V. (A)
Watt, C. W., Jr. (M)
Westcott, V. C. (A)
Whitehorn, R. M. (A)
Whitman, J. A. (A)

Dalton
Pack, E. L. (A)

Danvers
Dickson, D. C. (A)
Jones, R. L. (A)
Kauders, E. (A)
Koen, F. T. (A)
Law, R. R. (F)
Van Horne, J. L. (A)
Weinburg, E. F. (A)
Wolfskill, J. R. (SM)
Wroblewski, T. (A)

Dedham
Helm, G. D. (A)
Jackson, R. E., Jr. (A)
Jenks, F. A. (SM)
Searle, C. L. (A)

Dorchester
Berman, J. (A)
Berner, A. S. (A)
Callahan, R. J. (A)
Cleverly, J. F. (A)
Di Loreto, A. A. (A)
Duggie, R. L. (A)
Flaherty, F. E., Jr. (A)
Freedman, N. (A)
Heins, H. (A)
Herzberg, R. F. (A)
Katz, A. (A)
Kriger, L. V. (A)
Lenson, S. (M)
Lerner, H. A. (A)
Polito, V. J. (A)
Renner, G. W. (A)
Robinson, S. (A)
Ross, R. H. (A)
Rubin, M. D. (M)
Saltzberg, W. (A)
Shnitzler, R. K. (A)
Siedlecki, J. C. (A)
Slawsby, N. (A)
Sternick, S. H. (A)
Walker, R. M. (SM)
Wisneski, W. F. (M)

Dorchester Center
Rubinovitz, J. I. (A)

Dover
Cook, J. H. (SM)

East Boston
Welling, A. J. (A)

East Braintree
Long, K. G. (A)

East Brookfield
Houlihan, R. P. (A)

Easthampton
Gnacek, W. J. (A)
Mesh, T. J. (A)

East Lexington
Enticknap, R. G. (SM)

East Longmeadow
Landers, T. P.

East Lynn
Kazules, A. J. (A)

East Milton
Bowe, J. J. (A)

East Natick
Horton, W. P. (A)
Massard, R. L. (A)

East Pepperell
Wood, R. (SM)

East Princeton
Dickson, W. H. (A)

East Walpole
Burrell, R. E. (A)
Olivier, R. M. R. (A)
Stewart, R. F. (A)

East Weymouth
Fricks, R. E. (M)
Hickok, F. A. (A)

Essex
Sletten, C. J. (A)

Everett
Boyages, A. (A)
Cosentino, A. V. (A)
Cravotta, M. (A)
Finkle, M. (A)
Gantt, E. D. (A)
Halchak, J. R. (A)
Pickett, W. H. (A)
Plemenos, F. A. (A)

Fairhaven
Robinson, W. M. (SM)

Fall River
Powers, W. J. (A)
Ryan, J. E. (A)

Feeding Hills
Call, S. S. (A)

Fitchburg
Arthur, G. M. (A)
Pandiscio, A. A. (A)
Testarmata, N. R. (A)

Florence
Dewey, J. B. (A)

Foxboro
Gebel, H. W. (A)
Munro, W. D. (A)
Scanlon, W. C. (A)
Sturgeon, S. S. (VA)
Terrell, G. C. (A)
Wells, C. H. (A)

Framingham
Alley, R. P. (A)
Earl, R. J. (M)
Fraim, E. G. (A)
Hall, R. T. (A)
Phillips, T. L. (M)
Rosen, L. (M)
Ungvary, R. L. (M)

Framingham Center
Buckland, F. A. (A)
Keleher, A. E., Jr. (M)

Franklin
Handel, N. E. (M)

Gardner
Bujnicki, S., Jr. (A)
Richelieu, C. C. (M)

Georgetown
Nunan, K. W., Sr. (A)

Gloucester
Hammond, J. H., Jr. (SM)
Ktistes, P. J. (A)
Purington, E. S. (SM)
Short, J. A., Jr. (A)

Granby
Mack, P. W. (M)

Great Barrington
Hemmes, R. T. (M)
Markham, I. F. (A)

Greenbush
Brooks, G. W. (M)

Groveland
Earle, N. E. (A)

Hamilton
Peek, S. C. (SM)

Harvard
Gundersen, N. A. (A)

Haverhill
Atwood, D. J., Jr. (A)
Krinsky, B. D. (A)
Safran, L. (A)
Zoukee, M. G. (A)

Hingham
Broster, G. S. (A)
Dougherty, J. D. (A)
Drisko, B. B. (A)
Harris, C. C. (SM)
Pratt, F. (VA)
Swallow, C. E., Jr. (A)
Wood, J. O. (M)

Holliston
Heineck, A. W. (A)

Holyoke
Hampson, F. W. (A)
Junkins, C. E., Jr. (A)
Kennedy, D. J. (A)
King, F. H. (A)
Marek, L. W. (A)
Marek, M. B. (A)
Wernick, H. (A)

Hopedale
Tinkham, M. E. (A)

Hyde Park
Bonica, J. S. (A)
Burke, W. T. (A)
Lane, C. R. (M)
Martinson, R. M. (A)
Noyes, J. E. (A)
Ollive, J. F. (A)
Rich, A. L. (A)
Sims, B. S. (A)
Stanney, W. J. (M)

Ipswich
Baker, J. R., Jr. (A)
Bergerdn, W. F. (A)
McMillan, E. B. (SM)
Plaisted, A. H. (A)
White, H. B. (A)

Islington
Hedlund, D. A. (A)

Jamaica Plain
Arenberg, D. L. (A)
Buegler, R. J. (A)
Dunnet, W. J. (A)
Petraitis, A. J. (A)
Rocheleau, G. S. (M)

Kingston
Ertman, W. M. (A)

Lawrence
Ameen, S. J. (A)
Blanchette, C. F. (A)
Calobrisi, P. A. (A)
Chontoian, P. (A)
Hadad, J. D. (A)
Minicucci, R. P. (A)
Pappas, J. (A)
Pray, E. B. (M)
Zraket, C. A. (A)

Leominster
Spiller, M. E., Jr. (A)

Leverett
Roys, C. S. (SM)

Lexington
Atchley, D. W., Jr. (M)
Boehmer, H. W. (SM)
Burgess, L. M. (M)
Chaffee, M. (M)
Chu, L. J. (F)
Chute, D. H. (M)
Davenport, W. B., Jr. (M)
Dearborn, F. K. (M)
Detwiler, S. P. (A)
Emerson, W. P. (A)
Freeman, L. D. (A)
Goldberg, S. (M)
Hale, R. C. (M)
Hall, W. M. (SM)
Hammett, T. F. (A)
Harrington, J. V. (A)
Hauser, W. H. (M)
Hufton, C. D. (A)
Kelley, L. M. (A)
Kendall, P. R. (M)
Kline, F. S. (VA)
Knauss, H. C. (SM)
Kramp, K. M. (A)
Lewis, R. W. (A)
Littlejohn, H. C. (A)
MacDonald, D. A. (A)
Mackechnie, H. K. (M)
Martel, C. W. (SM)
McLeod, W. W., Jr. (A)
Naka, F. R. (A)
Northrop, P. A. (VA)
O'Neill, S. J. (A)
Packard, R. H. (M)
Parker, H. H. (A)
Pilkington, E. J. (VA)
Prescott, R. S. (M)
Reed, J. C. (A)
Reegan, J. E. (M)
Rehler, K. M. (A)
Richardson, A. W. (A)
Rosenberg, H. W. (M)
Schecter, H. (A)
Sheridan, W. F. (A)
Sherman, H. (SM)
Sokol, G. M. (A)
Spearin, F. W., Jr. (A)
Stevens, R. T. (A)
Warner, G. L. (A)
Weiss, H. G. (SM)
Williams, S. B. (A)
Wilson, H. M. (SM)
Winsor, D. L. (A)
Yewell, P. G. (M)

Lincoln
Scott, H. H. (F)
Wellman, B. (VA)

Linwood
Willis, F. A. (A)

Littleton
Houghton, R. W. (M)
McElroy, T. R. (A)

Longmeadow
Bassett, E. D. (A)
Cohen, M. (VA)
Gostyn, E. (M)

Lowell
Aslanian, A. (A)
Eckert, R. A. (M)
Gauriel, S. N. (A)
Giddis, A. N. (A)
Landry, L. H. (VA)
Michaels, A. G. (M)

Lynn
Bakalar, D. (A)
Blacquier, J. R. (A)
Collett, W. I. (A)
Cunningham, J. E. (A)
Dresios, S. C. (A)
Dumanian, J. A. (A)
Gates, E. K. (A)
Len, R. G. (A)
Manna, E. E. (A)
Marie, C. G. (A)
Proctor, H. E., Jr. (A)
Quamo, P. P. (A)
Riska, G. G. (M)
Waite, D. P. (A)

Lynnfield
Moore, R. L. (A)

Lynnfield Center
Radnor, R. R. (A)

Malden
Brown, O. C., Jr. (A)
Cutler, C. I. (A)
Hood, C. R. (A)
Linell, A. E. (A)
Lowe, M. E. (M)
Meyer, R. A. (A)
Nelson, C. V. (M)
Walsh, J. F. (A)
Werlin, A. M. (A)
Whitcraft, W. A., Jr. (M)
Williams, E. E. (M)
Zantos, N. G. (A)

Manchester
Hadfield, B. M. (SM)

Mansfield
Sabin, E. A. (M)
Sheldon, E. J., Jr. (A)

Marblehead
Chun, H. H. (VA)
Dane, F. W. (SM)
Gray, D. J. (A)
Hubbard, M. M. (SM)
Martin, W. H. (A)
Stromeyer, C. F. (VA)
Stuart, R. M. (A)
Tassinari, S. P. (A)

Marion
Warriner, R. R. (A)

Marlboro
Clark, F. E. (A)

Marlborough
Cheatham, T. P., Jr. (A)

Mattapan
Fertig, K. (A)
Ginsberg, I. (A)
Parker, R. (A)
Stone, I. C. (A)

Maynard
Walsh, J. J. (A)

Medfield
Glauberman, M. H. (A)
Jewell, R. L., Jr. (M)
Waddell, R. B. (A)

Medford
Belinski, A. M. (A)
Butcher, S., Jr. (A)
Demetrick, J. S. (SM)
De Young, J. A. (A)
Fiorello, E. A. (A)
Frost, A. D. (A)
Hobbs, C. F. (M)
Hokanson, H. P., Jr. (A)
Howell, A. H. (SM)
Krulee, R. L. (A)
Lane, J. F., Jr. (A)
Memzies, R. W. (A)
Mingins, C. R. (SM)
Mofenson, J. (M)
Morelli, A. (A)
Nault, F. J. (A)
Pearson, A. L. (A)
Quinn, W. T., Jr. (A)
Spongberg, R. C. (A)
Stevens, W. J. (A)
Stone, M. L. (A)
Sutro, L. (A)

Melrose
Black, P. B. (SM)
Burwen, R. S. (A)
Coggins, D. I. (M)
De Wolf, N. (M)
Ghen, W. R. (A)
Henrikson, F. R. (A)
Klane, C. H. (A)
Lewis, E. W. (A)
Newcombe, D. A. (A)
Rogers, W. S. (A)
Rose, L. J. (A)
Young, N. H. (A)

Merrimac
Manning, V. R. (A)

Methuen
Hurd, P. A. (A)
Pfund, E. T., Jr. (M)
Sable, R. L. (A)

Middleton
Nielsen, R. S. (A)

Milford
Kurlansky, S. (A)

Millis
Goodman, L. (M)
Sanders, E. W. (M)

Milton
Bradshaw, D. B. (A)
Day, W. J. (A)
Donovan, A. C. (A)
Gerber, A. (A)
Metcalfe, I. J. (M)
Moats, R. R. (M)
O'Day, A. C. (A)
Pritchard, E. M. (VA)
Smith, W. A. (A)
Woods, W. C., Jr. (M)

Nahant
Woodcock, C. A. (A)

Natick
Bastow, W. R. (M)
Benoit, G. F. (A)
Beswick, A. G. (A)
Blaisdell, A. A. (A)
Driscoll, J. F. (A)
Friedman, B. L. (A)
Gerdes, J. W. (A)
Gray, L. E., Jr. (A)
Heaton, R. G. (A)
Hogel, A. (A)
Holmes, K. O. (A)
Lockhart, H. H. (A)
Long, R. G. (A)
Meyer, M. A. (A)
Miller, H. A. (A)
Nicola, R. N. (A)
Nye, J. H. (M)
Platt, H. J. (A)
Ricardi, L. J. (A)
Rubin, R. (A)
Shelton, E. J., Sr. (A)
Topol, S. (A)
Vant, L. M. (M)
Walker, R. V. (A)
Wall, E. (A)
Walsh, J. E. (M)
White, M. M. (A)

Needham
Anderson, F. J. (A)
Baldwin, P. K. (SM)
Bullard, A. H., Jr. (A)
Creaser, C. W., Jr. (M)
Dean, F. R. (A)
Eckhardt, D. L. (SM)
Feuerstein, E. (A)
Heathcote, E. B. (A)
Henry, J. M. (VA)
Krueger, A. F. (M)
Mahoney, T. F. (M)
Pease, M. C., II (SM)
Rote, W. A. (M)
Rowland, H. J. (SM)
Sargent, H. P., Jr. (A)
Smith, H. J. (VA)
Tiffany, G. B. (A)
Whittemore, H. B. (A)
Whittier, E. W. (VA)

Needham Heights
Crowley, D. J., Jr. (A)
Kinne, C. B. (A)
Logan, C. A. (A)
Rettig, A. S. (A)

New Bedford
Bailey, W. M. (SM)
Golenpaul, C. (A)
Kahn, L. (SM)
Klemm, G. H. (A)
Saltus, G. E. (A)
Silva, C. C., Jr. (A)
Whiteside, J. S., Jr. (A)

Newbury
Christiansen, D. D. (A)

Newburyport
Fyler, N. F. (A)
Hadley, W. C. (A)
Harcher, A. J. (A)
Lemnios, W. Z. (A)
Lynch, R. E. (A)
Mavroides, J. G. (A)
Soorsoorian, S. A. (M)
Wimpy, E. K. (A)

Newton
Baker, A. (A)
Balmuth, N. (A)
Berghoefer, F. G. (A)
Bolan, R. S. (M)
Borts, R. B. (A)
Crippa, E. R. (M)
Dean, W. B. (A)
Fine, E. C. (M)
Jacobson, R. V. (A)
Kadet, J. (A)
Lowery, W. E. (M)
McCormack, R. L. (SM)
Michelson, M. (A)
Morse, C. H. (A)
Pucel, R. A. (A)
Rockwood, A. C. (SM)
Rudenberg, H. G. (M)
Smith, D. W. (A)
Smith, M. D. (A)
Taeschner, L. (A)
Taylor, A. R. (SM)
Weiss, B. J. (A)
Wheeler, L. P. (F)
Woolf, J. (A)

Newton Center
Aarons, J. (A)
Heick, B. K. (VA)
Hough, H. O. (A)
Jacobs, B. S. (M)
Kellner, R. L. (M)
Krim, N. B. (VA)
Lannary, J. (A)
Martin, L. B. (M)
Mills, W. B. (A)
Moore, W. C. (SM)
Pickard, G. W. (F)
Ward, A. E. (M)
Works, A. R. (A)
Zottu, P. D. (F)

Newton Highlands
Cummings, S. J. (M)
Friree, F. L. (A)

Newton Lower Falls
Farnsworth, E. P. (A)
Lindsay, G. A. (M)

Newton Upper Falls
Alessi, P. A. (M)
Fisher, R. E. (A)
Smith, L. C. (SM)

Newtonville
Brodkowicz, J. S. (A)
Farrington, J. F. (F)
Galagan, S. (A)
Handly, E. J. (A)
Hattery, W. V. (A)
Hatton, W. L. (A)
Hosmer, B. E. (A)
Wolfe, J. A. (A)
Woodward, C. A. (A)

Norfolk
Howard, G. E. (SM)

North Adams
Allison, W. M. (A)
Brafman, H. E. (A)
Devey, G. B. (M)
Dorat, S. (A)
Fabricius, J. H. (M)
Galbraith, J. S. (A)
Lehovec, K. (SM)
Tyler, R. H. (A)

Northampton
Ciaschini, W. (A)
Comble, A. A. (A)
King, A. D. (A)

North Beverly
Briggs, R. S. (A)

North Billerica
Sloan, G. H. (A)
Stillwell, T. E. (A)

North Chelmsford
Hathaway, S. W. (M)

North Dartmouth
Simmons, F. A. (A)

North Easton
Ames, D. (A)
Allen, L. W. (A)

North Reading
Hegler, R. E. (A)
Millen, J. (VA)

North Woburn
McCarthy, F. J. (M)

Norwood
Burns, H. S. (M)
Greene, G. G. (SM)
Gronroos, E. (A)
Johnson, H. A. (A)
Kleps, E. W. (A)

Palton
Alexander, D. C. (M)

Paxton
Stannard, G. E. (A)

Peabody
Harris, J. M. (A)
Maguire, W. M. (A)
Osepchuk, J. M. (A)

Pinehurst
Young, W. B. (A)

Pittsfield
Ayer, W. T. (A)
Boyajian, A. (SM)
Chertok, S. L. (A)
Green, W. W. (A)
Hardy, E. R. (A)
Hesse, M. H. (A)
Jordal, V. M. (A)
Landers, J. J. (A)
Lubin, S. (M)
Mentcher, I. (A)
Pierce, J. K. (A)
Podolski, G. A. (A)
Ringlee, R. J. (A)
Slagter, H. C. (A)
Velkers, G. D. (A)

Pocasset
Bennett, P. E. (A)
Hanson, N. L. (A)

Quincy
Burak, M. (A)
Burr, G. S. (A)
Grass, A. M. (VA)
Hartel, R. R. (M)
Malmberg, R. A. (A)
McLaughlin, W. C. (A)
Murphy, A. L. (A)
Osgood, R. C. (A)
Robertson, R. E. (M)
Strachan, R. W. (A)
Whitham, G. E. (A)
Zinchuk, M. (A)

Randolph
Bunting, J. H. (A)
Edwards, L. C. (A)
Sibley, R. C. (A)

Reading
Caywood, R. W. (A)
Hill, J. E. (M)
Kuczun, C. G. (A)
Lindsay, J. E. (A)
Morrison, D. A. (A)
Parsons, R. L. (M)
Shapiro, M. L. (A)
Skitzki, P. (M)
Smith, W. R. (M)
Taylor, N. H. (SM)
Zitzow, H. P. (A)

Revere
Abel, F. (A)
Di Venuti, A. L. (A)
Rosenbaum, B. (A)
Retman, W. (A)
Sico, A. (A)

Rockland
Hills, W. L. (A)
Maglathlin, R. N. (A)

Roslindale
Di Giorgio, J. A., Jr. (M)
Goodway, J. T. (A)
Kostecki, W. (A)
Murdoch, G. A. (A)
Murray, J. P. (A)
Palmer, P. J. (A)

Roxbury
Bovarnick, M. L. (A)
Crandell, P. A. (A)
Greenberg, S. A. (A)
Metten, W. H. (M)
Oxman, M. H. (M)
Snyder, R. L. (A)
Wolf, S. H. (A)

Salem
Gagnon, R. L. (A)
Nichols, H. F., Jr. (A)
Shortell, A. V., Jr. (A)

Saugus
Bradbury, R. A. (A)

Sharon
Cushman, R. W. (A)
Johnson, R. E. (A)
Lakari, R. W. (M)

Somerset
Ironfield, R., Jr. (A)
Lopes, R. E. (A)
Wardle, W. F. (A)

Somerville
Dorian, J. M. (A)
Fasciano, E. R. (A)
Haralampu, G. S. (A)
Kalakowsky, C. B. (A)
Kolster, C. C. (SM)
Levy, A. O., Jr. (A)
Maartmann-Moe, R. (A)
MacNair, E. A. (A)
Paskauskas, C. N. (A)
Rider, D. V. (M)
Vaccaro, P. (A)
Vaughan, T. J. (A)
Zieman, H. E. (A)

South Acton
Kienow, O. E. (M)
Palmer, F. J. (A)

South Boston
Slanina, E. P. (A)
Vitkus, P. L. (A)

Southbridge
Chapin, R. S. (SM)
Reiffen, B. (A)
Tillyer, E. D. (SM)
Traub, A. C. (A)
Wells, J. M. (SM)

South Dartmouth
Davis, S. L. (SM)
Fitzsimmons, T. J. (A)
Wood, G. D. (A)

South Hadley Falls
Davey, H. J. (A)

South Lincoln
Brown, D. R. (M)
Gibbs, N. E. (A)
Gross, T. A. O. (M)
Lush, M. J. (A)
Ostroff, E. D. (A)
Wilson, M. S. (A)

South Natick
Horan, W. H. (A)

South Peabody
Hiser, P. K. (A)

South Sudbury
Brown, K. E. (A)
Caldwell, R. J. (SM)
Keith, W. W. (A)
Throckmorton, K. L. (A)

South Weymouth
Abrahamsen, F. H. (A)
Briggs, F. R. (A)
Enemark, R. B. (A)
Fisher, A. B. (M)
Hall, J. R. (M)
Hill, H. F. (VA)
Wilson, R. T. (A)

Springfield
Andrews, M. A. (A)
Andrews, W. J. (A)
Bedard, G. O. (M)
Cameron, J. A. (M)
Carlson, F. A. (A)
Cooney, S. M., Jr. (A)
Cushing, F. F. (VA)
Da Prato, C. L. (A)
Dewey, C. S. (A)
Eisenmann, J. F. (A)
Fenton, A. F. (A)
Fratar, F. J. (M)
French, B. V. K. (SM)
Gagne, F. W. (A)
Knarr, C. E. (M)
Lyman, J. R. (A)
Norkin, H. (A)
Pappalardo, A. J. (A)
Plummer, C. H. (A)
Rich, D. A. (A)
Richardson, H. M. (SM)
Sable, A. J. (A)
Townsend, G. R. (A)
Webber, F. G. (SM)

Squantum
Bobroff, D. L. (M)
Jones, T. F., Jr. (SM)

Stoneham
De Agazio, E., Jr. (A)
Finley, A. D. (M)
Gardner, H. A. (M)

Stoughton
Linney, F. J., Jr. (A)
Sevian, E. A. (A)

Sudbury
Forbes, G. D. (M)
Hand, S. E. (SM)

Swampscott
Collier, E. E. (A)
Ludlam, W. A. (A)
Whittaker, H. F., Jr. (A)

Taunton
Lawlor, J. A. (A)

Topsfield
Castle, R. L. (A)

Tyngsboro
Pearce, P. F. (A)
Spindell, F. A. (SM)

Waban
Morrison, L. H. (SM)
Parisi, F. E. (A)
Sprague, R. M. (A)
Young, K. A. (SM)

Wakefield
Bianco, J. F. (A)
Jappe, H. C. (A)

Walpole
Willis, J. C. (A)

Waltham
Abate, A. (M)
Angelick, A. A. (A)
Anton, R. F. (A)
Aoyama, H. T. (A)
Ashton, D. (A)
Baxter, L., II (A)
Bickford, W. J. (A)
Brown, D. F. (A)
Chernosky, E. J. (M)
Chittenden, K. M. (A)
Clark, N., Jr. (A)
Coroniti, S. C. (M)
Davisson, R. R. (A)
Devereux, J. G. (A)
Dixon, R. K. (M)
Drake, W. W., Jr. (A)
Dukat, F. M. (M)
Durfee, G. H. (A)
Elliott, H. M. (A)
Ellowitz, H. I. (A)
Englund, E. T. (A)
Engman, G. E. (A)
Getting, I. A. (SM)
Gilmour, W. E. (A)
Grenier, H. N. (A)
Guba, R. F. (A)
Guiney, R. J. (A)
Hannon, S. (M)
Hines, P. P. (A)
Hlavacek, A. R. (A)
Hull, D. R. (F)
Hurney, P. A., Jr. (A)
Hutchins, W. R. (SM)
Jackson, S. R. (A)
Jacobs, H., Jr. (A)
Jones, J. W. (M)
Kaye, R. L. (A)
Kelly, T. J. (A)
Kokidko, A. (A)
Kurth, H. H. (SM)
Lehr, C. G. (M)
Lester, D. R. (A)
Lord, N. W. (A)
Lowe, W. R., Jr. (A)
Mandell, A. (SM)
Marcley, W. E. (A)
Metz, F. A. (SM)
Nichols, N. B. (SM)
O'Neil, C. E. (A)
Owen, S., Jr. (A)
Parkinson, G. B. (A)
Porter, A. D. (A)
Reed, R. D. (M)
Reifel, H. (A)
Riblet, H. J. (A)
Rogers, T. F. (M)
Sallen, R. P. (A)
Santangelo, J. (M)
Saunders, N. T. (A)
Shapiro, S. (A)
Shaw, G. J. (M)
Sherman, D. (A)
Skowron, J. F. (A)
Soltes, A. S. (A)
Stewart, A. K. (A)
Stockman, H. (SM)
Taylor, K. A. (M)
Thomas, H. J., Jr. (A)
Thompson, D. C. (A)
Tucker, N. (A)
Vacca, R. H. (A)
Von Alven, W. H. (M)
Waters, R. A. (M)
Watkins, A. E. (A)
Welchardt, H. H. (M)
Welts, J. (A)
Wilson, E. F. (A)
Windsor, R. B. (SM)

Watertown
Altieri, J. R. (A)
Andres, N. E., Jr. (A)
Antman, M. A. (SM)
Aronow, S. (A)
Bagnall, J. J. (A)
Bauer, P. S., Jr. (A)
Beddoe, A. C. (M)
Beloungie, L. W. (A)
Chacran, J. J. (A)
Chenez, R. D. (A)
Clark, D. L. (A)
Colten, B. (A)
De Shon, H. C. (A)
Dieterich, E. J. (A)
Epstein, D. J. (M)
Field, R. F. (F)
Gottschalk, W. M. (M)
Graustein, W. W., Jr. (M)
Hampson, E. R. (A)
Harden, C. M. (M)
Huntley, W. F. (M)
Koskinen, G. K. (A)
Kunstadt, G. H. (A)
Lazarkis, P. J. (A)
Le Fort, D. T. (A)
Lenhardt, L. J. (A)
MacCullum, J. M., Jr. (A)
Mudgett, W. L. (A)
Murray, M. W. (A)
Nelson, A. A. (A)
Newman, P. (M)
Paul, T., Jr. (M)
Pritchard, W. L. (SM)
Read, V. H. (A)
Richmond, M. R. (A)
Samson, E. W. (SM)
Schlener, J. E. (A)
Sletten, R. P. O. (A)
Terzian, V. V. (A)
Trimble, R. F. (M)
Wiesner, J. B. (F)

Waverly
Mekota, J. E., Jr. (A)
Nilssen, R. H. (A)

Wayland
Ballou, E. T. M. (M)
Campbell, R. E. (VA)
Dolce, S. L. (A)
Gillespie, C. N. (A)
Hodgkinson, W. S. (A)
Kayland, E. N. (M)
Larkin, K. T. (M)
Powers, D. M. (A)

Webster
Lanman, T. W. (A)

Wellesley
Alden, J. M. (A)
Bacon, F. S., Jr. (M)
Bark, A. (M)
Bobrow, E. N. (A)
Brainerd, H. B. (SM)
Bristol, H. B. (A)
Charow, W. J. (A)
Hart, H. M. (SM)
Hartley, M. S. (M)
Hautaniemi, B. W. (A)
McDowell, L. S. (SM)
Newton, G. C., Jr. (M)
O'Donnell, A. J., Jr. (SM)
Thomson, E. C. (A)
Weis, J. L. (M)

Wellesley Hills
Chaffee, R. E. (SM)
Eager, M. (SM)
Hall, J. D. (A)
Humphrey, G. S. (A)
McKinley, W. D. (A)
Murphy, W. M., Jr. (A)
Weeks, P. T. (SM)

Wenham
Tarr, R. K. (A)

West Acton
Clark, R. U. (A)
Cohan, L. (A)
Panetta, A. R. (A)
Pappas, P. O. (A)

West Boylston
Surprenant, A. H. (A)

West Concord
Cleveland, A. W. (M)
Holtje, M. C. (A)
Robinson, M. P., Jr. (A)

West Falmouth
Austin, J. F. (A)

West Lynn
Cunningham, J. E. (A)
White, A. (A)

West Medford
Chu, G. Y. (A)
Lanciani, D. A. (A)
Memishian, J. (A)
Slack, C. B. (A)
Stevens, C. A. (SM)

West Newton
Armstrong, D. G. (A)
Bean, O. E. (A)
D'Argento, F. R. (A)
Friedman, M. (A)
Hergenrother, R. C. (SM)

MacDowell, K. M. (A)
Myers, H. L. (M)
Parkin, T. R. (A)
Pekin, H. T. (SM)
Slusher, W. E. (A)
Smith, J. E. (SM)
Spencer, P. L. (A)
Turner, J. L. (A)
Wilcox, R. B. (M)
Wyckoff, P. H. (M)

Weston
Alstad, N. J. (A)
Beveridge, H. N. (A)
Brockington, H. F. (M)
Brown, W. C. (VA)
Burt, W. G., Jr. (M)
Conard, R. W. (A)
Dairiki, S. (A)
Gouin, P. L. (A)
Gross, F. A. (VA)
Hills, C. E., Jr. (VA)
Hoeppner, C. H. (SM)
Kahler, R. C. (A)
Kirkpatrick, D. N. (SM)
Ready, W. A. (SM)
Ricker, H. (A)
Thomas, J. E., Jr. (SM)
Van Rennes, A. B. (M)

West Roxbury
Alessi, V. J. (A)
Bagby, R. B. (A)
Downing, J. T. (A)
Haddad, S. G. (M)
Levy, S. L. (M)
Saad, T. S. (A)
Smith, R. V. (A)
Teachman, A. E. (SM)
Thomas, J. E. (A)

West Somerville
Henegar, H. B. (A)

West Springfield
Burnett, K. H. (M)
Rich, E. A. (A)

Westwood
Arlin, M. N. (M)
Gere, A. J. (A)
Hildebrant, B. M. (A)
Paddock, R. B. (A)
Staples, E. B. (SM)
Westbom, A. C., Jr. (A)

Weymouth
Torney, F. L., Jr. (A)
Wise, D. P. (SM)

Whitman
Gallimore, J. W. (A)
Simmons, E. C. (M)

Williamstown
Curry, J. R. (A)
Gray, D. A. (A)
Ness, O. A. (A)
Peck, D. B. (A)
Postle, A. H. (A)
Richardson, T. P., Jr. (A)
Schimmel, J., III (M)
Sheehan, R. P. (A)
Shuey, L. S. (A)
White, J. A. (A)

Willimansett
Songayllo, A., Jr. (A)

Winchester
Babakian, J. (M)
Beranek, L. L. (F)
Browning, G. H. (SM)
Byers, W. F. (M)
Cade, P. J. (A)
Chandler, G. E. (M)
Freedman, J. (SM)
Gillin, J. M. (A)
Hanson, P. R. (M)
Hinckley, R. H. (A)
Ivers, J. H. (A)
Leach, H. H. (A)
Martin, S. T. (SM)
McFarlane, D. J. (M)
Parks, P. B. (SM)
Pick, G. G. (A)
Redding, F. W., Jr. (A)
Sawyer, D. S. (A)
Segerstrom, C. A., Jr. (SM)
Tunnicliffe, W. W. (A)
Walters, S. H. (SM)

Winthrop
Esakov, D. A. (A)
Hooper, W. G., Jr. (A)
McDonald, F. J. (A)
Somers, L. (A)
Telcher, S. W. (A)
Tullin, M. B. (A)
Walker, J. R. (A)

Woburn
Bettencourt, J. P. (A)
Corderman, C. L. (A)
Cullen, A. E., Jr. (A)
Katz, L. (SM)
Lawler, J. J. (A)
Martin, P. E. (A)
Mead, D. C. (SM)
Sall, I. (A)
Seifert, W. W. (A)
Sutherland, J. J. (M)
Ulm, E. H. (M)

Wollaston
Bixby, W. L. (A)
Burgoyne, C. L. (A)
Edmonston, A. S. (A)
McNamara, T. J. (A)

Worcester
Achramowicz, M. J. (A)
Bonvouloir, F. D. (A)
Browning, E. A. (A)
Connolly, J., S.J. (A)
Connor, W. J., Jr. (A)
Devletoglou, A. E. (A)
Didio, R. E. (A)
Eteson, D. C. (A)
Goldstein, I. (A)
Gregal, J. (A)
Handleman, M. (A)
Howe, D. W., Jr. (M)
Howes, D. E. (VA)
Karazia, R. J. (A)
Luzgauskas, E. M. (A)
Manoog, J. C. (M)
Newell, H. H. (SM)
Sanderson, G. H. (A)
Sarkees, V. T. (A)
Shulman, L. (A)
Sulkoskik, W. M. (A)
Wadsworth, W. B. (M)
Wolniewicz, R. S. (A)

MICHIGAN

Allegan
Boll, R. W. (M)
Rose, J. (M)

Allen Park
Bledsoe, J. A. (A)
Hogle, R. C. (A)
Tosh, W. M. (M)

Ann Arbor
Attwood, S. S. (SM)
Bartman, F. L. (M)
Beach, J. B. (A)
Black, J. R. (A)
Boorsma, C. J. (A)
Boyd, J. A. (M)
Bozoian, M. (A)
Brown, R. K. (A)
Butler, T. W., Jr. (A)
Carr, J. W., III (M)
Chaney, L. W. (A)
Clench, C. W. (A)
Cline, J. F. (SM)
Constant, J. N. (A)
Cottrell, D. E. (A)
DeBolt, A. L. (A)
DeHart, W. R. (A)
Dicker, P. E. (A)
Dow, W. G. (F)
Early, H. (SM)
Emery, R. R. (A)
Farris, H. F. (A)
Fawcett, R. G. (A)
Frese, R. E. (A)
Garner, H. L. (A)
Gilbert, E. G. (A)
Giliix, E. L. (A)
Gilmore, R. M., Jr. (A)
Griffin, S. J. (A)
Hall, G. O. (A)
Haneman, V. S., Jr. (A)
Hansen, R. J. (A)
Harvey, W. M., Jr. (A)
Hok, G. (SM)
Holland, L. N. (SM)
Johnston, R. W. (A)
Kazda, L. F. (A)
Kroll, R. T. (A)
Lanning, H. E. (A)
Liang, D. (A)
Loughry, B. W., Jr. (A)
Macnee, A. B. (M)
Middleton, W. B. (A)
Miller, M. H. (A)
Monroe, K. E. (A)
Needle, J. S. (A)
Orr, L. W. (A)
Pantek, H. R. (A)
Pool, M. H. (A)
Rauch, L. L. (SM)
Remley, F. M., Jr. (A)
Rogers, P. H. (A)
Rollin, R. A., Jr. (A)
Rowe, J. E. (A)
Rupke, E. (A)
Sanford, J. R. (M)
Schaefer, E. J. (A)
Schoderbek, J. J. (A)
Schulte, H. F. (A)
Schupp, A. A., Jr. (A)
Scott, N. R. (SM)
Scott, W. F. (A)
Sharpe, C. B. (A)
Smith, H. L. (M)
Sondeen, P. (A)
Spencer, N. W. (SM)
Stout, M. B. (SM)
Strand, J. (A)
Talpey, T. E. (A)
Thefoil, D. V. (A)
Tu, J. C. (A)
Welch, H. W., Jr. (SM)
Yater, J. C. (A)

Battle Creek
Gilbert, E. O. (A)
Griffin, R. E. (A)
Thunder, L. C. (A)
Wolfe, B. F. (A)

Bay City
Bowden, F. J. (A)
Woody, F. (A)

Bear Lake
Swain, A. T. (A)

Belleville
Benner, B. (A)

Benton Harbor
Estkowski, M. H. (A)
Fiebich, E. C. (A)
St. John, R. F. (A)
Zindler, G. F. (A)

Berkley
Marquis, A. (A)
Norris, W. J. (A)
Onia, J. (A)
Stewart, J. E. (A)

Berrien Springs
Lashier, H. M. (A)

Birmingham
Adams, R. L. (M)
Armil, R. W. (A)
Benaglio, R. V. (A)
Booth, F. E., Jr. (A)
Boundy, G. G. (SM)
Burge, F. L. (A)
Burmaster, K. E. M)
Butler, R. I. (A)
Castle, C. X. (M)
Chapman, F. W. (SM)
Fahringer, W. H. (A)
George, E. E. (M)
Hyland, L. A. (VA)
Martens, H. A. (M)
McClymonds, C. C. (A)
McDonnell, W. F. (M)
Mika, H. S. (SM)
Munro, G. M. (A)
Oxford, C. J., Jr. (A)
Smith, H. B. (A)
Somerville, A. (A)
Wilson, K. L. (A)

Brooklyn
Cottrell, M. (VA)

Buchanan
Burroughs, L. R. (A)
Hagey, L. P. (A)
Tomcik, D. J. (A)
Wiggins, A. M. (SM)

Charlotte
Rypstra, B., Jr. (A)

Chelsea
Bridgman, A. D., Jr. (A)

Clawson
Christensen, V. E. (A)
Dougherty, R. H. (A)

Coldwater
Munn, E. H., Jr. (A)

Concord
Warnock, E. W. (M)

Dearborn
Bevis, J. H. (A)
Boltz, H. A. (M)
Calladine, G. T. (A)
Fisk, R. H. (A)
Huber, P. (VA)
Hunsicker, J. E. (A)
Lien, C. E. (VA)
McLaren, I. H. (A)
Phillips, A. H. (A)
Roberts, G. A. (A)
Scherba, M. B. (A)
Smith, E. H. (M)
Zopf, K. B. (A)

Detroit
Adkins, H. T. (A)
Allured, R. B. (SM)
Almas, S. L. (M)
Amick, R. H. (A)
Atems, E. (M)
Bailey, T. F. (A)
Ballard, R. L. (A)
Bandoian, P. (A)
Baumgartner, J. H. (A)
Bazydlo, H. A. (A)
Blett, E. B. (VA)
Brauning, G. E. (A)
Brauning, T. W. (A)
Brede, E. F. (A)
Brooks, J. H. (A)
Brosch, H. T. (A)
Buchanan, A. B. (SM)
Buehler, F. A. (M)
Bueker, D. A. (A)
Burley, H. A. (A)
Bushor, W. E. (A)
Butcher, J. H. (A)
Caffrey, T. J. (A)
Capron, R. W. (M)
Casselberry, R. L. (A)
Ciliax, D. I. (A)
Clark, E. H. (A)
Clark, M. R. (A)
Clark, R. R. (M)
Clayton, G. H. (A)
Coleman, H. B. (A)
Cotton, R. J. (SM)
Craig, A. D. (A)
Currie, J. H. (A)
Da Roza, F. G. (A)
Davis, C. (VA)
De Claire, A. G. (A)
Delmerge, A. H. (A)
Denstadet, E. C. (SM)
Detar, J. B. (A)
Donaldson, J. W. (A)
Donovan, R. (A)
Driver, J. P. (A)
Drouillard, C. T. (A)
Dubois, R. C. (A)
Dudeck, P. H. (M)
Duston, D. L. (A)
Egigan, P. (A)
Eisen, C. G. (VA)
Eisler, G. (A)
Ferguson, D. R. (A)
Fisk, N. C. (SM)
Fitzner, B. J. (A)
Forgacs, R. L. (A)
Forsythe, E. H. (A)
Fox, D. J. (A)
Freeman, L. R. (A)
Friedenthal, A. (M)
Gach, R. C. (A)
Gannon, W. T. (SM)
Ganschow, D. C. (A)
Garelis, C. (A)
Gasparovitch, S. (A)
Green, K. E. (M)
Greenfield, H. (A)
Gundersen, R. E. (A)
Gundy, P. L. (M)
Hagerty, J. J. (A)
Hall, A. C. (SM)
Hall, J. R. (A)
Hamilton, R. E., Jr. (A)
Hanes, M. (A)
Hangstefer, J. B. (M)
Hanysz, E. A. (A)
Harrigan, P. M. (A)
Hartz, F. M. (A)
Hayes, C. W. (A)
Head, J. W. (M)
Hein, D. W. (A)
Heiser, E. S. (SM)
Hemenway, B. J. (A)
Hess, H. M. (M)
Hevron, W. W. (A)
Hill, F. E. (A)
Howard, L. R. (M)
Hubbard, W. B. (A)
Hughes, E. J. (M)
Huskey, H. D. (A)
Jarvis, D. T. (A)
Jaworowicz, J. H. (A)
Jennings, F. S. (A)
Johnson, E. C., Jr. (A)
Johnson, K. E. (A)
Jones, C. W. (A)
Jouppi, A. (A)
Kearney, F. W. (A)
Kelbzak, W. M. (M)
King, L. E. (VA)
Kocher, C. F. (M)
Konopka, E. P. (A)
Korby, I. (A)
Korzeniowski, E. M. (A)
Kossuth, A. K. (A)
Kranz, H. E. (SM)
Krauer, J. H. (A)
Kring, J. D., Jr. (A)
Krug, E. G. (A)
Krulikoski, S. J., Jr. (A)
Kuba, R. E. (A)
Kubala, A. M. (A)
Lang, G. J. (M)
Lawrence, S. C. (M)
Lee, E. H. I. (SM)
Legatt, G. E., Jr. (A)
Leibich, R. E. (A)
Lesinsky, F. (M)
Lessem, M. (A)
Leydorf, G. F. (SM)
Liddel, U. (SM)
Lindsay, I. C. (A)
Lipkin, L. (A)
Lippmann, S. A. (M)
Loh, F. C. H. (A)
Loiacono, J. V. (A)
Longerich, E. P. (A)
Loring, L. W. (A)
Lottermoser, R. L. (A)
Love, E. J. (M)
Luzer, H. J. (A)
Lynn, H. F. (A)
Mackenzie, W. G. (A)
Madgett, W. H. (A)
Mallon, R. H. (A)
Mandzyn, M. (A)
Manning, D. C. (M)
Martin, O. E. (A)
Mason, D. F. (A)
Master, W. R. (A)
Masuch, R. A. (A)
McCartin, L. M. (A)
McCollum, S. B. (A)
McConoughey, S. R. (A)
McFatridge, J. E. (A)
McGregor, A. D. (A)
Mendel, F. S. (A)
Metevia, E. E. (A)
Michaels, C. L. (A)
Michell, G. A. (A)
Milek, H. (A)
Miller, R. C. (A)
Millett, L. F. (M)
Mills, R. J. (A)
Minidis, A. (M)
Miwa, G. Y. (A)
Mohr, D. B. (A)
Monticello, W. A. (A)
Morin, D. C., Jr. (A)
Mueller, H. W. (M)
Nartonis, W. C. (A)
Newton, J. D. (A)
Nutter, M. J. (A)
Nymberg, R. J., Jr. (A)
O'Brien, D. J. (A)
Osborne, R. L. (VA)
Panik, M. J., Jr. (A)
Payne, D. V. (A)
Pecar, A. J. (A)
Penhollow, H. A. (VA)
Piper, C. A. (SM)
Rausch, W. D. (A)
Reiher, H. F. (A)
Reiss, N. D. (M)
Renkiewicz, R. (A)
Retko, E. (A)
Reust, R. (A)
Rice, L. (A)
Riemer, R. L. (A)
Rissi, T. L. (A)
Robb, D. E. (SM)
Robinson, T. (A)
Ross, H. G. (A)
Roush, F. H. (VA)
Rudolph, I. W. (A)
Runkle, E. G., Jr. (A)
Rykata, T. P. (A)
Satullo, A. R. (A)
Scanlan, R. J. (VA)
Schafitz, S. A. (A)
Schmeisser, K. R. (M)
Scott, D. E. (A)
Scott, T. T. (A)
Selvidge, H. (SM)
Slabiak, W. (A)
Smith, B. F. (VA)
Stahl, T. H., Sr. (A)
Sterling, S. (M)
Stocker, D. V. (A)
Stretanski, P. A. (A)
Studnicka, G. J. (A)
Szajna, E. F. (A)
Taplin, L. B. (A)
Taylor, K. J. (A)
Tevlin, R. J. (A)
Thompson, T. E. (A)
Tierney, T. (A)
Toland, A. C. (A)
Tompos, S. F. (A)
Travis, E. W. (A)
Turkish, M. C. (A)
Tuskal, M. A. (A)
Varterasian, J. H. (A)
Vidro, E. F., Jr. (A)
Vogel, C. I. (A)
Walker, J. R. (A)
Walton, H. E. (A)
Ward, D. B. (A)
Warnick, A. (A)
Webb, A. E. (A)
Wheeler, J. V. (A)
Williams, W. B. (SM)
Wilson, D. G. (A)
Winter, R. J. (A)
Wolf, I. B. (A)
Wolf, S. B. (A)
Wood, T. A. (A)
Yamauchi, T. T. (A)
Yaskoff, R. (A)

Ziniuk, M. A. (M)
Zito, P. J. (A)
Zoss, C. L. (A)
Zukowski, J. A. (A)

East Ann Arbor
Bethel, H. W. (A)

East Detroit
Boyda, M. C. (A)
Pence, W. K. (A)
Weagel, K. D. (A)

East Grand Rapids
Friedman, S. N. (M)

East Jordan
Leu, T. W. (A)

East Lansing
Ebert, I. O. (A)
Evans, R. J. (A)
Hyde, C. M. (A)

Farmington
Rockafellow, S. C. (M)
Thomsen, T. R. (A)

Ferndale
Amman, E. A. (A)
Clark, J. E. (A)
Erickson, E. A. (A)
Gardner, D. C. (M)
Hunter, J. S., Jr. (A)

Flint
Colosi, A. (A)
Hansen, H. B. (A)
McBride, W. J. (A)
Murphy, E. F. (A)
Riegle, G. W. (A)
Ryan, G. E. (VA)
Savage, L. A. (A)

Freeland
Carpenter, R. H. (VA)

Grand Junction
Krieger, H. C. (A)

Grand Rapids
Barfuss, J. D. (A)
Bateman, G. H. (SM)
Bell, R. E. (A)
Berg, R. C. (A)
Bergenroth, L. C. (A)
Bocast, D. R. (A)
Boyd, C. H. (A)
Calahan, L. F. (A)
Carrington, W. A. (A)
Davis, R. L. (VA)
DeJong, P. G. (A)
Gaydos, G. J. (VA)
Gorton, E. D. (A)
Hoop, R. E. (A)
Lundquist, L. E., Jr. (A)
McCurdy, D. L. (A)
McKay, R. L. (M)
Moses, R. C. (M)
Naylor, A. F. (A)
Puca, Q. J. (A)
Stevens, L. G. (M)
Van Zoest, C. (A)

Grandville
Korb, A. W. (M)

Grass Lake
James, F. M. (M)

Grosse Ile
McCall, W. A. (M)

Grosse Pointe
Hughes, G. W. (A)
Martz, A. F., Jr. (A)
Rohrs, R. R. (A)

Grosse Pointe Farms
Book, E. (A)
Hittel, L. A., Jr. (A)

Grosse Pointe Woods
Byerlay, H. L. (SM)
Dacken, L. L. (VA)
Gulevich, J. H. (A)
Membery, A. H. (A)

Hastings
Branch, R. (VA)

Hazel Park
Erway, P. B. (A)
Schubring, N. W. (A)

Highland
Beach, E. H. (M)

Highland Park
Chiavarini, E. W. (M)
Gould, H. S. (M)
Shileds, R. A., Jr. (A)
Stinson, R. C. (VA)
Van Dusen, H. J. (A)

Holland
Christophel, G. H. (A)
Tysse, H. L. (VA)

Houghton
Jones, R. J. (M)
Oswald, J. A. (A)

Huntington Woods
Lendway, J. M. (A)
Schiffman, J. (A)
Wilton, V. A. (M)

Inkster
Bailey, C. B., Jr. (A)
DeCamillis, M. (A)
Rheaume, R. O. (A)
White, O. (A)

Jackson
Baker, F. J. (A)
Bell, D. L. (A)
Bradin, J. S. (A)
Efting, H. J. (A)
Fisk, H. V. (A)
Foy, S. (A)
Hungerford, R. S. (A)
Knubbe, H. (M)
Longman, E. R. (M)
Ruppel, D. (A)
Sorem, H. (A)
Westrate, M. C. (A)
White, R. T. (M)
Wilson, A. G. (A)

Kalamazoo
Fetzer, J. E. (SM)
Lee, C. E. (A)
Marburger, W. G. (A)
Moehring, W. D. (A)
Roff, R. R. (A)
Wells, L. V. (SM)
Woods, O. R. (A)

Lansing
Walton, P. E., Jr. (A)
Winters, L. C. (A)

Lake Orion
Steinhoff, H. W. (A)

Leslie
Stansfield, S. J. (M)

Lincoln Park
Gudaitis, W. V. (A)
Saigeon, N. D. (M)
Tank, H. F. (VA)

Livonia
Spragg, L. A. (M)

Ludington
Hack, N. R. (A)

Marshall
Brewnell, G. T. (SM)

Marysville
Stoner, M. J. (A)

Midland
Adler, S. E. (A)
Bauss, H. H. (A)
Ruhl, H. D., Jr. (A)
Woodland, P. C. (A)

Monroe
Cooley, P. (A)

Mt. Clemens
Miller, C. E. (A)
Sullivan, R. P. (A)

Mt. Morris
Anderson, H. J. (M)

Muskegon
Castenholz, F. R. (M)
Hammer, R. V. (A)

Muskegon Heights
Sanborn, R. H. (A)

New Boston
Niswonger, B., Jr. (A)

Niles
Beach, H. R. (A)
Beaverson, W. A. (M)

North Street
Wood, E. E. (A)

Oak Park
Babala, J. (A)
Ferrara, G. (M)
Hart, D. E. (A)
Hutchinson, R. W. (A)
Shackman, N. (A)

Petoskey
Horniman, N. L. (A)

Plymouth
Ebersole, H. R. (A)
Joehlin, N. C. (A)

Pontiac
Cook, W. N. (A)
Filkins, L. D. (A)
Fisher, M. R., Jr. (A)
Fowler, T. W., Jr. (A)
Gardiner, S. R. (A)
Ragsdale, W. H. (M)
Smith, L. G., Jr. (A)

Port Austin
Herring, C. E. (A)

Pullman
Robinson, G. D. (VA)

Richmond
Clark, N. M. (A)

River Rouge
Haney, C. A. (A)
Shepley, L. (A)

Rives Junction
Monroe, D. G. (A)

Rochester
McIntire, E. L. (A)
Pennanen, V. W. (A)
Wiggins, T. B. (A)

Romulus
Miller, O. R. (A)

Roseville
Hoehn, A. M. (A)
Melvedt, H. (M)

Royal Oak
Andrews, G. B. (A)
Briggs, F. F. (A)
Coates, A. L. (VA)
Edwards, C. M. (M)
Frincke, P. O. (M)
Hughes, J. B. (A)
Larime, L. H. (SM)
Nauman, J. G. (A)
Reinhold, H. W. (M)
Solley, S. W. (A)
Vincent, C. J. (A)
Watschke, M. V. (A)
Werden, A. H., Jr. (A)
Wilmot, W. R. (M)

Saginaw
Beardslee, D. A. (A)
Boettcher, A. J. (A)
Holl, W. H. (A)
Hummer, J. L. (M)
Kelb, A. J. (A)

St. Clair Shores
Dill, C. L., Jr. (M)
Marino, L. A., Jr. (A)
Niles, J. R. (A)
Spero, A. F. (A)

Saline
Harding, W. G. (A)
Hedges, H. G. (A)

Samaria
Humiston, H. A. (SM)

Sault Ste. Marie
Champion, R. W. (A)

South Haven
Freeman, D. B. (A)

Three Rivers
Lancaster, R. G. (A)
Perkins, M. L. (VA)

Traverse City
Biederman, L. M. (M)

Trenton
Mills, G. L. (A)
Thornton, C. H. (A)

Van Dyke
Strang, J. M. (A)

Walled Lake
Belprez, G. R. (M)
Hart, A. D. (M)
Ristow, H. E. (M)

Washington
Lax, B. (A)

Whitmore Lake
Podewils, N. R. (A)

Willow Run
Kruger, V. (A)
Michaelis, T. D. (A)
Ross, G. F. (A)

Wyandotte
Clark, R. K. (VA)
Dolsen, J. A. (M)
Moore, J. B. (VA)
Welter, L. J. (A)
Wesser, C. H. (SM)
Workman, W. B. (A)

Ypsilanti
Allen, J. K. (A)
Augustus, L. M. (VA)
Blikken, W. A. (A)
Blythe, R. (M)
Breymaier, R. W. (A)
Cutrona, L. J. (SM)
Gaskill, R. A. (A)
Godde, H. H. (SM)
Harwood, F. E. (A)
Jean, W. H. (A)
Kelly, D. V. (A)
Klinger, D. E. (A)
Knapp, A. J. (A)
McLane, R. C. (A)
Miller, R. E. (A)
O'Day, J. (A)
Ohlosson, R. L. (A)
Peterson, W. W. (A)
Sherman, H. W. (A)
Stahl, W. L. (SM)
Van Valkenburg, E. S. (A)
Wheatley, W. A. (A)
Wilbur, E. T. (M)
Wilcox, G. A. (A)
Williams, R. O. (SM)

MINNESOTA

Adrian
Murphy, W. F., Jr. (A)

Anoka
Anderson, I. H. (M)
Collier, G. X. M. (VA)
Hornsby, J., Jr. (A)
Longfellow, R. C. (SM)

Balaton
Somermeyer, H. F. (A)

Champlin
Lautzenheiser, R. W. (A)

Cohasset
Davis, R. H. (A)

Crystal Village
Jones, W. N. (A)

Duluth
Persons, C. B. (SM)

Excelsior
Dawson, O. D. (A)
Nichols, R. F. (A)

Faribault
Folsom, D. E. (M)
Hyde, J. E., Jr. (A)

Fergus Falls
Thompson, F. M. (A)

Fort Snelling
Harrison, L. E. (A)

Glen Lake
Biltz, F. J. (A)

Hopkins
Carlson, K. J. (M)
Museus, H. U. (A)

Mankato
Ellis, G. A. (A)

Minneapolis
Adams, F. L. (A)
Adkisson, W. M. (A)
Ainsworth, F. W. (A)
Alderson, R. C. (A)
Anderson, E. M. (A)
Anderson, G. P. (A)
Anderson, L. T. (M)
Anderson, P. M. (M)
Bakken, E. E. (A)
Baldwin, J. H. (M)
Barbour, R. E. (A)
Behymer, D. J. (A)
Bergan, K. M. (A)
Blazer, F. H., Jr. (A)
Block, E. J. (A)
Bonrud, L. O. (A)
Bramsen, E. A. (A)
Brunetti, C. (F)
Burrell, W. P. (A)
Casey, T. J. (A)
Christensen, T. W. (A)
Croze, M. W. (A)
Cummings, K. C. (A)
Dale, E. H. (A)
Dinter, H. A., Jr. (A)
Dundovic, J. F. (A)
Eckstein, E. A. (A)
Edblund, A. J. (A)
Eggestad, M. (A)
Engelman, C. W. (M)
Ewart, J. M. (A)
Fanyo, W. P. (A)
Featherstone, R. P. (A)
Fosseen, I. J. (A)
Frohbach, H. F. (A)
Gebert, V. D. (A)
Gergen, J. L. (A)
Gise, F. G., Jr. (A)
Gottlieb, D. C. (A)
Gustafson, H. A. (A)
Hallaway, A. B. (M)
Halling, J. H. (A)
Hansen, G. F. (A)
Harding, E. W. (M)
Harris, L. A. (A)
Hartig, H. E. (F)
Hartig, H. L. (A)
Headen, H. V. (M)
Herrmann, F. W. (M)
Hickert, E. G. (A)
Hill, B. M. (A)
Hirashima, H. K. (M)
Hird, P. S. (A)
Hunt, G. W., Jr. (A)
Huss, S. J. (A)
Iverson, H. (A)
Iverson, M. W. (A)
Johnson, D. A. (A)
Johnson, H. C. (A)
Kalb, R. M. (SM)
Kelar, J. (SM)
Kerbs, W. A. (A)
Kershaw, J. A. (A)
Knox, M. E. (M)
Kruse, J. E. (A)
Kubicek, W. G. (M)
Laitinen, W. R. (A)
Lampert, L. F. (A)
Lanelle, L. O. (A)
Lehnert, W. E. (A)
Little, G. W. (A)
Lower, J. W. (A)
Lund, R. E. (A)
Markusen, D. L. (M)
Matthys, R. J. (A)
McElroy, W. J. (A)
McGinnis, W. J. (M)
Milton, R. T. (A)
Moerke, R. W. (A)
Mooers, H. T. (A)
Moore, J. H. (SM)
Muckenhirn, O. W. (M)
Needham, D. P. (A)
Nelson, E. J. (A)
Nerheim, E. (A)
Newman, M. M. (A)
Ney, E. P. (A)
Nunn, E. C. (A)
O'Brien, H. G. (A)
Olsen, M. R. (A)
Olson, K. A. (A)
Ostberg, E. H. (A)
Paidosh, R. L. (A)
Pearson, V. H. (A)
Pedersen, I. C. (SM)
Petersen, R. J. (A)
Phelps, B. (A)
Pidcock, R. E. (A)
Porrazzo, R. J. (A)
Pree, W. G. (M)
Premack, J. (M)
Prince, J. P. (A)
Ralnville, L. E. (A)
Rebne, H. K. (A)
Reid, J. M. (A)
Reinke, R. F. (A)
Remily, W. M. (A)
Renk, B. J. (A)
Riordan, J. V. (A)
Roberts, H. A. (A)
Schmitt, O. H. (SM)
Schott, O. A. (M)
Schuck, O. H. (SM)
Schulz, S. W. (M)
Sear, A. W. (SM)
Sell, R. L. (A)
Shepherd, W. G. (F)
Sherman, J. M. (SM)
Sibley, H. R. (A)
Snegoski, J. J. (A)
Snow, S. F. (A)
Spargo, T. G. (A)
Sprecher, N. D. (A)
Stone, N. T. (A)
Stucky, N. P. (A)
Thoen, R. L. (A)
T'Kach, H. V. (A)
Tobin, R. D., Jr. (A)
Toth, D. H. (A)
Van der Ziel, A. (SM)
Warhol, N. (A)
Weber, R. G. (A)
Wells, W. S. (A)
Weyrauch, H. E. (M)
Wilson, W. R. (M)

Mound
Cray, S. R. (A)
Harrison, J. L. (A)

New Brighton
Lind, A. L. (A)
Schwantes, R. C. (A)

Northfield
Jensen, M. C. (M)

North St. Paul
Hill, J. L. (M)

Plainview
Stitch, B. D. (A)

Red Wing
Jelatis, D. G. (A)
Lee, G. M. (A)

Renville
Francis, O. T. (VA)

Richfield
Doherty, R. P. (A)
Sifford, B. M. (A)

Robbinsdale
Sells, H. A. (M)

Rochester
Floyd, R. A., Jr. (A)
Gleichauf, T. J. (A)
Herrick, J. F. (M)
Jones, R. E. (SM)
Senstad, P. D. (A)

Rosemount
Chiswell, E. (A)

St. Louis Park
Neveaux, R. J. (A)

St. Paul
Adair, F. M., Jr. (A)
Albrecht, H. W. (M)
Arndt, R. B. (A)
Barnes, J. C. (SM)
Baumgaertner, C. J. (A)
Beck, V. W. (A)
Benassi, D. A. (A)
Berg, O. H. (A)
Berry, H. W. (A)
Bolenbaugh, J. E. (A)
Bratschi, R. W. (A)
Callen, M. W. (A)
Cohen, A. A. (SM)
Coil, N. B. (SM)
DeVir, J. F. (A)
Disser, C. J. (M)
Depew, H. H. (A)
Ericksen, R. S. (A)
Fullwiler, F. K. (A)
Giles, M. M. (A)
Glewwe, C. W. (A)
Graebner, M. S. J. (A)
Hardenbergh, G. A. (A)
Hess, P. N. (A)
Hilker, B. R. (M)
Hill, B. F. (A)
Hoover, L. R. (A)
Hulstrand, B. E. (A)
Jensen, W. (M)
Kahnke, J. (M)
Kelsey, J. R. (A)
Kleason, D. B. (A)
Knoblauch, A., Jr. (A)
Lahue, P. M. (M)
Lode, T. (A)
Mayo, P. M. (A)
Maze, R. O. (A)
Moe, W. J. (A)
Mullaney, F. C. (SM)
Murray, D. A. (M)
Nellis, W. M. (M)
Nelson, E. A. (A)
Nielsen, E. G. (A)
Olyphant, M., Jr. (A)
Pence, C. J. (A)
Peterson, D. A. (A)
Pierce, A. J. (A)
Prom, G. J. (A)
Purcell, C. J. (A)
Rowan, T. D., Jr. (A)
Rowland, C. A., Jr. (A)
Sabine, L. (A)
Shubert, N. (A)
Stahmann, J. R. (A)
Sundry, O. J. (A)
Tomash, E. (A)
Trevithick, J. A. (A)
Weaman, C. (A)
Wesslund, R. E. (A)
Williams, G. I. (A)
Winget, W. F. (A)
Zimmer, E. D. (A)

South St. Paul
DePoy, J. A. (A)

Stillwater
Bashara, N. M. (M)

Wadena
Grindheim, E. A. (A)

Walker
Tipple, R. J. (A)

Waseca
Hager, F. M., Jr. (SM)
Johnson, E. F. (VA)
Kozan, F. J. (A)

Wayzata
Johnson, L. E. (M)
Wagner, F. C. (A)
Young, S. B. (VA)

White Bear Lake
Campbell, R. N. (A)
Pool, K. C. (M)

MISSISSIPPI

Baldwyn
Peach, S. E. (M)

Biloxi
Boyens, R. D. (A)
Cancellari, N. J. (M)
Carney, D. A. (A)
Dailey, R. R. (A)
Hartwell, W. T. (A)
Ingling, T. M. (A)
Shoemaker, W. J. (A)
Squire, R. W. (A)
Van Loon, R. M. (A)
Williams, E. A. (M)

Greenwood
Johnson, H., Jr. (A)
Perkins, E. G. (A)

Greenville
Kittleman, M. (A)

Gulfport
Hugel, S. J. (M)
Lester, V. R. (A)

Jackson
Benson, G. G. (M)
Courtenay, J. A. (SM)
Daniels, L. H. (A)
Hurst, K. J. (A)
Stietenroth, J. D. (A)

Knob Noster
Kuhlman, E. A. (A)

Madison
McKay, F. C. (M)

Natchez
Bowers, D. E (A)

Ocean Springs
Davis, J. C., Jr. (A)

Pass Christian
Helwick, E. A. (A)

State College
Fitzgerald, D. F. (A)
Hutchison, P. T. (A)
Simrall, H. C. (SM)

Troy
Walker, J. A. (A)

MISSOURI

Affton
Brickler, J. B. (M)
Shirling, G. K. (M)
Toeneboehn, C. C. (M)
Winters, D. E. (A)

Brentwood
Green, W. G. (A)
Hall, R. S. (A)
Hicks, H. J. (M)
Mohrman, R. F. (A)
Wiese, A. H. (M)

Cape Girardeau
Clippard, R. W. (A)
Hirsch, O. C. (M)
Vandeven, D. W. (A)
Wilson, C. (A)

Clayton
Andersen, A. R. (A)
Johnson, H. L. (A)

Columbia
Lago, G. V. (A)
Lamb, J. F. (M)
Waidelich, D. L. (SM)
Wallis, C. M. (SM)

Creve Coeur
Lechtreck, L. W. (A)

Eminence
French, R. W. (A)

Ferguson
Henderson, H. W. (A)
Rekart, A. F. (VA)

Florissant
Fenton, R. J. (A)
Fordyce, S. W. (M)
Jacobsmeyer, H. T. (M)
Pondrom, A. J. (A)

Fulton
Nickles, R. W. (A)

Glendale
Hexem, J. (A)
Malsbary, J. S. (M)
Rustemeyer, G. L. (A)

Grain Valley
Harmon, R. C. (M)

Hickman Mills
Ashley, W. H., Jr. (A)
Bergren, A. L. (SM)
Newton, K. V. (A)

Independence
Butler, W. E. (A)
Forristal, J. A. (A)
Hathhorn, W. R. (A)
Moler, A. R. (VA)

Kansas City
Alig, R. J. (A)
Anderson, R. M. (M)
Anderson, R. W. (A)
Artman, R. G. (A)
Bagnall, V. B. (SM)
Barker, F. L. (A)
Beebe, J. A. (A)
Bell, W. E. (A)
Bishop, G. W. (M)
Boutros, O. L. (M)
Boyles, J. O. (A)
Braidwood, D. W. (A)
Butler, R. W. (A)
Chinn, F. T. (A)
Clarke, A. G. (A)
Constant, P. C., Jr. (M)
Cook, K. H. (A)
Curtis, C. V. (M)
Davis, S. E. (A)
Devoll, C. W. (A)
Easterday, M. R. (M)
Earp, J. A. (M)
Epstein, S. (A)
Fernane, J. (M)
Foster, C. L. (SM)
Fouts, A. L. (M)
Frost, S. H. (A)
Fry, W. E. (A)
Gibbs, D. R (A)
Glass, A. H. (M)
Goldenberg, H. E. (M)
Hadley, J. F. (A)
Hall, R. E. (A)
Harris, J. B. (M)
Harrison, A. E. (M)
Hax, D. H. (A)
Heffelfinger, J. B. (SM)
Heister, C. F. (M)
Heyde, H. C. (M)
Ingwersen, D. N. (A)
Jarboe, R. A. (A)
Johnson, W. R. (A)
Jones, F. S. (M)
Keith, J. M. (A)
Kennedy, J. L. (A)
Kimball, C. N. (F)
Koch, F. R. (A)
Lamb, W. X., Jr. (M)
Lansdown, W. D. (A)
Lutes, R. K. (M)
Martin, E. J., Jr. (A)
McAllister, M. J. (A)
McCall, E. A. (M)
McMurray, D. D. (A)
Meador, B. M. (M)
Miller, C. V. (A)
Moore, H. H. (M)
Morgan, H. K. (SM)
Nail, P. L. (A)
Nicholson, T. (M)
Nuttall, A. F. (A)
Parks, J. V. (A)
Pierce, C. H. (M)
Powell, K. W. (A)
Pulliam, C. S. (A)
Reitz, W. H. (A)
Robb, L. S. (A)
Robertson, J. P. (A)
Rollert, C. R. (M)
Rousseau, A. L. (A)
Rovang, R. J. (A)
Rozas, F. (A)
Saltzman, H. (A)
Salzer, C. E. (VA)
Sandefur, K. L. (A)
Schilling, J. T. (A)
Schwerin, E. B. (SM)
Shapiro, E. (A)
Shontz, L. A., Jr. (A)
Slusher, R. W. (A)
Smith, C. B. (A)
Smith, W. F., Jr. (A)
Smith, Z. R. (A)
Stearns, C. F. (A)
Stone, J. B. (A)
Stout, H. L. (SM)
Taylor, G. L. (SM)
Troeglen, K. (SM)
Tuttle, F. M., Jr. (A)
Uhrig, R. B. (A)
Van Gundy, C. G. (VA)
Van Horn, J. H. (SM)
Welborn, D. L. (A)
Welter, N. E. (A)
Werner, W. F. (A)
Werner, W. T. (A)
White, R. N. (SM)
Whittle, O. W. (A)
Wilcox, J. V. (SM)
Wilder, M. K. (A)
Williams, L. E. (A)
Williams, M. (A)
Wolfskill, R. F. (SM)
Young, C. D., Jr. (A)

Kirksville
Rogers, H. D. (A)

Kirkwood
Barnes, J. A. (A)
Binzel, M. S. (A)
Dubuque, T. J. (A)
Fiedler, G. J. (SM)
Harvey, H. (SM)
Helmreich, L. W. (A)
Laws, C. R. (A)
McAllister, J. C. (A)
Pectol, J. L. (A)
Risk, J. E. (A)
St. Vrain, W. E. (A)
Winter, D. F. (SM)
Yount, T. L. (SM)

Liberty
Budd, R. W. (M)
Hilton, W. A. (A)
Lovan, J. E. (M)

Louisburg
Watson, J. F. (A)

Malden
Lawson, R. G. (A)

Maplewood
Earley, J. M. (A)
Huebschen, R. G. (A)

Marshfield
Payne, W. E. (A)

Monett
Balden, J. M. (A)

Monroe City
Hirner, J. A. (A)

Moscow Mills
Withers, J. S. (A)

Normandy
Lowell, T. R. (A)
Murty, E. H. (M)
Reed, D. L. (A)
Stephens, E. T. (A)
Volk, J. A. (VA)

North Kansas City
Bishop, W. T., Jr. (SM)
Gordon, J. M. (A)

Overland
Lienhard, O. W. (SA)
Mosley, C. E. (SM)

Perry
Davis, C. L. (SM)

Pierce City
Smerdon, W. D. (A)

Richmond
Basham, R. (A)

Richmond Heights
Cummings, G. M. (M)
Harris, R. L., Jr. (A)
Lentz, J. T. (A)

Rock Hill
Baker, S. E., Jr. (A)

Rolla
Mitchum, M. M. (A)
Nolte, R. E. (M)
Rittenhouse, J. W. (M)
Skitek, G. G. (A)

St. Ann
Decker, D. D. (A)

St. Charles
Cook, A. B. (A)
Hommes, H. E. (A)

St. Joseph
Clark, R. M. (A)
Koch, J. W. (M)
Lux, K. E. (A)
Simonds, R. L. (A)

St. Louis
Ancona, J. A. (A)
Apel, C. K. (A)
Augustine, R. J. (A)
Beller, E. H. (A)
Bennetsen, W. J. (M)
Benson, R. W. (M)
Berland, H. K. (M)
Bitzer, R. J. (M)
Black, D. R. (A)
Booker, R. W. (A)
Brent, L. L. (M)
Bubb, F. W., Jr. (A)
Caglia, A. J. (A)
Cerles, R. E. (A)
Chambers, R. M., Jr. (A)
Cherer, M. J., Jr. (A)
Cobb, H. A., Jr. (A)
Connell, J. B. (A)
Cornell, J. I. (SM)
Crosby, H. A. (A)
Deml, A. J. (A)
Detchemendy, J. A. (A)
Devereux, J. (A)
Dreifke, G. E. (A)
Drogge, R. F. (A)
Duchek, H. W. (A)
Dunn, C. A. (A)
Efthim, C. (A)
Faust, C. W. (A)
Fillmore, F. A. (M)
Fisler, R. E. (A)
Fox, G. W. (SM)
Fruin, R. J. (A)
Fuerst, R. J. (A)
Furfine, A. L. (A)
Glascock, J. C. (A)
Groetke, E. A. (M)
Habing, P. B. (A)
Hains, V. H. (A)
Hannon, J. P. (M)
Harris, H. H. (A)
Harrison, C. E. (SM)
Heitzeberg, C. H. A. (A)
Hoffman, H. T. (A)
Honnell, P. M. (SM)
Hubenschmidt, W. E. (A)
Jastram, P. S. (M)
Joerding, E. R. (A)
Kathrinus, N. W. (A)
Keil, E. W. (A)
Koerner, C. C. (A)
Lenkerd, J. P. (M)
Lennert, A. E. (A)
Lowell, B. W. (A)
Martin, G. I. (SM)
Mayer, M. F., Jr. (A)
McDaniel, O. S. (SM)
McGary, W. T. (A)
McHoney, L. M. (M)
Miller, G. L. (A)
Minnich, D. J. (M)
Mollman, L. A. (M)
Motchan, H. L. (A)
Murphy, C. H. S. (A)
Nakasato, J., Jr. (A)
Niemi, L. T. (A)
Nurre, H. H., Jr. (A)
O'Shaughnessy, V. P. (A)
Pauls, G. C. (A)
Polk, G. D. (A)
Pyle, J. L. (A)
Quick, J. R. (A)
Roberts, E. M., Jr. (A)
Rosenkoetter, E. A. (A)
Sack, V. M. (A)
Sayer, J. D. (A)
Schaeperkoetter, L. C. (A)
Schepflin, D. J. (A)
Schillinger, E. J. (A)
Schwarz, C. J. (SM)
Sevett, R. (A)
Sheehan, J. S. (A)
Shepard, W. D. (M)
Siegel, I. D. (A)
Siepman, A. B. (A)
Small, F. R. (SM)
Sorensen, W. N. (A)
Stertmann, W. E. (A)
Stocker, D. O. (A)
Swenson, G. W., Jr. (SM)
Thielen, H. H. (A)
Tims, E. F. (A)
Tindall, H. D. (A)
Tsao, P. Y. S. (A)
Upton, L. (A)
Vene, J. M. (A)
Vogel, E. H. (A)
Young, A. E. (M)
Zehr, N. J. (M)
Zurbriggen, J. H. (A)

Springfield
Baker, L. E. (A)
Bauer, F. (M)
Beachler, R. D. (A)
Brock, C. B. (A)
Curry, W. F. (A)
Morwood, R. C. (A)
Trotter, C. E. (A)
Wheat, W. M. (A)

University City
Busch, M. A. (A)
Butler, J. G., Jr. (A)
O'Hare, E. F. (SM)
Taylor, J. J. (A)
Twombly, J. W. (A)

Webster Groves
Frazier, R. L. (A)
Gregg, W. G. (A)
Sigman, H. M. (M)

MONTANA

Billings
Klichli, J. A. (M)
Lundquist, F. E. (A)

Bozeman
Penwell, G. N. (A)
Seibel, R. C. (M)

Butte
Kerns, R. L. (A)
McCourt, A. R. (A)

Cut Bank
Budd, M. A. (A)

Fort Benton
Warden, R. H. (A)

Glendive
Corcoran, M. E. (A)

Great Falls
Edwards, K. A. (A)
Lopuch, A. J. (A)
Parker, J. E. (VA)

Missoula
Taylor, A. S. (M)

Wolf Point
Vincent, L. P., Jr. (M)

NEBRASKA

Aurora
Kluck, J. H. (A)

Beatrice
Emerson, W. R. (A)

Bellevue
Hower, P. A. (M)

Broken Bow
Crawford, B. (A)

Grand Island
Farrall, W. R. (A)
Lynch, U. L. (M)

Hastings
Allison, D. B. (A)

Imperial
Karns, K. B. (A)

Kearney
Beshore, P. S. (VA)

Lincoln
Burden, C. B. (M)
Chamberlain, I. J. (A)
Davis, B. E. (SM)
Hare, M. D. (M)
Hutton, W. I. (M)
Jensen, J. C. (SM)
Leonard, P. F. (A)
Norris, F. W. (SM)
Robison, W. C. (A)
Rook, C. W. (M)
Soderholm, L. H. (A)
Watson, G. W. (A)
Wight, V. H. (M)
Winkler, C. W. (VA)

McCook
Lenwell, L. W. (A)

Morrill
Campbell, W. O. (A)

North Platte
Griffin, D. C. (A)

Ogallala
Wiles Q. T. (A)

Omaha
Bates, A. G. (A)
Becker, H. W. (M)
Borcher, E. J. (A)
Curry, H. D. (M)
Dunn, A. L. (A)
Flynn, G. (M)
Flyr, J. G. (A)
Elliott, H. R. (M)
Garrigus, N. F. (A)
Hadsell, G. C. (M)
Israel, L. J. (M)
Kolar, A. (A)
Kotera, W. J. (VA)
Krogstad, M. O. (A)
Lenz, C. E. (A)
McGowan, M. L. (M)
Noland, J. W. (M)
Peck, R. E. (A)
Ralls, R. H. (M)
Rogers, J. A. (A)
Rogers, W. M. (A)
Sibilia, L. (A)

Overton
Wycoff, K. H. (A)

Platte Center
Kluge, M. E. (A)

Scottsbluff
Garber, M. L. (A)

Weeping Water
Olive, D. W. (A)

Wilbur
Kral, I. H. (A)

Nevada

Las Vegas
Patten, R. B. (A)
Rugar, J., Jr. (M)
Wieland, C. W. (A)

Mercury
Adler, C. S. (A)

Reno
Garrott, W. L. (A)
Sandorf, I. J. (SM)

NEW HAMPSHIRE

Berlin
Coulombe, J. N. (A)

Canterbury
Grace, G. M. (M)

Chesham
Struthers, F. W. (VA)

Concord
Cheney, E. A. (A)
Evans, C. B. (M)

Derry
Dollinger, K. (M)

Dover
Mucher, G. J. (VA)
Youngblood, I. J. (A)

Durham
Blanchard, F. A., Jr. (A)
Winn, A. L. (M)

Exeter
Carbonneau, V. J. (A)

Francestown
Bailey, A. B. (SM)

Goffstown
Rust, W. F., Jr. (SM)

Hampton
Leoutsakos, G. N. (A)
McDonald, C. K. (A)

Hanover
Morgan, M. G. (SM)
Pratt, B. (A)

Hudson
Jones, C. W. (M)

Lyme
Wood, J. A., Jr. (SM)

Manchester
Apostolos, T. (M)
Boulay, H. E. (A)
Castor, A. H. (A)
Chandler, V. H. (SM)
Tilton, D. S. (A)
Whelan, F. X., Jr. (A)

Milford
Romney, E. (A)

Nashua
Blitz, D. (M)
Butler, J. L. (A)
LeVan, J. D. (A)
Sanders, R. C., Jr. (VA)

Newport
Boyle, D. A. (A)

Portsmouth
Allen, J. H. (A)
Lorenz, P. E. (A)
Molla, J. J. (A)
Schweizer, E. G. (M)

Warner
Mason, J. B. (A)

Windham
Goulder, M. E. (A)

NEW JERSEY

Allendale
Haystad, H. (VA)
Joy, C. R., Jr. (A)
Maninger, R. C. (M)

Allenhurst
Haddock, J. W. (A)
Lewis, H. M. (SM)

Allwood
Koch, S. J. (A)

Almonesson
Borzi, B. S. (A)

Alpha
Schaefer, J. B. (SM)

Andover
Ostlund, E. M. (SM)

Arlington
Durie, J. C., Jr. (A)
Millard, J. W. (A)
Nickless, W. H. (A)

Asbury Park
Acker, M. (A)
Carp, G. (A)
Chaskin, H. (A)
Dravneek, W. R. (M)
Ercolino, M. D. (A)
Greenberg, H. (A)
Jones, J. D. (M)
Lamorte, M. F. (A)
Lipman, N. (A)
Reilly, V. E. (M)
Salvano, D. P. (A)
Shannon, H. H. (A)
Singer, E. M. (A)
Spergel, J. (A)
Steinberg, J. (A)
Stone, H. B. (A)
Strasser, S. (A)
Sugarman, R. H. (A)
Terrell, J. M., Jr. (A)
Tobias, W. T. (M)
Wagner, H. M. (SM)
Weitz, S. (A)
Wiener, A. (A)
Zuckerman, B. (A)

Atlantic City
Barrett, C. S. (A)
Cogan, S. (A)
Schwab, P. E. (A)
Van Basselaere, L. J. (A)
Weisenfeld, S. (A)

Atlantic Highlands
Durrer, J. H. (A)
Keen, H. J. (A)
Krinsky, S. S. (A)
Marcille, R. E. (A)
Massey, W. F. (A)
Petersen, P. B. (M)
Rojak, F. A. (A)

Audubon
Bonney, L. A. (A)
Broadwell, H. S. (A)
Fitzpatrick, A. G. (A)
Gerber, P. D. (VA)
Haining, L. E. (A)
Klamo, A. E. (A)
Kozanowski, H. N. (SM)
Lewis, R. J. (SM)
Perry, R. A. (A)
Perry, S. V. (VA)
Ryan, V. F., Jr. (A)
Smalta, F. W. (VA)
Stasz, C. E. (M)
Woll, H. J. (M)

Avenel
Felton, L. E. (M)

Avon
Cordray, R. E. (A)
Egley, T. H. (A)

Barrington
McCulley, J. M. (A)
Poorte, G. E. (A)

Basking Ridge
Farmer, W. B. (M)
Fleming, H. M. (A)
Goddard, C. T. (SM)
Hasley, A. D. (SM)
Hull, R. W. (M)
Pentico, G. W. A. (M)

Bayonne
Eager, G. S., Jr. (A)
Hyman, L. T. (A)
Kessler, S. (A)
Kulik, V. A. (A)
Ledakowich, J. C. (A)
Mack, E. J. (A)
Olivieri, O. E. (A)
Panfile, P. A. (A)
Pfeffer, P. (M)
Richter, R. (A)
Rosenthal, S. W. (M)
Schnipper, A. (A)
Sigel, D. (A)
Skibneski, C. E. (A)

Belford
Glendinning, W. B. (A)
Sposato, F. J. (A)

Bellemead
Minks, F. A. (SM)

Belleville
Altman, H. (A)
Armstrong, T. R. (A)
Boyce, W. F. (A)
Edwards, R. A. (M)
Gallagher, P. (A)
Gallay, H. (M)
Gerard, W. A. (A)
Gruss, R. F. (A)
Koch, H. J. (A)
LaMarca, P. J. (A)
Lange, J. R. (A)
Miller, H. G. (SM)
Mock, W. C., Jr. (M)
Mumford, E. L. (A)
Petruzelli, R. T. (A)
Sherman, V. W. (SM)
Singer, F., Jr. (A)
Taylor, A. R. (A)
Taylor, I. R. (M)
Wallace, F. C. (SM)
Warren, J. E. (M)
Winship, T., Jr. (A)

Belmar
Blevins, L. G. (A)
Cooper, P. W. (A)
Fimmel, R. O. (A)
Gelernter, B. (A)
Gibbons, D. R. (VA)
Ingalls, R. P. (A)
Jarema, E. D. (A)
Kampinsky, A. (A)
Kiely, D. J., Jr. (A)
Maurer, M. S. (A)
Owens, H. L. (M)
Price, J. R. (A)
Stepien, W. (A)
Townes, W. D. (A)
Trinkaus, B. B. (A)

Bergenfield
Abend, I. J. (M)
Atran, L. (A)
Bright, T. F. (A)
Crawford, A. R. (A)
Curtis, R. W. (A)
Dern, H. (A)
Fee, D. R. (A)
Grube, W. O. (A)
Ham, D. L. (A)
Jones, M. E. (A)
Kahn, B. (A)
Meadow, S. (M)
Metzger, S. (SM)
Musselman, H. (A)
Pettigrew, A. F. (A)
Quance, F. R. (A)
Summerlin, W. O. (A)

Berkeley Heights
Anderson, J. R. (M)
Ferrar, R. C. (SM)
Quate, C. F. (A)
Shaffer, R. A. (A)
Shapiro, L. (A)

Bernardsville
Matthews, J. G. (A)
Schmid, E. R. (A)

Bloomfield
Atkins, C. E. (SM)
Atwood, H., Jr. (M)

Baracket, A. J. (SM)
Bartram, J. F. (A)
Bates, J. K., Jr. (A)
Blumberg, D. (A)
Brindley, H. H. (A)
Chatterton, E. L. (SM)
Coon, C. E. (VA)
Davis, R. C. (A)
De Rosa, L. A. (F)
De Ryder, H. (VA)
Dettman, M. C. (M)
Di Toro, M. J. (SM)
Evander, H. S. (A)
Everett, L., Jr. (SM)
Garrahan, P. G. (A)
Germann, J. D. (A)
Gordon, R. F. (A)
Hansen, J. A. (A)
Hawk, W. H. (A)
Hayes, W. A. (M)
Heberling, W. W., Jr. (A)
Hogin, P. E. (A)
Ivey, H. F. (SM)
Jarmick, R. J. (A)
Johnson, H. W. (SM)
Kelso, R. J. (A)
Kram, W. (A)
Kreer, J. G., Jr. (SM)
Laitinen, M. W. (M)
Lederer, E. A. (SM)
Luongo, J. (A)
McCarty, J. R. (A)
McNall, J. W. (SM)
Merrill, H. B., Jr. (A)
Messinger, E. W. (A)
Millar, W. M. (A)
Mitchell, A. V. (A)
Mitchell, C. D. (SM)
Pike, D. E. (A)
Polkinghorn, F. A. (F)
Rhodes, H. A. (A)
Roberts, E. L. (A)
Roberts, F. G. (A)
Saks, H. L. (A)
Seldon, M. (A)
Stephenson, H. L. (A)
Taylor, H. P. (A)
Wallace, P. A. (A)
Weckwerth, H. A. (A)
Widell, E. G. (SM)
Wohlert, A. M. (A)

Bloomingdale
Myhre, R. (A)
Vandervoort, A. (A)

Bogota
Gilcher, V. (A)

Boonton
Anderson, N. J. (A)
Braun, C. G. (A)
Christensen, H. (M)
Cook, L. (VA)
Daly, L. W. (A)
Daugherty, R. M. (SM)
Downsbrough, G. A. (A)
Drake, F. H. (SM)
Franks, C. J. (SM)
Grimm, E. M. (M)
Hazlehurst, E. (VA)
Hill, D. M. (M)
Houlroyd, G. F. (A)
Hull, C. J. (A)
Hull, L. M. (F)
King, P. B., Jr. (VA)
Kruger, H. A. (A)
March, P. S. (VA)
McCouch, G. P. (A)
Minter, J. (VA)
Montcalm, S. R. (SM)
Paine, R. C. (SM)
Pittenger, A. W. (A)
Pittenger, R. C. (A)
Plahn, R. W. (A)
Redington, J. H. (SM)
Richardson, A. G. (SM)
Richardson, S. A. (A)
Sanderson, A. E. (A)
Urbach, K. (SM)
Van Beuren, J. M. (A)
Zavoda, J. P. (A)
Zayac, F. R. (A)

Bound Brook
Brown, W. A. R. (A)
Cocker, J. T. (A)
Ginsberg, L. H. (A)
Romano, V. J. (A)
Uphoff, R. L. (A)

Bradley Beach
Blackwell, E. L. (A)
Brown, M. A. (A)
Caparn, C. (A)
Levy, S. J. (SM)
Macallister, A., Jr. (A)
Rosmovsky, P. (M)
Taffel, B. R. (A)

Breton Woods
Rottner, A. W. (A)

Bridgeton
Casarow, L., Jr. (A)
Rovins, J. J. (A)

Brielle
Taylor, G. W. (A)

Brooklawn
Sattler, E. W., Jr. (A)

Brookside
Adams, E. W., Jr. (A)
Dean, F. C. (A)

Burlington
Dubrow, W. (A)

Caldwell
Brundage, J. H. (SM)
Chambers, A. B. (A)
Hotopp, A. H., Jr. (SM)
McBrair, H. C. (A)
Meixell, O. S. (SM)
Nuner, J. F., Jr. (VA)
Philpott, L. R. (SM)
Sutherlin, L. (SM)
Vogel, W. H., Jr. (A)
Williams, W. J., Jr. (A)

Camden
Adler, B. (A)
Aron, S. (A)
Auerbach, B. (A)
Bagby, C. K. (A)
Batsel, M. C. (F)
Baumgardner, E. W. (A)
Boenecke, C. A. (M)
Bowen, D. C. (A)
Bradshaw, G. V., Jr. (A)
Brunt, N. F. (A)
Caron, E. J. (A)
Carrell, R. M. (A)
Chasteen, J. W., Jr. (M)
Comninos, D. A. (A)
Cornell, J. A. (A)
Cramer, R. E., Jr. (M)
Crosby, D. R. (SM)
Decker, E. E. (A)
Dion, D. F. (A)
Feyerherm, M. P. (M)
Finkelstein, M. B. (M)
Foley, A. A. (A)
Fricke, R. H. (A)
Friend, A. W. (SM)
Goldman, L., Jr. (M)
Gore, E. M. (A)
Griffith, B. D. (A)
Gunther, C. A. (SM)
Hasenberg, W. (SM)
Howe, V. Y. C. (A)
Hsueh, C. Y. (A)
Hucke, H. M. (SM)
Hunt, C. M. (A)
Insalaco, P. J. (A)
Jacobowitz, H. (A)
Jones, L. F. (SM)
Katella, A. J. (A)
Keefe, J., Jr. (A)
Koch, W. R. (SM)
Kornfield, N. R. (A)
Koros, L. L. (SM)
Kreuzer, B. (M)
Kslazek, F. T. (A)
Lauer, H. (A)
Lawton, R. S. (A)
Lewis, L. L. (M)
Maloff, I. G. (F)
Mandelkehr, M. M. (A)
McDermid, W. L. (A)
McKey, D. B. (A)
Merrill, R. B. (A)
Metzger, G. V. (A)
Morton, H. W. (A)
Nelson, R. A. (A)
O'Brien, J. A. (A)
Ossenbeck, F. J. (A)
Perez, A. A. (A)
Rosenberg, A. L., Jr. (A)
Sands, W. F. (SM)
Smith, T. A. (SM)
Spencer, H. H. (A)
Spielberg, A. M. (A)
Stearns, G. W. (A)
Stott, H. B. (M)
Trachtenberg, R. (A)
Trainer, M. A. (SM)
Trimble, J. E. (A)
Vilkomerson, B. S. (A)
Walter, J. C. (SM)
Wang, T. (A)
Watts, W. W. (A)
Weiman, W. W. (A)
Wittels, J. L. (A)
Woldow, A. F. (A)
Woods, W. E. (A)
Zusman, A. G. (A)

Cape May
Pearson, H. S. (A)

Carlstadt
Hanft, K. E. (A)
Kaiser, A. W. (A)
Lowers, C. E. (M)
Markosian, V. (SM)

Carneys Point
Mearns, A. B. (A)

Cedar Grove
Amos, B. (M)
Bulkley, A. W. (M)
Cherry, S. J. (SM)
Coan, E. M. (A)
Cole, H. W. (M)
Gorss, C. G., Jr. (A)
Hartmann, J. C. (A)
Himmel, L. (SM)
Holborn, F. (SM)
Jones, D. M. (A)
Kellom, B. K. (A)
Kramer, A. S. (SM)
Moore, E. B. (M)
Olson, H. M. (M)
Reeves, E. H. (A)
Rennenkampf, L. J. (M)
Rickett, S. B. (A)
Sensenig, W. A. (A)
Shackelford, C. L. (SM)
Van Duyne, J. P. (A)
Weltmann, O. (SM)
Wheeler, M. S. (A)
Whittle, R. L. (SM)

Chatham
Albrecht, J. C. (M)
Andrew, H. B. (A)
Babcock, W. C. (M)
Bobeck, A. H. (A)
Bryant, N. W. (SM)
Closson, H. T. (A)
Cousins, V. M. (VA)
Duckworth, G. W. (M)
Felch, E. P. (SM)
French, H. N. (M)
Geiges, K. S. (A)
Guenther, R. (M)
Hadley, A. M. (A)
Hensel, W. G. (VA)
Herud, E. C. (A)
Hilberg, E. A., Jr. (A)
Houghton, E. W. (SM)
Klesse, W. R. (M)
Koch, D. G. (A)
Moorhead, G. H. (VA)
Peterson, A. C., Jr. (SM)
Radcliffe, P. E. (A)
Rose, R. H., II (M)
Rupp, O. R. (A)
Simkins, Q. W. (A)
Sproul, P. T. (SM)
Sweeny, C. P. (SM)
Taylor, P. H. (VA)
Tryon, J. G. (M)
Vaughan, H. E. (SM)
Wakefield, P. R. (A)
Winans, R. C. (A)
Wintringham, W. T. (F)
Wirsz, N. C. (A)
Word, J. A. (SM)

Clayton
Breitwieser, G. F. (A)

Cliffside Park
Flosdorf, F. H. (A)
Koppl, W. J. (SM)

Clifton
Alter, R. S. (A)
Anway, H. E. (A)
Appleberry, T. K. (A)
Arditi, M. (SM)
Arp, R. H. (A)
Baker, H. C. (A)
Battel, F. A. (A)
Butler, E. W. (SM)
Campbell, E. J. (A)
Carow, W. M. (A)
Christaldi, P. S. (F)
Davidoff, F. (M)
Glomb, W. L. (A)
Harrison, C. J. (SM)
Herbin, L. (A)
Hobbs, J. (A)
Horvath, A. (SM)
Hval, H. N. (A)
Hylas, A. E. (A)
Johnson, V. L. (A)
Kass, J. S. (A)
Kern, G. A. (A)
Kohler, E. (A)
La Plant, W. P. (A)
Lieberman, H. (A)
Mangaudis, R. A. (A)
Masonson, M. (A)
MacMillan, T. S. (A)
Mazel, L. G. (A)
Mihalik, J. J. (A)
Morrow, R. A. (A)
Murphy, G. G. (A)
Nord, H. H. (A)
Oswald, R. L. (A)
Pike, F. R. (A)
Pollack, L. (A)
Postal, R. H. (A)
Pulchlopek, E. S. (A)
Quinlan, D. E. (A)
Rado, S. J. (A)
Ronald, T. T. (A)
Saari, V. R. (A)
Schneiderman, M. (A)
Schreiner, S. M. (A)
Seidel, H. (A)
Snadyc, A. M. (A)
Snell, P. A. (M)
Solomon, K. (A)
Spiro, N. J. (A)
Stein, S. (A)
Stewart, J. A. (VA)
Teeuw, J. W. (A)
Trivelas, A. C. (A)
Von Hirsch, A. F. (A)
Wainwright, E. A., Jr. (A)
Williams, C. E. (M)

Clinton
Tidd, E. D. (A)

Closter
Davis, R. H. (A)
Grenier, G. H. (M)
Grenier, T. B. (A)
Lawrence, R. J. (M)

Collingswood
Ackerman, M. J. (VA)
Allen, J. J. (A)
Andrews, D. R. (M)
Aronson, A. I. (A)
Benner, A. H. (M)
Berfield, R. G. (A)
Besel, H. W. (A)
Brotzman, E. S. (M)
Brown, L. R. (SM)
Buck, D. G. (M)
Buroojy, T. J. (A)
Casolaro, R. N. (A)
Chaney, W. G. (A)
Clark, E. L. (SM)
Coffin, B. E., Jr. (A)
Cutter, H. H. (A)
Davis, C. E. (A)
Duffin, J. D. (A)
Eisclein, J. E. (SM)
Fabbioli, L. F. (A)
Farnett, E. C. (A)
Field, G. R. (A)
Fillebrown, S. M. (A)
Gilmore, J. P. (A)
Gluyas, T. M., Jr. (SM)
Goodman, H. (A)
Goodrich, H. C. (SM)
Grever, J. L. (A)
Hans, M. F. (A)
Helbig, W. A. (A)
Holshouser, J. R., Jr. (A)
Kent, R. A. (A)
Kolar, R. F. (A)
Lang, K. T. (A)
Lewis, E. S. (A)
Lewis, J. R. (A)
Matson, L. E., Jr. (A)
McCoy, J. F. (A)
Meeker, W. F. (M)
Moule, W. N. (A)
Muggleworth, J. C. (A)
Neubauer, J. R. (M)
Olson, C. L. (A)
Paley, L. I. (A)
Pan, W. Y. (SM)
Pascalar, H. G. (A)
Pettengill, G. W. (M)
Phares, R. L. (A)
Phillips, L. B. (M)
Polk, C. (A)
Post, D. B. (A)
Roe, J. H. (SM)
Rouland, H. G. (A)
Sable, J. D. (A)
Schmitt, E. J. (A)
Selby, E. O. (VA)
Sheridan, E. W. (A)
Shoaf, J. R., II (SM)
Skorup, G. E. (M)
Smith, J. N. (A)
Sobolewski, F. (A)
Stanger, L. (A)
Stupp, R. W. (VA)
Talmage, F. E. (SM)
Teasdale, R. D. (SM)
Turner, A. H. (VA)
Umbach, L., Jr. (A)
Van Niman, R. T. (M)
Warren, C. S. (A)
Weible, N. R. (VA)
Weidemann, R. F. (A)
Weise, D. S. (A)
White, R. J. (A)
Woodward, B. J. (VA)
Yin, H-B (A)

Coytesville
Koskos, P. (SM)

Cranbury
Applegate, H. E. (A)
Lefkowitz, I. (A)
Moncrieff-Yeates, A. (M)
Morgan, J. M. (M)
Shankweiler, R. G. (VA)

Cranford
Alger, P. B. (A)
Kitty, F. J. (M)
Low, R. C. (A)
Rathje, E. (A)
Shuskus, J. M. (A)
Stewart, J. A. (A)
Sullivan, H. J. (M)
Taris, C. M. (A)
Williams, J. B., Jr. (A)
Woodruff, M. W. (M)

Cresskill
Langan, J. E. (A)
West, J. L. (A)

Deal
Bennett, H. S. (SM)
Dale, G. V. (VA)
Ference, M., Jr. (SM)
Hunt, L. E. (SM)
Klayton, M. H. (SM)
Rose, C. F. P. (SM)
Silva, A. A. (M)
Young, L. G. (SM)

Delanco
Potter, E. H. (SM)

Demarest
Foster, J. D. (M)

Denville
Backer, L. A. (VA)
Eells, M. M. (SM)
Gilbert, E. A. (M)
Mindes, A. S. (A)
Molloy, C. T. (SM)
Porter, E. A. (A)
Sauber, J. W. (M)
Vanek, L. J. (VA)
Zieger, J. A. (A)

Dover
Harris, J. R. (M)
Widenor, P. E., Jr. (A)

Dumont
Apfel, G. J. (A)
Hammond, M. L. (A)
Martin, S. J. (A)
Prior, T. K. (A)
Reinecke, H., Jr. (A)
Schwerin, P. (SM)
Strain, M. (A)
Sundberg, A. (A)

Dunellen
Lamphear, G. (A)

East Keansburg
Narze, J. S. (A)

East Orange
Aster, A. K. (A)
Bartels, R. H. (A)
Bartholomew, C., Jr. (A)
Bondy, M. (A)
Cameron, J. A. (A)
Cobb, W. A. (M)
Conrad, T. E., Jr. (M)
Coonce, H. E. (A)
Evans, P. H. (F)
Foyer, D. R. (A)
Gawler, H. C. (SM)
Geiss, G. K., Jr. (A)
Gifford, J. S. (A)
Gilleo, M. A. (A)
Grandmont, P. E. (M)
Hayman, W. H. (A)
Hess, R. C. (A)
Keim, F. J., Jr. (A)
Kendall, B. W. (SM)
Laube, O. T. (VA)
Lindon, J. (A)
Macalpine, W. W. (SM)
Magee, T. T. (A)
Marshall, B. O. (A)
McCargoll, A. K. (A)
McCarroll, J. F., Jr. (A)
McCrory, J. R. (A)
Meadows, H. R. (A)
Meyers, S. T. (SM)
Mitchell, H. K. (SM)
Morrow, H. W. (M)
Mulligan, J. H., Jr. (M)
Newman, R. J. (SM)
Powers, S. J. (M)
Reibling, J. V., Jr. (A)
Ruston, J. (M)
Sandretto, P. C. (SM)
Sanger, D. M. (A)
Seebald, H. A. (A)
Siekanowicz, W. W. (A)
Smith, H. H. (M)
Spencer, M. C. (VA)
Sussman, E. B. (M)
Vaccaro, F. E. (A)
Waskiewicz, L. R. (A)

East Paterson
Ariessohn, E. R. (M)
Bailey, R. S. (SM)
Broderick, N. E. (A)
Earnshaw, E. F., Jr. (A)
Heiser, W. H. (A)
Hesse, H. R. (M)
Hoffman, P., Jr. (A)
Maron, M. (M)
Reid, J. H. (SM)
Reiner, A. (A)
Roth, M. (A)
Schmidt, C. R. (M)
Tissot, T. R., Jr. (M)
Wolfish, I. H. (A)
Zitovsky, S. A. (A)

East Rutherford
Kesgen, E. W. (M)
Rabinowitz, J. (A)
Scott, G. R. (M)
Skalski, W. A. (A)
Star, M. (A)

Eatontown
Abeyta, I. (A)
Albright, A. R. G. (M)
Allen, C. A. (A)
Barton, D. K. (A)
Gaskell, R. J. (A)
Gikow, E. (A)
Graham, R., Jr. (A)
Kesselman, W. A. (A)
Menzel, H. W. (A)
Occhiogrosso, T. (M)
Schwartz, A. J. (A)
Young, H. D. (A)

Edgewater
Gonzalez, V. M. (A)

Elberon
Bady, I. (A)
Betts, P. H. (SM)
Blum, M. S. (A)
Doxey, W. L. (M)
Gerber, E. A. (A)
Gould, W. B., III (A)
Hatkin, L. (A)
Kaplan, J. (A)
Levy, M. L. (SM)
Malkin, S. (VA)
Martin, B. (A)
Moss, H. (A)
Schafer, J. P. (SM)
Schlaack, N. F. (SM)
Sussdorf, R. R. (M)
Tanzman, H. D. (A)
Elberon, J. D. (A)
Wynne, W. M. (VA)

Elizabeth
Abrahamovsky, J. J. (A)
Barr, F. M. (A)
Blaisdell, W. C. (SM)
Chasek, N. E. (A)
Frank, L. H. (A)
Green, L. N. (A)
Greenberg, N. S. (A)
Harkins, P. B. (SM)
Immen, G. H. (M)
Jakub, J. J. (A)
Lignugaris, T. (A)
Madonia, T. S. (A)
Nelson, D. E. (M)
Pedersen, F. C. (A)
Peterson, T. A., Jr. (M)
Samalonis, A. J. (A)
Singer, C. H. (SM)
Verdibello, A. A. (A)
Walsh, L. (VA)

Emerson
Dorney, P. E. (M)
Handelman, S. M. (A)
Solow, S. (A)

Englewood
Anick, G. (A)
Arrigo, L., Jr. (A)
Dunn, R. H. (A)
Elders, D. S. (A)
Guy, R. F. (F)
Hillman, L. (M)
Kuehn, R. L. (A)
Maher, T. P. (A)
Saliba, G. J. (SM)
Thomas, E. R. (VA)
Tucker, W. J., Jr. (M)

Englewood Cliffs
Savory, W. A. (M)

Erlton
Lindenberg, E. C. (A)
Mechler, E. A. (M)
More, C. C. (VA)
Pratt, D. (VA)
Price, J. F. (M)

Essex Fells
Knoop, W. A., Jr. (M)

Fair Haven
Chappell, J. F. (A)
Davis, D. P. (A)
Fast, S. (A)
Fox, K. H. (SM)
Hanley, J. F. (VA)
Hessel, J. (SM)
Kolar, E. F. (SM)
Lartaud, H. R. (SM)
Ohl, R. S. (SM)
Picard, H. E. (A)
Priebe, F. K. (M)
Puzio, P. S. (A)
Triolo, F. J. (M)
Van Deusen, G. L. (SM)
White, A. S., Jr. (A)
Zahl, H. A. (F)

Fairlawn
Bary, V. (A)
Bawer, L. I. (M)
Behr, J. L. (A)
Blumkin, R. (A)
Bond, L. (M)
Bradburd, E. (A)
Bradford, D. C. (A)
Brodsky, J. L. (A)
Carlin, B. (A)
Cooper, B. (A)
Diepeveen, N. (A)
Fischer, L. O. (VA)
Franz, K. A. (A)
Gaines, R. I. (A)
Gulack, J. G. (A)
Hill, E. (VA)
Hoberman, M. J. (A)
Kuras, H. F. (A)
Lafferty, R. E. (M)
Mansberg, H. (A)
Moskowitz, S. (M)
O'Meara, W. J. (A)
Petruska, P. C. (A)
Priest, R. B. (A)
Rizzo, J. E. (A)
Rosett, E. (A)
Roth, H. (A)
Scarr, H. F. (SM)
Schacher, D. L. (A)
Schwartz, E. I. (A)
Spector, M. (A)
Stein, E. (A)
Zerkin, M. (A)

Fairwood
Pattanaro, B. A. (A)

Fanwood
Anderson, F. B. (SM)
Warner, A. W., Jr. (M)

Farmingdale
Burke, M. H. (A)
Rock, F. E. (A)

Flanders
Allen, G. W. (A)

Flemington
Hoffmann, K. G. (A)

Florham Park
Bachman, W. J. (M)
Brown, C. H. (A)
Brunson, R. A. (M)
Littell, J. G. (M)

Fords
Gumbs, J. (A)
O'Reilly, J. P. (A)

Fort Lee
Davies, R. J. (A)
Frisch, F. W. (A)
Gannett, E. K. (A)
Grant, M. S. (A)
Kerver, N. E. (A)
Marcus, J. A. (A)
Miller, H. M. (A)
Neu, W. J. (A)
Rubino, J. W. (A)
Stansfield, F. H. (A)
Stromwall, C. W. (VA)
White, L. E. (A)

Fort Monmouth
Backman, F. F. (A)
Bernard, J. T. (A)
Bond, F. E. (M)
Burns, R. O. (SM)
Corum, D. R. (A)
Epstein, G. S. (A)
Hleken, C. (A)
Jack, R. W. (A)
Justus, J. R. (A)
Langs, D. W. (A)
Laurent, J. A., Jr. (A)
Linder, R. P. (A)
Mann, J. R. (A)
Meyer, R. G. H. (SM)
Nash, H. (A)
Nickel, W. L. (A)
Nicodemus, K. L. (A)
Perkins, O. D. (SM)
Romanelli, J. (A)
Richmond, I. D. (A)
Smith, I. D., Jr. (A)
Symons, R. S. (A)
Timmerman, F. (A)
Van Harlingen, W. (SM)
Wozencraft, J. M. (A)

Franklin Lakes
Piccoli, P. E. (A)

Freehold
Bastian, C. W. (A)
Buck, D. T. (A)
Edelman, F. (A)
Hersh, H. J. (SM)
Katz, S. (A)
Lawn, F. (A)
Pochmerski, D. (A)
Quinn, W. H. (A)

Garfield
Fredricks, I. E. (A)
Sudia, A. T. (A)

Gillette
Kannenberg, W. F. (SM)
Rystedt, T. (M)

Glassboro
Wittenburg, C. W. (A)

Glen Ridge
Brubaker, P. M. (A)
Dorff, L. A. (SM)
Gast, R. W. (M)
Hall, R. E. (VA)
Heinzerling, E. W. (A)
Hoffman, R. B. (SM)
Hopgood, R. C. (A)
Kirchner, K. F. (SM)
Laport, E. A. (SM)
Olsen, E. U. (VA)
Reveal, P. A. (M)
Ritter, E. W. (SM)
Schenck, A. K. (M)
Seidler, R. L. (A)
Tambling, R. L. (A)
Terry, C. B. (A)
Wilson, C. R. (A)

Glen Rock
Becken, E. D. (M)
Browne, R. (A)
Clark, L. E. (VA)
Lukas, W. (A)
Ringer, R. L., Jr. (M)
Sanger, R. B. (A)

Gloucester
Barger, J. R. (A)
Bertrand, W. T. (A)
Cornet, E. (M)
Elze, R. P. (A)
Feibel, R. L. (M)
Hatchwell, J. A. (A)
McKenna, B. D. (A)
Mills, H. J. (VA)
Poehls, V. J. (A)
Reed, P. B. (M)
Saeger, W. (A)
Taira, W. C. (A)

Great Notch
Affelder, C. (M)
Berkley, C. (A)
Godley, P. F., Jr. (A)

Hackensack
Cortizas, A. P. (A)
Elwell, H. G., Jr. (A)
Feoranz, F. J. (A)
Kunnes, H. (A)
Liguori, A. (A)
Lupo, F. J. (A)
Marsten, R. B. (A)
McKenzie, A. A. (SM)
Meyerhoff, A. J. (A)
Reed, S. I. (A)
Schentes, M. J. (A)
Wertman, R. C. (M)

Hackettstown
Dinzl, R. A. (A)
Ebersol, E. T., Jr. (M)
Ouellette, L. A. (A)

Haddonfield
Achenbach, J. C. (A)
Andrews, K. E. (A)
Anlage, J. J. (A)
Armbruster, G. J. (A)
Bailey, R. E. (M)
Beard, A. D. (A)
Beers, G. L. (F)
Bensky, L. S. (A)
Blodgett, E. D. (SM)
Buchanan, J. M. (A)
Bullock, J. B. (A)
Busby, J. W. (A)
Boerner, T. J. (SM)
Braddock, E. (M)
Brandt, M. M. (M)
Chittick, K. A. (SM)
Cochran, S. W. (SM)
Cole, D. D. (SM)
Coleman, J. B. (F)
Cooper, H. V. (A)
Corrington, M. S. (SM)
Cunningham, O. B. (SM)
Dennison, R. C. (A)
Denton, B. E. (SM)
Deuitch, D. E. (A)
Dewitt, C. C. (A)
Douman, T. (A)
Drenick, R. (SM)
Dunn, T. E. (A)
Ehrich, W. G. (A)
Estey, H. E. (A)
Fisher, C. D. (M)
Fitzgerald, T. J., Jr. (A)
Garden, M. (A)
Gavinski, V. A. (A)
Gehman, J. B. (M)
Gray, F. D. (M)
Guhn, D. K. (A)
Hall, J. R. (A)
Harris, W. A. (A)
Haynes, H. E. (M)
Herrmann, F. J. (M)
Hobbs, L. C. (A)
Hochman, D. (A)
Hoffman, W. H. (M)
Horowitz, L. A. (M)
Howery, R. W. (A)
Hubbard, B. L. (VA)
Humphrey, W. M. (A)
Johnson, E. O. (SM)
Joyner, A. A. (SM)
Kalkman, E. C. (A)
Keenan, E. L. (A)
Kelly, G. E. (A)
Kennedy, C. J. (A)
Kerfoot, B. P., Jr. (A)
King, R. E. (A)
Kirkwood, L. R. (SM)
Kreitzberg, S. B. (A)
Lapidos, R. W. (A)
Lasby, R. O. (A)
Lewis, F. C. (A)
Liddle, R. W., Jr. (A)
Lind, A. H. (A)
Lo, A. W. (A)
Love, J. E. (VA)
Luddy, E. N. (M)
Lyndon, W. L. (SM)
Maron, I. (A)
Mathwich, H. R. (A)
McGaughey, P. C. (M)
Meisenheimer, R. L. (SM)
Murakami, T. (M)
Ohler, A. E. (A)
Pennington, R. B. (A)
Perlman, M. (M)
Peterson, C. E. (A)
Phelps, G. H. (SM)
Pyle, M. O. (A)
Robins, B. W. (SM)
Robinson, J. E. (A)
Rose, H. E. (A)
Ross, G. T. (A)
Rudd, R. B. (A)
Rudner, M. A. (SM)
Schrader, H. J. (SM)
Scull, W. E., Jr. (M)
Shapiro, L. (M)
Sheetman, N. (A)
Sheilock, J. V. (A)
Sonnenfeldt, R. W. (SM)
Starner, C. J. (A)
Stone, F. B. (SM)
Strickland, K. T. (A)
Sublette, I. H. (A)
Sutherland, E. F. (A)
Taylor, J. P. (A)
Trouant, V. E. (SM)
Turner, R. R. (M)
Waldhauer, F. D. (A)
Watson, S. H. (SM)
Weiss, M. V. (M)
Welsh, R. R. (SM)
Welsher, C. E. (VA)
Wentworth, J. W. (A)
Wetzel, L. D. (A)
Wheeler, B. F. (SM)
Widmann, F. W. (A)
Willman, R. C. (SM)
Wolf, L. J. (SM)

Haddon Heights
Aitel, M. L. (A)
Boehm, P. P. (A)
Carlson, D. J. (A)
Darnell, W. E. (A)
Ferber, L. W. (A)
Franke, J. L. (SM)
Fujii, W. M. (A)
Gunter, D. L. (M)
Halstead, W. K. (A)
Hartmann, H. (A)
Iden, C. C. (A)
Latham, N. D. (A)
McDonald, J. E. (A)
McKee, D. M. (A)
McMorrow, C. F. (A)
Merle, C. W. (A)
Moore, E. E. (A)
Parker, J. R. (A)
Pewitt, B. D. (A)
Renfrow, R. J. (A)
Roys, H. E. (SM)
Solomon, K. (A)
Stanko, E. (VA)
Williamson, W. H., Jr. (A)
Wolcott, R. G. (M)

Hamburg
O'Brien, J. F. (A)

Hammonton
Campanella, M. J. (A)

Harrington
McElroy, G. E. (M)

Harrison
Arams, F. R. (A)
Brown, B. B. (A)
Burnap, R. S. (F)
Burnett, C. E. (SM)
Cimorelli, J. T. (SM)
Collins, R. M. (A)
Hirlinger, J. F. (SM)
James, W. M. (SM)
Kelly, R. L. (SM)
McElwee, E. M. (M)
McLaughlin, K. M. (SM)
Nelson, R. E. (M)
Poch, S. (M)
Rose, G. M., Jr. (SM)
Shaw, G. R. (SM)
Talpey, R. G. (SM)
Ulrey, D. (F)

Harbourton
Reed, R. D. (A)

Hasbrouck Heights
Goldberg, S. R. (A)
Green, N. H. (A)
Hamlin, J. C. (A)
Kiebert, M. V., Jr. (SM)
Weiner, M. J. (VA)

Haskell
Ryan, H. J. (M)

Haworth
Osborn, P. H. (VA)

Hawthorne
Fellows, E. T. (A)
Kross, V. (A)

Hazlet
Harries, W. (M)

Highland Park
Andreasen, I. (A)
Braun, M. (A)
Hensperger, E. S. (A)
Molony, D. A. (A)
Petrucci, F. A. (A)

Highlands
Rohrle, T. A. (A)
Weiss, R. A. (SM)

Hillsdale
Dimond, J. (A)
Gormley, R. S. (SM)
Marsh, C. O., Jr. (A)
Marriner, A. W. (A)
Sullinger, W. B. (SM)

Hillside
Irwin, R. P. (A)
Kahant, C. G. (A)
Levy, L. G. (A)
Repac, R. (A)

Hoboken
Neltzert, C. (A)

Hohokus
Baird, C. W. (A)
Lamb, H. A. (A)
Markus, J. (M)
Saul, E. R. (A)
Spaulding, H. K. (A)
Worster, J. R. (A)

Holmdel
Bania, S. E. (A)
De Lange, O. E. (A)
McKee, G. R., Jr. (A)

Hopatcong
Johnson, J. R. (M)

Interlaken
Todd, W. (M)

Irvington
Albanese, D. F. (A)
Alt, W. G. (A)
Andrews, J. L. (A)
Andrews, R. J. (A)
Bentivegna, M. J. (A)
Blake, J. B. (M)
Blake, J. T. (A)
Drexler, J. (A)
Eccles, T. L. (A)
Goldshine, A. D. (A)
Hill, G. V. (A)
Jordan, C. J. (A)
Kosmaczewski, I. (A)
Levine, S. (A)
Lowell, R. J. (A)
Markle, R. E. (A)
McAdams, H. T. (A)
Mommo, E. J. (VA)
Ort, D. L. (A)
Ossanna, J. F., Jr. (A)
Rosenbluth, M. L. (A)
Stiles, M. G. (A)
Thompson, T. H. (A)
Wolfe, R. M. (A)
Zablocki, H. S. (A)
Zaepfel, C. G. (A)
Zinuda, E. J. (A)

Iselin
Austin, F. H. (A)

Jamesburg
Brown, V. L. (A)

Jersey City
Balter, L. (M)
Bernhard, H. A. (A)
Brogan, J. M. (A)
Clark, H. R. (A)
Deichert, R. W. (A)
Dzula, G. (A)
Genser, A. (A)
Goldfarb, S. (A)
Harms, F. G. (A)
Haugk, G. (A)
Ittleson, J. S. (A)
Keane, J. E. (A)
Kovarik, H. (A)
Leslie, F. (VA)
Lindner, N. J. (A)
Loierman, L. (A)
Merritt, J. E. (A)
Motsek, M. (A)
Ockene, N. J. (A)
Olin, I. D. (A)
Putt, D. R. (A)
Raffel, L. (A)
Regueiro, W. R. (A)
Schwarzschild, B. (A)
Smith, W. M. (VA)
Weiss, S. I. (SM)
Wormcke, W. (M)
Zelinski, A. (A)

Kearny
Bitinas, J. (A)
Bondon, L. A. (SM)
Brady, J. F. (SM)
Eng, J. W. (A)
Gillies, W. (A)
Helwig, W. J. (A)
Kaczynski, R. F. (A)
Laikevich, A. (A)
Lewis, R. F. (A)
Percival, W. R. (M)
Salazar, L. A. (A)
White, H. R. (M)

Kenilworth
Osburn, C. M. (M)

Keyport
Baumann, D. A. (A)
Blumberg, L. (A)
Ellis, B. E. (A)
Hindin, A. (A)

Lake Hiawatha
Bremer, H. A. (VA)
Kaden, G. (A)

Lakewood
Coblenz, A. (SM)
Drukaroff, I. (A)
Geller, D. (A)
Lipetz, N. (A)

Landing
Grissler, H. W. (M)

Laurel Springs
Genetta, T. L. (A)
Pearson, R. W. (M)
Pramsheier, T. W. (VA)
Vorwerk, F. A. (A)

Lawrenceville
Kihn, H. (SM)

Leonia
Ackerman, B. F., Jr. (A)
Burger, F. J. (A)

Christie, F. W. (A)
Dietsch, C. G. (SM)
Hetzel, G. L. (A)
Sargeant, C. E. (VA)
Schild, P. (A)

Lincoln Park
Gartner, C. L. (M)
Keefe, O. A. (A)

Linden
Braun, L. (A)
Franklin, R. M. (A)
Kardauskas, E. (A)

Little Falls
Bluhm, R. W. (A)
Brown, A. R. (A)
Kocan, J. (A)
Morris, G. F. (A)
Pellock, J. (A)
Talamini, A., Jr. (SM)

Little Ferry
Gartner, J. J. (M)
Trenn, A. L. (A)
Zabransky, E. (A)

Little Silver
Borgeson, C. A. (SM)
Bracken, J. R. (A)
Brueckmann, H. L. (SM)
Butler, H. (M)
Craig, L. H. (SM)
Cushman, J. K. (A)
Garoff, K. (A)
Harrison, D. J. H. (A)
Havel, J. M. (M)
Hecht, B. (M)
Huebner, D. L. (M)
Jensen, A. M. (M)
Kilgore, G. R. (SM)
King, H. D. (A)
Klenk, L. M. (SM)
Lowry, L. R. (SM)
Mack, A. (A)
Marks, W. S., Jr. (F)
Meyer, H. F. (SM)
Miller, L. (SM)
Mond, L. I. (VA)
Morris, M. M. (SM)
Novick, G. (A)
Pick, L. A. (A)
Poteet, D. P. (VA)
Senn, G. F. (SM)
Sharp, C. E. (A)

Livingston
Bishop, J. B. (SM)
Galanty, H. (A)
Mennie, J. H. (M)
Rudensey, M. B. (M)
Safford, F. J. (SM)
Stone, S. A. (A)
Ussery, P. W. (A)

Locust
Massell, E. (M)

Lodi
Gravel, J. P. J. (A)
Hagmann, N. (VA)
Lappin, D. (A)
Meyer, R. W. (A)
Ubry, L. E., Jr. (A)

Long Branch
Alston, W. H. (A)
Anderson, B. S. (SM)
Arons, E. L. (A)
Barr, H. (A)
Bassler, S. G. (M)
Bedrosian, S. D. (A)
Beizer, H. H. (SM)
Benanti, M. A. (A)
Berman, G. (A)
Brown, A. (SM)
Bryan, J. F. (A)
Burkhard, H. F. (A)
Cavenaugh, D. E. (A)
Chernow, M. (M)
Coleman, A. H. (A)
Ducore, H. (M)
Dwin, D. (A)
Frasco, W. V. (A)
Goubau, G. J. E. (A)
Gubin, L. L. (A)
Guttwein, G. H. (A)
Hamer, H. (A)
Hosemann, J. H. (A)
Insierman, H. E. (VA)
Jacoby, D. L. (M)
Jakubowski, G. C. (A)
Knapp, R. L. (A)
Kullback, I. (A)
Lindsay, J. E. (A)
Martin, J. R. (A)
Mascari, P. F. (A)
McKinley, R., Jr. (A)
Mencher, H. (A)
Parker, W. E. (A)
Ragsdale, R. G., Jr. (A)
Russell, W. D. (A)
Schach, S. (A)
Search, R. W. (A)
Shirley, T. L. (A)
Skobel, M. (SM)
Tomaini, F. J. (M)
Trauben, W. (A)
Vieweger, A. L. (A)
Weaver, M. W. (A)
Weinstock, M. (A)
Winters, A. L. (A)
Wolinsky, A. (A)

Lyndhurst
Friberg, V. (A)
Gillette, D. (A)
Gilmore, A. C., Jr. (A)
Gilroy, R. B. (A)
Horbach, S. (M)
Hughes, M. J. (M)
Robinson, G. D. (A)
Van Kody, H. (A)

Madison
Baker, H. W., Jr. (M)
Barney, H. L. (SM)
Carter, H. T. (M)
Clark, O. (M)
D'Heedene, A. R. (SM)
Dimock, P. V. (SM)
Ebert, D. H. (A)
Ellis, B. T., Jr. (SM)
Glaser, J. L. (SM)
Harris, S. (A)
Holmes, D. B. (A)
Howard, E. J. (SM)
Kimble, C. B. (A)
Livera, A. L. (M)
Marble, F. (SM)
Neunzig, R. C. (A)
Nowell, R. E. (A)
Phillips, W. E., Jr. (M)
Riley, R. M. (A)
Roetken, A. A. (SM)
Ruckelshaus, J. G. (SM)
Skellett, A. M. (SM)
Smith, J. W. (SM)
Swain, R. G. (A)
Thomas, B. J. (M)

Magnolia
Foley, T. U. (A)

Mahwah
Boffo, A. P. (A)
Eslinger, R. L. (A)

Manasquan
Botha, D. G. (A)
Cline, D. E. (M)
Meyerson, M. (A)
Schor, H. (M)
Wagner, R. L. (A)

Manasquan Beach
Baganz, A. (A)

Manville
Larisch, R. W. (A)
Pontus, A. M. (M)

Maple Shade
Davis, J. T. (A)
Warren, M. V. (A)

Maplewood
Alexander, A. A. (A)
Bailey, B. (A)
Barkley, H. F. (VA)
Bosshart, R. P. (A)
Carpenter, L. B. (A)
Coachman, J. E. (A)
Cunningham, F. W. (SM)
Dickey, D. W. (M)
Gruenberg, H. S. (A)
Hankinson, F. K. (A)
Hazeltine, A. L. (F)
Hemmer, F. A., Jr. (A)
Humphrey, H. C. (VA)
Johnson, J. B. (F)
McDowell, H. L. (A)
Prosser, T. C. (A)
Pruden, H. M. (SM)
Puder, R. K. (A)
Sippach, F. W. (A)
Vance, H. C. (SM)
Worne, B. E. (M)
Youngstrom, N. C. (VA)

Margate City
Thron, B. K. (M)

Marlboro
Bernard, J. L., Jr. (VA)
Silverstein, M. M. (A)

Marlton
Kentner, C. D. (VA)

Matawan
Chartoff, M. (A)
Fisher, W. W. (A)
Lundy, C. (SM)
Morley, A. R. (A)
Oster, F. J. (A)
Ronson, H. T. (A)
Wilshinsky, I. (A)
Wurthmann, G. E. (A)

Maywood
Babcock, W. E. (M)
Benenson, C. A. (A)
Calafati, S. S., Jr. (M)
Fichtl, R. R. (A)
Honig, A. R. (A)
Koechel, W. P. (VA)
Koehler, J. A. (A)
Salem, J. (A)
Seibert, J. L. (SM)
Seisler, M. (A)
Standig, H. L. (A)
Woods, C. R. (A)

Medford Lakes
Edwards, H. D. (A)

Mendham
Lewis, W. D. (SM)
Marston, W. J. (A)

Merchantville
Arbuckle, F. M. (M)
Buder, S. H. (A)
Cannata, A. L. (A)
Combellack, E. M. (M)
Conron, W. H. (SM)
Darling, W. (A)
Fell, W. F. (M)
Gallo, P. (SM)
Gibling, H. E. (SM)
Gluda, H. W. (A)
Grieser, G. J. (A)
Hamm, N. G. (M)
Hopkins, A. R. (SM)
Hurst, R. N. (A)
Kampf, R. J. (A)
Kephart, E. T. (A)
Lappin, L. S. (SM)
Lawrence, W. L. (VA)
Layer, J. H. (A)
Long, F. (A)
Luther, A. C., Jr. (A)
Marsh, D. R. (M)
McKinney, R. S. (A)
Oman, N. J. (VA)
Orr, J. R. (A)
Patterson, E. B. (SM)
Petry, G. F. (VA)
Sanborn, J. W. (SM)
Small, C. E. (A)
Staton, M. G. (M)
Story, T. H. (SM)
Swierczak, P. C. (A)
Taylor, J. R. (A)
Terrell, R. L. (A)
Thompson, L. E. (SM)
Washburn, E. M. (SM)
Young, J. E. (SM)

Metuchen
Dranetz, A. (A)
Fernald, O. H. (A)
Hantzik, R. M. (A)
Henley, E. J. (A)
Jacobs, R. A., Jr. (M)
Kasner, E. (A)
Kmosko, J. A. (A)
Lerner, A. M. (A)
Reich, A. (M)
Schiffmayer, G. F. (M)
Schofield, C. R. (A)
Woody, M. W. (A)

Middlesex
Schreiber, O. P. (A)
Warren, R. E. (A)

Middletown
Hayes, F. A. (A)
Kerr, S. A. (A)
Miller, S. E. (M)

Midland Park
Cotellessa, R. F. (A)

Millburn
Freeman, R. H. (A)
Hoth, D. F. (SM)
Leef, G. R. (A)
Marks, R. L. (M)
Moon, R. B. (A)
Morris, R. M. (SM)
Schaeffer, M. J. (A)
Vreeland, W. E. (A)

Millington
Bodmer, M. G. (M)
Harrison, C. W. (A)

Milltown
Meyer, R. C., Jr. (A)

Millville
Fath, J. A., Jr. (A)
Monari, A. J. (A)

Montclair
Adams, P. R. (SM)
Baker, C. I. (SM)
Bang, M. W. (SM)
Bibbins, L. L. (A)
Busignies, H. (F)
Charton, P. W. (A)
Dorfman, J. (M)
Du Bois, J. H. (SM)
Fulmer, N. C. (M)
Gabriel, E. Z. (A)
Gage, W. M. (A)
Gaston, J. B. (A)
Gladden, C. J. (A)
Harmon, H. D. (A)
Haynes, H. S. (A)
Kauffman, C. W. (A)
Lane, F. A. (VA)
Leighton, H. W. (A)
Maginnis, W. P. (SM)
Mouromtseff, I. E. (F)
Muller, C. R. (SM)
Myers, M. C., Jr. (M)
Okress, E. C. (SM)
Pacini, H. P. (M)
Patterson, T. T. (A)
Peer, G. C. (A)
Rose, F. C. (A)
Sherman, C. M. (A)
Sprague, V. G. (VA)
Thomas, H. E. (SM)
Timm, R. S. (M)
Vosburgh, M. C. (A)
Wentzel, M. G. (A)
Whiter, C. M. (SM)
Yamagami, Y. (A)
Yates, C. R. (A)

Moorestown
Apolenis, C. J. (A)
Baker, H. F. (A)
Ballentine, E. C. (SM)
Bright, D. C. (SM)
Bucher, T. T. N. (A)
Endres, R. O. (A)
Gillespie, H. C. (A)
Greenwood, H. T., III (M)
Herbst, P. J. (SM)
Hill, N. R. (A)
Luty, R. C., Jr. (A)
Nessmith, J. T., Jr. (A)
Palm, K. E. (A)
Poch, W. J. (SM)
Rettenmeyer, F. X. (F)
Schmit, D. F. (F)
Snyder, R. L., Jr. (M)
Stewart, W. E. (SM)
Sutinen, C. P. (SM)
Vance, D. H. (A)
Wilson, R. E. (A)
Zwiep, T. C. (A)

Morganville
Lavoie, S. D. (A)

Morris Plains
Fleckenstein, W. O. (A)
Freeman, W. C., Jr. (SM)
Geils, J. W. (M)
McLay, J., Jr. (A)
Rosier, H. L. (A)
Townley, R. C. (M)
Van Iderstine, A. (A)
Wilde, A. E., Jr. (A)

Morristown
Aaron, M. R. (A)
Alley, R. E., Jr. (A)
Arrington, J. L., II (A)
Baird, J. A. (A)
Cohen, B. S. (A)
Cronburg, C. I., Jr. (M)
D'Albora, J. B., Jr. (SM)
Dobler, V. W. H. (A)
Dubois, D. A. (A)
Early, J. M. (A)
Ehrlich, N. (A)
Embree, M. L. (A)
Favin, D. L. (A)
Filmer, W. L. (VA)
Gillson, M. H. (SM)
Giloth, P. K. (A)
Githens, J. A. (A)
Grubbs, W. J., Jr. (A)
Hagelbarger, D. (A)
Jacobs, O. B. (A)
Kellogg, W. M. (SM)
King, R. A. (M)
Lang, H. J. (M)
Larin, F. (A)
Lesser, T. S. (SM)
Mason, D. R. (A)
Miessner, B. F. (F)
Miller, E. O. (A)
Morrison, H. (SM)
Munk, P. R. (A)
Parrott, A. D. (M)
Paul, C. E. (A)
Perrier, J. F. (M)
Pierson, V. F. (A)
Roberts, S. C. (A)
Rowen, J. H. (A)
Saloom, J. A. (A)
Schneider, P. (A)
Schontzler, J. G. (A)
Seeley, R. M., Jr. (A)
Slade, B. N. (M)
Smith, P. D. (A)
Souders, E. R. (A)
Sumpter, P. B. (A)
Thayer, P. H., Jr. (M)
Walbesser, W. J. (A)
Walters, G. B. (A)
Welber, I. (A)
Welch, K. A. (A)
Wheeler, G. W. (A)
Wickliffe, P. R., Jr. (A)
Winternitz, T. W. (A)

Mountain Lakes
Bareiss, M. (SM)
Beck, R. J. (A)
Black, W. L. (SM)
Claassen, F. S. (A)
Engelmann, H. F. (SM)
Gabel, W. (M)
Houck, H. W. (SM)
Hughes, R. W. (SM)
Jacobus, W. M. (A)
Krist, H. K. (SM)
Nelson, E. L. (F)
Nexon, V. J. (A)
Nordstrom, B. H. (SM)
Noyes, A., Jr. (SM)
Osterland, E. H. (SM)
Parkes, A. W., Jr. (SM)
Tyzzer, H. J. (SM)
Webster, F. D. (SM)
White, W. F. (A)

Mountainside
Anderson, A. E. (M)
Anderson, T. N. (A)
Browne, G. W. (M)
Kniazuk, M. (A)
Sears, P. R. (M)
Wagner, S. J. (SM)

Mountain View
Dilatush, E. (M)

Mount Arlington
Hart, J. P. (A)

Mount Ephraim
Easley, R. L. (M)
Steoger, J. E. (A)
Taylor, J. M., Sr. (M)

Mount Holly
Colby, N. C. (A)
Jose, R. S. (M)
Million, J. W., Jr. (SM)
Westcott, H. H. (A)
Williams, E. A. (A)

Mount Royal
Clement, B. R. (A)

Murray Hill
Affel, H. A. (F)
Alsberg, D. A. (SM)
Anderson, C. N. (F)
Anderson, R. E. (A)
Andrews, F. T., Jr. (A)
Baldwin, G. L. (A)
Baldwin, M. W., Jr. (F)
Bangert, J. T. (SM)
Bashkow, T. R. (A)
Bennett, W. R. (SM)
Berger, U. S. (SM)
Beyer, J. W. (SM)
Black, D. M. (SM)
Bode, H. W. (F)
Bollman, J. H. (SM)
Bown, R. (F)
Braga, F. J. (M)
Bullock, D. B. (A)
Burton, E. T. (SM)
Carbrey, R. L. (M)
Calbick, C. J. (A)
Carretta, P. M. (A)
Cherry, D. D. (A)
Church, S. E. (A)
Clogston, A. M. (SM)
Cobb, L. J. (M)
Cornell, W. A. (M)
Cutler, C. C. (A)
Darlington, S. (SM)
Darnell, P. S. (SM)
David, E. E., Jr. (A)
Dennis, F. R. (M)
Depp, W. A. (SM)
Dietzold, R. L. (SM)
Doba, S., Jr. (A)
Doherty, W. H. (F)
Drazy, E. J. (A)
Eberhart, E. K. (SM)
Edwards, P. G. (SM)
Eglin, J. M. (A)
Ehrbar, R. D. (SM)
Elmendorf, C. H. (SM)
Fagen, M. D. (M)
Fair, I. E. (VA)
Fairweather, B. A. (A)
Fay, C. E. (SM)

Ferguson, J. G. (SM)
Ferrell, E. B. (SM)
Finch, T. R. (M)
Fischer, H. B. (SM)
Fisk, J. B. (SM)
Flegal, J. R. (SM)
Fisher, H. J. (SM)
Flood, J. D., Jr. (A)
Frantz, G. R. (SM)
Friis, R. W. (SM)
Goodale, W. D., Jr. (A)
Graham, R. E. (M)
Gray, M. C. (A)
Green, E. I. (SM)
Grossman, A. J. (M)
Haines, A. B. (A)
Hallenbeck, F. J. (SM)
Hartman, C. D. (VA)
Harvey, F. K. (A)
Heberlein, A. A. (SM)
Hefele, J. R. (VA)
Heffner, H. (A)
Herr, F. J. (A)
Heskett, H. (M)
Hewitt, W. H., Jr. (SM)
Hines, M. E. (M)
Hoffman, R. J. (A)
Hollenberg, A. V. (SM)
Hopper, A. L. (SM)
Horton, A. W., Jr. (SM)
Hudack, J. M. (SM)
Israel, J. O. (SM)
Jansen, J. J. (A)
Jensen, A. G. (F)
Johanson, A. E. (M)
Jordan, H. G. (A)
Kammerer, F. W. (VA)
Keith, C. R. (A)
Kelley, R. A. (A)
Kersta, L. G. (SM)
Kerwien, A. E. (SM)
King, F. H. (A)
Kinsburg, B. J. (M)
Kinzer, J. P. (SM)
Kirkpatrick, W. E. VA)
Klapp, C. D. (A)
Kock, W. E. (F)
Koerner, L. F. (VA)
Kolding, A. R. (A)
Kompfner, R. (F)
Kretzmer, E. R. (A)
Kuh, E. S. (A)
Kummer, O. (SM)
Lebert, A. W. (VA)
Levin, S. A. (VA)
Lewis, H. A. (SM)
Linvill, J. G. (A)
Lozier, J. C. (SM)
Lund, N. (A)
Madsen, R. L. (A)
Manley, J. M. (SM)
Marrison, W. A. (SM)
Martin, W. H. (SM)
McDavitt, M. B. (M)
McGuigan, J. H. (A)
McKay, K. G. (M)
McNally, J. O. (SM)
Meacham, L. A. (F)
Mendel, J. T. (A)
Mendenhall, H. E. (SM)
Michaels, S. E. (SM)
Miller, R. A. (A)
Mischler, W. D. (A)
Moll, J. (A)
Molnar, J. P. (SM)
Moore, G. E. (M)
Morton, J. A. (SM)
Munn, A. J. (A)
Myers, P. B. (A)
Nebel, C. N. (A)
Nielsen, G., Jr. (A)
Nordahl, J. G. (SM)
Norwine, A. C. (SM)
Oswald, A. A. (F)
Owens, C. D. (SM)
Packard, G. N. (M)
Penick, B. B. (VA)
Perry, A. (A)
Pierce, J. R. (F)
Pietenpol, W. J. (M)
Pittman, R. C. (A)
Pomeroy, A. F. (SM)
Potter, R. K. (F)
Reichle, W. E. (SM)
Relling, P. A. (VA)
Robertson, G. H. (A)
Rogers, R. M. (A)
Runyon, J. P. (A)
Ryder, R. M. (SM)
Sawyer, B. (A)
Schawlow, A. L. (A)
Schelkunoff, S. A. (F)
Schimpf, L. G. (SM)
Schneider, H. A. (A)
Schott, L. O. (A)
Sears, R. W. (SM)
Shannon, C. E. (F)
Sharp, W. O. (M)
Shockley, W. (SM)
Slepian, D. (A)
Smith, C. A. (SM)
Southworth, G. C. (F)
Spencer, A. E., Jr. (A)
Stammerjohn, L. W. (A)
Stansel, F. R. (SM)
Stevens, R. R. (A)
Straube, H. M. (SM)
Sykes, R. A. (SM)
Taylor, E. R. (VA)
Thomas, D. E. (SM)
Thulin, C. W. (A)
Tidd, W. H. (SM)
Tien, P. K. (A)
Townley, R. K. (A)
Trent, R. L. (M)
Uhlir, A., Jr. (A)
Valdes, L. B. (M)
Veazie, E. A. (VA)
Weeks, G. E. (VA)
Wentz, J. F. (SM)
Wilson, J. R. (SM)
Winter, H. F. (A)
Wood, I. E. (A)
Woodmansee, B. S. (A)
Wright, S. B. (SM)
Young, C. H. (SM)

Neptune
Ackerman, J. C. (M)
Allen, J. A. (A)
Armstrong, R. W. (VA)
Bert, J. E. (A)
Bifson, M. (A)
Daniels, T. E. (A)
Danko, S. F. (M)
Evers, J. T. (VA)
Frevert, A. W. (M)
Holtum, A. G., Jr. (A)
Hull, J. F. (M)
Jachter, M. H. (A)
Repella, N. (A)
Speaker, B. (A)
Stodola, E. K. (SM)
Swingle, D. M. (M)
Woodyard, O. C. (M)

Neptune City
Mudgett, A. H. (A)

Neshanic
Kuthe, H. K. (VA)
Schiff, W. J. (A)

Netcong
Reichard, W. C. (VA)

Newark
Abrams, H. (A)
Acosta, F. B. (A)
Berkery, E. A. (A)
Bird, S. P. (A)
Bizon, M. J. (A)
Boyson, C. V. (A)
Bremer, F. V. (SM)
Caprarola, L. J. (A)
Carluccio, J. (A)
Cohen, S. (SM)
Coppola, A. A. (A)
Cunniff, T. W. (M)
Denney, J. M. (A)
Farese, V. C. (A)
Faughnan, J. F. (A)
Fishman, S. (SM)
Gilbert, R. W. (M)
Giordano, A. P. (A)
Glick, C. L. (A)
Goldberg, D. L. (A)
Greenwood, T. S. (A)
Gropp, B. P. (A)
Guarino, P. A. (A)
Helm, R. J. (A)
Henry, T. J. (SM)
Herber, J. C. (SM)
Hergenhan, O. (A)
Hold, H. W. (A)
Holdman, M. (A)
Hooven, M. D. (SM)
Houghton, H. V., Jr. (A)
Jensen, D. C. (A)
Kang, C. L. (A)
Klappholz, L. (A)
Klein, M. (A)
Koppelon, R. (SM)
Kunkel, E. A., Jr. (A)
Kups, E. F. (A)
Kwast, V. B. (M)
Lamb, F. X. (VA)
Lamoreaux, F. H. (A)
Lebednik, M. A. (A)
Mandzik, M. M. (A)
Marx, D. H. (A)
Meier, W. L. (VA)
Meinholtz, H. J. (A)
Miller, J. H. (F)
Morelock, O. J. (SM)
Morgan, W. H. (A)
Nagy, J., Jr. (A)
Nahay, L. P. (A)
Newman, L. (A)
Pfost, R. H. (A)
Popyk, J., Jr. (A)
Ranger, R. H. (F)
Rheaume, R. H. (M)
Ross, P. L. (A)
Russell, R. A. (M)
Schooley, R. W., Jr. (A)
Surenian, D. (A)
Tiffin, C. M. (A)
Tucker, W. (A)
Vernick, J. N. (A)
Walker, R. D. (A)
Wallenstein, J. P. (A)
Wells, D. H. (A)
Widzemok, W. (A)
Zick, B. A. (A)

New Brunswick
Badoyannis, G. M. (A)
Bernard, W., Jr. (A)
Butenko, J. W. (A)
Cahill, R. M. (A)
Fich, S. (M)
Freedman, L. A. (A)
Haeseler, P. R. (A)
Herzog, G. B. (A)
Lempert, I. E. (M)
Longo, C. V. (A)
Meyerhoff, A. A. (A)
Moore, T. H. (A)
Potter, J. L. (SM)
Rosenthal, L. (SM)
Selinsky, J. J. (A)
Weil, G. M. (A)
Weintraub, W. B. (A)
Williams, R. L. (A)

Newfield
Mullen, C. V. (A)

New Milford
Alexander, S. B. (A)
Chadney, H. B. (A)
Cohen, N. L. (A)
Ewert, A. C. (M)
Franzel, I. H. (A)
Fruchter, C. L. (A)
Frye, F. X. (A)
Gardner, R. O. (A)
Hafemeister, R. F. (M)
Harris, G. D. (A)
Heir, D. H. (A)
Labagh, E. L. (A)
MacDermid, B. W. (A)
Mills, H. J. (A)
Olson, R. E. (M)
Paine, J. A. (A)
Patremio, S. R. (M)
Phelps, R. B. (M)
Reich, P. J. (M)
Umles, M. S. (A)
Volger, W. A. (A)

New Providence
Alexander, E. J. (A)
Borden, C. C., Sr. (M)
Carrubba, S. J. (A)
Chruney, M. (A)
Filo, J. P. (A)
Quinn, J. L., Jr. (A)
Seppeler, W. C. (A)
Simonds, R. E. (M)
Steele, R. B. (A)
Tendick, F. H., Jr. (A)
Thomas, G. B., Jr. (SM)
Wall, J. J. (A)

Nixon
Bocchieri, A. J. (A)
Richardson, J. N. (A)
Unger, R. J. (A)
Zapotocky, A. C. (M)

Normandy Beach
Shanahan, J. C. (M)

North Arlington
Balter, S. A. (A)
Berger, M. (A)
Bruning, J. M. (M)
Fischer, J. G. (A)
Newman, E. L. (A)

North Bergen
Biamonte, O. A. (A)
Cox, J. L. (A)
Fennick, B. (A)
Feucht, R. E. (A)
Frieborn, J. K. (A)
Frum, A. (A)
Horner, R. G. (A)
Nasto, S. N. J. (A)
Oliver, G. E. (SM)
Perlis, H. J. (A)
Riley, G. B. (A)
Wolter, H. R. (A)

North Caldwell
Baldwin, W. O. (A)
Clark, T. G. (A)
Goldman, H. (A)
Grieg, D. D. (SM)
Siemens, R. H. (SM)
Steadman, A. (A)

North Hackensack
Gumaer, H. (A)
Hammerich, H. A. (A)

North Long Branch
Pitzer, J. F. (A)
Reusch, R. K. (A)

North Merchantville
Obert, M. J. (SM)

North Plainfield
Deeley, P. M. (SM)
Dinzik, D. J. (A)
Gordon, M. J. (A)
Noble, M. L. (A)
Ottobre, J. N. (A)
Vergon, T. F. (A)
Warren, C. W. (A)

Norwood
Brick, F. R., Jr. (SM)
Gunther-Mohr, G. R. (A)
Vieth, W. G. (M)

Nutley
Alexander, B. (M)
Allison, J. L. (SM)
Altman, F. J. (M)
Bondy, J. O. (A)
Bryant, J. H. (SM)
Bucher, F. X. (SM)
Capen, H. N. (SM)
Cater, J. R. (M)
Clavier, A. G. (F)
Cookson, A. E. (SM)
Cornwell, R. C. (M)
Davis, R. C. (SM)
De Vany, B. V. (M)
Dishal, M. (SM)
Dite, W. (A)
Ellis, R. (A)
Fahnestock, R. J. (A)
Felsenheld, R. A. (M)
Frederick, R. E., Jr. (A)
Goldan, T. J. (A)
Graham, W. (A)
Gray, R. E. (VA)
Greenfield, G. (A)
Groce, J. C. (A)
Gronberg, H. C. (VA)
Hamilton, G. E. (SM)
Hall, J. (A)
Happe, W. H., Jr. (A)
Harvey, J. B. (A)
Hoagland, K. A. (SM)
Janco, M. (A)
Jeans, J. R. (A)
Jones, M. A. (A)
Kandoian, A. G. (F)
Lott, R. E., Jr. (A)
Lundburg, F. J. (SM)
Magdeburger, P. E. (A)
Mangolds, B. (M)
Marchese, T. J. (SM)
McGalliard, W. V. (A)
Miller, R. J. (A)
Parzen, P. (SM)
Peifer, A. G. (M)
Polyzou, J. (A)
Rist, D. H. (A)
Rogoff, M. (M)
Rutherford, R. E. (A)
Schildknecht, R. O. (A)
Shapiro, O. (M)
Sichak, W. (M)
Spahr, P. K., Jr. (A)
Stacey, J. M. (A)
Stevens, F. J. (M)
Swinney, J. G. C., Jr. (SM)
Troutman, J. E. (A)
Tyminski, W. V. (A)
Van Vechten, R. K. (A)
Waer, R. R. (A)
Ware, P. M., Jr. (A)
Westbrook, E. P. (A)
White, R. E. (SM)
Wickersham, W. H. (A)
Wing, A. K., Jr. (SM)
Wirth, C. H. (A)
Young, N. H. (SM)
Zaret, M. E. (SM)
Zeliff, R. J. (A)

Oaklyn
Ayres, W. R. (M)
Brown, E. L. (A)
Crawford, R. D. (A)
Fiet, O. (SM)
Henderson, R. A. (SM)
Jacobi, R. J. (A)
Salani, J. M. (A)
Sass, E. J. (M)
Scheldorf, R. D. (VA)
Schneider, G. (A)

Oceanport
Nagel, J., Jr. (A)
Nylander, G. A. (A)
Schnabolk, H. L. (A)
Stromberg, R. E. (M)

Ocean City
Glawson, T. J. (A)

Old Bridge
Ganson, D. M., Jr. (A)
Koch, J. G. (A)

Oldwick
Wittwer, N. C., Jr. (A)

Oradell
Brackett, H. H. (VA)
McDaniels, H. A. (A)
Schwartz, H. C. (A)
Yeutter, C. S. (A)

Orange
Arnts, F. D., Jr. (A)
Burkhart, W. H. (A)
Field, W. T. (VA)
Fromer, M. (A)
Gardner, P. S. (A)
Grayson, E. L. (M)
Harris, R. J. T. (A)
Helfrich, J. H. (A)
Kenyon, R. R. (A)
La Manna, R. J. (A)
Lepic, R. E. (A)
Limberg, A. C. (A)
Myers, B. R. (A)
Suydam, C. H. (M)

Oxford
Bartron, H. H. H. (A)

Packanack Lake
Beaver, H. E. (A)
Bentley, A. V. (SM)
Brown, P. F. (M)
Fockler, W. C. (A)
Nestlerode, C. D., Sr. (A)
Reese, H., Jr. (M)
Wixson, F. C. (A)
Zusi, F. C. (A)

Palisade
Andrews, E. (A)
Coppell, F. K. (A)
Schnoll, N. (A)

Palisades Park
Karolkiewicz, D. J. (A)

Palmyra
Foerster, W. (A)
Gorski, A. A. (A)
Hilbourn, C. L. (A)
Johnson, R. M. (M)
Masterson, E. (M)
Rammer, C. A. (M)
Ringer, H. N. (A)
Waring, J. W. (A)
Woestman, J. W. (A)
Woodward, G. P. (A)
Yewdall, G. E. (A)

Paramus
Braun, W. E. (A)
Brown, T. G. (A)
Chanes, H. (A)
Deiss, E. W. (A)
Honeiser, V. P. (A)
Manoly, A. E. (A)
Petrina, R. J. (A)
Poarch, M. P. (A)
Robertson, J. D. (A)
Schenkel, F. W. (A)
Stahl, P. D. (M)
Wehrlin, R. F. (A)

Park Ridge
Ecklund, E. (A)

Parsippany
Krause, C. K. (VA)
Mehrbach, E. (M)
Stanton, S. W. (VA)

Passaic
Backus, A. S. (A)
Brussel, E. H. (A)
Bunn, H. L. (A)
Currier, P. J. (A)
Dalkiewicz, J. M. (A)
De Bell, J. M., Jr. (A)
Dehoney, R. J. (A)
Dresner, J. (A)
Dumont, A. B. (F)
Faust, W. E. (A)
Hair, G. R., Jr. (A)
Hettinger, S. (A)
Morris, A. E. (A)
Schkolnick, H. (A)
Schmidt, L. (A)
Sher, A. (A)
Smith, P. W. (A)
Stoj, F. R. (A)
Suszek, E. J. (A)
Von Savage, J. (A)
Wakeman, R. P. (M)
Webster, G. C. (A)
Yu, V. P. (A)

Paterson
Barker, B. B., Jr. (A)
Becher, W. D. (A)

Biagi, A. D. (A)
Binneveld, H. A. J. (A)
Brown, A. T., III (A)
Bruggeman, J. T. (A)
Buchinger, M. J. (A)
Butterworth, J. W. (SM)
Carlson, O. E. (M)
Di Ruggeriero, M. A. (A)
Dolan, F. J. (A)
Durgin, L. A. (A)
Emaut, J. L. (A)
Evans, N. L., Jr. (A)
Gariano, W. F. (A)
Geller, W. (A)
Goforth, J. L. (A)
Grimes, W. M., Jr. (A)
Grower, B. B. (A)
Hansen, R. K. (A)
Heinis, F. W. (A)
Lome, J. B. (A)
Lucas, E. F. (A)
Martin, J. A. (A)
Norton, M. H. (A)
Papanou, D. S. (A)
Pauloski, S. H. (A)
Potash, J. (A)
Rich, P. A. (A)
Sautner, J. (A)
Seergy, C. M. (A)
Thiegartner, G. J. (A)
Volpe, D. F. (A)

Paulsboro
Galopin, A. (A)
Gross, S. D. (A)
Michelson, H. J. (A)

Pennington
Feinsler, G. L. (SM)

Pennsauken
Bauer, J. A. (A)
Benzuly, H. J. (A)
Dietch, L. (M)
Hobson, N. L. (A)
Kaplan, M. (A)
Mintzer, A. I. (A)
Nangle, F. J., Jr. (A)
Reeder, C. E. (A)
Shock, W. R. (A)
Uphoff, F. B. (A)

Penns Grove
Tipton, W. F. (M)

Perth Amboy
Ceres, G. V. (A)
Garretson, T. A. (M)
Jesse, S. A. (A)
Marcy, S. P. (A)
Moravek, J. J. (A)
Sher, H. T. (A)

Phillipsburg
Hill, C. A. (A)
Kascha, G. E. (A)

Pitman
Andrade, L. (A)
Brown, I. N. (SM)
Luckock, W. J. (M)
Parker, S. R. (M)
Thomas, W. F. (A)

Plainfield
Barr, H. J. (A)
Bennett, F. K. (A)
Boise, E. B. (A)
Buttolph, J. D. (A)
Cowperthwait, W. L., Jr. (M)
Day, J. E. (A)
Edson, J. O. (SM)
Haydu, G. K. (A)
Ingerson, W. E. (A)
Kelly, H. P. (A)
Magers, T. M. (A)
Noble, R. B. (A)
Russo, L. J., Jr. (A)
Satter, H. W. (A)
Schneider, W. A. (A)
Smith, A. E. (M)
Snyder, C. L. (A)
Stull, R. J. (SM)
Townsend, G. B. (A)
Wehrle, A. W. (A)

Point Pleasant
Nichols, H. J. (M)
Scharmann, L. E. (A)

Pompton Lakes
McDevitt, J. J., Jr. (A)
McEwan, A. W. (M)
Sellers, G. W. (M)
Wachter, J. E. (A)

Pompton Plains
Arnold, A., Jr. (A)
Cavanagh, R. T. (A)
Clough, R. F. (A)
Gullfoyle, R. J. (M)
Palmer, R. C. (M)
Sayer, W. H., Jr. (A)
Thompson, R. D. (M)

Pottersville
Peery, W. E. (VA)

Preakness
Noll, J. W. (A)

Princeton
Allen, H. C. (SM)
Baker, G. M. K. (M)
Barco, A. A. (SM)
Barnes, W. E. (A)
Barton, L. E. (SM)
Baugh, C. W. (M)
Beam, W. R. (A)
Bedford, A. V. (F)
Behrend, W. L. (M)
Bliss, W. H. (SM)
Bond, D. S. (SM)
Borkan, H. (A)
Braden, R. A. (SM)
Brinster, J. F. (M)
Brown, G. H. (F)
Burns, L. L., Jr. (SM)
Burnside, D. G. (SM)
Burrill, C. M. (SM)
Carlson, W. L. (F)
Carpenter, M. M., Jr. (A)
Chambers, F. T., III (A)
Chandler, C. H. (SM)
Chandler, H. M., Jr. (M)
Cheeseman, P. R. (A)
Cowan, E. J. (M)
Crane, H. D. (A)
Creager, F. L. (M)
De Vore, H. B. (SM)
Dickey, E. T. (SM)
Dodds, W. (SM)
Dodge, S. W. (SM)
Donal, J. S., Jr. (SM)
Donath, E. (SM)
Donley, H. L. (SM)
Engstrom, E. W. (F)
Epstein, D. W. (F)
Epstein, J. (SM)
Estrin, G. (A)
Estrin, T. A. (A)
Ewing, D. H. (SM)
Fischer, J. T. (A)
Flory, L. E. (SM)
Forgue, S. V. (SM)
Fredendall, G. L. (SM)
Garretson, E. B. (A)
George, R. W. (SM)
Giacoletto, L. J. (SM)
Gibson, W. G. (A)
Goodman, S. (A)
Hackley, R. A. (A)
Hansen, P. J. G. (M)
Hart, L. C. (M)
Harvey, R. L. (SM)
Hegyi, I. J. (M)
Hellwarth, R. W. (A)
Herold, E. W. (F)
Herkart, P. G. (M)
Herman, F. (A)
Holmes, D. D. (A)
Holmes, R. S. (F)
Hook, H. O. (A)
Houghton, W. D. (A)
Hoyler, C. N. (SM)
Hubbard, B. R. (VA)
Hufford, G. (A)
Hutter, E. C. (A)
Jenny, D. A. (A)
Jensen, A. S. (SM)
Johnson, E. O. (M)
Johnson, H. (SM)
Johnson, W. C. (SM)
Karns, M. E. (SM)
Kazan, B. (A)
Keizer, E. O. (SM)
Kell, R. D. (F)
Kent, G. (A)
Kessler, J. O. (A)
Klensch, R. J. (A)
Knights, J. E., Jr. (M)
Knoll, M. (SM)
Knowles, W. S. (A)
Kurshan, J. (SM)
Landon, W. D. (F)
Law, H. B. (F)
Lindenblad, N. E. (F)
Linder, E. G. (SM)
Liu, D. F. (A)
Luck, D. G. C. (F)
MacLean, K. G. (SM)
Malter, L. (F)
Martinelli, C. C. (SM)
Mason, R. S. (A)
Mather, N. W. (M)
Matheson, R. M. (A)
Mesner, M. H. (SM)
Mitchell, O. V. (M)
Modlinski, W. M. (A)
Moore, D. G. (M)
Morrison, W. C. (SM)
Morton, G. A. (F)
Mueller, C. W. (SM)
Nelson, M. D. (A)
Nergaard, L. S. (F)
Nicoll, F. H. (SM)
Norman, F. H. (A)
North, D. O. (F)
Olive, G. A. (A)
Olson, C. V. (M)
Olson, H. F. (F)
Pankove, J. I. (A)
Pensak, L. (SM)
Peter, R. W. (SM)
Peterson, D. W. (A)
Petterson, E. A. (M)
Pike, W. S. (M)
Pomerene, J. H. (M)
Pritchard, D. H. (M)
Pyne, I. B. (A)
Rajchman, J. A. (SM)
Rankin, J. B. (A)
Raymond, C. A. (A)
Richey, J. L. (SM)
Roberts, W. V. (F)
Robinson, J. G. (A)
Robinson, K. W. (A)
Rodgers, G. M. (A)
Rose, A. (F)
Rosenberg, M. (A)
Ruetz, J. A. (A)
Schairer, O. S. (SM)
Serrell, R. (SM)
Smith, J. P. (SM)
Smith, P. T. (SM)
Spears, H. (A)
Stone, R. P. (SM)
Surber, W. H., Jr. (M)
Sziklai, G. C. (SM)
Tolson, W. A. (SM)
Trevor, B. (SM)
Tuska, C. D. (SM)
Vose, C. H. (SM)
Wadlin, M. L. (A)
Ward, S. A. (M)
Webster, W. M. (A)
Weimer, P. K. (SM)
Wendt, F. S. (A)
Westneat, A. S., Jr. (SM)
Wilkinson, W. C. (M)
Williams, T. R. (A)
Wolff, I. (F)
Wong, S. Y. (A)
Woodbridge, D. E. (A)
Woodward, O. M., Jr. (A)
Yamada, D. A. (A)
Young, C. J. (SM)
Zworykin, V. K. (F)

Princeton Junction
De Remer, K. R. (A)

Radburn
Eaton, R. D. (M)
Silver, M. (A)

Rahway
Basarab, J., Jr. (A)
Bellingham, L. C. (A)
Coler, B. A. (A)
Gegenheimer, F. F. (A)
Grill, C. (A)
Lucier, O. S. (A)
Robinson, G. D. (A)
Turnbull, H. A. (A)

Ramsey
Buyer, E. M. (A)
Carter, W. S., Jr. (A)
Friedman, D. (A)
Paschetto, D. D. (A)

Rancocas
Korman, N. I. (SM)

Red Bank
Anderson, E. C. (SM)
Bawden, H. G. (M)
Beck, A. C. (SM)
Billick, P. (A)
Breckman, J. N. (A)
Budenkaye, A. C. (M)
Burawski, J. A. (A)
Bush, J. A. (A)
Caffrey, J. V., Jr. (A)
Campbell, S. V. (A)
Crawford, A. B. (F)
Czerwinski, W. P. (M)
Daniels, F. B. (A)
Dathe, L. C. (A)
Debiasio, C. (A)
Domidion, W. G., Jr. (A)
Edwards, C. F. (A)
Egli, J. J. (A)
Evans, E. D., Jr. (A)
Farlee, R. J. (A)
Feist, W. E. (SM)
Fow, B. F. (A)
Fox, A. G. (SM)
Frankel, H. (M)
Gerhold, R. A. (M)
Goodall, W. M. (F)
Gordon, L. (M)
Gougoulis, G. H. (A)
Gunn, A. C. (SM)
Hiltner, E. B. (A)
Hunt, D. W. (M)
Jakes, W. C., Jr. (A)
Johnson, G. D. (VA)
Karp, A. (A)
Keligher, B. J. (A)
Kent, C. E. (A)
Kiger, L. L. (A)
King, A. P. (SM)
Koelle, A. R. (A)
Krassnet, G. N. (A)
Krevsky, S. (SM)
Kulinyi, R. A. (M)
Lacy, R. E. (SM)
Lavin, H. D. (A)
Legg, W. E. (A)
Levine, R. H. (A)
Lindner, G. H. (A)
Lindner, H. G. (M)
Lippel, B. (A)
Maloney, T. E. (M)
Mancino, V. J. (A)
Martin, J. E. (A)
McCormick, S. T., Jr. (A)
Menhennett, G. H. (M)
Moody, C. S. (A)
Moore, J. C., Jr. (M)
Morris, F. W., Jr. (SM)
Mumford, W. W. (F)
Niemhoff, N. (M)
Obsharsky, P. (A)
Petrillo, S. E. (A)
Ring, D. H. (SM)
Robertson, S. D. (SM)
Rosenzvaig, J. E. (A)
Rothstein, J. (A)
Rowe, H. E. (A)
Schatz, H. J. (A)
Schelleng, J. C. (F)
Sharpless, W. M. (SM)
Shaver, K. C. (A)
Sherburne, F. B. (A)
Siderman, J. A. (M)
Singer, H. (A)
Smith, S. S. (M)
Spittle, S. E. (M)
Stangl, F. P. (M)
Stanley, H. T. (A)
Taylor, C. H. (A)
Tillotson, L. C. (SM)
Weiss, M. T. (A)
Whitten, C. L. (A)
Winn, W. F. (A)
Wopat, J. W., Jr. (A)
Wright, D. S. (A)
Zalesky, S. J. (M)
Zarin, A. (A)

Ridgefield
Dolinko, L. (A)
Fristensky, C. A. (A)
Gelling, H. F. (A)
Sokol, S. (A)

Ridgefield Park
Roth, M. C. (M)

Ridgewood
Armstrong, C. A. (SM)
Boyle, G. G. (A)
Cahill, W. J. (VA)
Davids, D. A. (A)
Dean, W. W. (SM)
DeLeon, J. (A)
DeMars, S. A. (A)
Dowell, K. P. (A)
Eichenberger, N. F. (A)
Engel, G. C. (A)
Fitts, W. F. (A)
Holt, A. C. (SM)
Howlte, R. (A)
Johnson, F. H. (A)
Keetch, W. A. (A)
Lamons, R. P. (A)
McKesson, L. J. (A)
Pain, D. H. (A)
Puckette, C. M., Jr. (M)
Robinson, C. S. (M)
Sands, L. G. (SM)
Simpson, L. C. (SM)
Titus, E. S. (A)
Troell, R. E. (A)
Warsher, A. (M)

Ringwood
Engert, G. W. (A)

Riverdale
Hegeman, B. L. (A)

River Edge
Baum, E. (A)
Bochet, F. J. (A)
Colman, L. (A)
Elbert, C. H. (A)
Ennis, F. T. (VA)
Gulland, G. R. (A)
Howitt, G. (A)
Izzo, A. J. M. (A)
Kennedy, A. (SM)
Levine, A. M. (A)
Levitsky, J. (A)
Mazzola, J. R. (SM)
O'Connor, R. A. (M)
Plouffe, R. L., Jr. (A)
Samuelson, C. D. (VA)
Seldin, L. (SM)
Slack, S. J. (A)
Zuehlke, E. R. (A)

Riverside
Warner, F. N. (A)

Riverton
Benware, R. T. (SM)
Chapman, L. J. (A)
Collings, F. C., Jr. (M)
Good, L. H. (M)

River Vale
Lambert, F. D. (A)

Robbinsville
Hawks, B. (A)

Rochelle Park
Carroll, J. M. (A)
Coughlin, J. J. (A)
Hancock, P. L. (A)
Macaluso, L. J. (A)
Martinez, C. I. (A)
Studwell, A. E. (A)
Uzel, F., Jr. (A)

Rockaway
Carne, G. G. (SM)
Lundstedt, C. V. (VA)
Uiga, E. (A)
Woodruff, G. N. (A)

Roseland
Harlan, R. E. (A)
Janes, A. W. (A)
Richardson, G. G. (A)
Schoenbaum, J. R. (SM)

Roselle
Altman, N. G. (A)
Atlas, Z. (A)

Roselle Park
Hampshire, J. R. (A)
Legendre, V. (M)
McNicol, D. (F)
Olsen, R. F. (A)
Reichert, W. G., Jr. (A)

Rumson
Blom, B. V. (SM)
Brogle, A. P., Jr. (A)
Friis, H. T. (F)
Golay, M. J. E. (SM)
Gruol, J. W. (M)
McCandless, J. B. (M)
Ribe, M. L. (A)
Stega, E. A. (M)
Strothman, R. A. (M)
Teeter, A. A. (A)
Voigt, G. (A)

Runnemede
Oda, D. J. (A)

Rutherford
Ankenbrock, C. A. (A)
Del Vento, J. M. (A)
Edmunds, J. J., Jr. (A)
Feit, L. (A)
Green, M. W. (A)
Hartmann, W. A., Jr. (A)
Higgins, L. A. (A)
Keller, W. N. (A)
Kline, M. B. (SM)
Lohrenz, C. (A)
Loring, B. L. (A)
Manty, W. A. (SM)
Merrill, J. B. (A)
Monack, A. J. (SM)
Muniz, R. (SM)
Reenstra, W. A. (A)
Sakate, F. S. (A)
Sammon, A. C. (A)
Schneider, A. E. (M)
Simpson, W. F. (VA)
Van Winkel, E. W. (SM)
Vogt, R. J. (A)
Walter, C. W. P. (SM)
Wattson, H. B. (SM)
Wilmarth, R. W. (M)

Salem
Bailey, L. W. (SM)
Morton, R. S. (VA)
Perlaweig, A. M. (A)

Scotch Plains
Bell, J. S. (A)
Fisher, J. H. (M)
Harkless, E. T. (A)
Montlior, J. A. (A)
Reneker, D. H. (A)

Seabrook
Nishimura, G. H. (A)

Secaucus
Bartlett, B. R. (A)
Eickhorn, C. R., Jr. (A)

Fleischmann, W. W. (A)
Tonn, J. L. (A)

Sea Girt
Geissinger, E. L. (A)

Sewell
Woodward, J. D. (SM)

Short Hills
Adams, R. T. (A)
Budenbom, H. T. (SM)
Carroll, M. J. (SM)
Cozier, J. R. (A)
Hershey, L. M. (SM)
Huber, G. H. (SM)
Jones, H. B., Jr. (A)
MacRae, R. B. (A)
Opie, A. (M)
Robinson, A. L. (SM)
Saunders, H. O., Jr. (A)
Steers, W. F. (SM)
Tucker, J. P. (VA)
Vanderbilt, S. (A)
Whittemore, L. E. (F)
Wright, A. K. (SM)
Ziegler, A. W. (SM)

Shrewsbury
Brown, A. L. (A)
Covici, W. (A)
Mittelman, W. (A)
Petkofsky, L. (A)
Rehm, W. L. (M)
Ross, A. H. (SM)
Wiener, A. (M)

Sicklerville
Ayres, J. J. (M)

Singac
Krell, J. (A)

Skillman
Hamner, L. H. (A)

Somerville
Larky, N. D. (A)
Parr, H. M. (A)

South Orange
Augenblick, H. A., Jr. (A)
Billets, M. P. (A)
Bonanno, J. L. (SM)
Harris, W. A. (SM)
Maurer, A. K. (A)
Miller, H. J. (SM)
Neary, J. F. (A)
Poppele, J. R. (F)
Royden, G. T. (F)
Stanwick, C. A. (VA)
Wooldridge, A. C. (SM)

South Plainfield
Bellew, F. N. (A)
Bishop, J. C., Jr. (A)

South River
Blanchard, C. K. (A)

Sparta
Hussey, L. W. (SM)
Lundstrom, A. A. (SM)

Springfield
Aitelli, F. P. (A)
Emmel, L. L. (A)
Feindel, A. (M)
Freedman, N. S. (SM)
Hartz, W. W. (A)
Jelen, M. J. (SM)
Keppert, G. D. (A)
Ozsvath, D. R. (M)
Phelps, J. W. (A)
Rogers, A. W. (M)

Spring Lake
Bozzelli, J. F. (A)
Huber, W. A. (SM)
Slattery, J. J. (SM)

Spring Lake Heights
Romano, G. F. (A)

Stelton
Heilmann, P. E. (A)

Stockton
Wolcott, J. R. (A)

Summit
Ansorge, H. W. (A)
Black, H. S. (F)
Block, F. G. (A)
Buntenbach, R. W. (A)
De Rienzo, F., Jr. (A)
Distler, J. E. (A)
Dudley, H. W. (SM)
Evans, H. W. (SM)
Fawcett, D. G. (A)
Feldman, C. B. (F)
Gammie, J. (M)
Grierson, C. A. W. (SM)
Grieser, T. J. (M)
Hammell, R. (A)
Hanchett, G. D., Jr. (SM)
Harley, J. B. (VA)
Hartley, R. V. L. (F)
Hatch, R. W. (A)
Hathaway, S. D. (A)
Hensel, M. L. (A)
Hughes, H. K. (M)
Johnson, R. L. (M)
Jordan, D. R. (A)
Kircher, R. J. (SM)
Lundry, W. R. (A)
Luscher, R. W. (M)
Maggio, J. B. (SM)
Malthaner, W. A. (SM)
Marshall, R. W. (M)
Means, W. J. (SM)
Michon, A. E. (M)
Moeder, W. D. (A)
Mosier, C. R. (A)
Oliwa, W. S. (A)
Orth, R. T. (SM)
Power, D. W. (SM)
Ratajczak, R. A. (A)
Robb, D. T. (A)
Satterthwaite, W. F. (A)
Schaefer, A. W. (A)
Schauwecker, H. E. (A)
Schisel, J. (SM)
Schwenker, J. E. (A)
Shepard, F. H., Jr. (A)
Steiger, R. F. (A)
Stevens, H. R. (A)
Stiefel, K. E. (A)
Stiles, K. P. (SM)
Szeremeta, P. J. (A)
Thompson, K. A. (A)
Toy, W. N. (A)
Von Rosenberg, C. E. (A)
Walsh, D. E. (A)
Weppler, H. E. (M)
Wing, O. (A)

Sussex
Bliss, D. C. (A)

Taunton Lakes
Wagoner, R. G. (A)

Teaneck
Chalmers, W. G. (A)
Chin, E. (A)
Easterling, M. F. (A)
Galbraith, J. E. (A)
Hartnett, E. J. (A)
Hunt, D. G. (A)
Joller, C. R. (A)
Klein, M. E. (M)
Luhrs, C. H. (M)
Mezger, G. R. (VA)
Mohr, A. R. (A)
Preston, J. G. (VA)
Pulley, A. A. (VA)
Sather, O. J. (SM)
Sheer, C. (SM)
Thurston, W. R. (SM)
Tsao, T. C. (SM)
Verseput, P. C. (A)
Wachter, F. W., Jr. (A)

Tenafly
Border, B. (A)
Copp, W. C. (A)
Hull, R. E. (A)
Paulson, G. A. (A)
Shotliff, L. A. (SM)
Swensen, J., Jr. (A)

Teterboro
Sprung, R. A. (A)

Toms River
Wood, H. V. (A)
Zelnick, S. (A)

Totowa
Monsees, W. A. (A)

Totowa Boro
Wehner, J. H. (A)

Towaco
Falkinburg, R. (A)

Trenton
Allwine, H. S. (A)
Ballard, R. C. (SM)
Byrne, R. F. (A)
Carver, L. A. (M)
Czyzewski, E. T. (A)
Di Giuseppe, A. (A)
Dilley, J. E. (A)
Edwards, L. M. (A)
Fireman, P. (M)
Freund, J. A. (A)
Harris, F. M. (VA)
Kellock, J. H., Jr. (A)
Kerbec, M. J. (A)
Lancaster, T. W. (A)
Miller, R. (A)
Newhart, E. L. (A)
Orlowski, J. S. (A)
Powers, K. H. (A)
Preisig, J. O. (A)
Ralston, G. (M)
Raser, E. G. (M)
Rosenzweig, G. E. (A)
Sakson, P. J. (A)
Strother, W. F. (A)
Wentzel, A. G., Jr. (M)
Wilkinson, L. E. (A)
Yard, E. M. (M)

Union
Bleisch, G. W. (A)
D'Agostino, V. F. (A)
Edwards, J. B. (VA)
Hultquist, J. F. (A)
Lambert, G. W. (A)
Metzler, R. (A)
Penk, C. (A)
Treuhaft, M. A. (SM)

Union City
Anderson, R. K. (A)
Bonazza, W. J. (A)
D'Amico, C. J. (A)
De Carlo, A. P. (A)
Donat, O. E. (A)
Feder, J. H. (A)
Gayle, A. (A)
Kelly, R. J. (A)
Kettmann, H. W. (A)
Kulesha, K. J. (A)
Lee, J. P. (A)
Marchand, O. P. (A)
Markunas, J. P. (A)
Matto, V. G. (A)
Musto, A. A. (A)
O'Brien, J. F. (A)
Ollick, E. (A)
Pizzigoni, A. (A)
Ricca, R. F. (A)
Ring, C. E. (A)
Tahan, E. N. (A)

Upper Montclair
Benner, T. A. (M)
Borden, E. W. (A)
Burnett, J. H. (M)
Chipp, R. D. (SM)
De Long, O. A. (VA)
Felix, E. H. (SM)
Findlay, J. H. (SM)
Gallagher, H. E. (A)
Godley, P. F. (VA)
Goldsmith, T. T., Jr. (F)
Hallborg, H. E. (F)
Hicks, B. A. (M)
Hulst, G. D. (M)
Hunkins, H. R. (VA)
Nelson, E. P. (SM)
Nietsch, H. E. (A)
Osborne, H. S. (F)
Patten, S. F. (SM)
Roemisch, J. L. (SM)
Ruiter, J. H., Jr. (M)
Siegel, R. (A)
Terhune, H. R. (SM)
Whitley, E. G. (A)

Vaux Hall
Accardo, N. A. (A)
Rundstedt, R. J. (A)

Ventnor City
Kingan, J. (A)

Verona
Baum, R. F. (A)
Baxter, C. L. (A)
Beltz, W. F. (A)
Buck, D. C. (A)
Butler, H. R. (VA)
Caspar, C. W., Jr. (A)
Concelman, C. W. (A)
Curtis, L. B. (A)
Griffith, B. G. (VA)
Jacobs, G. W. (M)
Lewinter, S. W. (A)
Peet, E. C. (M)
Scheraga, M. (A)
Smith, H. R. (A)
Steen, J. E. (A)
Tobler, C. R. (A)
Tompson, E. C. (A)
Van Brunt, L. B. (A)

Waldwick
French, H. A. (A)
Gottfried, N. J. (M)
Lupfer, W. C. (A)
Russell, A. W. (SM)
Vallarino, A. R. (A)

Wanamassa
Clark, A. R. (A)
Franklin, W. S. (A)
Goldberg, B. (SM)
Greenblum, C. (A)
Hixson, J. D. (M)
Kuhnapfel, R. H. (A)
Miller, M. (A)
Shein, S. (A)
Steelman, K. C. (A)
Treston, P. (A)

Washington
Aten, D. C. (M)

Watchung
Warren, C. A. (SM)

Weehawken
Hatke, F. L. (A)

Wenonah
Starr, D. A., Jr. (A)
Sterner, J. F. (SM)

West Allenhurst
Brockel, H. W. (A)
Friedrich, V. L. (A)

West Caldwell
Capodanno, R. T. (SM)
Crimp, E. E. (M)
Eberhard, L. E. (VA)
Hampshire, R. A. (VA)
Lynn, P. R. (A)
McKechnie, J. S. (SM)
Miller, H. P., Jr. (SM)
Myers, R. H. (A)
Rigrod, W. M. (A)
Schade, O. H. (F)
Wilson, L. F. (A)

West Collingswood
Daly, G. M. (SM)
Gloystein, E. E. (A)
Lundgren, D. L. (A)
Thomas, L. P. (A)

West End
Doughty, S. D. (A)
Epstein, M. (A)
Feigenbaum, I. A. (A)
Kahn, D. (M)

West Englewood
Anthony, I. B. (A)
Anthony, R. L. (A)
Bitner, R. E. (A)
Brown, W. G. (A)
Dwork, L. E. (SM)
Scott, D. A. (A)
Walsh, A. A. (SM)
Wilbur, E. C. (VA)
Zabransky, R. J. (A)

Westfield
Augustadt, H. W. (SM)
Bacon, D. R. (A)
Blonder, I. S. (A)
Burns, G. K. (VA)
Follingstad, H. G. (A)
Friedman, A. B. (A)
Goldsmith, B. M. (SM)
Hunter, F. L., Jr. (A)
Ingalls, D. (A)
Leggett, E. P. (A)
MacLean, N. W. (M)
Melhose, A. E. (M)
Moons, A. G. (A)
Nein, H. R. (M)
Peterson, L. J. (M)
Pulley, L. A. (VA)
Smith, K. D. (SM)
Stillwell, A. L. (SM)
Tongue, B. H. (A)
Van Tassel, E. K. (SM)
Wohlgemuth, A. J. (A)

West Long Branch
Deisinger, D. A. (SM)
Fisher, A. J. (A)
Griffith, P. E. (SM)
Levine, S. (A)

West Milford
Goebel, R. J. (A)

Westmont
Barton, R. H. (A)
Beezer, J. E. (A)
Brown, E. M. (A)
Condon, S. F. (A)
Grundmann, G. L. (SM)
Lev, S. N. (VA)
Myers, B. D., Jr. (A)
Sinnett, C. M. (SM)

West New York
Allan, G. H. (A)
Keilhin, R. E. (M)
Lang, C. W. (A)
Mendez, C. (A)
Parrott, R. D. (M)

West Orange
Crowley, H. L. (SM)
Crowley, K. I. (M)
Dabrowski, H. L. (A)
Dooner, J. L. (A)
Edison, T. M. (VA)
Evon, J. (A)
Goldstein, M. K. (SM)
Grady, C. B., Jr. (A)
Hetherington, G. V. (A)
Higgins, W. H. C. (SM)
Higgs, R. E. (M)
Kisinpaugh, A. W. (SM)
Milner, C. M. (M)
O'Connor, J. T. (A)
Padalino, J. J. (M)
Panter, P. F. (SM)
Perkins, G. C. (VA)
Reed, E. D. (A)
Reise, H. A. (SM)
Robertson, A. S. (M)
Ryan, F. M. (F)
Shamis, S. S. (M)
Shangraw, C. C. (SM)
Snow, H. A. (VA)
Somers, R. M. (SM)
Tulchin, H. (A)
Woodruff, D. L. (A)

West Paterson
Beckers, A. E. (M)

West Trenton
Kunicki, H. R. (A)

Westwood
Gregory, G. S. (SM)
Hammerschmidt, A. (SM)
Hoeper, H. B. (A)
Murnighan, R. J. (A)
Spanos, W. M. (A)

Whippany
Albertsheim, W. J. (SM)
Anderson, A. B. (A)
Baldwin, E. G. (A)
Behren, A. K. (SM)
Bower, M. M. (M)
Campbell, M. E. (SM)
Carlisle, H. C., Jr. (A)
Clement, A. W. (SM)
De Motte, F. E. (A)
Dungan, M. R. (M)
Ebers, J. J. (A)
Enright, D. J. (A)
Felker, J. H. (A)
Frantz, D. R. (M)
Hammann, P. L. (SM)
Helm, H. A. (M)
Hibbert, J. J. (A)
Hoffmann, E. H. (M)
Hough, R. R. (SM)
Hyatt, W. R., Jr. (M)
Kovach, L. (A)
Jenny, H. K. (SM)
Johnson, G. D. (SM)
Lane, R. F. (SM)
Leighton, J. (M)
Lenigan, T. E. (VA)
MacWilliams, W., Jr. (SM)
Martin, J. F. (A)
Mattingly, R. L. (M)
McCoy, J. C. (SM)
Merriam, F. F. (SM)
Miller, W. F. (A)
Morrison, E. D. (A)
Morrison, J. F. (F)
Morrison, L. W. (VA)
Mraz, W. L. (SM)
Newhouse, R. C. (SM)
Nimmecke, F. E. (SM)
Olmstead, N. C. (SM)
Ong, F. C. (SM)
Pardee, S., Jr. (A)
Petrich, L. G. (A)
Schnebbe, A. D. (A)
Sherman, S. (A)
Short, R. A. (A)
Simons, B. H. (A)
Sinclair, R. O., Jr. (M)
Skene, A. A. (SM)
Smith, P. H. (F)
Taft, C. R. (SM)
Tarrant, S. R. (A)
Thatcher, W. H. (M)
Tinus, W. C. (F)
Troe, J. L. (A)
Wall, R. A. (M)

Williamstown
Roberts, M. J. (A)
Walecki, V. (A)

Woodbridge
Warner, H. K. (M)

Woodbury
Frank, A. J. (A)
Halket, D. R. (A)
Herr, J. R. (A)
Jackson, A. (A)
Neubert, H. A., Jr. (A)
Seeberger, L. M. (A)
Sharp, R. F. (M)
Sheppard, W. H. (A)
Skinner, R. L. (A)
Stark, J., Jr. (A)
Wamsley, B. N. (A)
Wasson, H. M. (A)

Woodlynne
Johnson, R. V. (A)
Miller, J. P. (VA)
Siukola, M. (A)

Woodridge
Arcand, W. (M)
Bruno, G. A. (A)
Gempp, T. A. (A)
Legrand, J. S. (VA)
Yockel, A. P. (A)

Wrightstown
Crupi, D. W. (A)

Wyckoff
Baasch, H. C. (M)
Bradley, J. K. (SM)
Oesterle, A. G., Jr. (A)
Partridge, E. M., Jr. (A)
Samson, R. L. (A)
Scholtes, D. R. (A)

Yardville
Bozowski, S. (A)

NEW MEXICO

Alamogordo
Aldous, C. N. (A)
Apa, F. E. (A)
Arnold, N. E. (A)
Beckley, T. L. (A)
Clapp, G. V., Jr. (A)
Cress, R. B. (A)
Crocker, J. A. (A)
Davidson, H. K. (A)
Dodd, S. C. (A)
Folan, W. (A)
Fussell, L. B. (A)
Green, C. S. (A)
Greene, J. F. (A)
Harrington, M. W. A)
Hatfield, J. P. (A)
Johnson, R. R. (M
Kuerschner, H. (M)
Lane, C. A., Jr. (M)
Levin, K. L. (M)
Looney, G. R. (A)
Lovell, R. E. (M)
Lux, M. O. (M)
Maes, W. J. (A)
Mahaffey R. F. (M)
McCasland, R. S. (A)
Messner, G. P. (A)
Muehlner, J. W. (M)
Olmsted, D. T. (A)
Poteracke, J. L. (A)
Shaw, G. W. (A)
Shear, H. J., Jr. (A)
Snow, L. L. (A)
Stapler, Z. B. (A)
Steele, O. A. (M)
Stotts, W. S. (A)
Torrible, A. W. (A)
Vick Roy, J. W. (A)

Albuquerque
Aas, E. A. (A)
Abraham, L. G. (SM)
Adams, C. W. (M)
Adams, H. J. (A)
Allen, T. L., Jr. (M)
Allenworth, J. A. (A)
Althouse, J. E. (A)
Ames, J. R. (M)
Arnett, W. (SM)
Arnot, G. A., Jr. (M)
Atkins, W. R. (A)
Bachand, G. (SM)
Ball, K. E. (SM)
Baltz, L. E. (A)
Banks, T. G., Jr. (SM)
Barcroft, J. R. (A)
Basore, B. L. (A)
Bircher, P. H. (A)
Biskner, L. J. (SM)
Bittner, B. J. (M)
Bostwick, W. E. (M)
Briscoe, W. C. (A)
Brooks, E. P. (M)
Bryson, V. E. (A)
Bueffel, B. H., Jr. (SM)
Burk, P. O. (A)
Burke, B. (A)
Bush, T. A., Jr. (A)
Butler, E. R. (A)
Butler, R. B. (A)
Campbell, A. A. (M)
Canty, E. T. (A)
Carman, W. H. (M)
Carnahan, C. W. (F)
Carr, B. J. (A)
Carr, E. A. (A)
Carrick, D. S. (A)
Cassidy, B. F. R. (A)
Church, P. K. (A)
Church, T. S. (M)
Clarke, G. W. (A)
Clement, P. R. (A)
Connell, J. C. (M)
Couden, D. V. (A)
Courtney, J. M. (SM)
Creveling, R. (SM)
Crone, J. L. (M)
Cunningham, F. B. (M)
Daly, W. J. (A)
Daughton, G. B. (M)
Davis, J. F. (A)
Deer, J. W. (A)
Delestowicz, L. (A)
Delicath, R. C. (M)
Dike, S. H. (SM)
Dossey, J. L. (A)
Duncan, J. W. (A)
Dye, D. L. (A)
Eimstad, H. A. (A)
Ekeroot, S. F. (A)
Eldridge, A. J. (A)
Elliott, N. J. (A)
Ellis, R. M. (SM)
Engquist, A. R. (A)
Ferner, R. O. (M)
Finch, H. D. (M)
Fligner, O. M. (A)
Fliss, A. D. (A)
Fontana, R. E. (SM)
Ford, G. T. (A)
Foster, C. E. (M)
Fowler, G. A. (SM)
French, L. E. (SM)
Frenkel, L. J. (M)
Furland, F. W. (A)
Furss, A. (A)
Gamara, N. J. (M)
Garblik, A. M. (A)
Gillespie, E. S. (A)
Gilman, E. L. (A)
Given, F. J. (SM)
Glaser, R. G., Jr. (A)
Glenn, A. J. (A)
Goss, W. (A)
Gross, J. E. (A)
Hafer, F. L. (A)
Halliday, J. R. (M)
Hays, C. (A)
Heaty, C. N. (A)
Heinrich, B. F. (A)
Hessemer, R. A., Jr. (A)
Hicks, C. W. (SM)
Hight, S. C. (SM)
Hill, Y. (A)
Hodges, E. M. (A)
Holland, E. R. (A)
Holmes, R. P. (A)
Hopkins, L. A., Jr. (M)
Hovey, W. J. (A)
Howell, H. R. (A)
Humphris, R. R. (A)
Hunter, W. C. (M)
Hyde, W. L. (A)
Iverson, M. M. (A)
Jacques, R. B. (M)
Janza, F. J. (A)
Jeske, H. O. (A)
Jessen, P. L. (A)
Johnson, G. S. (A)
Johnson, R. E. (A)
Jones, K. N. (A)
Jones, M. C. (A)
Jones, R. D. (M)
Kabell, J. (A)
Kahn, H. S. (A)
Kile, R. L. (M)
King, C. J. (A)
Klink, E. J. (M)
Koontz, R. H. (A)
Kowallis, O. K. (A)
Lagomarsini, G. C. (A)
Lambert, R. P. (A)
Lathrop, L. L. (A)
Lawrence, G. H. (A)
Lee, W. W., Jr. (A)
Le Fever, C. F. (A)
Little, F. A. (M)
Lommasson, T. E. (M)
London, R. E. (A)
Lorentz, N. A. (M)
Lusk, T. D. (A)
Maki, C. E. (A)
Marker, T. F. (SM)
Marron, J. J. (A)
Martin, T. L. (M)
Matthews, R. P. (M)
Maxen, J. S. (M)
Mayfield, J. D. (A)
McCarthy, C. J. (A)
McCarthy, F. M. (VA)
Meuer, E. A. (A)
Miller, E. G., Jr. (M)
Milton, D. (A)
Minck, J. L. (A)
Moore, L. D. (A)
Moore, R. K. (M)
Murray, R. R. (A)
Myers, V. V., Jr. (A)
Noe, J. B. (M)
Oltman, H. G., Jr. (A)
Opperman, R. H. (A)
Oyster, D. E. (M)
Pace, E. C. (A)
Paddison, L. J. (A)
Padilla, D. J. (A)
Palmer, J. E. (M)
Palmer, P. R. (A)
Patterson, H. H., Jr. (A)
Peurifoy, R. L., Jr. (A)
Polakowski, W. G. (A)
Poole, R. E. J. (SM)
Powell, N. E. (M)
Purdue, C. H. (A)
Quarles, D. A. (SM)
Rehberg, J. C. (A)
Reid, H. J. (A)
Reintjes, I. C. (A)
Robbins, L. S. (A)
Rockey, G. H. (SM)
Roeschke, C. W. (SM)
Sander, H. H. (A)
Schauer, J. D. (M)
Scheible, W. R. (M)
Scidmore, D. L. (M)
Senter, C. H. (SM)
Simmons, J. M., Jr. (M)
Sinkew, E. J. (A)
Skinner, F. L. (A)
Skinner, L. V. (SM)
Smart, T. E. (M)
Smith, J. D. (M)
Smoll, L. A. (M)
Stattel, R. J. (A)
Stimpson, E. C., Jr. (A)
Sullivan, W. A., Jr. (A)
Swain, R. R. (VA)
Tillman, J. E. (SM)
Trukken, H. R. (A)
Urquhart, K. J. (M)
Van Every, A. (A)
Villers, D. (A)
Walker, H. C. (A)
Walker, H. E. (M)
Washburn, B. W. (A)
Washburn, C. A. (A)
Watkins, L. C., Jr. (SM)
Watterberg, J. (A)
Webber, G. H. (A)
Weber, M. (M)
Wells, M. A. (A)
Westcott, H. S. (M)
Wilde, N. (M)
Williams, C. S., Jr. (A)
Wood, E. E. (A)
Wooley, R. E. (A)
Wooten, A. D. (A)
Wright, O. L. (M)
Wulfe, R. F. (A)
Zimmerman, W. L. (A)

Cedar Crest
Yoder, E. R. (A)

Cloudcroft
Schiffmacher, E. R. (M)

Deming
Frei, J. (A)

Farmington
Bowles, M. E. (M)

Las Cruces
Adams, E. S., Jr. (A)
Boone, B. B. (A)
Burton, E. B. (A)
Campbell, J. M. (A)
Carpenter, L. C. (A)
De Rosa, A. L. (A)
Garber, L. F. (A)
Gatkin, T. E. (VA)
Godley, W. P. (A)
Goff, R. H. (A)
Hackmann, P. F. (A)
Hammond, L. A. (M)
Hemingway, F. S., Jr. (M)
Hessler, J., Jr. (A)
Jackson, H. J. (A)
Keys, D. D. (A)
Krivanich, M. A. (A)
Meixner, R. P. (A)
Miller, V. L. (A)
Minichiello, R. (A)
Monleone, J. (A)
Obenchain, L. (SM)
Petitjean, A. E. (A)
Polimerou, L. G. (A)
Smithline, H. (A)
Young, J. F. (A)
Young, K. J. (A)

Los Alamos
Aiello, W. P. (A)
Baumgarte, P. H. (A)
Boyd, T. J., Jr. (A)
Briscoe, W. L. (A)
Brousseau, A. T. (A)
Brower, H. P. (A)
Byington, P. W. (M)
Crew, W. H. (SM)
Deal, J. B., Jr. (A)
Doremire, F. E. (A)
Featherston, J. R. (A)
Freyman, R. W. (A)
Gardner, J. M. (A)
Garrett, R. E. (A)
Glore, J. P. (A)
Harrington, D. C. (A)
Hayes, B. (A)
Heyman, H. (SM)
Hiebert, R. D. (A)
Hull, D. E. (A)
Huntington, R. C. (A)
Johnstone, C. W. (SM)
Kemp, E. L. (A)
Lamb, J. K. (SM)
Lang, H. J. (A)
Lilienthal, J. R. (A)
Mason, H. (M)
Mathis, G. P. (A)
McCloud, B. J. (A)
Musick, A. L., Jr. (A)
Newlin, G. C. (A)
Parsons, J. H. (M)
Peck, R. C. (A)
Rawcliffe, A. S. (SM)
Stone, O. L. (A)
Watts, R. J. (A)
Weber, W. (A)
Weintraub, L. (A)
Whitmer, R. F. (A)
Winston, J. G. (A)

Mesilla Park
Hancock, W. L. (A)
Ware, H. W., Jr. (A)

Mountain Park
Billups, E. E. (A)
Rothman, M. I. (M)

Raton
Pitts, D. S. (A)

Roswell
Guros, F. S. (A)
Schwartz, A. J. (A)
Yourdon, F. R. (A)

Sandoval
Smith, W. T. (SM)

Santa Fe
Braddock, R. C. (A)
Davis, M. E. (A)
Martin, C. F. (VA)
Nikolakakis, H. J. (A)
Woodward, M. W. (SM)

Silver City
Robinson, R. (A)

State College
Brown, H. A. (A)
Haas, H. W. (A)

Tierra Amarilla
Howe, R. B. (A)

Tijeras
Middelton, A. D. (SM)

Tularosa
Crom, G. C. (SM)
Martin, W. T. (A)
Suska, J. T., Jr. (A)
Webb, R. C. (A)

NEW YORK

Albany
Dewire, D. S. (M)
Felker, G. E., Jr. (M)
Gisser, D. (A)
Griffin, G. J., Jr. (A)
Marin, I. L. (A)
Martin, W. D. (A)
Otis, G. E. (A)
Passman, A. J., Jr. (A)
Pino, J. P. (A)
Portanova, M. C. (A)
Schwedock, B. (A)
Sweeney, F. C. (A)
Uphoff, E. C. (A)
Wilbur, D. A. (SM)

Albany County
Dillenback, G. V., Jr. (A)

Albertson
Cashman, H. W. (A)
Engel, L. (A)
Kelvin, W. (A)
Robinson, D. L. (A)
Sullivan, G. D. (M)

Alden
Graves, D. L. (A)

Alfred
Burzycki, M. (A)

Arplaus
Robinson, D. (A)

Altamont
Bleichner, C. W. (SM)
Fortington, W. H. (M)
Hackley, C. L. (M)
Pennoyer, R. T. (SM)
Amityville
Adams, J. P. (A)
Brockner, C. E. (SM)
Isherwood, H. (A)
Schabbehar, E. A. (A)
Watkins, J. E. (A)

Amsterdam
Garratt, P. M. (A)

Apalachin
Sweet, M. E. (A)

Ardsley
Achtellik, G. (A)
Dornhoefer, W. J. (A)
Glaser, P. F. (A)
Graveson, R. T. (A)
Prestholdt, O. (M)

Armonk
Hector, L. G. (SM)
Kneale, A. T. (M)

Arverne
Foschi, E. J. (A)

Astoria
Asmundsson, E. (A)
Bedoian, B. (A)
Benesch, E. J. (A)
Berhley, F. E. (A)
Breitzer, D. I. (A)
Chittick, C. (A)
Iversen, R. J. (SM)
Lanzisero, N. T. (A)
Levene, R. A. (A)
Petrocelli, V. (A)
Pighi, L. H. (A)
Schwab, D. (M)
Seelig, G. (M)
Willett, E. (A)

Auburn
Blanchard, J. W. (A)
House, H. J. (A)

Babylon
Albin, F. I. (A)
Bleil, F. J. (SM)
Brown, M W., Jr. (A)
Buff, C. (M)
Ewanus, W. (A)
Gollhofer, P. J. (M)
Rafferty, W. G. (A)
Turnage, R. E., Jr. (A)

Bainbridge
Lias, R. B. (M)

Baldwin
Browning, S. D. (VA)
Colligan, J. A. (A)
Dayton, R. A. (A)
De Valve, R. H. (A)
Fraser, R. M. (M)
Furst, R. E. (M)
Gray, R. P. (A)
Hertzberg, A. (A)
Hinsdale, E. M., Jr. (SM)
Hults, E. H. (M)
Sall, C. W. (M)
Storey, A. E. (A)
White, C. E. (A)

Baldwinsville
Byers, W. S. (A)
Cockburn, C. D. (M)
Cooper, J. V. B. (M)
Cronshey, R. W. (A)
Custin, T. G. (M)
Downey, R. L. (A)
Farmer, R. A. (A)
Fishback, K. H. (A)
Jensen, R. C. (SM)
Krafft, W. R. (A)
Lester, B. R. (SM)
Morris, W. J. (A)
North, S. M. (A)
Quinn, W. M., Jr. (A)
Rhodehamel, A. J. W. (A)
Winchester, D. S. (A)

Ballston Lake
Amstutz, R. W. (A)
Bristol, T. R. (M)
Canfield, E. B. (A)
Coffey, W. N. (A)
Crownover, W. P. (A)
Reynolds, M. T. (M)
Stillwell, H. R. (A)

Ballston Spa
Bischoff, A. F. H. (SM)

Bath
Alexander, J. J. (A)
Fink, J. H. (A)
Johnson, W. C. (A)
Miller, C. F. (SM)
Payne, W. J. (A)
Pridmore, T. C. (M)
Schwartz, E. (A)
Spicer, W. A. (A)
Szilasi, A. (A)
Wood, E. F., Jr. (A)

Bayside
Abjanich, G. S. (M)
Adler, L. L. (A)
Agree, I. (A)
Battle, R. P. (A)
Berge, P. J. (A)
Bernstein, J. L. (A)
Bonney, H. W. (A)
Bracco, D. J. (M)
Briskin, H. B. (A)
Burdick, G. A. (M)
Burke, E. W., Jr. (A)
Cohen, S. B. (A)
Compton, H. B. (A)
Cooperstein, M. (M)
Costa, T. A. (A)
Crush, J. F. (A)
Cuddy, E. J. (A)
De France, J. J. (SM)
Ellefson, B. S. (F)
Ellis, H. R. (A)
Farel, V. M. (SM)
Fine, A. M. (A)
First, D. (A)
Fishner, S. (A)
Frink, F. W. (SM)
Gardiner, C. E. (M)
Gatti, W. (A)
Gauger, R. H. (A)
Gellert, J. (A)
Glasser, H. (A)
Graham, V. M. (F)
Gross, L. (M)
Gross, V. (A)
Hackert, W., Jr. (A)
Hunt, H. W. (A)
Hutter, R. G. E. (SM)
Jacob, G. W. (M)
Janis, P. (SM)
Kahan, I. (A)
Kearney, J. J. (A)
Keen, A. W. (SM)
Keene, J. (A)
Kiessling, G. A. (A)
Kroeger, R. D. (A)
Laufman, T. D. (A)
Leifer, M. (SM)
Levine, S. (SM)
Lewis, B. F. (A)
Lieber, S. (M)
Lielbriedis, K. (M)
Livingston, D. C. (M)
Martin, E. J. (M)
Masucci, C. (A)
Mealy, J. T. (A)
Meinheit, C. E. (M)
Nadler, B. D. (M)
Nord, R. H. (M)
O'Bryan, H. M. (M)
O'Neill, G. D. (F)
Pinkham, G. E. (A)
Podeyn, G. J., Jr. (A)
Potts, T. J., Jr. (M)
Prufer, E. F. (A)
Rabin, G. C. (A)
Relis, M. J. (M)
Ressler, H. C. (SM)
Richter, E. (A)
Salz, N. P. (M)
Schiffman, B. M. (A)
Seigle, R. K. (M)
Seitz, S. S (A)
Shipley, D. W. (M)
Suito, T. (A)
Sussman, N. (M)
Swatke, J. J. (A)
Talle, C. A. (A)
Toman, J. J. (A)
Troxler, L. J. (SM)
Waller, H. H. (M)
Weissman, J. G. (M)
Westman, H. P., Jr. (A)
Williams, G. W., Jr. (A)

Bayside Hills
Gradza, E. E. (A)

Bay Shore
Day, S. M. (A)
Gaenzle, J. B. (M)
Leedham, R. (A)

Bayville
Bartolomei, G. G. (A)
Hotine, W. (M)

Beacon
Conover, D. G. (A)
Craft, J. L. (A)
Cummings, C. E. (M)
Keniston, H. E. (A)
Thompson, D. B. (A)

Bedford Hills
Ferguson, A. (A)
Vogeler, R. A. (M)

Bedford Village
Strempel, E. L. (A)

Beechhurst
Dalessandro, J. A. (A)

Belle Harbor
Schure, A. (A)

Bellerose
Altman, D. (A)
Berriman, M. (A)
Brown, R. W. (A)
Chaber, R. K. (A)
Clark, F. K. (A)
Farber, H. (A)
Fay, F. H. (A)
Fialkov, H. (A)
Hettich, R. E. (A)
Homeyer, W. (A)
Jacobs, C. E., Jr. (M)
Ley, B. J. (A)
Loebl, W. W. (A)
McLarin, M. (A)
Purdy, R. L. (A)
Shologon, R. S. (M)
Spiegel, R. M. (A)
Trock, R. (A)
Wengryn, M. (A)
Ziblatt, R. (A)

Bellerose Manor
Buchsbaum, W. H. (A)

Bellmore
Glaser, E. M. (SM)
Jackson, C. H. (A)
Packard, K. S., Jr. (M)
Russo, A. J. (A)
Wellman, F. C. (A)

Bethpage
Beaumariage, D. C. (M)
Biloon, R. F. (A)
Bogner, R. D. (A)
Bostick, G. (M)
Brown, R. M. (A)
Dorne, A. (M)
Fried, G. (A)
Margolin, J. (M)
Mason, L. (A)
Nelson, V. H. (A)
Russell, D. H. (A)
Peterson, R. M. (A)
Schenck, H. F. (A)
Schoenfeld, R. L. (A)
Steele, L. R. (A)

Binghamton
Burton, W. E. (A)
Corderman, S. A. (A)
Decker, D. M. (A)
Decker, G. A. (VA)
Egan, S. H. (A)
Foss, F. A. (A)
Fuchiek, R. J. (A)
Garvey, E. J. (M)
Hajko, H. J. (A)
Hallinan, C. (M)
Hayes, M. H., Jr. (A)
Hemstreet, H. S. (A)
Hewitt, E. W. (A)
Hicken, J. (SM)
Higgs, P. T. (A)
Hunt, J. M. (M)
Kelley, A. A. (M)
Klinko, E. H. (A)
Lavender, R. W. (M)
Ling, O. T. (A)
Lockhart, B. W. (A)
Mailhot, P. J. (A)
McPheeters, D. W. (A)
Merchant, J. H. (M)
Miller, W. C. (A)
Montague, H. R. (A)
Montgomery, A. (A)
Morgan, W. A. (A)
Nash, R. W. (A)
New, R. F. (A)
Peterson, R. E. (A)
Quinn, T. J. (A)
Raymond, C. G. (A)
Reed, G. G. (A)
Ricciardelli, G. (A)
Rice, P. P. (A)
Risse, J. A. (A)
Rowley, R. A. (M)
Searle, W. B. (A)
Shaw, W. A. (A)
Stantz, L. H. (M)

Black Creek
Lewis, R. M. (A)

Blossvale
Ellis, T. E., Jr. (A)

Bowmansville
MacArthur, R. C. (A)
Martin, F. C. (A)

Brentwood
Gould, G. B. (A)

Briarcliff Manor
Urban, C. (A)

Briarwood
Herrman, R. F. (A)

Brightwaters
Faltin, J. W. (SM)
Geiger, J. M. (A)
Lang, J. G. (VA)
Margolin, J. (A)

Brewerton
Wassilak, E. J. (A)

Bronx
Ackerman, D. D. (A)
Adelsberg, J. (A)
Adler, C. (A)
Agugliaro, J. (A)
Allen, M. H. (A)
Anapol, J. (A)
Auerbacher, W. F. (SM)
Axelrod, A. (A)
Barbella, A. M. (A)
Barkey, R. (A)
Barosin, S. (A)
Baumoel, D. (A)
Bendetti, J. (A)
Berkoff, S. (M)
Bernstein, E. (A)
Berson, A. S. (A)
Bertan, L. L. (A)
Bertero, E. P. (A)
Betlejewski, F. J. (A)
Blashalg, S. (A)
Bodow, J. (A)
Bondarenko, A. J. (A)
Bregman, M. W. (A)
Brenner, M. (A)
Buchalter, M. (A)
Burg, H. (A)
Busch, W. R. (VA)
Byrnes, I. F. (SM)
Capasso, L. V. (A)
Cash, W. I. (A)
Chanzit, L. (A)
Charton, S. (M)
Cohen, A. B. (A)
Cohen, D. (A)
Cohen, M. H. (A)
Cristina, A. A. (A)
Cubert, J. S. (A)
Cuccia, J. F. (A)
Damovsky, A. (A)
Davidson, G. M. (A)
DeSalvo, A. F. (SM)
Deshields, A. E. (A)
Dickstein, M. (A)
Divins, B. (A)
Duffy, J. J. (A)
Dujack, R. L. (A)
Einsohn, I. A. (A)
Eisenberg, I. (A)
Eisenberger, A. J. (A)
Fassberg, M. (A)
Federing, A. M. (VA)
Feerst, I. (A)
Ferrantelli, J. (A)
Fidelman, D. (A)
Friedberg, I. S. (A)
Friedman, E. H. (A)
Friedman, O. (A)
Geller, M. (A)
Gery, S. W. (A)
Giannattasio, A. R. (A)
Girodias, R. M. (A)
Gltelman, E. (A)
Gitlin, S. A. (A)
Glatt, G. M. (A)
Glueckler, E. J. (A)
Golden, H. (A)
Gordon, R. L. (A)
Greenberg, S. (A)
Greenblatt, S. (A)
Grieve, W. R. (A)
Gross, S. (A)
Gunderson, R. W. (M)
Harmatuk, S. N. (M)
Harris, B. (A)
Hefter, M. (A)
Hemmila, A. (A)
Hoffman, H. L. (A)
Horvath, J. S. (A)
Jagerman, D. L. (A)
Kantrowitz, P. (A)
Kass, E. J. (A)
Kerner, S. J. (A)
Knight, R. W. (A)
Kobi, J. (A)
Komuves, K. E. (A)
Kulik, H. S. (A)
Lampert, L. (A)
Letkowitz, L. B. (A)
Leichtman, J. A. (A)
Levin, I. J. (A)
Levine, D. (A)
Levy, E., Jr. (A)
Lewinski, J. (A)
Lieberman, L. (A)
Linder, A. (A)
Linhardt, R. J. (A)
Lipin, B. (A)
MacDonald, W. D. (A)
Marcus, M. (A)
Marinace, R. C. (A)
Matarese, J. (A)
Mathis, C. E. (A)
Mayers, J. C. (A)
Messina, F. (A)
Meyers, J. G. (SM)
Miller, M. P. (A)
Moro-Lin, H. (A)
Moss, A. M. (A)
Muchnick, P. (A)
Nissen, J. H. (M)
Olick, J. (A)
Petrakos, N. (A)
Philactos, C. J. (A)
Pintell, R. H. (SM)
Plofker, N. H. (A)
Posternak, H. (A)
Potak, I. W. (A)
Priftis, S. (A)
Reiss, E. V. (A)
Reitman, J. (A)
Rensin, E. (A)
Richman, D. W. (A)
Rooney, W. V. (A)
Rosenfeld, A. (A)
Roth, A. Q. (A)
Rothbart, A. (A)
Rotker, W. (A)
Samuelian, B. (A)
Schack, R. H. (A)
Schiffman, M. M. (A)
Schlossberg, H. (A)
Schmerler, S. (A)
Schneider, M. (A)
Schoemer, A. W. (A)
Shainis, M. J. (A)
Shapiro, M. (A)
Shaw, D. (A)
Shecter, E. S. (A)
Shegirian, P. (A)
Silberman, A. (A)
Simon, I. A. (A)
Simon, M. L. (A)
Singh, M. S. (A)
Smith, G. J. (A)
Smith, J. S. (A)
Solomonoff, R. J. (A)
Sopchick, F. J. (A)
Spiegel, R. E. (A)
Sporty, S. (A)
Squires, C. (A)
Steifel, A. A. (A)
Stern, E. (A)
Sullivan, E. (A)
Taub, J. J. (A)
Tefel, A. J. (A)
Teitler, A. (SM)
Trott, G. G. (A)
Tucker, M. H. (A)
Tullman, N. L. (A)
Victor, H. W. (SM)
Wachspress, M. H. (A)
Ward, B. R. (A)
Wasserman, H. (A)
Wasson, I. (A)
Waxler, B. (M)
Weinstein, G. (A)
Weiss, L. M. (A)
Weiss, S. (A)
Wessbecher, F. W. (A)
West, S. S. (A)
Wolf, F. E., Jr. (A)
Wolin, D. (A)
Wolotkin, A. (A)
Zaslavky, S. (A)
Zelen, H. J. (A)
Zinn, A. W. (A)
Zuckerbraun, J. (A)

Bronxville
Bartelink, E. H. B. (SM)
Bowyer, K. M. (A)
Butler, G. H. (A)
Fisher, S. (A)
Langley, R. H. (F)
Lurie, W. B. (SM)
McCoy, R. D. (A)
Reed, H. A. (A)
Stein, R. S. (A)
Udolf, R. J. (A)
Wasserman, J. (A)
Whittemore, D. B. (A)

Brooklyn
Abilock, S. (A)
Abrahamsen, A. (A)
Abrams, I. (A)
Abramson, J. (A)
Acker, J. L. (A)
Agress, M. C. (M)
Albanese, P. (A)
Albanese, V. J. (A)
Allen, T. (A)
Altonji, E. R. (A)
Amaitis, E. J. (A)
Amling, J. L. (A)
Ammirati, S. (A)
Anderson, C. L. (A)
Angelastro, S. P. (A)
Antman, H. S. (A)
Anton, N. G. (SM)
Appelbaum, G. (A)
Arcidiacono, J. (A)
Arkus, H. (A)
Aron, M. (A)
Aron, N. (A)
Aronoff, M. (A)
Aronowitz, L. (A)
Ascione, R. (A)
Ashinsky, M. (A)
Ashley, H. R. (A)
Ashlan, E. E. (A)
Avallone, A. (A)
Backinoff, B. (A)
Bailin, R. C. (A)
Bambara, J. E. (M)
Barr, P. (A)
Bartolotta, M. A. (A)
Baumel, I. D. (A)
Bayer, L. (A)
Beach, R. (SM)
Beaver, M. W. (A)
Beer, A. S. (A)
Beidler, S. (M)
Bellare, D. (SM)
Berger, M. (A)
Bergstein, L. E. (A)
Berinsky, M. (A)
Berlin, J. (A)
Bernfeld, M. (A)
Bernstein, B. (A)
Bernstein, G. (A)
Bernstein, M. H. (A)
Berridge, G. J. (A)
Besmertnik, J. (A)
Beter, R. H. (A)
Bialkowski, M. (A)
Biegen, A. J. (A)
Bifano, V. J. (A)
Bingham, R. J. (M)
Black, K. C. (F)
Blazek, H. F. (A)
Blecher, F. (A)
Blum, R. E. (A)
Bogossian, Z. (A)
Boilen, I. (A)
Boles, S. (A)
Borowski, E. (A)
Borst, J. M. (VA)
Bosco, A. (A)
Bower, J., Jr. (VA)
Boyle, B. (A)
Braun, L., Jr. (A)
Brazdionis, J. (A)
Brennan, J. (A)
Bressner, G. (A)
Bresson, J. (A)
Bricker, L. N. (A)
Bridgeman, T. H. (A)
Broman, H. F. (M)
Brown, C. (A)
Brown, I. A. (A)
Brown, S. J. (A)
Brownstein, M. (A)
Burt, C. A. (A)
Cahan, L. C. (M)
Calimafde, J. M. (A)
Callaghan, E. P. (A)
Camack, C. W. (A)
Cammer, H. R. (M)
Canavan, J. J. (M)
Candiotti, J. (A)
Canfora, A. E. (A)
Capellupo, F. V. (A)
Caren, E. (A)
Caretto, H. L. (A)
Carlin, T. J. (SM)
Carlin, J. (A)
Castagnaro, D. (SM)
Cataldo, J. T. (M)
Catapano, R. L. (A)
Chaikind, S. L. (A)
Chavkin, L. (A)
Chays, S. (A)
Cincotta, J. A. (A)
Cohan, H. R. (A)
Cohen, J. J. (A)
Cohen, L. (A)
Cohen, L. A. (A)
Cohen, M. (A)
Cohen, S. A. (A)
Collins, K. (A)
Comninos, R. (A)
Conley, W. H. (A)
Conroe, A. H. (A)
Coppola, A. S. (A)
Craft, A. M. (A)
Crane, R. L. (A)
Curtin, J. M. (M)
Czyzyk, S. K. (A)
Dagavarian, H. O. (M)
D'airo, J. (A)
D'airo, L. J. (A)
D'Amato, E. J. (A)
D'Amato, R. J. (A)
D'Antonio, R. G. (A)
Danziger, A. (M)
Darch, N. S. (A)
Davidson, S. (A)
Day, G. (SM)
Dean, M. A. (A)
De Grande, R. S. (A)
Dery, G. F. (A)
De Satnick, S. (A)
Deutsch, L. (A)

Deutsch, S. (A)
Diamond, S. (M)
Dieli, S. A. (A)
Diemer, F. P. (A)
Dilauro, A. F. (A)
Dinbart, M. (A)
Drosin, A. B. (A)
Dunne, J. R. (A)
Eckert, G. F. (A)
Edelberg, S. (A)
Edwards, D. S. (A)
Eichwald, B. (SM)
Elefant, J. (A)
Ellis, P. H. (A)
Emilio, G. A. (A)
Farhi, S. (A)
Farkas, R. D. (A)
Faske, A. A. (A)
Feder, E. I. (A)
Feinman, G. (A)
Feinson, R. J. (A)
Feldman, E. F. (A)
Feldman, L. L. (A)
Feldman, S. (A)
Feller, M. (A)
Fels, L. (A)
Fenichel, M. (A)
Fetsch, J. T. (SM)
Fink, M. (A)
Finke, H. A. (M)
First, M. H. (A)
Fischler, A. (A)
Fishman, T. (A)
Fleary, W. K. (A)
Flores, I. (A)
Forman, J. B. (A)
Fox, J. (SM)
Frank, J. (A)
Frankel, A. (A)
Frawley, J. E. (A)
Freda, J. (A)
Freed, L. E. (A)
Freedman, L. M. (A)
Freedman, R. H. (A)
Friedman, D. S. (A)
Friedman, H. (M)
Friedman, J. (A)
Friedman, L. (M)
Frieling, E. (A)
Frisch, E. S. (A)
Gabriel, F. C. (A)
Gaffney, F. J. (SM)
Gallant, M. B. (A)
Galligan, T. J. (A)
Gancie, J. J. (A)
Gatzke, F. W. (A)
Gaunt, W. B., Jr. (A)
George, D. E. (M)
Gerber, S. (A)
Gerry, M. E. (SM)
Gilbert, I. B. (A)
Giordano, A. B. (SM)
Giordano, P. J. (A)
Glantz, L. M. (M)
Glaser, P. R. (A)
Glassman, S. H. (A)
Glowalla, J. (A)
Goetz, H. (A)
Goldbaum, S. (A)
Goldberg, E. (A)
Goldberg, E. (A)
Goldberg, R. J. (A)
Goldstein, H. (A)
Goldstein, I. (A)
Goldstein, M. (A)
Gorczycki, E. (A)
Gorelick, G. (A)
Gorlick, N. S. (A)
Goronin, A. (A)
Gorowitz, M. (A)
Gottlieb, A. W. (A)
Govinsky, W. (A)
Gray, G. A. (A)
Grebler, M. (A)
Green, E. H. (A)
Green, J. R. (M)
Green, W. F. (A)
Greenberg, H. (A)
Greenidge, G. (A)
Greenspan, J. (M)
Greenspan, L. E. (A)
Greenspan, S. (A)
Greenwald, C. (A)
Grekk, H. L. (M)
Grib, B. F. (A)
Griffin, W. J. (A)
Gruenberg, E. L. (SM)
Grujecky, H. (A)
Guman, G. (A)
Guttman, J. (A)
Hachemeister, C. A. (SM)
Halpern, H. M. (A)
Hammer, H. (A)
Hammer, R. M. (A)
Hammerstein, H. A. (A)
Hanft, H. (M)
Hanson, E. D. (A)
Harder, J. F. (A)
Harris, L. (SM)
Hart, G. K., Jr. (A)
Haslmall, M. (A)
Hawkins, R. (A)
Heckelman, A. J. (A)

Hein, E. (A)
Heller, J. I. (SM)
Hembrooke, E., Jr. (VA)
Herman, S. (A)
Hermida, R. J. (A)
Hevesh, A. H. (A)
Hirschman, H. (A)
Hoffman, G. (A)
Hollis, W. C. (SM)
Honig, W. M. (A)
Hopkins, E. J. (VA)
Horn, A. M. (A)
Horowitz, I. M. (A)
Horowitz, J. (A)
Huang, H. (A)
Hughes, J. G. (A)
Hurwitz, A. M. (A)
Hutson, L. S. (A)
Hyman, A. (A)
Jacobowitz, A. (A)
Jacobs, G. (A)
Jacobs, M. (A)
Jacobs, M. G. (A)
Jaffe, D. L. (SM)
James, W. S., Jr. (M)
Jasinski, J. J. (A)
Jaworski, A. M. (A)
Johnson, A. E., Jr. (A)
Johnson, B. F. (A)
Jorysz, A. (M)
Kadin, J. (A)
Kagan, H. (A)
Kahn, W. K. (A)
Kaplan, I. (A)
Kaplan, J. (A)
Kaplowitz, M. (A)
Karvel, C. T. (A)
Kassel, A. (A)
Kaswen, M. (A)
Katz, S. (A)
Katz, S. H. (A)
Kaufman, H. B. (A)
Kaufman, L. (A)
Kaufman, M. N. (A)
Kaufman, S. (A)
Keefe, G. (A)
Kings, W. E., Jr. (A)
Kirdahy, E. (M)
Kirtman, F. (A)
Klawsnik, F. (A)
Klein, A. M. (A)
Klein, M. S. (A)
Klevans, S. E. (A)
Kline, A. (A)
Kline, M. (M)
Klipper, S. (A)
Klug, S. H. (A)
Knowles, C. C. (A)
Koffer, M. (M)
Kopeloff, B. G. (A)
Kopp, E. H. (A)
Korbin, A. D. (A)
Korkes, H. (A)
Korn, I. (A)
Kozitzky, W. J. (A)
Kramer, B. H. (A)
Kramer, M. (A)
Krasney, S. (A)
Kraus, M. (A)
Krimsky, W. J. (A)
Kullback, M. (A)
Kurss, H. (A)
Kurtz, J. A. (VA)
Kuzmyak, M. G. (A)
Lammel, A. E. (A)
Lamvert, M. A. (A)
Landlow, I. S. (A)
Langille, N. A. (A)
Laskin, H. J. (A)
Leber, A. N. (A)
Lebowitz, L. L. (A)
Lebowitz, R. A. (A)
Lederman, S. (A)
Leff, R. J. (A)
Leight, J. (A)
Lem, H. N. (A)
Levi, S. (VA)
Levin, H. L. (A)
Levin, S. (A)
Levine, S. (A)
Levine, S. B. (A)
Levy, L. (VA)
Levy, W. A. (A)
Lewis, M. B. (A)
Lewis, V. (A)
Lewyt, A. M. (SM)
Liebell, E. (A)
Lieberman, J. L. (A)
Likel, H. C. (SM)
Lindeman, B. (M)
Lisiansky, W. (A)
Livingston, D. B. (A)
LoCascio, R. J. (A)
Loecher, G. S. (A)
Lovoff, A. (SM)
Lowe, M. (M)
Luber, L. (A)
Lubkin, S. (SM)
Lundin, J. A. (A)
Machlis, J. (A)
Maedel, G. F. (SM)
Malchman, F. L. (A)
Maldini, P. A. (A)

Malina, M. (A)
Mandel, M. (A)
Marantz, S. A. (A)
Margulies, F. (A)
Mason, H. J., Jr. (A)
Mazur, S. (A)
Mazziotti, I. J. (A)
McCormick, L. P. (A)
McGee, F. M. (M)
McGill, J. J. (A)
McLeod, D. W. (A)
Meaney, M. H., Jr. (A)
Medici, N. (A)
Mengani, C. M. (A)
Merenda, C. T. (A)
Meth, I. (M)
Meyers, S. (A)
Milazzo, S. (M)
Milkman, N. (A)
Miller, S. S. (M)
Mills, N. B. (A)
Mitchell, S. L. (A)
Mittman, S. A. (A)
Monroe, J. (A)
Montuori, A. V. (A)
Moore, J. B. (SM)
Mordkowitz, I. (A)
Morgen, M. (A)
Morris, A. A. (A)
Morton, A. R. (SM)
Moses, A. I. (A)
Moss, J. A. (A)
Most, D. (A)
Musicaro, J. S. (A)
Myers, R. T. (A)
Nachtigall, S. (SM)
Nasipak, V. (A)
Nechemias, M. (A)
Neidorf, E. (A)
Nelson, H. C. (A)
Nelson, W. F. (A)
Nestor, G. (M)
Neveroski, W. J. (A)
Newdorf, A. S. (A)
Newman, S. (A)
Nirenberg, A. (A)
Nozick, S. (A)
Ocheret, R. (A)
Odessey, P. H. (A)
O'Donnell, J. P. (A)
Ohlmann, R. C. (A)
Okun, A. M. (M)
Oliner, A. A. (SM)
Osbahr, B. F. (M)
Oscar, R. W. (A)
Ost, S. B. (A)
Oxley, J. E. (A)
Pagano, K. J. (A)
Pajak, A. W. (A)
Palatinus, A. C. (A)
Parke, H. G. (A)
Pearlman, L. (A)
Pedowicz, J. M. (A)
Pelavin, M. H. (A)
Pelitsch, E. J. (A)
Pelner, N. (A)
Perenic, L. J. (SM)
Perliss, R. E. (A)
Perlman, I. (A)
Perlman, S. (SM)
Peters, A. D. (A)
Pettersen, E. S. (A)
Place, H. (A)
Polak, H. L. (A)
Pollack, B. H. (M)
Pollack, H. W. (A)
Pollack, M. (M)
Poole, A. L. (A)
Popper, J. N. (A)
Portnoy, A. (A)
Posner, W. (A)
Prasinos, T. (A)
Pugliese, L. (A)
Radicchi, P. O. (A)
Rappoport, J. F. (A)
Rauch, M. (A)
Rauth, R. G. (A)
Reader, M. (A)
Reed, D. S. (A)
Reichenthal, A. (A)
Reinhardt, S. (A)
Reinish, G. B. (A)
Richards, A. (A)
Rifkin, W. B. (A)
Riley, C. D. (A)
Ritter, L. (A)
Riwman, J. (A)
Roberts, R. P. (A)
Robinson, H. L. (A)
Roel, E. L. (A)
Rolnik, J. A. (A)
Romano, V. (A)
Roselli, D. J. (A)
Rosen, A. (A)
Rosen, B. (A)
Rosenberg, M. (A)
Rosner, I. S. (A)
Ross, H. (A)
Rothman, L. (A)
Rowe, L. (M)
Rubens, D. A. (A)
Rubin, W. L. (A)
Ruddy, W. (A)

Rudofsky, R. (A)
Rudolf, S. (A)
Ruggi, A. G. (A)
Ryan, E. H. (A)
Ryan, J. J. (A)
Sacco, V. (A)
Sachs, M. (A)
Sadowski, H. (A)
Salica, R. R. (A)
Salij, Z. B. (A)
Salz, H. (A)
Sapoff, M. (A)
Savalli, F. P. (A)
Sawelson, A. I. (A)
Schachter, J. (A)
Scheblein, G. M., Jr. (A)
Scherner, D. (A)
Schiffres, P. (A)
Schneider, R. M. (A)
Schreiner, E. D. (A)
Schulman, F. D. (A)
Schwartz, A. (A)
Schwartz, P. (A)
Sears, C. B. (A)
Seewald, E. J. (M)
Segner, S. M. (A)
Segreto, A. J. (A)
Selender, H. (A)
Selvaggio, N. J. (A)
Serra, J. F. (A)
Shaffer, A. (M)
Shaller, A. (A)
Shapiro, P. (A)
Shaw, R. F. (SM)
Sheffield, B. (A)
Shepetin, M. (A)
Shulman, J. (A)
Siclari, V. (A)
Sigler, A. (A)
Silver, B. L. (VA)
Silverman, D. (A)
Simone, C. F. (A)
Simonelli, N. A. (A)
Sinsheimer, W. J. (A)
Sira, M. A., Jr. (A)
Sirota, N. (M)
Sisskind, S. G. (A)
Skeist, S. M. (A)
Slatic, G. A. (A)
Slobodin, L. (A)
Small, B. (A)
Smith, E. J. (A)
Smith, F. (A)
Smith, R. H. (A)
Smykowski, C. P. (A)
Sobel, A. (A)
Sobel, A. D. (SM)
Sokol, L. L. (A)
Solomon, S. M. (A)
Sombor, H. (A)
Sontag, H. M. (M)
Soreny, E. V. (A)
Specter, L. (A)
Spellman, F. C. (A)
Spencer, G. D. (A)
Spollen, F. J. (A)
Stahl, C. (A)
Staiano, A. J. (A)
Steckler, A. (A)
Steinberg, W. A. (A)
Sterman, R. S. (A)
Stevens, S. (M)
Stewart, B. L. (A)
Stitch, M. (A)
Stone, A. P. (A)
Strazzulla, R. L. (A)
Summerville, R. W. (A)
Suttenberg, S. (A)
Sweet, L. O. (A)
Talley, D. (SM)
Tannenbaum, M. S. (A)
Tellerman, J. (A)
Temple, W. J. (A)
Tocci, D. P. (A)
Tremper, W. (A)
Trimboli, B. J. (A)
Trott, B. S. (SM)
Tulgan, S. S. (A)
Tung, S. P. (A)
Turczyn, W. A. (M)
Uslan, S. D. (M)
Vagt, H. T., Jr. (A)
Vallese, L. (SM)
Viola, V. (A)
Virmani, B. D. (A)
Vitale, P. A. (A)
Vitrogan, D. (SM)
Volpe, C. D. (A)
Vorperian, H. (A)
Waas, G. J. (A)
Walker, A. S. (A)
Wambold, R. F. (M)
Ward, W. P. (A)
Watine, M. N. (A)
Watstein, L. (A)
Weber, E. (F)
Weinberg, F. R. (A)
Weinberg, M. (A)
Weinstein, D. C. (A)
Weinstein, H. M. (A)
Weintraub, I. (A)
Weiss, A. A. (A)
Weissman, S. (A)

Weitz, M. K. (A)
Werman, H. M. (A)
Werner, G. L. (M)
Whitehurst, C. H., Jr. (A)
Williams, D. G. (A)
Wind, M. (SM)
Wolensky, W. (A)
Wolf, E. M. (A)
Wolk, N. (A)
Wollman, E. (A)
Zaretsky, A. (A)
Zarouni, A. (A)
Zbar, P. B. (M)
Zeiger, L. B. (VA)
Zetekoff, A. (M)
Zimet, M. A. (A)
Zimmerman, S. (M)
Zimnoch, J. J. (A)
Zupnick, I. N. (M)
Zweibel, J. (A)
Zweifler, I. (A)

Brooktondale
Beck, G. (A)
Jacomini, O. J. (A)

Buffalo
Abboud, F. L. (A)
Allen, J. K. (A)
Anderson, M. J. (A)
Anderson, R. T. (M)
Arent, E. (A)
Ausbourne, R. K. (A)
Ayer, D. R. (A)
Bailey, D. L. (M)
Bargman, M. (A)
Barrowcliff, T. A. (A)
Baumler, F. R. (A)
Beckerle, F., Jr. (A)
Bennett, J. E. (A)
Benson, R. A. (A)
Bergerson, W. (A)
Bossler, F. B. (A)
Brantley, J. Q., Jr. (A)
Breeden, F. C. (M)
Browder, L. P. (A)
Brown, R. M. (A)
Burdick, D. D. (A)
Champness, N. A. (M)
Chapman, S. (SM)
Chester, E. B. (A)
Ciany, M. C. (A)
Clausen, E. B. (A)
Clune, E. F. (A)
Cours, T. M. (A)
Davies, R. W. (A)
Davis, D. L. (M)
Davis, J. E. (A)
Dehm, R. E. (A)
Dunn, J. E. (M)
Dunn, L. L. (A)
Dusterdick, H. G. E. (A)
Dybowski, A. J. (VA)
Earshen, J. J. (A)
Edmiston, R. B. (A)
Falkenbach, G. J. (A)
Farber, M. (A)
Finke, H. J. (A)
Fischer, F. P. (SM)
Fischler, P. E. (M)
Fisk, N. H. (A)
Flemming, F. L. (A)
Fogel, C. M. (A)
Fryer, W. D. (A)
Gavin, R. F. (A)
Gibbons, H. M. (A)
Green, M. (A)
Halsted, G. P. (A)
Hamren, S. D. (A)
Harvey, N. L. (SM)
Hasinski, J. J. (A)
Hershberger, R. W. (A)
Hettinger, M. (A)
Hoffman, K. B. (SM)
Hoffman, R. S. (A)
Holley, M. V. (M)
Holly, J. A. (A)
Horton, A. B., Jr. (A)
Horvath, J. O. (A)
Houck, G. S. (A)
Huber, C. W. (VA)
Hunt, R. A. (A)
Iddings, H. G., Jr. (SM)
Jackson, K. J. (A)
Jackson, R. W. (A)
Jacomini, O. J. (A)
Jarosik, N. A. (M)
Jaworski, A. M. (A)
Jennings, R. W. (A)
Johnson, A. E., Jr. (A)
Johnson, B. F. (A)
Johnstone, N. J. (A)
Judd, A. E. (A)
Kahn, D. A. (A)
Kane, B. P. (A)
Kay, R. H. (A)
Kell, R. E. (A)
Kingsley, R. J. (M)
Kinsell, W. L. (SM)
Kitchin, H. W. (SM)
Knorr, W. G., Jr. (A)
Kurchin, A. (A)

Lanning, W. E. (A)
Lautz, C. F., Jr. (A)
Lebid, J. (A)
Lerner, T. (A)
LeVan, W. I. (A)
Lindberg, E. (A)
Loebner, E. E. (M)
Maltais, W. E. (A)
Marchiniak, A. E. (A)
McCormick, E. D. (A)
Mennen, H. (A)
Michnik, L. (A)
Mitscher, R. W. (A)
Moncton, H. S. (M)
Morgan, R. B. (M)
Musico, G. (A)
Newman, H. L. (M)
Newton, D. J., Jr. (A)
Okonski, C. B. (A)
Olney, V. W. (A)
Orlowski, C. J. (A)
Oslake, J. J. (A)
Phillips, J. (A)
Puttick, A. W. (A)
Ridgeway, F. B. (M)
Riser, C. R. (A)
Rizzo, S. J. (A)
Rosebrugh, R. K. (A)
Rosen, N. M. (A)
Rosenfelder, G. S. (A)
Roy, E. H. (A)
Rusnak, W. (A)
Sackinger, J. R. P. (A)
Schneeberger, R. F. (A)
Schultze, W. J. (A)
Schwartz, J. H. (A)
Shuart, J. F. (A)
Shub, L. (A)
Simpson, C. L. (M)
Slater, R. H. (A)
Smith, R. H. (A)
Spoon, G. E. (A)
Steeb, E. C., Jr. (A)
Stevens, H. V. (A)
Sullivan, P. E. (M)
Swartzel, K. D. (SM)
Syverson, C. L. (A)
Tanner, W. E. (A)
Taylor, F. E. (A)
Territo, J. N. (A)
Thalner, R. R. (SM)
Tona, C. J. (A)
Unger, W. J. (A)
Van Allen, J. W. (A)
Van Every, B. (A)
Vuhuri, A. L., (A)
Watson, W. H. (A)
Waud, E. C. (VA)
Weinberg, D. H. (A)
Welch, D. P. (A)
Wendt, K. R. (SM)
Wilkins, F. W. (A)
Wittman, J. H. (A)
Zimmerman, E. A. (A)

Burnt Hills
Hamren, S. D. (A)

Caledonia
Angevine, O. L., Jr. (SM)
Chapin, D. W. (A)

Cambria Heights
Cohen, S. A. (A)
Fangmann, G. (A)

Camden
Hickey, J. B. (A)

Camillus
Giles, J. W. (A)
Gordon, R. T. (A)
Place, J. F. (A)

Carle Place
Gill, H. A. (SM)
Matthews, L. M. (M)
Richardson, F. L. (M)

Cato
Sproul, S. (A)

Catskill
Gardner, C. B. (A)

Cazenovia
Chamberlain, P. L. (A)
Healy, D. W., Jr. (M)

Cedarhurst
Levine, A. M. (A)
Mercier, A. E. (VA)
Norris, S. (A)
Ross, B. R. (A)

Centereach
Clark, M. J. (A)

Centerport
Klaus, G. H. (M)

Chadwicks
Walker, R. K. (A)

Chappaqua
Dellenbaugh, F. S., III (A)
D'Humy, F. E. (F)
Kellogg, D. S. (A)
Short, W. P. (SM)
Washburne, B. P. (M)

Chittenango
Everts, W. J. (M)
Floyd, G. H. (M)
Weise, D. M. (A)

Clarence
Dobson, H. R. (A)
Doolittle, J. H. (SM)
Greatbatch, W. (A)
Mott, R. M. (A)
Pelton, F. M. (A)
Popovich, B. (A)

Clay
Carlson, E. R. (A)
Hall, G. D. (A)

Clinton
Mayer, H. F. (SM)

College Point
Fury, A. E. (A)
Hoffman, R. A. (A)
Ritter, F. (A)
Sieven, M. O. (A)
Stiepel, G. W. (A)
Wappler, A. C. (A)

Commack
James, G. W. (M)

Conesus
Young, E. C. (SM)

Constantia
Day, R. G. (A)

Coram
Sondericker, J. H. (A)

Corfu
Mech, H. D. (A)

Corning
Bell, A. N. (A)
Condon, E. U. (SM)
Gumbart, H. E. (A)
Guyer, E. M. (M)
Hocker, J. P. (M)
Jessen, F. A., Jr. (A)
Mann, R. H. (A)
Muller, J. S. (A)
Nitsche, J. E. (A)
Sheldon, J. L. (SM)
Wetmore, W. L. (A)

Cornwall-on-Hudson
Hollberg, R. W. (A)

Corona
Di Franco, J. V. (A)
Dubin, L. (A)
Milano, J. (A)
Pafundi, M. T. (A)
Silbar, J. I. (A)
Smith, H. H. (A)
Strauss, G. M. (A)

Crestwood
Krauer, O. (A)

Croton-on-Hudson
Crawford, P., Jr. (M)
Lescarboura, A. C. (SM)

Cuba
Miller, E. A. (A)

Delanson
Dibb, G. (A)

Delmar
Johnson, G. L. (M)

Dewitt
Buchwald, C. E. (SM)
Clark, H. T. (SM)
Devore, L. T. (F)
Gifford, R. P. (M)
Harnett, D. E. (F)
Hasuz, W. (SM)
Perkins, D. W. (A)
Taylor, F. W. (M)

Dobbs Ferry
Crawford, R. V. (SM)
Espersen, G. (SM)

Douglaston
Batcher, R. R. (F)
Cramer, S. (A)
DeFloria, R. N. (A)
Long, F. A. (A)

McClellan, G. B. (SM)
Merten, D. J. S. (SM)
Ruvin, A. E. (A)
Shanck, R. B. (SM)
Tyson, B. F. (SM)

East Aurora
Andersen, N. Y. (A)
Finnigan, C. W. (SM)
Frazier, R. E. (M)
Hopkins, J. E. (M)
Scrafford, R. L. (A)

Eastchester
Ga[illegible], G. C. (A)

East Elmhurst
Amis, C. W. (A)
Butler, S. H. (A)
Elkin, B. P. (A)
Gordon, S. M. (A)

East Hampton
Dominy, J. F., Jr. (A)
Good, M. B. (A)

East Hempstead
Aha, R. S. (A)
Fay, A. H. (A)
Fragola, C. F. (A)
Keen, H. S. (A)
Slack, W. J. (M)
Vanaglia, E. J. (M)

East Meadow
Ballard, L. L. (A)
Basil, A. (A)
Boyce, J. (A)
Byrne, M. (A)
Carnagie, V. F. (A)
Conway, B. B. (A)
Dlugatch, I. (M)
Dosch, T. J. (A)
Duggan, J. R. (SM)
Frerking, H. W. (A)
Frost, S. (M)
Grodzinsky, S. (A)
Gruber, P. (A)
Jurow, S. (A)
Kauper, L. T. (A)
Koch, J. F. A. (A)
Newman, S. O. (A)
Parker, S. (A)
Preti, L. L. (A)
Redovian, M. (A)
Rothlein, B. J. (SM)
Sills, M. M. (A)

East Northport
Wallace, R. A. (A)

East Norwich
Churchill, D. B. (M)
Fowler, C. A. (A)
Torkildsen, R. A. (A)

East Rockaway
Brown, W. (M)
Cohen, G. (A)

East Setauket
Kemic, C. S. (A)

East Syracuse
Anderson, S. E. (A)
Brown, J. S. (A)
Cahn, C. R. (A)
Downie, J. W. (SM)
Ellis, I. M. (M)
Galbraith, R. A. (SM)
Glasford, G. M. (SM)
Hu, M. K. (A)
Hu, Y. S. (A)
Intrator, A. M. (A)
Lepage, W. R. (SM)
Lothes, R. N. (A)
Morrison, R. H. (M)
Nash, C. C., Jr. (A)
Phillips, A. B. (A)
Rosen, C. A. (M)
Wilson, G. G. (A)

East Williston
Galella, P. F. (SM)
Schulz, R. F. (A)

Eden
Pontius, J. C. (M)

Eggertsville
Borkowski, C. J. (M)
Eckert, E. H. (A)
Harvey, H. F. (A)
McGowan, J. W. (A)
Mezger, C. C. (A)
Reinnagel, R. E. (SM)

Ellenville
Greenberg, H. (A)
Lo, Y. T. (A)

Elma
Stoll, V. B. (A)

Elmhurst
Auditore, C. J. (SM)
Berendsen, C. G. (A)
Blumenstock, N. R. (A)
Erdman, A. (A)
Gommo, F. J. (M)
Leonard, E. V. (M)
Pelzer, B. (A)
Picus, F. (A)
Pincus, M. (M)
Rebel, G. L. (A)
Secan, H. (M)
Stuhler, R. E. (A)
Toufexis, S. (M)
Weida, R. L. (A)

Elmira
Argyle, L. C. (A)
Ausfresser, H. D. (A)
Dart, H. F. (SM)
Drummond, W. D. (A)
Greene, T. A. (M)
Knochel, W. J. (VA)
Ley, G. S. (SM)
Link, V. F. (A)
Moran, W. G. (A)
Ramich, C. E. (M)
Sheehe, J. M. (A)
Stacy, J. E. (SM)
Stelmak, J. P. (M)
Stewart, N. H. (SM)
Upshaw, V. (M)
White, L. E. (A)

Elmira Heights
Paulson, C. T. (A)
Washburn, G. W. (A)

Elmont
Ballard, F. (A)
Cronin, D. (A)
Dong, J. G. (A)
Dressler, R. (A)
Gaglianello, J. W. (A)
Gould, S. (A)
Griffen, K. A. (A)
Griffing, W. W. (A)
Kuck, G. P. (A)
Kuhn, J. J. (A)
Lee, S. R. (A)
Rhodes, M. L. (A)
Seidman, A. H. (A)

Elmsford
Carlisle, R. W. (SM)
Carlisle, S. F., Jr. (A)
Greenbaum, W. H. (M)
Kranz, F. W. (SM)
Myers, H. W. (M)
Oess, F. G. (A)
Pearson, H. A. (VA)
Von Baudissin, J. (VA)

Elsmere
Maguire, H. S. (A)

Endicott
Aldrich, D. H. (A)
Allen, C. W. (A)
Allen, F. K. (A)
Ayers, J. G., Jr. (A)
Baldauf, D. R. (A)
Bernier, J. R. (A)
Black, T. L. (A)
Branning, H. F. (A)
Brooke, A. W. (A)
Budd, W. E. (A)
Cantwell, R. J. (A)
Cheng, D. K. (SM)
Daykin, D. R. (A)
Diaz, J. (A)
Hamburger, A. (A)
Hardie, F. H. (A)
Hiznay, J. M. (A)
Johnson, R. M. (A)
Kramer, N. H. (A)
La Jole, Z. A. (A)
Lamy, R. C. (A)
Leimer, J. J. (A)
Lohman, I. H., Jr. (M)
McMillan, E. C. (A)
Moran, J. F., Jr. (A)
Mulock, L. E. (A)
Perrin, L. A. (A)
Pratt, R. E. (A)
Pratt, R. L. (M)
Pyle, C. L. (A)
Ralfer, S. J. (A)
Shatz, J. R. (A)
Shell, E. F. (M)
Strup, C. F., Jr. (M)
Swarthout, W. M. (M)
Tate, M. C. (A)
Veburg, J. C. (A)
Willard, D. D. (A)
Yurgartis, W. C. (A)

Endwell
Frehsee, R. (A)
Katz, A. J. (A)

O'Connor, D. G. (SM)
Yeager, C. J. (A)

Farmingdale
Dannels, H. J. (A)
Delallo, L. D. (A)
Gneses, M. I. (A)
Maguire, J. P. (A)
Niewenhous, J. H. (A)
Ragni, V. F. (A)

Fayetteville
Campbell, C. M. (M)
Costas, J. P. (A)
Deerhake, F. M. (SM)
Dickey, F. R., Jr. (A)
Gangberg, F. (A)
Gethmann, R. B. (M)
Hartman, D. K. (A)
Jones, J. L. (SM)
Messer, H. G. (SM)
Mushrush, R. S., Jr. (A)
Perreault, D. A. (A)
Ryerson, J. D. (A)
Thomas, H. P. (F)
Trotter, G. C. (M)
Waugh, G. T. (M)

Fishkill
Hallock, D. G. (A)
Pullis, F. D. (A)

Floral Park
Ahern, W. R. (SM)
Austin, C. S. (A)
Becchetti, F. J. (A)
Buble, F. L. (A)
Coccoran, J. W. (A)
Dorman, D. (A)
Eaton, R. S., Jr. (A)
Eberle, E. E. (M)
Garrand, L. W. (SM)
Greenbaum, J. R. (M)
Gunnell, G. T. (VA)
Halliden, A. R. (A)
Heiss, W. H. (A)
Imboden, G. J. (A)
Kefalas, G. P. (A)
Knox, R. W. (A)
Lesser, J. (M)
Marshall, T. A. (A)
McGinn, J. F. (A)
McNally, W. P. (A)
McNamara, T. R. (A)
Mooney, V. J. (A)
Nixon, G. M. (VA)
Novick, R. (A)
Novikoff, E. B. (M)
Rarick, J. B. (A)
Rogers, W. (A)
Sanekoff, R. (A)
Schmidt, R. D. (A)
Spittal, W. R. (A)
Stokes, B. C. (M)
Toomey, J. F. (M)
Weidmann, L. J. (M)
Weiser, S. (A)
Whitford, J. R. (A)
Willcox, P. D. (A)
Zaremba, C. J. (A)

Flushing
Altmann, S. (A)
Amedeo, P. (A)
Anspach, K. E. (M)
Auerbach, L. (A)
Auerbach, M. (SM)
Aull, W. (SM)
Baasch, T. L. (A)
Barber, A. W. (VA)
Barry, S. (A)
Beck, A. T. (A)
Becker, H. R. (A)
Beitner, C. R. (A)
Belock, H. D. (SM)
Berkowitz, M. W. (A)
Blass, J. (M)
Boyer, J. M. (SM)
Brody, J. (A)
Cap, S. T. (A)
Casper, S. (A)
Clerkin, C. R. (A)
Climent, L. J. (M)
Cohen, A. L. (A)
Courter, H. M. (A)
Crowder, H. A. (A)
De Clerck, C. E. (A)
Del Giorno, A. E. (A)
Dittenhofer, H. F. (A)
Doulos, N. P. (A)
Erhardt, K. D. (A)
Farber, R. J. (A)
Fein, B. (A)
Feitler, J. (A)
Felsen, L. B. (A)
Findley, P. B. (SM)
Fox, E. I. (A)
Frangoulis, S. I. (M)
Fredricks, I. (A)
Freedman, M. M. (M)
Fugazzi, C. (A)
Gerber, M. M. (A)
Gleimer, B. (M)

Granoff, N. H. (A)
Greene, J. C. (M)
Greiger, G. (A)
Hallisey, R. J. (A)
Harris, H. I. (A)
Hatfield, L. N. (SM)
Hebel, E., Jr. (A)
Heffernan, H. J. (A)
Hillman, K. (A)
Holloway, H. R. (M)
Howard, L. L. (A)
Huebscher, H. (A)
Jacobson, R. I. (SM)
Jansky, C. M. (A)
Jasik, H. (SM)
Jensen, R. A. (A)
Johanson, P. (A)
Joyce, K. J. (A)
Joyce, M. V., Jr. (A)
Juhas, L. A. (A)
Kalet, E. (A)
Kalish, H. M. (A)
Klein, H. (A)
Klein, M. M. (A)
Knapp, J. Z. (A)
Koffman, H. J. (A)
Kornbluth, A. E. (A)
Krawitz, M. (SM)
Kritz, J. (M)
Kupferberg, K. M. (M)
Kushner, D. (A)
Langer, P. L. (A)
Lawrence, G. (A)
Lee, T. K. (A)
Lenczowski, T. M. (A)
Leskinen, J. I. (A)
Letendre, L. J. (A)
Levinson, S. (A)
Lindeman, R. J. (A)
Lyons, W. (SM)
Mahren, A. A. (A)
Marcus, M. (A)
Martin, P. S. (M)
Mecol, J. C. (M)
Medwin, A. H. (A)
Menes, M. (A)
Middleton, R. G. (A)
Mohr, H. F. (A)
Neeck, J. E. (A)
Olson, O. F. (M)
Orne, P. W. (A)
Packer, L. (A)
Paradis, B. (A)
Parker, H. W. (F)
Pater, O. C. (A)
Pierce, V. M. (A)
Pomerantz, N. (A)
Press, M. (SM)
Prihar, Z. (SM)
Resnick, A. (A)
Retzger, L. I. (A)
Rifkin, M. S. (M)
Roberts, A. K. (A)
Robinson, A. S. (A)
Rosen, M. (A)
Rothmel, B. J. (A)
Rothstein, M. (SM)
Ruben, A. S. (VA)
Rubin, S. (A)
Ruderfer, M. (A)
Russ, R. H. (VA)
Salkind, E. (A)
Sanial, A. J. (SM)
Schlegel, R. A. (A)
Schneiderman, S. (A)
Schroeder, K. R. (A)
Schroter, R. G. (A)
Schwartz, E. (A)
Seabury, E. M. (M)
Siegmann, M. J. (A)
Sieminski, E. (SM)
Smith, L. (A)
Sohne, G. C. (A)
Strauss, K. J. (A)
Tepper, H. H. (M)
Thropp, C. H. (VA)
Todd, P. G. (A)
Volz, N. A. (A)
Weiland, G. H. (A)
Weindorf, D. R. (A)
Wierenga, B. B. (A)
Zion, H. (A)

Forest Hills
Algase, L. I. (M)
Ball, R. M., Jr. (M)
Baum, S. H. (VA)
Bendett, R. M. (A)
Burns, R. F. (A)
Canavaciol, F. E. (SM)
Caplan, N. (A)
Carlat, B. (SM)
Cheng, C. C. (A)
Cohen, E. (A)
Cretella, S. A. (A)
Dahlin, E. K. (M)
Davis, S. (A)
Della-Corte, J. P. (SM)
Dick, A. I. (A)
Dietz, I. G. (A)
Dzik, S. (A)
Evans, J. (A)
Fendrich, L. (A)
Fonseca, A. P. (A)
Freeman, E. E. (SM)
Gleimer, L. (A)
Grayson, K. B. (A)
Gross, J. (A)
Harmatz, H. J. (A)
Harris, W. T. (A)
Hogan, J. V. (A)
Hollywood, J. M. (SM)
Julie, J. (A)
Kantor, G. (M)
Kao, C. C. (M)
Keogh, R. J. (A)
Koenig, R. H. (A)
Krainin, S. (A)
Leeds, M. (A)
Levin, M. S. (A)
Lidz, S. (A)
Losher, M. I. (A)
Lustig, H. E. (A)
Mann, A. (A)
Margosian, J. W. (SM)
Markantes, P. N. (A)
Markaroglu, H. (A)
Mitchell, W. M. (A)
Newton, A. (A)
Ottenberg, E. C. (A)
Ottenberg, L. A. (A)
Palester, J. J. (A)
Pease, C. H. (A)
Polcyn, S. J., Jr. (A)
Pritkin, L. (A)
Rabin, R. (A)
Rawson, H. B. (A)
Rice, J. (M)
Roush, G. E. (M)
Sandor, A. (SM)
Schiller, H. H. (A)
Seidner, J. H. (M)
Seliger, V. H. (A)
Simon, C. J. (M)
Solzberg, S. (A)
Staschover, L. (A)
Sullivan, W. E. (A)
Teltscher, E. S. (A)
Toepel, W. A. (A)
Weiner, S. L. (A)
Wu, W. I. L. (SM)
Youdin, M. (M)
Yuni, W. (A)

Fort Edward
Grahame, F. W. (A)

Fort Niagara
Derflinger, H. L., Jr. (A)

Franklin Square
Affias, I. M. (M)
Balogh, J. (A)
Bibercher, R. (A)
Blaisdell, H. L. (SM)
Brody, H. (A)
Daskam, E., Jr. (M)
Elion, H. A. (A)
Isaacs, S. J. (A)
Kennedy, J. E., Jr. (A)
Kirby, M. J. (M)
Klerk, R. H. (A)
Kraemer, E. H. (A)
Lee, V. C. (A)
Lipson, W. (M)
Lorch, J. (M)
Makstein, F. I. (A)
McNealus, A. L. (A)
Meyer, F. (A)
Salit, L. (A)
Schisler, C. W. (A)
Schwalbe, J. H. (A)
Schwartz, L. J. (A)
Shanney, W. J., Jr. (A)
West, H. B., Jr. (A)
Winer, J. D. (M)

Franklinville
Wagner, D. W. (A)

Freeport
Antony, C. (M)
Barone, S. A. (SM)
Belderok, H. C. (A)
Butterworth, G. S. (A)
Campani, L. M. (A)
Dolphy, E. L. (VA)
Elar, P. A. (A)
Hesse, A. N. (VA)
Howard, F. J. (A)
Johnson, G. R. (M)
Kahn, L. R. (M)
Prichard, J. S. (A)
Russell, G. A. (M)
Sebold, A. J. (A)
Smedes, R. L. (A)
Tricamo, V. A. (M)

Fresh Meadows
Barash, L. F. (A)
Eaton, J. E. (M)
Feingold, W. (A)
Freeman, O. S., Jr. (A)
Gebhardt, J. W. (A)
Koppel, A. U. (A)
Meltzer, H. S. (A)
Richman, D. (SM)
Went, J. J. (A)
White, E. S. (SM)

Fulton
Clark, W. D., Jr. (A)
Riddle, P. (A)

Galway
David, W. R. (A)
Lemmerman, E. R. (A)

Garden City
Allen, H. E. (SM)
Barnaby, R. H. (A)
Beardsworth, R. (A)
Beetham, R. B. (A)
Berglund, E. B. (A)
Bernsley, J. T. (A)
Blinn, W. J. (A)
Carroll, J. M. (M)
Caswell, J. N. (A)
Dunn, L. J. (SM)
Ferrill, T. M., Jr. (SM)
Fisher, D. L. (SM)
Frank, K. F. (M)
Fricker, J. N. (M)
Gemmill, F. Q. (A)
Grunsky, C. E. (SM)
Haerer, W. A. (A)
Hancock, J. R. (A)
Heins, J. L. (VA)
Hinds, J. E., Jr. (A)
Keim, D. Y. (VA)
Learned, V. (SM)
Lester, J. M. (SM)
Marston, R. S. (M)
Mellor, W. N. (VA)
Monfort, R. A. (SM)
Rau, D. S. (SM)
Ruth, E., III (SM)
Schock, J. O. (M)
Shaper, H. B. (A)
Shepherd, J. E. (F)
Sweeney, W. R. (A)
Wies, G. (M)
Winchell, W. H. (VA)
Zomber, G. L. (M)

Garden City South
Schlessel, J. H. (A)

Geneva
Benda, D. (M)
Long, C. P. (A)
Philip, R. M. (A)
Smith, S. S. (A)

Glen Cove
Barber, R. G. (A)
Buchtenkirch, A. J. (A)
Davis, W. M. (A)
Doncese, G. (A)
Downs, J. W. (SM)
Duffy, D. P. (A)
Firth, L. G., Jr. (A)
Gebhardt, R. J. (A)
Jorge, A. (A)
Kiser, W. L. (M)
McDonough, J. A. (SM)
Moreno, C. A. (A)
Scott, G. G. (A)
Voice, C. C. (A)

Glendale
Chapman, R. F. (M)
Glazer C. R. (M)
Sperber, A. O. (M)
Trelewicz, E. R. (A)
Vought, N. F. (M)
Veit, F. (A)

Glenford
Johnson, J. D. (A)

Glen Head
Cooke, W. T. (SM)
Gorrill, W. S. (SM)
Hanson, G. N. (SM)
Keeneth, J. A. (A)
Mansur, F. (M)
Martin, E. E. (A)
Reed, F. C., Jr. (A)
Swanson, E. H. (M)
Widenor, M. D. (A)
Williams, R. B., Jr. (A)
Zylla, H. R. (A)

Glen Oaks
Braman, M. D. (A)
Dolin, M. (A)
Doucette, A. R. (M)
Dunn, B. B. (A)
Eichel, J. H. (SM)
Enlow, P. M. (A)
Franks, C. V. (A)
Greene, A. H. (A)
Gutman, J. H. (A)
Hittner, C. (A)
Imgram, R. H. (A)
Kaelin, B. A., Jr. (A)
Lazarchik, R. E. (A)
Lowe, F. B. (A)
Magenheim, B. (A)
McKeand, R. W. (A)
Micalowsky, M. (A)
Montesano, S. J. (A)
Mullin, J. F. (A)
Murtough, W. L. (A)
Nowack, E. W., Jr. (A)
O'Connor, W. A., Jr. (A)
Rees, M. H. (A)
Roberts, C. R. (A)
Simon, J. M. (M)
St. John, K. M. (A)
Sweenie, G. C. (A)
Tiedeman, I. B. (A)

Glen Oaks Village
Greene, E. B. (A)
Scott, R. C. (A)

Glens Falls
Foster, L. W. (SM)
Harrington, D. J. (M)
Wells, H. D., Jr. (M)

Glenwood Landing
Gaylor, R. (A)

Gloversville
Horton, M. D. (A)

Goshen
McClean, J. F. (SM)

Governor's Island
Pokat, B. (A)

Gowanda
Allen, M. B. (A)

Grand Island
Arthur, R. J. (A)
Barnes, J. A. (A)
Ellis, R. H. (A)
Hamlin, N. B. (A)
Hattersley, T. E., Jr. (A)
Hayles, O. J. (M)
Prast, J. W. (A)

Great Neck
Arthur, G. R. (M)
Bachman, H. L. (A)
Barney, K. H. (A)
Beck, D. H. (SM)
Boop, W. E. (M)
Bornhorst, K. F. (A)
Bradley, G. G. (M)
Burkhalter, R. M. (A)
Chalkin, M. (A)
Cook, C. E. (A)
Crawford, J. D. (SM)
Crosby, R. W. (A)
Dalman, G. C. (SM)
Davis, C. W. (M)
Davis, W. J. (A)
Dettinger, D. (SM)
Dostal, F. X. (A)
Dunlap, O. E., Jr. (SM)
Edwards, A., Jr. (A)
Espenlaub, W. C. (A)
Ettenberg, M. (SM)
Figge, E. E. (A)
Forsberg, K. E. (A)
Frank, R. L. (M)
Frantz, W. P. (M)
Frattura, J. D. (A)
Friedman, M. I. (A)
Gittlemar R. (A)
Gregory, J. G. (M)
Halpern, W. (A)
Hannan, P. W. (A)
Haskin, R. H. (A)
Hauser, A. A., Jr. (M)
Helf, W., Jr. (A)
Hinchey, R. L. (A)
Isbister, E. J. (SM)
Jahn, D. M. (A)
Kaminsky, C. J. (A)
Kolman, W. G. (A)
Krieger, P. (M)
Kuranuki, L. A. (A)
Langston, J. F. (A)
Larick, S. H. (M)
Levers, E. O. (A)
Lian, K. T. (A)
Lundquist, G. A. (A)
Marcuvitz, N. (VA)
Martinson, O. M. (A)
Mayerson, M. I. (M)
McClure, R. E. (A)
Messner, W. S. (A)
Meyer, E. G. (A)
Moerman, N. A. (M)
Morgan, J. F. (A)
Mulligan, J. R. A., Jr. (A)
Mundo, C. J., Jr. (A)
Nachemson, P. R. (A)
Onyskin, M. (M)
Palmer, R. D. (A)
Pasek, D. M. (SM)
Paulson, C. R. (M)
Planteroth, J. A. (A)
Potter, J. T. (A)
Poulos, N. M. (A)
Powell, T. (A)
Proctor, D. W. (A)
Proctor, E. K., Jr. (SM)
Redlien, H. W., Jr. (A)
Reid, W. (A)
Rickert, H. H. (A)
Roake, W. C. (M)
Roberts, W. W. (A)
Rohn, W. B. (A)
Rosenberg, S. L. (A)
Rudd, J. E. (A)
Sawyer, H. S. (A)
Schwab, B. B. (A)
Schwartz, L. S. (SM)
Schwiebert, H. (A)
Smith, C. C. (A)
Spencer, B. F. (SM)
Spencer, N. A. (A)
Sperling, J. G. (M)
Steber, W. C. (A)
Strawbridge, R. B. (M)
Sturgeon, W. S. (M)
Sussman, H. (SM)
Swern, L. (A)
Tenenbaum, F. (A)
Thatcher, E. V. (SM)
Tomiyasu, K. (SM)
Van Davelaar, F. S. (A)
Vehslage, E. P. (A)
Vodak, A. W. (A)
Wanty, B. G. (A)
Wathen, R. L. (M)
Welch, T. J. (A)
Wengenroth, R. D. (A)
Wheeler, H. A. (F)
Whitfield, E. W. (A)
Wilder, J. E. (A)
Williams, F. H. (M)
Winter, N. L. (M)
Yale, W. H. (A)

Greenlawn
Sadler, W. E. (A)
Schoenfeld, K. (VA)

Greenvale
Debaun, J. R. (A)
Hansel, P. G. (SM)
Siegmund, E. L. (A)

Groton
Clark, M. M. (A)
Jones, C. E. (M)

Hamburg
Fiedler, L. (M)

Hamilton Beach
Pihl, R. L. (A)

Hampton Bays
Turner, F. T. (M)

Harpursville
Friedlander, A. T. (M)
Lawrence, N. S. (M)

Harrison
Bohl, L. L., Jr. (A)
De Pasquale, R. H. (M)
Katz, L. (A)
Volpe, M. J. (A)

Hartsdale
Deuth, A. F. (SM)
Engelhardt, G. B. (VA)
Gillis, J. F. (A)
Van Bemmelen, H. M. (A)

Hastings-on-Hudson
Batchelor, J. C. (SM)
DeMuro, T. M. (A)
Fenaughty, A. L. (A)
Harnack, W. P. (A)
Lodge, W. B. (F)
Miller, D. H. (VA)

Haverstraw
Finkelstein, D. (A)

Hawthorne
Casabona, A. M. (A)
Didinger, G. H., Jr. (A)
Hales, E. B. (A)
Knox, R. V. (A)

Hempstead
Allen, W. T. (A)
Bellmar, C. L. (A)
Cornes, R. W. (SM)
Dannals, E. W. (SM)
Dean, W. N. (A)
Dick, T. M. (M)
Diorio, J. (A)
Feuer, H. (A)
Fuchs, M. (A)
Hopkins, J. J. (M)
Johnson, H. E. (A)
Mandl, G. P. (M)
Marcinkowski, E. R. (A)
Peter, R. E. (A)
Peters, J. L. (VA)
Rich, C. E. (A)

Shnitkin, L. (A)
Skirrow, J. E. (A)
Stewart, J. W. (A)
Thwing, R. W. (A)
Westover, T. A. (A)
Wilkerson, J. R. (SM)
Williams, R. J. (A)
Wright, G. B. (A)
Yuran, T. (A)

Hewlett
Metcalfe, D. (SM)

Hicksville
Adams, B. L. (A)
Bostrom, R. C. (A)
Bradley, J. R. (A)
Burns, R. C. (A)
Cohen, L. D. (A)
Coleman, S. F. (A)
Craib, J. F. (SM)
Crosby, M. G. (F)
Donals, A. B. (A)
Drach, J. G. (A)
Dudeck, M. P. (A)
Evans, T. L. (A)
Feltham, C. F., Jr. (A)
Fordon, W. A. (A)
Goldstein, A. (A)
Hagedorn, H., Jr. (A)
Heacock, W. J., Jr. (A)
Houseworth, G. H. (A)
Jung, C. W. (A)
Kaufman, W. (A)
Kawaller, J. (A)
Lenfest, G. C., Jr. (A)
Loth, P. A. (A)
Marcinko, F. C. (A)
Marsden, W. Y. (A)
Mehr, A. (A)
Nehrbas, T. C. (A)
Oberlies, J. L. (A)
Popik, M. J. (A)
Purnell, L. S. (M)
Richman, M. A. (M)
Roberts, L. W. (A)
Saur, R. D. (A)
Solomon, C. (A)
Stateman, M. J. (M)
Stone, W. R. (A)
Thompson, A. C. (A)
Tribken, E. R. (A)
Variano, V. V. (A)
Walker, A. C. (A)
Walsh, C. (SM)
Zampino, F. J. (A)

Highland
Christiansen, C. L. (A)
Greenfield, A. (A)
Lindsay, R. L. (M)
Morgan, J. C. (A)
Thompson, L. J. (A)

Hillsdale
Sabeff, S. S. (M)

Holland Patent
Armstrong, N. A. (A)
Bennison, G. K. (M)
Pulhamus, W. R. (M)

Hollis
Booth, R. E. (A)
Bowler, D. L. (A)
Caputo, N. J. (VA)
Chubbuck, E. L., Jr. (M)
Daly, J. J. (A)
Edell, J. J. (A)
Elkins, R. (A)
Froehlich, F. J. (A)
Gelck, G. H. (A)
Haagens, D. (A)
Klein, H. M. (A)
Mahland, E. W. (M)
Paull, M. (A)
Ridenour, W. S. (A)
Sachs, H. L. (A)
Sard, E. W. (A)
Schlafly, H. J., Jr. (SM)
Small, H. (A)
Squire, F. M. (A)
Timms, A. S. (A)
Williams, H. C. (M)

Hoosick Falls
Case, C. C., Jr. (A)

Hopewell Junction
Edwards, N. P. (A)
Femmer, M. E. (A)

Hornell
Haley, A. J. (A)

Horseheads
Betts, B. J. (A)
Larson, R. G. (M)
Stephanz, G. H. (A)
White, R. A. (SM)

Howard Beach
Yamamoto, G. H. (A)

Hudson Falls
Scoville, M. E. (SM)

Huntington
Barbour, C. W., Jr. (SM)
Bethel, C. D., Jr. (SM)
Cahill, F. C. (SM)
Ferrier, D. T. (SM)
Gretz, R. W. (A)
Hartman, L. A. (A)
Howell, R. O. (A)
Hughes, F. (M)
Irick, J. (A)
Joss, E. T. (VA)
Litchford, G. B. (M)
Lyons, R. C. (A)
McCoy, J. H. (SM)
McProud, C. G. (M)
Olszewski, W. R. (A)
Singer, J. S. (A)
Stengel, J. F., Jr. (A)
Sterling, R. W. (A)
Weaver, S. E. (A)

Huntington Station
Aske, V. H. (M)
Atwood, S. (VA)
Fraser, R. (M)
Freundlich, M. M. (SM)
Kerzner, N. A. (A)
Lehr, P. (SM)
Meichner, F. T. (M)
Mezger, G. (VA)
Newdale, E. I. (A)
Pruszynski, C. C. (A)
Ritchey, N. B. (A)
Roller, W. P. (A)
Russell, J. A., III (A)
Safran, M. (A)
Serniuk, W. (SM)

Hyde Park
Bloch, E. (A)
Eckelman, P. F. (A)
Evans, B. O. (A)
Henle, R. A. (A)
Herdina, F. E. (M)
Spatz, P. (A)

Ilion
Momberger, P. E. (A)

Inwood
Bauer, W. C. (A)

Irvington
Colehower, C. H., Jr. (M)
Duffendack, O. S. (SM)
Kohler, T. R. (A)
LaPlante, R. A. (A)
Wyatt, K. S. (A)

Islip
Daubaras, E. J. (M)
Wiener, W. A. (A)

Ithaca
Ankrum, P. D. (A)
Augustine, J. A. (A)
Bolgiano, R., Jr. (A)
Booker, H. G. (SM)
Burrows, C. R. (F)
Colbert, S. M. (A)
Creder, A. B. (VA)
DeNeuf, D. K. (SM)
Dunn, S. B. (A)
Field, M. J. (A)
Fitterer, C. E. (A)
Gamble, G. W. (A)
Godwin, C. J., Jr. (A)
Gordon, W. E. (M)
Hafstrom, J. R. (SM)
Hesse, H. R. (A)
Heydt, H. L. (M)
Holden, W. D. (A)
Humphrey, T. R. (A)
Ingalls, C. E. (SM)
Jankowski, H. (M)
Jones, W. R. (SM)
Kirchner, P. H. (A)
McGaughan, H. S. (M)
McLean, T. (SM)
McMullen, C. W. (A)
Misra, R. P. (A)
Nichols, B. (A)
Reed, G. W. (A)
Rooney, T. J. (A)
Rudwick, B. H. (A)
Schmidt, R. A. (A)
Smith, E. K., Jr. (M)
Smith, H. G. (A)
Stanton, J. W. (A)
Wegner, L. S. (A)
Warriner, B. (SM)
Weaver, P. F. (A)
Webb, J. S. (SM)
Wilson, R. D. (A)
Zimmerman, S. W. (SM)

Jackson Heights
Berens, J. (A)
Bonda, D. (A)
Botta, A. J. (A)
Bryerman, G. J. (A)
Callais, R. T. (M)
Callan, J. M. (A)
Cole, W. J., Jr. (A)
Coundjeris, A. (A)
Davidson, J. J. (A)
Deitz, J. L. (A)
Dinga, E. W. (A)
Eisenhauer, F. E. (A)
Fama, C. S. (A)
Farber, B. (A)
Feltzin, A. (A)
Ferrante, J. F. (A)
Flum, E. (A)
Fogel, L. J. (M)
Foster, J. E. (A)
Garretson, C. M. (A)
Goyette, L. E. (A)
Hall, R. C. (A)
Hanft, C. J. (A)
Herlinger, L. F. (A)
Hertzberger, R. E. (A)
Hollabaugh, M. G. (M)
Immarco, A. E. (A)
Johnston, H. (A)
Kassel, P. (A)
Kelley, L. A. (VA)
Kozicki, H. (A)
Lavan, D. A. (A)
Levy, B. (A)
Milton, L. (A)
Nemchuk, W. J. (A)
Paterno, P. M. (A)
Pleasure, M. (M)
Rehberg, C. F. (A)
Salzer, R. M. (A)
Schiavoni, T. V. (A)
Shaw, D. (A)
Sokol, A., Jr. (A)
Solt, H. B. (M)
Striedinig, L. J. (A)
Sudinsky, L. (A)
Torian, J. T. (A)
Vartanian, V. (A)
Weil, K. (A)
Williamson, C. R. (A)
Wortzman, S. K. (A)

Jamaica
Barlam, T. (A)
Beck, A. J. (A)
Belchis, S. (A)
Benz, J. K. (A)
Berger, M. (M)
Berkowitz, B. (M)
Berkowitz, L. C. (A)
Bicknese, F. H. (M)
Carlos, J. B. (A)
Chanko, P. N. (A)
Chow, W. T. (SM)
Dow, J. B. (F)
Eland, P. D. (A)
Feltman, A. V. (A)
Freeman, H. (M)
Gewirtz, A. (A)
Goldschmidt, A. M. (A)
Hacker, S. J. (A)
Kratsch, P. H. (A)
Lee, H. T. (M)
Lewinstein, M. (SM)
MacDonald, W. W. (SM)
McCabe, P. I. (A)
Mehlman, S. J. (M)
Morgenstern, A. (A)
Paledes, T. P. (M)
Peck, C. L. (A)
Rivera-Cardona, B. A. (A)
Robbins, A. (M)
Robinson, J. H. (A)
Rudis, M. (A)
Shottenfeld, R. (A)
Theodoseau, T. (A)
Weber, J. H. (A)
White, J. D., Jr. (VA)
White, J. J. (A)
Young, C. B., Jr. (M)

Jamaica Estates
Bernstein, J. (SM)
Busharis, J. G. (A)
Selbmann, R. W. (A)

Jamaica Hill
Wylie, T. F., Jr. (A)

Jamestown
Anderson, S. E. (A)
Babcock, L. F. (A)
Babcock, T. R. (A)
Heston, W. S. (M)
Rulifson, R. R. (A)

Jamesville
Pugsley, D. W. (F)

Jericho
Hartel, R. (A)

Johnson City
Bender, D. R. (A)
Bosman, E. H. (M)
Caulfield, J. T. (A)
Demer, F. M. (A)
King, J. D. (A)
Pittsley, E. I. (M)
Roehm, F. J. (M)
Shield, C. E., Jr. (A)
Stilwell, G. R., Jr. (A)
Stouppe, J. J. (A)
Upham, S. W. (M)
Wagenseller, G. W. (A)

Jonesville
Schwarz, T. G., III (A)

Kenmore
Browne, J. F. (A)
Carson, R. D. (A)
Edighoffer, E. A. (A)
Essen, O. E. (A)
Faraone, J. (A)
Fink, A. (A)
Foster, G. C. (A)
Goundry, R. A. (A)
Haney, D. W. (M)
Harpster, W. T. (A)
Hohenstein, M. R. (A)
Hoover, I. D. (A)
Kaushagen, W. M. (A)
Kiefer, C. F., Jr. (A)
Kwit, C. J. (A)
Lamy, R. H. (A)
Laurien, I. M. (A)
Less, F. L. (A)
McCullough, F. S. (A)
Myers, J. F. (SM)
Oxley, V. C. (A)
Paige, A. (A)
Riggs, J. H. (A)
Rupp, E. W., Jr. (A)
Siegel, V. H. (M)
Squires, W. K. (M)
Stephenson, H. B. (M)
Vanacore, T. (VA)
Wallace, J. W. (A)
Weatherbee, W. H. (A)
Wiley, V. H. (A)

Kew Gardens
Acheson, M. A. (F)
Appel, H. G., Sr. (A)
Ashley, A. (A)
Bettan, M. I. (A)
Brilmayer, E. W. (A)
Gehrke, F. E. (SM)
Goodwin, V. D. (VA)
Graham, R. E. (M)
Iversen, A. H. (A)
Kent, L. I. (A)
Lurye, J. R. (A)
Marcus, D. H. (A)
Mazzei, A. L. (SM)
Minneman, M. J. (SM)
Palmer, R. N. (SM)
Pressman, R. (A)
Raphael, M. S. (A)
Rufus, D. (A)
Saunders, C. L. (A)
Schindler, J. P. (A)
Smith, C. R. (SM)
Steinhardt, L. (A)
Taylor, J. M. (A)
Trotter, W. E. (A)
Weisner, L. (A)
Weiss, M. (A)
Wheeler, W. R. (M)
Wilson, A. L. (M)

Kingston
Donohue, D. C. (A)

Kirkville
Winfield, W. S. (M)

Lake Mahopac
Criscione, A. J. (A)

Lake Peekskill
Kafalas, C. (A)

Lake Ronkonkoma
DeSimone, D. J. (A)
Pines, C. C. (M)

Lake Success
Aveney, R. J. (M)
Barnes, R. S. (A)
Barrow, W. L. (F)
Delany, F. J. (A)
Webber, H. E. (SM)

Lakewood
Nelson, V. A. (A)

Larchmont
Cammer, M. (M)
Cooper, W. H. (SM)
Fish, K. L. (A)
Galione, W. J. (A)
Harris, C. M. (A)
Hoenig, W. (SM)
Johnson, E. M. (SM)
Jones, G. L. (SM)
Kerby, G. A. (A)
McVity, L. I. (A)
Mullenger, K. E. (A)
Plowman, F. R. (A)
Roberts, E. A. (A)
Rudd, W. C. (M)
Schneider, J. R. (A)
Watson, E. F. (SM)

Latham
Bass, C. F. (A)

Laurelton
Cassidy, M. E. (A)
Elvan, M. (A)
Glaser, M. (SM)
King, P. D. (A)
Lurie, E. M. (VA)
Parry, J. P. (A)
Robinson, R. J. (A)
Stenecker, R. G. (A)

Lee Center
Brunette, G. E. (A)
Kunze, A. A. (SM)

Leroy
Lapp, R. S. (VA)

Levittown
Addleman, L. A. (A)
Alexander, R. (A)
Anderson, D. K. (A)
Arcate, J. A. (A)
Attura, G. M. (M)
Auerbach, A. A. (A)
Bales, C. W. (A)
Brodek, W. J. (A)
Buehrle, W. E., Jr. (A)
Cady, R. T. (A)
Caligiuri, J. F. (A)
Charlton, J. (A)
Clothier, C. M. (A)
Connors, T. J., Jr. (A)
Conway, J. F. (A)
Cope, R. H., Jr. (A)
D'Agostino, J. V. (A)
Davis, E. W. (A)
Dean, J. C. (A)
DeBardelaben, S. L. (A)
Dickon, A. J. (A)
DiMatteo, P. L. (A)
DiMeglio, E. (A)
Easterday, J. L. (A)
Flynn, W. J. (A)
Flynn, W. J. (A)
Friedman, E. D. (SM)
Fry, W. H. (A)
Gahn, D. E. (A)
Harris, M. R. (A)
Haynes, J. M. (A)
Heermans, J. W. (A)
Holland, J. W. (A)
Hollopeter, W. C. (A)
Hughes, F. J. (A)
Jackson, T. L. (A)
Janes, W. M. (A)
Johnston, J. B., Jr. (A)
Keely, A. W. (A)
Kimball, L. R. (A)
Knecht, R. A. (A)
Kolen, N. (A)
Lally, P. M. (A)
Lautenberger, H. W. (A)
Lee, K. O. (A)
Marion, J. F. (M)
McCullough, J. H. (A)
McGowan, T. C. (A)
McPherson, D. L., III (A)
Michel, P. C. (SM)
Morgan, W. E., Jr. (A)
Neff, W. H. (A)
Olsen, L. V. (A)
Olson, C. W. (A)
Olthius, R. W. (A)
Papamarcos, G. (A)
Perkowski, T. F. (A)
Pike, D. (A)
Poulos, B. J. (A)
Rickett, R. J. (A)
Rigdon, C. A. (A)
Rudich, I. (A)
Sherman, E. H. (A)
Sherman, S. (A)
Sicuranza, C. A. (A)
Siegel, L. I. (A)
Swearingen, T. J. (M)
Tatz, A. (SM)
Taylor, D. M. (A)
Thompson, J. L. (A)
Tilly, V. F. (M)
Triantafellow, W. (A)
Vetter, W. F. (A)
Warner, E. R. R. (A)
Weiss, M. (A)
Wels, B. G. (A)
Woodcock, E. L. (A)

Lewiston
Buranich, G. F. (M)
Vincent, W. R. (A)

Liberty
Mauer, W. V. (A)

Lido Beach
Gutterman, A. Z. (A)

Lincolndale
Bruns, W. H. (M)

Lindenhurst
Church, T. A. (A)
Mayerhofer, S. R. (A)
Morgenstern, O. A. (A)
Rohner, G. J. (M)
Sixbey, S. R. (A)
Tate, H. J. (A)

Little Neck
Bailey, W. F. (SM)
Binns, J. R. (VA)
Browning, J. H. (A)
Burr, R. P. (A)
Cerino, R. (A)
Cosby, J. C. (M)
Dean, C. E. (SM)
Duffy, M. P. (A)
Dunning, O. M. (SM)
Eisaman, L. C. (A)
Forrest, J. C. (A)
Glaser, W. A. (A)
Hana, T. C. (VA)
Hirsch, C. J. (F)
Jasik, C. (A)
Kapp, C. E. (A)
Kunicky, B. F. (VA)
Lane, C. C. (A)
Lough, B. D. (M)
Loughren, A. V. (F)
Lowrence, R. E., Jr. (A)
MacDonald, W. A. (SM)
McIlwain, K. (F)
Mesa, J. O. (SM)
Nurmela, G. E. (A)
Okrent, J. (SM)
Page, C. E. (A)
Rado, J. A. (SM)
Sillman, D. (SM)
Tucker, S. A. (SM)
Webb, H. E. (A)
Weinberg, S. (SM)
Wilson, W. H. (M)
Young, V. J. (SM)
Zimmer, E. W. (A)

Liverpool
Applebaum, S. P. (A)
Baker, V. L., Jr. (A)
Brown, W. W. (SM)
Capri, M. F. (A)
Clark, M. E. (SM)
Eachus, E. D. (A)
Erickson, M. F. (A)
Fisk, R. E. (M)
Fowler, A. K. (A)
Fye, R. P. (A)
Goetter, W. F. (A)
Grimmett, C. A. (A)
Hafstrom, W. F. (M)
Hansen, R. J. (M)
Henry, G. V., Jr. (A)
Herzog, E. E. (A)
Hoeger, W. G. (A)
Junken, L. H. (VA)
Klous, G. A. (A)
Kovacs, F. M. (A)
Lawrence, B. J. (SM)
Lewis, R. V. (SM)
Miner, C. R. (M)
Neelands, L. J. (M)
Novak, W. D. (A)
Popejoy, I. J. (A)
Pritchard, H. T. (A)
Scripture, F. R. (A)
Sobiech, C. A. (A)
Swing, M. (M)
Walker, O. F. (SM)
Wayne, C. R. (M)
Williamson, J. C. (A)

Lockport
Bulmore, T. R. (A)
Rupp, R. B. (A)

Long Beach
Blaustein, S. E. (A)
Dembinski, L. J. (A)
Gurien, S. (A)
Meehan, J. D. (A)
Rubin, A. (A)
Wurman, G. (A)

Long Island City
Abrahams, S. (A)
Alterman, F. J. (M)
Amatneek, K. V. (A)
Bagno, S. M. (VA)
Bloch, D. C. (A)
Buda, P. V. (A)
Collins, W. G. (A)
Depiola, F. J. (A)
DeVaney, R. J. (A)
DeVincent, J. (A)
Dzilvelis, A. A. (A)
Fairman, H. E. (A)
Fletcher, R. (A)
Given, I. (M)
Goodman, H. (A)
Groder, M. L. (SM)
Herz, H. (A)
Hicks, W. M. (A)
Higby, R. L. (A)
Kellerman, D. (A)
Kessler, F. (A)
King, M. (A)
Kraus, C. J. (A)
Mecca, S. (A)
Michaels, P. A. (A)
Monturo, J. B. (A)
Pagano, C. N. (A)
Penabad, J. (A)
Poehler, H. (A)
Roeloffs, E. H. (A)
Rosin, A. (A)
Rubin, S. W. (M)
Sanchez, H. M. (A)
Sartorio, D. R. (A)
Shaler, D. (A)
Shanahan, W. J. (A)
Simkovich, J. R. (A)
Skaperdas, D. O. (A)
Snyder, S. J. (M)
Spera, R. L. (A)
Tai, J. H. Y. (A)
Tavetian, H. E. (A)
Vignali, J. J. (A)
Wald, D. (A)
Watson, R. R. (A)
Xikes, N. (A)
Zauderer, J. (A)

Loudonville
Rulison, J. P. (M)

Lowman
Knowles, D. D. (SM)

Lynbrook
Dixon, L. G. (M)
Dunn, J. F. (A)
Ebert, J. E. (A)
Fuchs, G. W. (A)
Koch, R. F. (M)
Magin, J. L. (A)
Richardson, K. (A)
Rossoff, A. L. (A)
Ruppel, A. E. (A)
Shmurak, B. (M)
Surette, W. E., Jr. (A)
Teommey, G. H., Jr. (SM)
Vandenburgh, A. A. (A)

Lyons
Eckert

Malba
Sorenson, S. E. (A)

Malverne
Deans, W. L. (A)
Gurevics, D. (A)
Hepburn, J. C. (A)
Naybor, E. V. (A)
Pollack, I. (M)
Rojas, F. R. (SM)
Sauer, H. E. (A)
Schneider, R. E. (VA)
Tanck, H. (VA)
Van Rosenbergh, W. (A)

Mamaroneck
Pasciuti, R. A. (A)
Romero, R. F. (A)
Stevens, A. M. (F)
Van Lieshout, L. J. A. (SM)
Vollenweider, A. D. (M)

Manhasset
Brown, H. A. (SM)
Friebele, E. J. (VA)
Grant, E. F. (SM)
Hamlett, R. T. (SM)
Hathaway, J. L. (SM)
Love, F. B. (A)
Nickel, F., Jr. (VA)
Srebroff, C. M. (SM)

Marathon
Wilson, R. M. (A)

Marcellus
Devine, G. F. (M)

Maspeth
Clinton, R. E. (A)
Hall, J. D. (A)
Jaworowski, B. R. (A)
Kabrisky, M. J. (A)
Kline, L. M., Jr. (A)
Richter, H. L. (A)
Treitel, W. S. (A)
Tullius, A. B. (M)

Massapequa
Ashus, A. (A)
Barzilai, G. (SM)
Baunach, E. L. (VA)
Coffman, B. C. (M)
Davidson, S. (A)
Elliott, J. O. (A)
Judin, H. (A)
Kaufman, K. (A)
Krueger, A. C. (M)
Martin, J. L. (A)
Mautner, R. S. (SM)
Read, L. P., Jr. (A)
Ross, K. J. (A)
Tahara, G. R. (A)
Thoman, R. E. (A)

Massapequa Park
Bergman, C. F. (A)

Massena
Bond, N. T. (A)

Mastic Beach
Fuelling, P. W. (A)

Merrick
D'Amico, S. P. (A)
Grossman, M. (A)
Groves, Q. D. (A)
Knight, P. (A)
Lindenfelser, W. A. (A)
McConaughy, R. L. (A)
Miller, R. H. (A)
Paul, I. (A)
Randall, G. A. (SM)
Reynolds, L. G. (A)
Sahm, E. J. (A)
Squitieri, A. (A)
Thienpont, M. C. (A)
Woodbury, C. P. (M)

Middle Village
Blum, M. P. (A)
Harrison, S. W. (M)
O'Neill, E. P. (A)
Powers, J. T. (M)
Reinhard, F. C. (A)
Shelford, L. L. (A)

Middletown
Fellenzer, A. D. (A)

Millbrook
Kerbin, J. F. (A)

Miller Place
Bartow, J. E. (A)

Milton
Scott, A. E. (A)

Mineola
Avery, R. E. (SM)
Berge, R. G. (M)
Bisby, J. F. (SM)
Bock, E. L. (SM)
Brockman, M. H. (M)
Brown, L. L. (A)
Close, R. N. (A)
Comstock, G. C. (SM)
Cooper, H. W., III (A)
Decker, S. M. (A)
Diell, F. J. (A)
Diller, D. S. (A)
Exley, L. (A)
Fromm, W. E. (SM)
Fubini, E. G. (SM)
Graber, L. J. (A)
Graef, R. L. (VA)
Greene, J. C. (A)
Guarrera, J. J. (A)
Harvey, G. L. (A)
Hendler, A. J. (A)
Hockenjos, R. M. (A)
Horn, A. M., Jr. (A)
Hronek, R. L. (A)
Ihrig, L. C. (M)
Jones, B. F., Jr. (VA)
Josias, C. S. (A)
Karpen, E. W. (A)
Kearney, J. W. (SM)
Kezer, C. F. (M)
Lebenbaum, M. T. (SM)
Lilly, J. L. (A)
Lloyd, J. W., Jr. (A)
Lombardi, M. W. (A)
Lory, J. (A)
Lowman, R. V. (M)
Lynch, W. A. (SM)
McGregor, J. C. (SM)
Mieher, W. W. (SM)
Miller, D. M. (SM)
Morton, G. W. (M)
Papas, J. (A)
Pasqua, L. (A)
Price, R. C. (A)
Pride, D. W. (A)
Rubenson, J. G. (SM)
Scordato, M. (A)
Skifter, H. R. (F)
Smyth, F. J. (A)
Sommers, C. E. (A)
Spencer, W. H. (A)
Stephenson, J. G. (SM)
Stewart, S. W. (M)
Strum, P. D. (A)
Tionaytis, C. J. (A)
Tolles, W. E. (M)
Torn, L. J. (M)
Wang, C. C. (SM)
White, W. D. (SM)
Woodward, J. E. (M)

Monroe
Sperr, A. E. (A)
Vollkommer, W. A. (VA)

Monsey
Gams, T. (A)

Monticello
Fleischer, A. P. (A)

Moravia
Ward, H. T. (A)

Mount Kisco
Doyle, R. J. (A)
Fredrick, A. H. (A)
Garretto, L. A., Jr. (A)
Halstead, W. S. (SM)
Sands, E. A. (A)
Taggart, C. E. (A)

Mount Vernon
Bloom, F. J. (A)
Brazee, G. (SM)
Brenner, B. (VA)
Buchbinder, M. M. (A)
Callahan, J. P. (A)
Campbell, C. H. (M)
Carlson, L. C. (A)
Davidson, R. (A)
Freedman, D. D. (A)
Gayet, P. J. (A)
Gurdus, H. W. (A)
Herz, H. L. (A)
Hineline, H. D. (A)
Hirsch, J. D. (A)
Jones, A. J. (A)
Jurafsky, A. J. (M)
Kaufman, A. L. (A)
Kinaman, E. W. (M)
Myers, G. H. (A)
Podell, S. (M)
Rosenbaum, A. H. (VA)
Rosenberg, P. (A)
Seer, H. G. (A)
Sonkin, D. (SM)
Spann, R. G. (A)
Stone, C. G., Jr. (A)
Wallace, M. (SM)
Winkelstein, R. A. (A)
Zang, T. (A)

Munsey Park
Heindel, H. J. (SM)

Nassau
Merchant, R. (A)
Smith, G. H. (A)

Neponsit
Goldfein, S. F. (A)
Sylvane, A. A. (SM)
Zinn, S. (A)

Newburgh
Digenova, F. (A)
Westenhaver, J. L. (A)
Youngblood, H. R. (M)

New City
Christen, A. L. (A)
Doellner, L. J. (A)

New Hartford
Bussey, H. C. (A)
Convertino, R. O. (A)
Edgett, R. S. (A)
Ricci, B. E. (A)

New Hyde Park
Anderson, D. B. (M)
Angevine, R. A. (A)
Ballin, H. M. (A)
Barbaccia, A. J. (A)
Benjaminson, A. (A)
Blackstone, H. (A)
Blankmeyer, W. A. (A)
Borgelt, W. E. (A)
Bozwick, G. E. (A)
Bruce, G. B. (VA)
Camp, S. N. (A)
Colbert, R. P. (A)
Contrastan, D. P. (A)
Deloi, D. J. (M)
Duffy, A. F. (A)
Eckenrode, R. L. (A)
Ellis, F. W. (A)
Feay, D. I. (A)
Friedman, I. (M)
Gilmartin, J. J., Jr. (M)
Haas, P. (VA)
Hickman, R. S. (A)
Hutchinson, T. C. (A)
Kaplan, M. (A)
Kirschner, A., Jr. (A)
Liebman, H. S. (A)
Loughlin, R. G. (A)
Martin, E. T. (SM)
Madrick, S. A. (A)
Meyer, W. E. (A)
Neidert, J. H. (A)
Nelson, R. P. (A)
Noyes, A. E. (A)
O'Brien, T. H. (A)
Odom, C. H. (A)
Orazio, A. F. (A)
Proskauer, R. (A)
Robbins, I. M. (A)
Schreitmueller, R. F. (A)
Seymour, J. W. (A)
Sherbin, L. E. (M)
Sherry, R. S. (A)
Smith, H. D. (A)
Szalach, P. E. (A)
Weaver, W. P. (A)
Weber, R. L. (A)
White, W. T. (SM)
Wimmer, A. A. (A)
Wittenberg, R. C. (A)
Yorinks, A. (SM)

New Paltz
Gay, T. W., Jr. (A)

New Rochelle
Anraud, R. J. (A)
Baker, L. S. (A)
Bennett, R. S. (SM)
Bollettieri, P. J. (A)
Bonner, W. A., Jr. (A)
Burnell, L. G. (SM)
Burnett, L. J., Jr. (A)
Carter, W. F. (A)
Fisher, S. G. (A)
Garrigan, T. E. (A)
Goodale, E. D. (SM)
Greibach, E. H. (SM)
Hemming, C. B. (A)
Herrmann, J. E. (A)
Krasner, H. J. (A)
Lahm, G. P. (A)
Moffatt, W. H. (SM)
Pels, E. (A)
Pray, G. E. (SM)
Reilly, W. J. (A)
Reiner, S. (A)
Rozzoni, A. C. (A)
Schwartz, H. E., Jr. (A)
Shelley, E. F. (SM)
Temple, I. (A)
White, F. E., Jr. (VA)
Williams, J. E. (A)

New York City
Abelow, I. L. (A)
Abercrombie, G. D. (A)
Aceves, J. G. (SM)
Adams, G. G. (A)
Adams, J. F., Jr. (A)
Adams, M. D. (SM)
Addamo, J. H. (A)
Adler, W. (M)
Aikens, A. J. (A)
Albert, D. (A)
Albert, S. L. (A)
Aldor, E. (A)
Alexander, L. (VA)
Allen, M. E. (A)
Alliot, E., Jr. (A)
Almquist, M. L. (A)
Altman, W. J. (A)
Altschul, E. R. (A)
Altschuler, H. M. (A)
Amy, E. V. (SM)
Anagnost, A. L. (A)
Anderson, A. G. (A)
Anderson, C. W. (A)
Andrasko, J. P. (VA)
Andrews, E. G. (A)
Ankenbrandt, F. L. (SM)
Antin, J. (A)
Antony, S. J. (A)
Appel, H. W. (SM)
Applequist, J. E. (A)
Arany, D. M. (SM)
Armstrong, E. H. (F)
Arnold, J. W. (SM)
Arnson, L. (SM)
Aronoff, M. (SM)
Asen, R. (A)
Babcock, S. M. (SM)
Bachman, G. F. (A)
Baer, R. H. (A)
Baer, T. M. (A)
Bailey, A. (F)
Bailey, A. B. (A)
Bailey, G. W. (SM)
Baker, G., Jr. (A)
Baker, G. H. (A)
Bales, N. M. (M)
Balfour, L. S. (A)
Baller, M. D. (M)
Baran, P. (A)
Barash, S. A. (A)
Barkely, W. J. (SM)
Barrett, A. E. (SM)
Barron, L. (A)
Barstow, J. M. (SM)
Barth, J. E. (A)
Bartlett, T. L. (M)
Barton, G. R. (A)
Baruch, S. N. (A)
Batcheller, A. (SM)
Baulch, E. L. (A)
Baum, M. C. (A)

Baumgardner, P. E. (A)
Beagan, W. J. (A)
Beck, L. (A)
Beckham, C. L. (A)
Beckhardt, T. (M)
Beers, Y. (M)
Bein, W. (A)
Belfi, J. L. (A)
Bell, W. L. (A)
Beller, W. C. (A)
Bemis, E. W. (M)
Bemis, P. S. (A)
Bendazzi, A. (A)
Benedikt, J. (A)
Benham, M. J. (A)
Benjamin, S. K. (A)
Bennett, H. W. (M)
Bereza, A. (A)
Berger, L. (A)
Berger, L. J. (A)
Bergherr, W. (A)
Bergman, S. (A)
Berkely, E. C. (A)
Berkner, L. V. (F)
Berl, S. (A)
Berman, R. (A)
Bernard, P. (A)
Bernstein, R. (A)
Berthold, R. V. (A)
Besner, A. (M)
Beverage, H. H. (F)
Bhatta, E. K. (A)
Bibbero, R. J. (SM)
Bickel, H. J. (A)
Billet, F. G. (A)
Birenbaum, L. (A)
Black, E., Jr. (SM)
Blackman, R. B. (A)
Bland, G. F. (A)
Blicher, A. (A)
Blickstein, M. J. (A)
Blitzer, R. (M)
Blodgett, D. F., Jr. (A)
Blomquist, E. A. (A)
Blount, R. H. (M)
Blumenberg, A. (A)
Blye, P. W. (SM)
Boatwright, L. T., Jr. (A)
Bocharoff, G. M. (VA)
Bodeen, G. S. (A)
Bodle, D. W. (M)
Boguslawski, H. A. (SM)
Bolsey, E. J. (A)
Bolton, A. (A)
Bomberger, D. C. (VA)
Bonner, M. K. (A)
Borders, C. R. (A)
Borner, R. C. (A)
Boronow, E. L. (A)
Bose, J. H. (VA)
Bostwick, L. G. (VA)
Botts, V. R., Jr. (A)
Boughtwood, J. E. (M)
Bouie, W. (M)
Bowie, R. M. (F)
Bowler, J. A. (A)
Boyd, R. C. (A)
Bradley, F. R., Jr. (M)
Bradley, L. W. (A)
Bramhall, G. B. (SM)
Braunfeld, M. T. (M)
Braverman, M. (A)
Brenneman, D. (M)
Bresler, A. D. (A)
Bressler, J. J. (A)
Bright, R., Jr. (M)
Brillouin, L. N. (F)
Bristol, R. W. (A)
Brociner, V. (M)
Broder, A. (A)
Bromberg, J. J. (A)
Brown, C. J. (A)
Brown, D. S. (VA)
Brown, F. L. (A)
Brown, G. M. (SM)
Brown, J. T. L. (VA)
Brown, R. I. (A)
Brown, R. L. (A)
Brown, T. E. (A)
Brown, W. J. (SM)
Brownell, H. R. (A)
Brownman, H. L. (A)
Brunet, M. (SM)
Buckles, R. A., Jr. (M)
Buhl, W. T. (VA)
Bullington, K. (SM)
Burger, E. (A)
Burghard, G. E. (SM)
Burke, A. L. (SM)
Burlingame, B. O. (SM)
Buttner, H. H. (F)
Cadek, J. (A)
Cahn, C. E. (A)
Calderaro, A. A. (A)
Caldwell, C. M. (SM)
Caldwell, O. H. (F)
Callahan, J. L. (SM)
Cambridge, C. G. (SM)
Cammarata, J. (A)
Campbell, E. A. (A)
Campbell, R. D. (F)
Canavan, T. P. (A)
Carduner, W. (VA)
Carlebach, W. M. (VA)
Carlson, E. S. (A)
Caro, L. G. (A)
Carpenter, R. E. (A)
Carreau, G. (A)
Carter, E. F. (F)
Cassell, J. L. (VA)
Cassidy, J. J. (A)
Castor, R. W. (A)
Castown, R. W. (A)
Cedarholm, J. P. (A)
Cervantes, H. T., Jr. (A)
Chaffee, J. G. (SM)
Chamberlain, A. B. (F)
Chamberlain, L. J. (A)
Chapel, I. J. (M)
Chapman, A. K. (M)
Chen, T. S. (A)
Chin, P. H. (A)
Chinn, H. A. (F)
Chirlian, P. M. (A)
Chislow, J. H. (A)
Chu, H. (A)
Cinelli, H. L. (A)
Cipperly, W. L. (A)
Clark, A. B. (SM)
Clemens, G. J. (A)
Clinton, P. J. (M)
Clutts, C. E. (A)
Coe, R. L. (SM)
Coggeshall, I. S. (F)
Cohen, A. J. (A)
Cohen, B. C. (A)
Cohen, B. G. (A)
Cohen, E. (A)
Cohen, J. (A)
Cohen, M. M. (A)
Cohn, E. (A)
Cohn, E. M. (A)
Cohn, H. (SM)
Cohn, I. H. (A)
Coles, F. A. (SM)
Colton, R. B. (SM)
Comitz, P. (A)
Connelly, J. J. (A)
Connor, G. C. (VA)
Coogan, E. A. (A)
Cooley, A. G. (M)
Cooper, F. S. (A)
Corbin, J. E. (A)
Corr, J. J. (A)
Correa, H. A. (A)
Corson, B. R. (A)
Corwith, H. P. (F)
Costello, A. W. (A)
Cowan, F. A. (SM)
Cowan, S. R. (A)
Coxhead, H. B. (SM)
Crane, P. H. (A)
Crane, R. (M)
Cravis, H. (A)
Crews, F. H. (VA)
Crimmins, T. J. (A)
Cumming, L. J. (SM)
Curtis, R. E. (A)
Custer, C. J. (VA)
Cutler, S. N. (A)
Cutting, F. (F)
Dahlbom, C. A. (M)
Davey, J. R. (A)
Davidson, W. F. (SM)
Davies, R. H. (SM)
Davis, R. F. (A)
DeCubas, J. D. (A)
DeDufour, W. F. (A)
Deerhake, W. J. (A)
De La Parra, A. F. (A)
Deloraine, E. M. (F)
Denny, C. R. (A)
Deschamps, G. A. (SM)
Desnoes, A. B. (A)
Deutsch, E. M. (A)
Dewey, G. C. (A)
Diamond, E. H. (A)
Diaz, L. V. (A)
Dibrell, J. W. (M)
Dickieson, A. C. (SM)
Dickson, J. F. (M)
Dietrich, F. (VA)
DiGiacomo, N. (A)
Dilson, J. (A)
Dominguez, M. J. (A)
Dominick, J. (M)
Donald, D. D. (SM)
Doniger, J. (A)
Donovan, W. E. (SM)
Dorf, R. H. (A)
Dorman, N. G. (A)
Douglas, D. A. (A)
Doyle, W. T. (A)
Drake, J. B., IV (A)
Dressel, H. O. (M)
Drucker, D. A. (A)
Dubbs, B. (M)
Dubilier, W. (F)
Dugan, J. F. (A)
Duggan, R. S., Jr. (A)
Dunlap, K. S. (A)
Dunn, E. J., Jr. (A)
Dunne, H. P. (A)
Durkee, A. L. (VA)
Duskis, E. F. (A)
Dutterea, W. S. (SM)
DuVall, W. E. (A)
Dwork, B. M. (A)
Eason, L. (A)
Eaton, W. W. (SM)
Echtman, L. (A)
Edmonds, R. H. (M)
Edrich, J. G. (A)
Egert, S. S. (A)
Eggart, G. J., Jr. (A)
Ehrlich, C. N. (VA)
Elliott, S. J. (VA)
Elmore, W. B. (A)
Elsea, I. W. (M)
Engle, A. (A)
Engle, V. M. (M)
Engstrom, O. D. (SM)
Eoyang, T. T. (SM)
Epstein, R. R. (A)
Ernst, R. F. (A)
Eslinger, L. H. (A)
Espenschied, L. (F)
Esternaux, F. L. (A)
Ettlinger, A. B. (A)
Facey, J. W. (VA)
Faige, M. D. (SM)
Fairchild, S. M. (A)
Farkas, F. S. (SM)
Farley, J. (A)
Farrand, C. L. (F)
Farrelly, E. K. (A)
Feeney, J. M. (A)
Feher, E. (A)
Feintuch, H. (A)
Feldman, S. (A)
Feldt, R. (M)
Feng, S. C. (A)
Ferber, D. (A)
Ferrell, O. P. (A)
Finch, J. L. (SM)
Fingerhood, S. A. (A)
Finkelstein, M. J. (A)
Fiorletta, A. A. (A)
Fish, P. (SM)
Fishberg, S. (VA)
Fisher, A. (A)
Fitch, W. A. (SM)
Fitzgerald, E. T. (A)
Fleming, C. C. (M)
Florant, L. E. (A)
Fogel, M. H. (A)
Forman, A. J. (A)
Forman, I. (A)
Forman, I. (A)
Fowler, J. A., III (A)
Franchina, M. A. (A)
Francis, C. A. (M)
Franke, H. C. (A)
Franklin, G. F. (A)
Franklin, L. F. (A)
Franklin, L. W. (SM)
Freed, A. (A)
Freed, L. (A)
Freed, R. D. (A)
Freiman, M. J. (A)
Freud, E. L. (A)
Freudenberg, B. (SM)
Frey, A. F. (A)
Frezzolini, D. (VA)
Friedman, H. J. (A)
Frishauf, S. H. (M)
Fritsche, A. J. (A)
Fu, C. (A)
Fuchs, A. M. (A)
Gallard, R. L. (A)
Gallaher, A. (A)
Galluppi, F. B. (A)
Gancher, L. (A)
Gannett, D. K. (SM)
Garrison, C. P., Jr. (A)
Gellen, A. J. (A)
Gellman, E. S. (A)
Gerard, D. R. (A)
Gerb, B. (A)
Gersch, W. M. (A)
Gerstein, M. G. (A)
Gibbons, J. (A)
Giese, R. C. (SM)
Giguere, E. F. (SM)
Gilbert, J. J. (SM)
Gill, C. C. (A)
Gill, G. H. (A)
Gillette, E. H. (A)
Gilman, G. W. (F)
Ginsberg, A. J. (A)
Ginsberg, M. B. (A)
Girdwood, J. (A)
Glass, M. S. (VA)
Glazer, B. G. (A)
Glick, H. (A)
Glickstein, J. (A)
Godofsky, M. (A)
Gold, J. I. (A)
Goldberg, H. (A)
Goldberg, H. D. (A)
Goldberg, M. I. (A)
Goldberg, W. P. (M)
Golden, D. (A)
Goldman, S. (A)
Goldmark, P. C. (F)
Goldmuntz, L. A. (A)
Goldschmidt, K. (A)
Goldsmith, A. S. (A)
Goldsmith, A. N. (F)
Goodfriend, L. S. (A)
Goodstein, L. P. (A)
Gordon, L. (A)
Gordon, S. (A)
Gottlieb, G. L. (A)
Gottlieb, H. B. (A)
Goyder, C. W. (SM)
Grabois, B. (A)
Grace, F. C. (M)
Graham, C. H. (A)
Graham, H. D. (A)
Graham, M. P. (A)
Grandizio, L. A. (A)
Greene, R. J. (A)
Greenquist, R. E. (A)
Greenstein, P. (VA)
Greenwald, M. S. (A)
Greer, L. H. (A)
Greig, J. H. (A)
Grigoraki, N. M. (A)
Grob, B. (M)
Grogsinsky, H. L. (A)
Gross, R. D. (A)
Grosselfinger, W. H. (SM)
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Grover, H. G. (SM)
Gruber, A. E. (A)
Grundfest, H. (SM)
Grundy, A. B., Jr. (A)
Grybowski, T. M. (A)
Guild, B. (SM)
Gunn, D. W. (M)
Gunzenhauser, A. (A)
Gurian, S. D. (M)
Guterman, H. C. (SM)
Hackenberg, J. H. (M)
Haertig, M. M. (A)
Hafenmaier, H. F. (A)
Hafner, C. G. (A)
Halabi, T. (A)
Hallworth, F. D. (A)
Halsall, M. (A)
Handelman, R. B. (A)
Hanson, O. B. (F)
Hara, B. (VA)
Hardwick, A. H. (SM)
Harris, C. M. (SM)
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Haussig, L. (A)
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Hayes, A. E., Jr. (M)
Hayes, K. V. (A)
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Hecht, G. (SM)
Heidbreder, G. R. (A)
Helt, S. (M)
Henney, K. (F)
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Hester, F. A. (SM)
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Hogan, J. V. L. (F)
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Holt, D. G. (A)
Honaman, R. K. (SM)
Hooper, W. D. (A)
Horan, J. J. (A)
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Hovgaard, O. M. (SM)
Howard, M. S. (M)
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Howell, W. J. (SM)
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Hunter, G. T. (M)
Huntley, H. R. (SM)
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Huston, Q. E. (A)
Huth, A. G. (M)
Hyneman, J. R. (SM)
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Ingram, S. B. (SM)
Ingles, H. C. (SM)
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Israel, D. D. (F)
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Jutson, R. P. (SM)
Juviler, P. H. (A)
Kahn, A. (SM)
Kahn, I. (A)
Kalisky, A. (A)
Kallmann, H. E. (SM)
Kamen, I. (SM)
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Kaplan, M. (A)
Karda, W. O. (M)
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Kay, J. S. (A)
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Keller, A. C. (SM)
Kelly, M. J. (F)
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Kent, G. J. (SM)
Kerman, M. (A)
Kerwin, P. S. (A)
Kievit, B. (SM)
Kilian, L. H. (A)
Killgore, H. S. (M)
Kimons, E. (A)
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Kiriloff, A. (M)
Kishi, H. J. (A)
Klass, P. J. (A)
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Koehler, A. O. (A)
Kofler, E. J. (A)
Kohn, D. (A)
Kopecky, G. F. (M)
Korn, S. J. (A)
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Krasnick, S. (A)
Krause, A. M. (A)
Krescholleck, F. W. (A)
Kronengold, M. (A)
Kunc, F. (M)
Kundler, H. H. (A)
Kunik, I. J. (A)
Kurrelmeyer, B. (SM)
Kurzrok, R. M. (A)
Kyslea, S. L. (A)
Laas, I. E. (A)
Labin, E. (SM)
Lack, F. R. (F)
Laighton, A. K. (A)
Lakshmanan, T. K. (M)
Landauer, W. E. (A)
Landis, M. (M)
Lavalle, M. L. (A)
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Lee, C. V. (A)
Leed, D. (SM)
Legebvre, R. E. (A)
Leibman, M. H. (A)
Lentz, J. J. (A)
Leopold, G. R. (A)
Lerman, H. (A)
Levens, L. M. (SM)
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Levin, R. (A)
Levine, D. J. (M)
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Levit, M. (A)
LeVon, M. (A)
Levy, M. G. (A)
Lieberman, E. (A)
Lienhard, J. W. (M)
Limansky, I. (A)
Lin, H. C. (A)
Lincoff, W. (A)
Lincoln, J. K. (A)
Lindsay, M. H. A. (SM)
Link, R. E. (A)

Littner, G. H. (A)
Llewellyn, F. B. (F)
Lockwood, L. W. (A)
Loesing, J. B., Jr. (A)
Long, M. B. (VA)
Loomis, A. L. (F)
Lowenstein, M. (A)
Loynes, O. H. (VA)
Lukashewitz, P. (A)
Lunchick, A. (A)
Luntz, J. D. (A)
Luskin, B. (A)
Luth, P. A., Jr. (M)
Lynch, J. A. (A)
Lynch, W. J. (A)
Mabry, J. H. (A)
MacMullen, A., Jr. (A)
Magid, A. (M)
Mahler, R. J. (A)
Maloney, T. C. (A)
Mangold, E. J. (A)
Mapes, C. M. (SM)
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Marcinkowski, C. J. (A)
Marcus, P. (A)
Margolis, A. B. (A)
Marin, F. L. (A)
Mark, R. D. (A)
Markel, A. (A)
Marolda, J. (A)
Martin, A. E. (SM)
Martin, A. J. (A)
Martin, H. B. (SM)
Martin, R. D. (M)
Marx, E. A. (A)
Marx, F. L. (SM)
Maser, H. (SM)
Mason, W. P. (F)
Massy, F. M. (A)
Matsuoka, M. E. (A)
Mattison, G. H. (A)
McCann, M. J. (A)
McCann, T. A. (A)
McCluskey, V. (M)
McCutchen, B. S. (F)
McDonald, J. F. (A)
McDonough, V. T. (A)
McGlashan, K. W. (A)
McGuire, T. S. (A)
McHugh, E. L. (A)
McKee, L. H. (M)
McKirdy, R. W. (M)
McManus, T. J. (A)
McPartland, T. J. (A)
McPherson, J. C. (SM)
McPherson, L. G. (A)
McRae, J. W. (F)
McSweeny, R. (SM)
McWhan, B. (A)
Mealy, G. H. (A)
Mehring, A. C. (A)
Mennitt, L. C. (A)
Merl, K. C. (A)
Merrill, B. (A)
Mertz, P. (F)
Meslener, G. J. (A)
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Meyers, M. (A)
Meyerson, A. H. (M)
Miccioli, A. A. (A)
Miccioli, A. R. (A)
Michael, H. (M)
Michaels, H. M. (A)
Mieville, L. C. V. (M)
Millar, J. Z. (SM)
Miller, H. G. (M)
Miller, K. S. (M)
Miraglia, J. M. (A)
Misenheimer, H. N. (SM)
Mitchell, D. (SM)
Mitchell, I. A. (VA)
Mitchell, T. H. (SM)
Monk, N. (SM)
Mony, A. J. (A)
Moore, C. E. (M)
Moore, T. E. (A)
Moran, T. G. (A)
Morillo, M. A. (A)
Morse, M. (A)
Moses, K. (A)
Moylan, J. D. (A)
Muller, J. H. (SM)
Murbach, J. F. (A)
Murino, C. C. (A)
Murphy, J. J. (A)
Murphy, O. J. (SM)
Murphy, R. P. (A)
Murray, H. J., Jr. (A)
Nagel, C. E., Jr. (A)
Naidamast, D. (A)
Nans, E. A., Jr. (A)
Nash, A. (A)
Nashman, A. E. (A)
Nathan, A. M. (A)
Naumann, E. A. (A)
Nedell, E. (A)
Neuwirth, P. (A)
Nevitt, H. J. B. (SM)
Newman, L. (A)
Nicholides, E. C. (A)
Niebuhr, J. E. (A)
Nielsen, H. V. (VA)
Niemann, L. H. (A)
Nisteruk, C. J. (A)
Nordin, N. E. (A)
Norton, H. N. (M)
Novik, W. (A)
Nowogrodzki, M. (A)
Nyquist, H. (F)
O'Brien, R. S. (M)
O'Connor, J. J. (A)
Oettinger, A. G. (A)
O'Hea, J. T. (A)
Oliver, G. A. (A)
Oliver, O., Jr. (A)
Olson, D. R. (A)
Onder, K. (SM)
O'Neill, L. H. (A)
Oppenheimer, F. W. (A)
Ortiz, E. (A)
Ostheimer, F. R. (A)
Ostrolenk, S. (VA)
Owen, C. H. (VA)
Owyang, G. H. (A)
Ozolins, L. (M)
Paddock, D. (A)
Palmer, J. H. (A)
Palumbo, F. A. (A)
Pannill, C. J. (F)
Panzen, W. (A)
Pardes, H. I. (A)
Parisier, M. (A)
Parker, J. D. (SM)
Parrott, J. H., Jr. (A)
Paskin, M. (A)
Pataki, E. (A)
Paul, F. H. (A)
Paul, G. S. (VA)
Paulisen, H. (M)
Pearson, H. (A)
Peborde, R. J. (A)
Pegler, H. M. (A)
Pegler, J. A. (A)
Pegram, G. B. (VA)
Peifer, W. A. (A)
Pellegrinelli, G. L. (A)
Pelton, E. G. (M)
Pelzman, L. (A)
Perkins, E. H.
Perlman, R. R. (A)
Pernick, H. L. (A)
Peskin, E. (SM)
Peterson, E. (SM)
Peterson, R. A. (A)
Petranek, L. (A)
Petrasek, A. C. (SM)
Petrides, T. (A)
Pfleger, K. W. (SM)
Phanos, S. (A)
Phelps, R., Jr. (A)
Phinney, E. D. (SM)
Pippenger, C. R. (M)
Pitlik, H. (A)
Pitman, D. A. (M)
Pizzuti, F. D. (M)
Platt, S. (A)
Platzman, M. M. (M)
Polak, R. (A)
Polin, H. S. (A)
Ponsolle, W. J. (VA)
Porter, F. A. (A)
Post, F. L. (A)
Post, R. D. (A)
Postove, H. (A)
Pranitch, J. (A)
Predmore, E. E. (A)
Press, A. (A)
Prisament, N. T. (A)
Puckett, T. H. (A)
Purgett, L. J. (SM)
Quanrud, O. G. (M)
Quinn, J. R. (M)
Quirk, W. B. (M)
Rabinovici, B. (A)
Racker, J. (A)
Ragazzini, J. R. (SM)
Raju, T. V. B. (M)
Rankin, R. L. (SM)
Ransom, G. B. (M)
Rarity, J., Jr. (A)
Razdow, A. (M)
Rea, W. T. (SM)
Read, O. (A)
Reade, R. B. (A)
Reed, J. (SM)
Reeves, J. J. (M)
Reich, S. M. (A)
Reicher, M. D. (A)
Reiner, M. (M)
Reiss, L. (A)
Rella, J. D. (A)
Relson, M. (M)
Rembert, R. P. (A)
Renne, H. S. (SM)
Reynolds, G. (A)
Rhodes, B. S. (A)
Rice, S. O. (SM)
Richard, S. J. (M)
Richman, P. L. (A)
Rider, J. F. (VA)
Ridings, G. H. (M)
Rips, E. M. (A)
Rivera, E. R. (A)
Robbins, D. (A)
Robertson, C. B. (M)
Robey, M. J. (A)
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Robinson, H. A. (SM)
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Rogan, J. J. (SM)
Rojas, R. R. (A)
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Romnes, H. I. (SM)
Rose, A. F. (SM)
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Rosenthal, C. W. (A)
Ross, G. G. (M)
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Rothschild, R. F. (M)
Rothschild, R. S. (A)
Rowe, R. G. (SM)
Rowley, E. G. H. (A)
Rubenstein, A. L. (A)
Rubenstein, C. F. (A)
Ruddley, J. (A)
Rumpel, C. H. (A)
Rusinow, K. (A)
Russell, J. B., Jr. (SM)
Ruttenberg, S. (A)
Sadenwater, P. O. (A)
Safir, R. (A)
Sail, A. H. (A)
Salzer, R. I. (A)
Samoluk, P. (A)
Sanders, R. G. (A)
Sanford, V. M. (A)
Santer, M. (A)
Saporta, L. J. (A)
Sarasohn, H. M. (M)
Sarnoff, D. (F)
Saron, R. (A)
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Sears, J. F. (SM)
Seay, P. A. (A)
Seckler, H. N. (A)
Seeley, E. S. (SM)
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Shreve, T. S. (M)
Shute, E. R. (SM)
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Skroblach, A. (A)
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Sonkin, S. (M)
Sonnenschein, A. H. (A)
Southall, T. W. (M)
Spain, A. I. (A)
Spangenberg, L. F. (M)
Speed, R. B. (VA)
Spence, P. W. (M)
Spett, H. (A)
Spiecens, C. P. (A)
Spitalny, M. (M)
Sponable, E. I. (SM)
Sporn, S. R. (A)
Sprung, J. (A)
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Stansfield, J. Q. (A)
Statsinger, J. (A)
Steen, J. R. (F)
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Strack, W., Jr. (A)
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Strieby, M. E. (SM)
Sutter, A. W. (A)
Swanson, J. W. (SM)
Symons, W. E. (M)
Szabo, W. (A)
Szego, J. L. (A)
Szucs, A. S. (A)
Taffet, M. S. (A)
Taffet, W. (A)
Taishoff, J. (M)
Talley, T. J. (M)
Tatum, F. W. (SM)
Taylor, C. C. (M)
Taylor, C. H. (F)
Taylor, W. E. (A)
Taylor, W. H., Jr. (SM)
Tenenbaum, E. (A)
Thatcher, T. W., Jr. (A)
Thayer, G. N. (F)
Thieblemont, A. H. (VA)
Thompson, R. G. (SM)
Tierney, W. L. (SM)
Tiger, H. S. (A)
Tiryakian, A. (A)
Tobin, M. W. (A)
Torgow, E. N. (A)
Toulon, P. M. G. (SM)
Traver, H. A. (M)
Trevor, J. B., Jr. (M)
Trucksess, D. E. (SM)
Tucker, A. G. (A)
Tucker, R. S. (SM)
Tuckerman, L. S. (A)
Tudor, J. E. (A)
Turner, E. (A)
Tuttle, C. W. (A)
Twersky, V. (A)
Tykulsky, A. (A)
Ullman, H. A. (A)
Ulrich, W. (A)
Underwood, J. F. (M)
Unger, W. H. (M)
Uttendorfer, E. A. (M)
Vallelunga, J. (A)
VanDerVeen, H. (VA)
Wambeck, S. H. (SM)
Wehling, R. H. (VA)
Velonis, C. (A)
Vlebranz, A. C. (A)
Vogel, H. O. (A)
Vroom, E. (SM)
Wager, G. C. (A)
Walker, R. M. (SM)
Walsh, A. L. (A)
Walsh, J. B. (A)
Walsh, J. V. (A)
Wankel, F. A. (SM)
Warshaw, C. H. (A)
Watson, B. (A)
Weaver, A. (A)
Weber, H. J. (A)
Weber, L. A. (A)
Wechsler, M. S. (A)
Weil, R. T., Jr. (SM)
Weinberger, E. F. (A)
Weinberger, J. (F)
Weindling, F. (A)
Weinman, M. (A)
Weinroth, S. A. (A)
Weinshenker, T. J. (A)
Weisfeld, B. R. (A)
Weisman, I. (A)
Weiss, G. D. (A)
Weissman, E. (A)
Wendell, E. N. (F)
Wernick, J. I. (A)
Wernlein, C. E., Jr. (A)
Wertz, H. S. (SM)
Westheimer, M. (A)
Weyer, E. R. (A)
Whalen, B. F. (A)
White, M. F. (M)
White, S. D. (M)
Whitmore, R. C. (A)
Wiberg, H. J. (A)
Wichmann, T. F. (A)
Wichtendahl, W. J. (A)
Wiesendanger, M. U. (A)
Willis, F. H. (VA)
Willner, P. (A)
Willson, F. E. (A)
Wilson, I. G. (SM)
Wilson, R. S. (A)
Winkler, A. (A)
Winner, L. (M)
Winter, H. (SM)
Winters, A. (A)
Wise, R. J. (SM)
Wise, W. H. (SM)
Wohl, C. J. (A)
Wojciechowski, B. (SM)
Wolf, H. (SM)
Wolf, I. (A)
Wolf, S. K. (SM)
Wolff, F. M. (A)
Wolfthal, D. A. (A)
Wolters, J. T. (A)
Wong, N. F. (A)
Wood, J., Jr. (M)
Woodworth, F. B. (SM)
Worthen, G. B. (A)
Wouk, V. (M)
Wright, J. W. (SM)
Wunderlich, N. E. (M)
Yamasaki, A. A. (M)
Yarbrough, K. A. (A)
Yieh, T. (M)
Yokelson, B. J. (A)

Niagara Falls
Alaimo, J. J. (A)
Albin, J. F. (A)
Davis, H. M. (A)
Gleason, M. H. (A)
Lee, L. H. (A)
Leming, J. G. (A)
Lidbury, F. A. (SM)
Morrison, H. V. (A)
Potter, C. E. (A)
Sheehan, J. F. (A)
Shulman, H. (A)
Schwartz, B. (A)

North Baldwin
Alberts, H. C. (A)
Kappelmann, G. E. (A)

North Bellmore
Dolin, R. (M)
Dvorak, C. J. (M)
Giulianelli, R. M. (A)
Lipkin, W. (A)
Moffat, D. (A)
Wheeler, R. B. (A)

North Merrick
Greenstein, E. (A)
Leggio, J. (SM)
Schoenfuss, A. F. (A)
Schwenker, R. B. (M)
Thogersen, G. O. (A)
Tolsch, I. H. (A)

North Pelham
Isole, J. J., Jr. (A)

Northport
DeWitt, D. (SM)
Lockwood, M. D. (M)
Watson, R. F. (M)

North Rockville Center
Melman, I. J. (SM)

North Syracuse
Apple, L. S. (M)
Bassett, L. A. (A)
Beckwith, R. W. (M)
Bergman, C. E. (A)
Blackstock, R. S. (A)
Brown, S. R. (A)
Cadwell, E. B., Jr. (A)
Carson, R. E. (SM)
Chynoweth, W. R. (A)
Colley, L. E. (A)
Corbell, I. T., Jr. (A)
Coullard, J. B. (SM)
Craig, E. L. (A)
Deitzler, R. P. (A)
Ehrhart, E. H. (A)
Elkins, R. A. (A)
Ellis, C. L. (A)
Evans, W. E. (M)
Felice, J. J. (A)
Fiet, J. H., III (A)
Garrett, D. E. (A)
Ginder, M. E. (A)
Greenwood, P. E., Jr. (A)
Grimm, H. H. (M)
Howell, E. K. (M)
Hunstad, C. E. (A)
Johnson, W. G., Jr. (A)
Kuhn, D. H. (M)
Muldoon, W. J. (A)
Muschamp, R. A. (M)
Nease, J. (A)
Plavcan, C. T. (A)
Records, J. K. (A)
Revercomb, H. E. (M)
Roberts, E. G., Jr. (M)
Roth, E. L. (A)
Rudolph, R. H. (M)
Shumway, N. R. (A)
Smee, P. G. (SM)
Smith, J. S. (A)
Smith, P. J. (M)
Spencer, G. W. (A)
Stoken, C. L. (A)
Tidwell, B. B. (A)
Torsch, C. E. (SM)
Venema, H. J. (A)
Wintle, H. C. (M)
Wood, R. F. (A)

North Tarrytown
Akin, R. M. (VA)
Palmquist, C. A. (A)
Vavra, J. M. (A)

North Tonawanda
Bryzinski, T. F. (A)
Janowsky, R. H. (A)
Johnston, G. D. (A)
Schmidt, F. M. (VA)
Taber, R. F. (A)

North Valley Stream
Sodaro, J. A. (A)
Vogel, E. (A)

Norwich
Hamilton, O. M. (A)
Knudson, L. I. (M)

Oakland Gardens
Clavier, P. A. (M)

Oakdale
Van Weele, J. C. (M)

Oceanside
Schrader, W. A. (M)
Silken, H. (A)
Symanovich, T. (A)
Urbanik, J. G. (A)

Old Westbury
Curtis, R. C. (VA)

Olean
Chipchak, J. S. (A)

Orchard Park
Ball, M. T. (A)

Oriskany
Richter, H. (A)

Ossining
Stavis, G. (M)
Washburn, W. K. (A)
Webb, J. C. (A)

Oswego
Knox, L. A. (M)

Oyster Bay
Dyer, J. N. (F)
George, H. A. (A)
Hollingsworth, R. L. (M)

Ozone Park
Martinson, C. D. (A)
Mellard, J. (A)
Saltsburg, S. S. (A)
Simon, L. (A)

Painted Post
Dawson, A. W. (A)

Patchogue
Kleinberger, R. (A)
Wise, A. (A)

Pattersonville
Oakes, W. S. (A)

Pearl River
Porter, H. A. (A)

Peekskill
Fezer, H. (M)
Heath, H. F., Jr. (A)
Lewis, E. J. (A)
Milinowski, A. S. (VA)
Stein, V. J. (A)
Todd, S. E. (A)
Walder, B. (A)
West, R. L. (A)

Pelham
Chenery, P. J. (M)
Kruse, L. C. (A)
Noneman, F. A. (A)
Skinner, F. J. (SM)

Pelham Manor
Kalt, C. G. (A)

Penfield
Atwood, B. E. (SM)
Heit, J. C. (A)
Huie, J. A. (A)
Tennant, M. J. (A)

Pennellville
Smoll, A. E. (M)

Phoenix
Griffith, W. A. (A)

Pittsford
Ozone, K. (A)

Plainview
Lanning, W. C. (M)
Lawson, H. W., Jr. (A)
Segall, J. (A)

Plandome
Blackwell, O. B. (F)
Brunn, R. D. (VA)
Striker, R. G. (A)

Pleasant Valley
Anderson, R. L. (A)

Pleasantville
Berger, F. B. (SM)
Dewhirst, T. P. (VA)
Dieter, N. H., Jr. (A)
Eisele, W. A. (A)
Gamertsfelder, G. R. (SM)
Garman, R. L. (SM)
Gillette, F. N. (A)
Greenwood, I. A., Jr. (M)
Hannahs, W. H. (M)
Hilliard, W. P. (VA)
King, G. W. (A)
Lee, R. W. (SM)
LeVay, T. C. (M)
McKendry, J. K. (A)
Melliger, A. W. (M)
Miller, A. G. (A)
Parr, A. F. W. (A)
Pourciau, L. L. (A)
Reed, H. J., Jr. (SM)
Smith, L. A. (A)
Tull, W. J. (M)
Ward, J. C. (A)
Wood, A. G. (A)

Port Chester
Barker, D. R. (M)
Houck, G. B., Jr. (A)
Hutchinson, R. B. (M)

Port Crane
Slater, C. F. (A)

Port Jefferson
Burditt, W. F. (A)
Carter, P. S. (F)
Dow, O. E. (VA)
Hansell, C. W. (F)
Munzer, L. F. (M)
Usselman, G. L. (VA)

Port Washington
Aitken, R. K. (A)
Anderson, E. I. (SM)
Andrews, B. H. (M)
Baston, W. M. (M)
Craig, D. R., Jr. (A)
Cronauer, E. A. (A)
Doersam, C. H., Jr. (SM)
Durkee, C. H. (M)
Edgerly, J. J. (A)
Flynn, J. M. (A)
Halenbeck, A. D. (A)
King, R. W., Jr. (A)
Knights, C. F. (A)
Little, D. S. (SM)
Marsh, K. W. (SM)
McBrian, J. E. (A)
Murdoch, A., Jr. (SM)
Pacent, H. C. (A)
Robberson, E. L. (A)
Sioles, G. W. (M)
Sparacino, R. R. (A)
Tawney, G. L. (SM)
Veronda, C. M. (SM)
Volpe, I. D. (M)
Westlake, N. L., Jr. (A)
Witten, A. L. (M)

Potsdam
Merrill, L. L. (SM)
Record, F. A. (A)
Salerno, J. (A)
Trinkle, F. J. (A)
Uskavitch, C. W. (A)

Poughkeepsie
Abell, G. R., Jr. (A)
Abruzzo, J. (M)
Albanes, N. J. (A)
Amdahl, G. M. (A)
Anahan, M. M. (M)
Bartelt, J. E. (A)
Bashe, C. J. (A)
Bauer, E. W. (A)
Beattie, H. S. (A)
Beesley, J. P. (A)
Berger, A. W. (A)
Beverly, N. E. (A)
Blakely, R. T. (SM)
Blessing, R. R. (A)
Blust, C. D. (A)
Braude, E. J. (A)
Breiding, E. J. (A)
Brennemann, A., Jr. (A)
Bruce, G. D. (A)
Buchholz, W. (M)
Buley, T. L. (A)
Bullard, R. L. (A)
Cameron, D. P. (A)
Capozzi, R. V. (A)
Carrothers, G. H. (A)
Coats, W. H. (A)
Coombs, J. M. (A)
Counihan, R. G. (A)
Crago, R. P. (A)
Crawford, D. J. (A)
Crawford, J. K. (A)
Davis, C. M. (A)
Dean, K. W. (M)
DeLano, R. B., Jr. (A)
Emery, R. W. (A)
Frizzell, C. E. (A)
Fry, W. A., Jr. (A)
Goetz, J. A. (A)
Goldman, E. H. (A)
Goodman, H. C. (A)
Harper, L. R. (M)
Haynes, M. K. (A)
Helland, J. C. (A)
Houck, S. C. (A)
Housman, B., Jr. (A)
Hunter, L. P. (SM)
Johnson, J. R. (A)
Jones, H. S. (A)
Kanter, L. E. (A)
Karan, C. (A)
Keller, E. A. (A)
Lampe, A. W. (A)
Lawrence, D. G. (A)
Little, J. B. (SM)
Logue, J. C. (A)
Lowrie, R. W. (A)
Luhn, H. P. (M)
Martin, R. R. (A)
Merwin, R. E. (A)
Moore, J. W. (A)
Muenzer, B. M. (A)
Mundrick, E. L. (A)
Murtha, G. A. (A)
Mussell, H. A. (A)
Mutter, W. E. (M)
Nanes, M. (A)
Nordyke, H. W., Jr. (A)
Noyes, R. A. (A)
O'Farrell, J. J., Jr. (A)
Oliva, F. J. (A)
Paley, M. O. (A)
Palmer, R. L. (SM)
Phelps, B. E. (M)
Phillips, F. G., Jr. (A)
Reinheimer, H. J., Jr. (A)
Roberts, W. (A)
Robins, R. D. (A)
Rochester, N. (SM)
Ross, H. D., Jr. (A)
Royston, M. F. (SM)
Rutz, R. F. (A)
Saling, D. M. (M)
Samuel, A. L. (F)
Santino, L. (A)
Sarahan, B. L. (A)
Sauter, W. D. (A)
Schmidt, L. M. (A)
Schmitz, J. V. (A)
Sell, W. E., Jr. (A)
Shultz, G. L. (A)
Sih, K. V. (A)
Sindelar, F. J. (A)
Slonaker, R. D. (A)
Sochor, J. J. (A)
Sollie, S. A. (SM)
Steinberg, R. K. (A)
Stock, J. A. (A)
Taub, S. (A)
Taylor, O. P. (SM)
Underhill, G. H. (M)
Verven, S. J. (A)
Vislocky, J. (A)
Walter, G. (A)
Ward, R. H. (A)
Weber, F. A. (A)
Whalen, R. J. (A)
Whalen, R. M. (A)
Whitmore, D. C. (A)
Williams, B. W. (A)
Willson, E. S. (SM)
Winger, W. D. (A)
Witt, V. R. (A)
Wolfe, I. P. (A)
Zimmer, J. T. (A)

Pultneyville
Byers, A. E. (A)

Putnam Valley
Media, E. (A)

Queens
Davis, H. (M)
Davis, S. (M)
Goldstein, W. (A)
Paley, W. D. (A)
Schloss, A. (A)

Queens Village
Becker, S. (A)
Chieffo, A. B. (A)
Davis, M. (A)
Goldstone, L. O. (M)
Griemsmann, J. W. E. (A)
Hansen, E. L. (M)
Hickman, W. C. (A)
King, L. H. (A)
Kleinoder, J. (A)
Krueger, D. H. (A)
McBride, W. O. (A)
Monsees, F. G. (A)
Osterndorf, J. F. (A)
Schefer, N. A. (A)
Schmidt, H. P. (A)
Soboleski, W. P. (A)
Tennis, J. E. (M)
Urban, W. D. (A)
Wohl, R. J. (M)
Woodward, A. E. (A)
Yeager, J. R. (A)

Rego Park
Astrow, M. (A)
Atlas, H. T. (A)
Gilbert, R. C. (A)
Gluck, J. (A)
Green, P. S. (A)
Herbstman, M. I. (M)
Hershkowitz, M. (A)
Hochman, S. (A)
Kassler, R. (A)
Martin, R. E. (M)
Pollak, F. (A)
Rothenberg, N. (A)
Weiner, L. H. (A)

Rensselaer
Stuarts, A., Jr. (M)
Wetmore, G. C. (A)

Rexford
Coblne, J. D. (SM)

Richmond Hill
Egan, W. G. (A)
Feulner, F. A. (A)
Henn, W. (A)
Jacobs, F. (VA)
Jensen, A. J. (A)
Murphy, E. A. (A)
Schwaninger, J. W. (A)
Seckler, F. J. A. (A)
Selnick, L. L. (A)
Turnow, W. F. (A)
Walberg, A. G. (A)
Wolf, R. G. (A)
Zanichkowsky, M. (A)

Ridgewood
Brinker, H. (A)
La Via, J. (M)
Wirfel, W. M., Jr. (A)

Riverdale
Froelich, C. (A)
Thompson, J. F. (A)

Riverhead
Atwood, J. B. (SM)
Braaten, A. M. (SM)
Brandinger, J. J. (A)
Goddard, D. R. (SM)
Hansell, G. E. (SM)
Leis, W. S. (A)
Lindow, I. L. (VA)
Moore, H. A. (A)
Olsen, W. E. (A)
Peterson, H. O. (F)
Schock, R. E. (SM)
Schoenborn, F. J. W. (M
Shipley, D. G. (A)
Taylor, H. A. (SM)
Wickizer, G. S. (SM)

Rochester
Andzer, A. (A)
Arno, R. S. (M)
Auer, J. H., Jr. (A)
Balling, A. W. (VA)
Barr, E. M. (M)
Bellor, W. F. (VA)
Benin, Z. (SM)
Blow, A. W. (M)
Boscia, A. F. (A)
Brumley, C. H. (A)
Burrows, H. R. (A)
Chesna, J. (A)
Cheston, H. C. (A)
Cohen, G. H. (A)
Cottier, L. A. (A)
Cox, P. G. (A)
Curtis, S. R. (SM)
Dahl, A. H. (M)
Dasburg, A. V. (M)
Demong, M. D. (A)
Dixon, E. O. (SM)
Enslein, K. (M)
Ferry, R. N. (M)
Fink, E. J. (A)
Freehafer, J. E. (M)
Gardner, K. J. (M)
Gerharz, R. J. (A)
Glandon, A. E. (A)
Grammer, R. A., Jr. (A)
Guenther, J. H. (M)
Guth, R. (A)
Hailes, W. D. (SM)
Harris, L. M., Jr. (SM)
Haupt, G. H. (VA)
Hausler, W. B. (A)
Hicks, H. F., Jr. (A)
Holmes, L. C. (F)
Holstrom, A. (SM)
Huntington, M. B. (VA)
James, C. L. (A)
Jamieson, D. F. (A)
Karker, E. C. (M)
Kendall, H. C. (SM)
Kennedy, R. P., Jr. (M)
Klumb, H. J. (VA)
Lankes, L. R. (SM)
Licata, J. P. (A)
Lovick, R. C. (A)
Lyke, E. F. (M)
Malone, W. J. (A)
Manson, R. H. (F)
Marsh, G. E. (M)
McArdle, B. L. (SM)
McCumber, D. E. (A)
Moore, E. G. (A)
Morken, D. A. (A)
Mosher, R. M. (A)
Mountjoy, G. (F)
Murphy, W. L. (A)
O'Brien, B. C. (SM)
Ossmann, E. A. (A)
Peed, A. C., Jr. (A)
Prasil, A. (A)
Rausa, G. J. (A)
Ravl, G. J. (A)
Reinke, R. V. (A)
Richter, W. (M)
Rodgers, J. A. (SM)
Ronbeck, J. E. (A)
Sass, L. J. (A)
Schifino, A. G. (M)
Schmidt, P. S. (A)
Slaymaker, F. H. (M)
Stephenson, E. D. (A)
Stevenson, H. (M)
Stolze, W. J. (M)
Tapernoux, P. J. (A)
Tholstrup, H. (SM)
Traino, C. (A)
Trotter, H., Jr. (SM)
Turner, W. (M)
Weissleader, H. I., Jr. (A)
Whitman, R. N. (A)
Wilcox, D. D., Jr. (A)
Yeaton, E. C. (A)
Young, J. W. (A)

Rockaway Beach
Flomenhaft, L. (A)

Rockville Center
Browde, A. (A)
Bensen, H. (A)
Corrarino, C. W. (SM)
Delligatti, S. F. (A)
DeWeese, H. W. (SM)
Duke, V. J. (SM)
Everett, F. C. (VA)
Gilman, B. S. (A)
Harris, H. (A)
Hellige, H. C. (A)
Hinners, F. A. (F)
Hoffman, E. J. (SM)
Hoxie, I. R. (A)
Johnson, J. H. (A)
Lee, R. L. (A)
Leuteritz, H. C. (VA)
Levenstein, H. (A)
Perry, J. S. (A)
Rich, E. M. (A)
Riker, W. E. (A)
Saffitz, I. M. (A)
Singer, F. J. (SM)
Stotz, C. C. (A)
Uzmann, J. G. (SM)
White, H. A. (A)
Wolff, F. (A)

Rocky Point
Aird, A. W. (VA)
Goldstine, H. E. (SM)
Martin, C. A. (VA)
Peterson, L. E. (A)
Watson, C. W. (A)
Young, L. L. (A)

Rome
Alfie, C. L. (M)
Berlinger, J. (A)
Barreto, J. M. (A)
Beauchamp, A. J. (M)
Bean, R. C. (A)
Beane, S. M. (A)
Benoit, R. C., Jr. (SM)
Blazej, J. E. (A)
Boutillette, R. H. (A)
Boxer, R. (A)
Bromley, J. E. (A)
Calicchia, J. L. (A)
Carlson, H. A. (M)
Carney, P. G. (VA)
Colangelo, L. P. (A)
Colin, L. (A)
Conroy, R. J. (A)
Cosgrove, T. (SM)
Crowley, H. J. (A)
Cruickshank, J. E. (SM)
Darrow, F. M. (A)
Davis, H. (SM)
De Lutis, T. (M)
De Minco, A. P. (M)
Desens, A. W. (A)
Diamond, F. I. (A)
Emanuino, J. M. (A)
Feiner, A. (A)
Fishbein, S. B. (SM)
Fitchett, R. N., Jr. (A)
Fix, O. W. (A)
Friedman, H. (M)
Frolich, A. J. (A)
Gabelman, I. J. (SM)
Goldstein, B. S. (A)
Gordy, I. (A)
Graham, R. C. (A)
Holliday, R. H. (A)
Homrighous, J. H. (A)
Horowitz, S. (A)
Jaeger, M. (A)
Jones, E. D., Jr. (M)
Jones, F. W. (A)
Kant, M. (A)
Kirshner, D. R. (A)
Kraus, R. B. (A)
Lambert, J. (M)
Lepper, W. E. (A)
Levine, M. (A)
Libby, R. L. (A)
Loreto, D. R. (M)
Ludgate, F. E. (SM)
Maggio, T. (A)
Malowicki, E. (A)
Manley, T. M. (M)
Martini, S. (A)
Mazzola, F. D. (A)
Merer, G. E. (SM)
Mirman, I. (SM)
Montague, G. H. (A)
Moskowitz, F. (SM)
Moyant, G. C. (A)
Munzer, E. N. (M)
Neeley, A. C. (A)
Nelson, R. (A)
Palmer, L. N. (A)
Pavane, M. M. (M)
Pope, W. T., Jr. (M)
Ratynski, M. V. (M)
Rehrig, E. S. (A)
Ricketts, P. E. (M)
Rosenberg, S. (A)
Rush, S. (SM)
Schlegelmilch, R. O. (SM)
Schulte, O. (A)
Scott, E. C. (A)
Setrin, M. (A)
Sharki, P. (M)
Sprinz, E. (A)
Storrs, E. N. (M)
Strom, C. A., Jr. (SM)
Tanenhaus, A. M. (M)
Taschler, E. J. (A)
Tepper, S. J. (A)
Thompson, J. M. (SM)
Turner, W. P. (A)
Vaccaro, J. (A)
Vogelman, J. H. (SM)
Votava, Y. (A)
Warner, M. (M)
Webb, H. E. (M)
Webb, T. E. (A)
Williams, L. E. (A)
Winkler, E. H. (M)
Worthington, J., Jr. (A)
Zinn, T. B., Jr. (A)

Ronkonkoma
Gold, T. (M)

Roosevelt
Adachi, W. Y. (VA)
Beck, G. S. (A)
Brown, E. M. (A)
Forster, E. E. (A)
Gager, C. H. (A)
Popkin-Clurman, J. (SM)
Randazzo, J. J. (A)
Uzzo, A., Jr. (A)

Rosedale
Di Paola, R. G. (A)
Epstein, M. (A)
Haneman, W. J. (A)
Rodriguez, L. H. (A)

Roslyn
Hayward, G. H. (A)
O'Connor, J. F. (A)
Rimmler, F. F. (A)
Sege, T. D. (M)
Susskind, S. E. M. (A)
Wild, J. J. (A)
Winters, B. C. (A)

Roslyn Harbor
Ming, A. (M)

Roslyn Heights
Agins, B. R. (A)
Bourke, W. A. (A)
Browder, J. E. (M)
Cetrone, V. C. (A)
Chiei, F. D., Jr. (M)
Corwin, A. (A)
Crist, P. W. (SM)
Day, W. B. (A)
Deegane, W. (A)
Easton, A. (SM)
Gray, J. E. (A)
Harges, M. T. (M)
Harris, H. C., Jr. (M)
Huettner, O. A. (M)
Kahn, H. (A)
Klein, R. C. (A)
Knutson, H. C. (A)
Loeb, M. (A)
Roth, H. H. (A)
Seeley, S. W. (F)
Skipper, L. C. (M)
Slaughter, G. K. (SM)
Smith, C. A. (M)
Spielberger, S. C. (A)
Weinmann, R. H. (M)
Willenbecher, J. F. (SM)
Willey, F. G. (M)
Yelsey, B. (M)

Rye
Davis, D. (A)
Deri, H. B. (A)
Eaves, A. J. (SM)
Lawton, L. M., Jr. (A)

St. Albans
Behr, J. (A)
Ceccanti, L. P. (A)
Englert, H. E. (A)
Funk, R. E. (A)
Heller, R. C. (A)
Parker, H. L. (A)
Prunty, P. F. (A)
Przyryla, E. M. (A)
Ramsey, W. S. (M)
Reisman, S. J. (M)
Rothenberg, S. M. (VA)
Stella, R. (A)
Vetter, R. F. (A)

Sanborn
Whitson, A. L. (A)

Sands Point
Deakin, G. (VA)
Langerman, H. (A)

Saratoga Springs
Ant, E. B. (A)
Samsky, B. S. (M)
Saslow, S. (M)

Saugerties
Stifler, W. W., Jr. (A)
Wright, A. W. (A)

Scarsdale
Andrews, C. (A)
Fox, W. C. O. (M)
Griffiths, R. W. (M)
Heller, S. (A)
Hoehn, A. F. (A)
Hultquist, J. A. (M)
King, K. L. (SM)
Knox, W. E., Jr. (A)
Mina, P. P. (A)
Monroe, R. B. (SM)
Seitz, F. A. (VA)
Slaybaugh, C. W. (SM)
Stephens, M. C. (A)
Turner, A. (VA)
Wagenhals, E. R. (M)

Schenectady
Adams, G. E. (A)
Alexanderson, E. F. (F)
Allen, C. C. (A)
Anderson, C. J. (A)
Anderson, R. E. (M)
Bailey, F. M. (SM)
Baker, R. G. (A)
Beggs, J. E. (SM)
Bernstein, S. (A)
Billingsley, F. C. (A)
Blanning, R. B. (A)
Bohanske, T. A. (A)
Borgese, A. J. (A)
Borst, D. W. (A)
Bowers, R. E. (A)
Boyd, M. R. (A)
Brandes, D. D. (A)
Brate, D. C. (A)
Bray, D. W. (A)
Burnett, K. N. (A)
Burroughs, E. H. (A)
Chaston, A. N. (A)
Clark, S. C., Jr. (A)
Cleary, C. J., Jr. (A)
Cohen, A. (A)
Colgin, J. R. (A)
Collins, R. N. (A)
Crane, W. K. (SM)
Cruger, B. W. (A)
Curtis, T. P. (SM)
Davenport, J. E. (M)
Dehn, R. A. (M)
De Santis, V. J. (SM)
De Walt, K. C. (SM)
Dickey, F. E. (SM)
Dickinson, T. M. (VA)
Duckwald, C. S., Jr. (A)
Dunham, S. B. (M)
Ellert, F. J. (A)
Ellis, S. S. (A)
Eshbach, J. R. (A)
Evans, J. T., Jr. (A)
Fick, C. G. (F)
Flood, F. R. (M)
Ford, W. A. (SM)
Frick, C. W. (SM)
Fritschel, E. H. (SM)
Gable, A. C. (SM)
Gardner, G. F. (VA)
Gehrig, J. W. (A)
Gerould, L. D. (A)
Graham, J. M. (A)
Grover, F. W. (F)
Gurdak, E. D. (A)
Gurewitsch, A. M. (SM)
Hall, R. N. (SM)
Hansen, W. O. (M)
Hawkins, D. W. (SM)
Hellar, M. W., Jr. (A)
Henyan, G. W. (VA)
Hershenson, L. H. (A)
Hickey, J. S., Jr. (A)
Hilbert, E. A. (A)
Horton, W. H. (A)
Howland, I. R. (A)
Jacobi, G. T. (A)
Jarek, J. J. (A)
Jernakoff, G. (A)
Johnson, E. M. (A)
Kaplan, S. M. (A)
Karlberg, B. G. (A)
Kennedy, W. H. (M)
Kessler, G. W. (A)
Kettlety, R. W. (A)
Kirchmayer, L. K. (A)
Koch, A. R. (SM)
Kohl, H. F. (A)
Kowalczyk, A. C. (A)
Kunz, L. C., Jr. (M)
Lafferty, J. M. (SM)
Lake, C. J. (A)
Lang, J. M. (A)
Larson, R. W. (SM)
Lawson, J. L. (SM)
Lee, E. S. (SM)
Lemmond, C. O. (A)
Loeper, C. J. (A)
Maginniss, F. J. (A)
Manfredi, R. E. (A)
Masnik, M., Jr. (A)
Mayes, T. L., Jr. (A)
McArthur, E. D. (F)
McMullen, G. D. (A)
Mead, M. S., Jr. (SM)
Meahl, H. R. (SM)
Mihran, T. G. (A)
Milford, R. E. (A)
Miller, F. A., Jr. (A)
Milliam, R. L. (M)
Moles, F. J. (SM)
Moore, R. E. (A)
Morgan, R. E. (A)
Mumford, L. G. (A)
Murray, K. W. (A)
Nakamura, H. (A)
Nelson, J. E. (SM)
Newman, R. W. (M)
Nielsen, R. D. (A)
Norgaard, D. E. (SM)
Ogle, H. M. (SM)
Owen, E. R. (M)
Patterson, F. G. (VA)
Perry, F. M. (M)
Pester, R. F. (A)
Peters, P. H., Jr. (A)
Peterson, E. F. (M)
Peterson, N. J. (A)
Petty, R. W., Jr. (A)
Pickert, C. E. (A)
Pravda, M. F. (A)
Prince, D. C. (SM)
Pritchard, R. L. (A)
Purcell, W. J. (A)
Ralls, J. W. (A)
Rankin, A. E. (SM)
Reed, R. I. (SM)
Reque, S. G. (A)
Rice, C. T. (A)
Robbins, N. P. (A)
Robinson, R. D. (A)
Rocha, H. A. F. (A)
Rothe, F. S. (A)
Russ, R. B. (SM)
Rustay, R. C. (A)
Sampson, E. S. (SM)
Sayles, P. W. (A)
Schaffer, C. A. (M)
Schussele, J. H. (A)
Schwarzhaupt, P. J. (VA)
Shuey, R. L. (M)
Skolka, K. M. (A)
Smith, R. L. (SM)
Spence, D. W. (A)
Stefkovits, P. (A)
Summerhayes, H., Jr. (SM)
Taylor, L. A. (VA)
Teare, W. H. (SM)
Thuresson, R. G. (A)
Turtentine, R. E. (A)
Warner, D. F. (M)
Watson, R. P. (SM)
Watters, R. L. (A)
Webber, S. E. (SM)
White, W. C. (F)
Whitten, J. R. (A)
Zecher, R. O. (A)

Schuyerville
Hoag, D. S. (M)

Scipio Center
Matuzich, J. D. (A)

Scotia
Bowles, L. T., Jr. (M)
Chambers, D. E. (F)
Clapp, C. W. (A)
Cook, E. D. (F)
Coolidge, A. W., Jr. (M)
Dickinson, R. H. (M)
Driskill, R. D. (A)
Elder, T. A. (SM)
Fraenckel, W. H. (A)
Gardiner, P. C. (SM)
Jachym, T. M. (A)
Kramer, R. S. (A)
McFall, R. W. (SM)
Roberts, S. (M)
Shepard, B. R. (A)
Samsel, R. W. (A)
Travis, E. F. (SM)
Waldron, W. K. (A)
Washburn, F. L., Jr. (A)
Wilson, T. M. (M)

Sea Cliff
Brown, B. (A)
Busching, H. L. (A)
Flackbert, A. C. (A)
Jagoe, R. W. (A)
Singleton, C. M. (M)

Seaford
Battle, F. H., Jr. (A)
Grumich, J. (SM)
Ladof, L. G. (A)
Levinson, L. (A)
Weston, S. (SM)

Seneca Falls
Burroughs, F. L. (SM)
Cowden, D. G. (M)
Dickinson, W. A. (SM)
Faust, A. C. (A)
Fogg, G. E., Jr. (A)
Gessford, R. K. (SM)
Greenberg, I. D. (A)
Jans, J. T. (A)
Kahl, M. I. (SM)
Oseas, J. (A)
Ottemiller, W. H., Jr. (SM)
Peck, H. D., Jr. (A)
Shields, R. R. (M)
Stone, E. O. (A)
Stone, R. W. (SM)
Swan, R. A., Jr. (M)

Shenorock
Renke, A. (A)

Sherburne
Brown, H. H. (M)
Leitner, R. T. (A)
Lippitt, K. H. (M)
Lunddahl, T. (SM)
Voorhaar, F. R. (M)

Sidney
Maylott, C. F. (SM)
Sluis, M. H. (A)
Struble, R. C. (A)

Silver Creek
Gull, R. A. (SM)

Skaneateles
Dale, J. A. (A)

Slingerlands
Bowie, W. G. (SM)

Snyder
Balint, A. T. (SM)
Forster, H. F. (A)
Hultberg, C. A. (SM)
Lawton, J. G. (A)
McDonough, S. L. (A)
Richmond, G. E., Jr. (A)
Sanders, E. R. (SM)
Schantz, J. D. (SM)
Tanguay, A. R. (A)
Wagner, R. W. (M)
Whyman, E. W. (A)

Sodus Point
Hunter, N. E. (A)

Solvay
Cohen, M. (A)
Palladino, M. J. (A)
Shofstall, N. F. (SM)

Southampton
Buckingham, W. D. (A)
Hildreth, A. E., Jr. (A)
Lamar, R. E. (A)

Southold
Luke, R. O. (A)

South Ozone Park
Lizzio, J. (A)

Spencerport
Sibley, H. C., Jr. (A)

Springfield Gardens
Alcott, E. H. (A)
Mahnken, W. J. (A)
Portantino, A. (A)
Shapiro, D. L. (M)

Spring Glen
Green, J. (M)

Spring Valley
Cook, S. (A)
Faist, C. A. (A)
Rosenbaum, J. (M)
Welan, I. (A)

Stanley
Bogart, P. M. (A)

Staten Island
Auriema, R. C. (A)
Avins, J. (SM)
Bellis, R. P. (A)
Bremmer, L. F. (SM)
Brossok, W. C. (A)
Culicetto, P. J. (A)
Embrechts, A. C. (SM)
Gallonio, A. A. (A)
Gannett, E. (A)
Grassia, C. C. (A)

Gunther, F. A. (SM)
Harper, R. (A)
Kiely, G. F. (A)
Kostriza, J. A. (M)
La Penna, F. W. (A)
Levine, M. E. (M)
Mallin, J. A. (A)
Martenson, R. B. (A)
Nagy, W. Z. (A)
Panicello, T. B. (A)
Radgowski, S. P. (A)
Reeves, J. F. (A)
Rodwin, G. (SM)
Robinson, M. (A)
Ruedisueli, R. W. (A)
Shea, J. W. (A)
Smith, W. G. (A)
Vavoudis, S. N. (A)
Weinberg, T. L. (A)

Stewart Manor
Moore, F. H. (A)

Stittville
Waxler, D. (A)

Stony Brook
Medd, J. S. (SM)
Woodruff, E. T. (A)

Stony Point
Favre, R. M. (A)

Stone Ridge
Darrell, R. D. (A)
Van Winkle, H., Jr. (A)

Suffern
Frachtman, H. E. (A)
Hammel, D. G. (A)

Sunnyside
Capon, N. J. (A)
Castrignano, R. A. (M)
Feldman, J. (A)
Majlinger, A. (A)

Syosset
Abrams, C. F. (A)
Bruck, G. G. (SM)
Carlton, M. D. (M)
Erickson, J. S. (SM)
Forrest, G. E. (M)
Greenleaf, F. D. (SM)
Hollister, D. G. (A)
Lang, H. M. (A)
Miles, R. C. (SM)
Mueller, F. J. (A)
Nittoli, A. J. (A)
Reisch, R. P. (A)
Samuelson, D. S. (M)
Thomas, E. U. (M)
Ward, J. W. (M)

Syracuse
Abrahams, I. C. (SM)
Ackley, E. H. (A)
Allen, J. E. (SM)
Andrews, P. D. (SM)
Aronson, C. A. (SM)
Arsem, A. D. (SM)
Bachman, C. H. (VA)
Baer, J. A. (A)
Bahr, R. J. (A)
Bailey, J. S. (M)
Bakeman, O. R. (A)
Baker, W. R. G. (F)
Balabanian, N. (A)
Baldwin, C. F. (SM)
Barhydt, C. R. (SM)
Barlow, L. C. (A)
Bartley, W. P. (A)
Barton, L. M. (SM)
Bass, L. (SM)
Batter, L. M. (A)
Beard, C. E. (A)
Beguin, F. P. (SM)
Belamarich, J. P. (A)
Belle Isle, A. G. (A)
Bentley, A. D., Jr. (A)
Berger, J. (A)
Bias, F. J. (SM)
Biele, R. J. (SM)
Bischoff, E. L. (A)
Bockstiegel, R. B. (A)
Boothroyd, G. A. (A)
Bradbury, B. (M)
Broms, B. H. (A)
Broudy, R. M. (A)
Broughton, W. G. (VA)
Buchanan, H. R. (A)
Callahan, G. F. (A)
Campbell, V. C. (SM)
Carr, L. O. (A)
Carrillo, E. B. (A)
Chafaris, G. J. (A)
Chapman, J. K. (SM)
Chivers, C. C. (A)
Cisler, M. C. (SM)
Clark, P. B. (A)
Clark, R. E. (M)
Cleary, E. P. (A)
Clement, R. R. (M)
Clements, S. E. (SM)
Cochran, N. B. (M)
Cohen, L. R. (A)
Cole, F. G. (A)
Cooper, C. W. (A)
Copp, J. H. (SM)
Cottle, D. W. (A)
Coykendall, J. C. (SM)
Crosby, H. M. (SM)
Cummings, A. P. (VA)
Dall, A. B. (A)
Dally, R. (SM)
Davids, H. H. (SM)
Davidson, R. A. (A)
Davis, R. J. (A)
De Garmo, A. V., Jr. (A)
Dewire, G. M. (A)
D'Hoostelaere, A. C. (A)
Dome, R. B. (F)
Duncan, K. W. (A)
Earls, H. G. (M)
Eber, L. O., Jr. (A)
Eliot, A. B. (A)
Ellis, C. R. (A)
Estes, R. M. (A)
Evans, H. J. (SM)
Fancher, H. B. (SM)
Fank, F. B. (A)
Farrell, J. J. (F)
Field, B. (A)
Fields, H., Jr. (A)
Fink, L. R. (SM)
Fitzmorris, S. R. (M)
Fong, K. (A)
Foster, R. F. (SM)
Fritschel, P. G. (A)
Frost, E. L. (A)
Galidas, P. (A)
Gannett, G. L. (A)
Gardner, D. R. (SM)
Gentry, F. E. (A)
Geyer, B. H., Jr. (A)
Ghandhi, S. K. (A)
Gibbons, E. H., Jr. (A)
Gildersleeve, R. E. (A)
Glenn, A. B. (SM)
Goldman, S. (SM)
Goldstein, H. (A)
Golinsky, M. (A)
Good, W. E. (SM)
Goodman, C. J., Jr. (A)
Goodwin, A. R. (A)
Grisetti, R. S. (A)
Gruen, W. J. (M)
Haedecke, A. D. (SM)
Hall, W. H. (SM)
Hamlett, J. G. (A)
Harrington, R. F. (A)
Hart, J. E. (A)
Hartnett, G. C. (A)
Heaton, H. T. (A)
Heiden, C. M. (SM)
Heil, H. (SM)
Hellerman, H. (A)
Herzog, E. F. (SM)
Hocking, L. J. (A)
Hogan, E. V., Jr. (A)
Holtz, R. E. (A)
Holtzclaw, B. L. (A)
Howells, P. W. (M)
Hurley, D. T. (A)
Huyler, L. E., Jr. (A)
Hyde, W. E., Jr. (A)
Ingerson, F. A. (A)
Jeffers, W. M. (A)
Jenkins, W. M. (A)
Johnson, C. W. (A)
Johnson, G. L. (A)
Johnson, M. A. (A)
Johnson, S. O. (A)
Johnston, P. G. (A)
Kaar, I. J. (F)
Kalmus, F. (A)
Keister, J. E. (SM)
Kelley, J. J. (A)
Kenefake, E. W. (SM)
Keonjian, E. (SM)
Kerr, J. S. S. (A)
Killion, R. H. (A)
Kinzie, M. M. (A)
Kirkpatrick, G. M. (M)
Kluender, E. C. (SM)
Kozinski, R. E. (A)
Kreinheder, D. E. (A)
Lasher, C. C. (SM)
Learned, A. J. (M)
Leeder, H., Jr. (M)
Leeds, M. (SM)
Leinweber, L. F. (A)
Lemon, S. G. (A)
Lesk, I. A. (A)
Lett, R. P. (SM)
Liberatore, D. F. (A)
Lidovitch, S. B. (A)
Liggett, W. E. (A)
Lillo, C. L. (A)
Linderman, O. E. (A)
Linker, J. B., Jr. (A)
Lippert, H. B. (M)
Lloyd, C. G. (SM)
Lob, C. G. (A)
Lynch, I. E. (A)
Lynn, L. H. (SM)
MacLeod, W. R. (M)
Maier, L. C., Jr. (M)
Manke, A. G. (SM)
Marsa, A. R. (A)
Martin, D. O. (A)
Marvin, H. B. (F)
Mather, D. L. (A)
Matteson, R. G. (A)
Maxwell, D. E. (SM)
Mayoral, G. A. (SM)
McAllister, J. F., Jr. (SM)
Meehan, J. A. (A)
Mellott, R. N. (A)
Merrigan, C. F. (A)
Merrithew, R. F. (A)
Metcalf, G. F. (F)
Millett, R. G. (A)
Morlock, W. J. (SM)
Moseley, S. T. (A)
Mullen, E. B. (A)
Mullin, L. A. (SM)
Muntz, W. E. (SM)
Nelson, C. E. (A)
Nelson, J. W., Jr. (SM)
Nitzberg, R. (A)
Ocko, R. (A)
Olson, F. A. (M)
Pachuta, J. R. (A)
Palmquist, M. L., Jr. (A)
Pan, P. M. (M)
Pardee, O. O. (A)
Passarelli, W. F. (A)
Perry, H. E. (A)
Peterson, E. H., Jr. (A)
Petrie, A. F. (A)
Petrik, J. S. (A)
Pfefer, B. L. (SM)
Phillips, J. M., Jr. (A)
Pinkerton, D. C. (SM)
Platts, G. F. (SM)
Plusc, I. (M)
Polisse, L. F. (M)
Portz, H. G. (A)
Potter, H. C. (A)
Powell, B. O., Jr. (A)
Priest, C. A. (F)
Quinn, H. H., Jr. (A)
Randall, D. P. (SM)
Rausch, R. H. (A)
Rector, R. V. (SM)
Reibert, F. A. (A)
Reimmith, G. M. (A)
Reynolds, F. M. (VA)
Reynolds, R. H., Jr. (A)
Rives, T. C. (SM)
Rosenberg, J. (M)
Rouse, W. E. (A)
Rubin, I. E. (M)
Ruhl, W. T. (A)
Saby, J. S. (SM)
Sadowsky, S. S. (A)
Sample, G. A. (A)
Samulon, H. A. (SM)
Santa, M. M. (A)
Schaffner, J. S. (A)
Schatz, F. W. (A)
Schick, N. E. (SM)
Schlecht, M. F. (A)
Schultz, R. E. (A)
Schupp, G. A., Jr. (A)
Sedlack, G., Jr. (A)
Seely, S. (SM)
Shaw, C. A. (A)
Shea, R. F. (SM)
Sherman, J. H., Jr. (A)
Shelter, R. L. (A)
Smith, S. L. (A)
Sorbye, K. E. (A)
Spirer, H. F. (A)
Spitzer, C. F. (M)
Squires, W. F. (A)
Starkey, G. M. (M)
Steele, E. L. (A)
Stern, A. P. (A)
Stone, R. F. (M)
Suran, J. J. (A)
Svitek, G. A. (A)
Swank, W. B. (A)
Teich, P. J. (A)
Thomas, W. P., Jr. (A)
Thor, R. C. (A)
Towlson, H. G. (SM)
Uren, D. E. (A)
Vaccaro, R. A. (A)
Villeneuve, A. T. (A)
Vize, J. F. (A)
Wakefield, W. F. (A)
Watts, D. E. (SM)
Weir, I. R. (F)
Weiss, I. (A)
Wellinger, R. P. (M)
Wellner, F. R. (M)
Wexler, C. H. (A)
Wick, R. S. (A)
Wiggin, J. F. (A)
Wilcox, J. F. (SM)
Williamson, R. H. (F)
Winslow, W. R. (A)
Whistler, W. T. (A)
Wooley, R. L. (SM)
Wu, T. T. B. (A)
Yeandle, R. S. (SM)
Verian, C. S. (SM)
York, R. A. (SM)
Yost, D. E. (A)
Zellmer, L. R. (A)
Zierdt, C. H., Jr. (M)
Zimmer, C. R. (A)

Tappan
Ulrich, E. C. W. (A)

Tarrytown
Cartoon, G. P. (A)
Minich, C. H. (A)
Moffett, R. (SM)
Pickles, S. (SM)
Rae, J. R. (M)

Thornwood
Bollari, L. (A)
Burns, G. D. (A)
Hall, H. D. (A)
Newsom, E. G. (A)
Orth, F. (M)

Tonawanda
Field, T. O. (A)
Gauthier, L. P. (A)
Koons, E. E. (A)
Plicato, W. L. (A)
Reese, J. S. (A)
Rockman, I. A. (A)
Root, R. E. (A)
Shrum, L. R. (A)
Skinner, G. M. (M)
Wolcott, J. R. (A)
Zehr, R. M. (A)

Troy
Babb, D. D. (A)
Babits, V. A. (SM)
Beers, R. F. (A)
Campese, N. H. (A)
Chernoch, J. (A)
Chismark, A. H. (A)
Gudzin, M. G. (A)
Hall, C. F. (A)
Harris, H. D. (VA)
Hasserdji, G. K. (A)
Hutchinson, D. F. (A)
Kunz, C. J., Jr. (A)
Lococo, S. (A)
Love, A. L. (A)
McLaughlin, W. J. (M)
Mortenson, K. E. (A)
Norvik, F. J. (A)
Runkle, L. D. (A)
Siegmeth, A. J. (M)
Stoker, W. C. (SM)
Valentine, R. H. (A)
Wansovich, J. (A)

Trumansburg
Beers, R. B. (A)

Tuckahoe
Austin, K. B. (VA)
Brooks, L. P. (A)
Collison, P. B. (SM)
Drew, C. E. (SM)
Dunn, C. J. (A)
Edens, G. E. (M)
Engel, J. S. (A)
Glassman, S. (M)
Lichtenstein, M. J. (M)
Mausler, R. (A)
McGinnis, F. (M)
Porterfield, E. A. (A)
Steinberg, M. I. (A)
Troster, M. (A)
Van Gieson, W. D., Jr. (A)
Waldron, R. E. (A)
Zatorsky, E. F. (VA)

Uniondale
Armentano, J. A. (A)
Gould, R. V. (SM)
Johl, M. J. (A)
Munson, B. (A)
Stein, N. (M)

Upton
Blewett, J. P. (A)
Chase, R. L. (A)
Cowan, F. P. (M)
Graham, M. (A)
Kuper, J. B. H. (SM)
Plotkin, M. (A)
Rankowitz, S. (A)
Weiss, M. M. (M)

Utica
Ainsworth, M. G. (A)
Anderson, C. T. (M)
Antonucci, P. (A)
Barker, J. (A)
Barnum, A. R. (A)
Blum, H. (A)
Chmielewicz, L. S. (A)
Dondero, R. L. (A)
Dowdell, J. T. (A)
Goldberg, O. D. (A)
Holmquist, J. A. (A)
Hornak, P. M. (A)
Humphrey, J. G. (A)
Johnson, M. R. (SM)
Kapfer, V. C. (A)
Kenyon, H. P., Jr. (A)
Kubik, C. P. G. (A)
Kuehl, W. J. (A)
Kulmus, R. J. (M)
Layton, D. T., Jr. (A)
Orear, E. R. (M)
Pankiewicz, C. L. (A)
Pereda, E. F. (A)
Romanelli, P. A. (A)
Rosenberg, M. W. (A)
Ryerson, J. L. (A)
Weigel, R. L. (A)
Willard, C. H. (A)
Zachary, R. A., Jr. (M)
Zawada, J. D. (A)

Valhalla
Belcher, R. D. (A)
Mainberger, W. A. (M)

Valley Stream
Beaton, C. R. (M)
Davis, S. (A)
Durbin, E. (A)
Elderkin, C. J. (A)
Goodstein, J. (A)
Gould, L. M. (A)
Griesan, G. F. (A)
Hansen, J. A. (SM)
Jackson, B. A. (M)
Jacobson, N. (A)
Kalmar, J. O. (A)
Kappauf, F. F. (A)
MacDonald, A. H. (A)
Mancke, R. B. (M)
Match, M. J. (A)
Miller, G. (A)
Muth, J., Jr. (A)
Nelson, R. T. (A)
Offutt, W. B. (A)
Peyser, W. P. (SM)
Rokosz, A. J. (A)
Schlang, A. (A)
Schottland, F. D. (VA)
Woodbury, W. F. (M)
Zeichner, D. (A)
Ziegler, F. W. (A)

Verona
Miller, T. A. (A)

Vestal
Alman, J. (A)
Bartholy, F. E. (VA)
Bolton, W. D. (A)
Bowen, E. C. (A)
Bussey, R. L. (A)
Claflin, R. E., Jr. (A)
Cooper, A. E. (A)
Dickinson, M. M., Jr. (A)
Farr, L. E., Jr. (A)
Grace, C. H. (A)
Greene, J. E. (A)
Hawkins, G. F. (A)
Ingram, J. D. (A)
Kornbluh, A. J. (A)
Lawson, E. R. (A)
Marcy, H. T. (M)
Pederson, H. T. (A)
Pederson, R. H. (A)
Rogers, M. D. (A)
Vacca, L. N. (A)
Valenta, G. W. (A)
Williams, C. W. (A)
Woodson, R. A. (SM)

Victor
Aldridge, C. A. (A)

Wantagh
Alter, J. (SM)
Arndt, W. R. (SM)
Battin, D. C. (A)
Bean, F. E. (A)
Behringer, N. C. (A)
Berg, S. (M)
Berler, R. M. (A)
Bischoff, J. J. (A)
Bloom, L. (A)
Brown, C. J. (A)
Ellis, H. J., Jr. (A)
Fahnestock, J. D. (A)
Gaynor, E. (A)
Gibbs, E. D. (A)
Goodman, D. M. (A)
Grossman, R. (A)
Holcombe, P. G. (A)
Horton, G. L. (A)
Jacobson, R. S. (A)
Levey, A. W. (M)
Losee, W. B., Jr. (A)
McBee, W. D. (A)
Norde, L. (SM)
O'Donnell, J. J. (A)
Paley, A. I. (A)
Ratner, M. (A)
Rawitz, H. (A)
Sachar, H. N. (A)
Salzberg, A. (A)
Sferrazza, P. J. (A)

Smith, P. G. (A)
Steen, D. R. (A)
Sunder, J. E. (A)
Vang, J. P. (A)
Verdon, G. W. (M)
Zeitz, A. (SM)

Wappingers Falls
Baker, C. T., Jr. (A)
Brewer, C. P. (M)
Collins, G. B. (A)
Disney, J. V. (A)
Domenico, R. J. (A)
Dye, W. G. (A)
Fernekees, J. E. (M)
Fox, P. E. (A)
Geisler, H. J. (A)
Haddad, J. A. (M)
Hickerson, J. E. (A)
Jackson, P. W. (A)
Keller, R. E. L. (A)
Quick, A. E., Jr. (M)
Seimes, M. S. (A)
Slagle, W. C. (A)
Stierhoff, G. C. (A)
Wild, H. K. (A)

Waterloo
Osborn, C. M. (A)

Water Mill
Deibert, C. R. (M)

Watertown
Beckenstein, M. (A)
Bonadio, G. (A)
Morgan, C. W. (A)
Sweeney, J. E. (M)

Waterville
Cooper, F., Jr. (A)

Watervleit
Lavoo, N. (M)
Raschke, R. R. (A)

Webster
Haskell, J. W. (A)
Piotraschke, C. F. (M)
Trousdale, R. B. (M)
Vosteen, R. E. (A)

Wellsville
Clarke, R. L. (A)

West Albany
Lawrence, J. D., Jr. (A)
Maurer, J. W. (A)

West Babylon Oaks
Shubel, E. J. (A)

West Falls
Holmes, W. S. (M)

West Hempstead
Buck, J. D. (A)
Caithness, W. (A)
Childs, A. F. (M)
Di Blasi, J. (SM)
Erlick, P. S. (A)
Evans, C. L. (A)
Fairweather, R. W. (A)
La Rosa, R. (A)
Levine, H. A. (SM)
Levinson, E. (A)
Palmer, W. (SM)
Platt, W. D. (A)
Rockett, F. H., Jr. (A)
Simmons, J. C. (M)
Sinnott, J. (A)
Thiede, F. C. W. (VA)
Voelpel, J. (A)
Weintraub, R. (A)
Westman, H. P. (SM)
Williamson, R. G. (A)

West Islip
Bell, R. W. (A)
Damast, M. A. (A)

West Point
Curtis, H. W. (M)
Ekberg, W. A. (M)
Gillette, E. C., Jr. (A)
Green, J. W., Jr. (SM)
Pankowski, B. J. (A)
Strohm, W. E. (M)
Tetley, W. H. (M)

West Seneca
Nowicki, J. J. (A)

Westbury
Abajian, H. B. (M)
Averett, S. S. (A)
Boecker, A. (A)
Dasher, P. M. (A)
Douglas, W. S. (A)
Hildreth, E. E. (SM)
Figlia, J. R. (M)
Fishman, G. N. (A)
Gledhill, A. P. (A)
Hellmann, R. K. (VA)
Kelleher, R. L. (A)
Kenny, J. A. (A)
Lehtonen, E. W. (A)
MacVeety, R. C., Jr. (A)
Oldmixon, R. (A)
O'Meara, T. J. (A)
Richards, G. F. (M)
Richardson, C. M. (A)
Rosar, M. T. (A)
Schrader, L. W., Jr. (A)
Schumacker, A. L. (VA)
Smith, H. M. (A)
Speakman, E. A. (SM)
Truhlar, G. (A)
Waicule, D. (A)
Waller, W. E. (M)
White, J. R. (A)
Wilson, L. B. (M)

Westernville
Clawson, G. T. (A)
Mackey, C. L. (A)
Naresky, J. J. (M)

White Plains
Abdun-Nabi, Z. (A)
Adler, B. (SM)
Atlee, R. Y. (A)
Belove, C. (A)
Bernardi, A. R. (A)
Bloom, W. E. (A)
Brackmann, W. J. (M)
Campanale, A. J. (A)
Comstock, D. C. (A)
Demmer, L. T. (A)
Desnoyers, H. (M)
Fearing, J. L. (VA)
Fetherolf, J. M. (A)
Flower, R. A. (A)
Gano, A. S. (SM)
Garcia, J. R. (A)
Gilbert, J. (M)
Green, H. (A)
Gresko, W. J. (M)
Hackett, A. J. (A)
Harris, E. R. (M)
Hillmann, D. A. (A)
Huntington, W. J., Jr. (A)
Jacobus, H. R. (SM)
Jenkins, H. C. (M)
Kaye, H. W. (M)
Kothe, E. W. (A)
Lake, J. R. (A)
Lamarque, J. W. (VA)
Landberg, A. (A)
Lehman, W. (A)
Machover, C. (A)
Mele, B. T. (A)
Mountain, J. D. (A)
Murphy, T. J. (A)
Preston, F. S. (M)
Schimmel, H. (A)
Schleicher, M. (A)
Schlesinger, E. R. (A)
Shortt, H. L. (M)
Speller, J. B. (SM)
Stuart, A. F. (A)
Weinstein, I. (A)
Ziserman, M. (A)

Whitesboro
Bunger, J. W. (M)
Davis, D. M. (A)
Ewing, L. M. (SM)
Hannell, F. D. (A)
Ketchum, P. M. (SM)
Krzysiak, E. F. (A)
Little, G. R. (A)
White, R. L. (A)

Whitestone
Birnham, D. Z. (A)
Cawood, D. W. (M)
Di Cecio, S. A. (M)
Dunefsky, M. (A)
Foodim, C. (SM)
Greene, I. (A)
Grumet, A. (A)
Herbiz, A. J. (A)
O'Connell, T. P. (A)
Peckjian, A. J. (A)
Piller, S. E. (A)
Pomerantz, M. (A)
Sandler, H. (A)
Smith, J. W. (SM)
Vogel, R. Q. (M)
Von Kunits, P. (M)

Wiccopee
Nutter, E. H. (A)

Williamsville
Corp, D. E. (A)
Knau, D. V. (A)
Hart, W. E. (M)
Kuhn, H. G. (M)
Maynard, H. M. (M)
Pifer, M. J. (A)
Snyder, W. W. (M)
Wightman, C. W., Jr. (A)
Wixson, E. S. (A)

Williston Park
Ghirlando, F. L. (A)
Hopkins, G. C. (M)
Lerch, O. A., Jr. (A)
Losow, H. C. (A)
Lovell, J. A. (A)
Maisto, N. S. (A)
Napolin, S. (A)
Parsons, B. L. (A)
Spergel, P. (A)

Wilson
Schneider, R. J. (A)

Woodhaven
De Size, L. K. (A)
Goldstone, L. L. (A)
Hintz, R. T. (VA)
Leahy, R. E. (A)
Reitlinger, A. (A)
Reuther, D. W. (A)
Schaefer, A. E. (A)
Scheen, J. (A)
Smith, W. J. (A)
Winter, D. W. (A)
Wolber, R. R. (A)

Woodmere
Bach, H. M. (A)
Crystal, F. H. (A)
Kahgan, J. J. (M)

Woodside
Bukofzer, R. (A)
Carlan, L. B. (M)
Cleary, D. F. (A)
Dechovitz, H. (A)
Dowds, H. M. (A)
Fraleigh, J. B. (A)
Francoeur, G. R. (A)
Garbarini, G. S. (A)
Grebe, A. H. (A)
Green, W. (A)
Gronner, A. (SM)
Jahoda, J. R. (A)
Keith, W. S. (A)
Miller, W. A. (A)
Noji, T. T. (A)
Parzen, B. (SM)
Postman, M. H. (A)
Quinn, J. A. (A)
Rabinowitz, M. H. (A)
Rafferty, J. J. (A)
Reuman, W. H. (A)
Richter, F. G. (A)
Rossler, R. A. (A)
Stavitski, L. X. (A)
Stinehelfer, H. E. (M)
Strong, J. J., Jr. (A)

Woodstock
Van Rijn, J. C. (SM)

Wyandanch
Hanlon, R. M. (M)
Johnston, W. A., Jr. (M)
Spector, A. (A)

Yaphank
Oakes, R. E. (A)

Yonkers
Avrutik, R. F. (A)
Balletta, A. G. (A)
Bartlett, S. C. (SM)
Bastian, A. L. (A)
Bernstein, R. (A)
Burnell, N. (A)
Campbell, J. A. (A)
Castriota, L. J. (M)
Davidoff, S. (M)
Douglas, R. H. (M)
Findels, W. J. (A)
Finkler, R. A. (A)
Fried, J. (A)
Garbowitz, L. (A)
Genz, W. F. (A)
Goetzl, M. (M)
Goldstein, A. L. (A)
Hertsch, G. (A)
Hesse, G. L. (A)
Hillman, P. L. (A)
Husenita, J. (A)
Jordan, E. I. (A)
Kellner, M. (A)
Knauert, W. F. (M)
Korewick, J. (A)
Krelk, J. F. (A)
Lambert, F. C. (A)
Landry, A. W. (A)
Lisewski, E. E. (A)
Looney, L. A. (VA)
Lynch, H. G. (A)
Maurer, J. A. (A)
Morris, M. J. (A)
Neumann, K. L. (A)
Orefice, G. T. (A)
Paris, H. F. (A)
Perelman, I. B. (A)
Raciti, S. A. (A)
Regan, H. T. (A)
Robbins, L. (A)
Roth, S. S. (A)
Rourke, C. R. (A)
Runyon, C. R., Jr. (VA)
Schreiner, R. J. (A)
Staudt, W. (A)
Tarkowsky, H. (A)
Yablonsky, D. M. (A)

Yorktown Heights
Athey, S. W. (SM)
Matarainen, K. O. (M)
Teschmacher, H. W. (SM)

NORTH CAROLINA

Asheville
Chambers, W. M. (A)
Morgan, Z. K., Jr. (A)
Wade, R. A. (A)

Burlington
Alsabrook, C. M. (A)
Apple, H. L. (M)
Barlow, J. E. (A)
Burley, F. E. (SM)
Daly, J. A., Jr. (A)
Darby, J. F. (A)
Day, J. L. (M)
Fox, M. L. (A)
Hastings, C. L. (M)
Hawkins, A. R. (A)
Hermansdorfer, J. E. (A)
Kelly, I. E. (A)
Morris, K. G. (A)
Parris, W. J. (A)
Rudisill, M. E. (A)
Sees, J. H. (A)
Severance, F. D. (A)
Smith, C. P. (A)
Smith, H. O. (A)
Turrini, J. J. (M)

Camp Lejeune
Roble, A. R. (A)

Candler
Brown, J. R. (A)

Cary
Cormack, W. J., Jr. (A)
Rood, H. W. (A)
Sherwood, J. M., Jr. (A)

Chapel Hill
Adams, W. (A)

Charlotte
Britt, C. L., Jr. (A)
Brown, F. R. (A)
Bush, T. K. (M)
Carey, J. G. (SM)
Caudle, L. L., Jr. (M)
Chaney, H. L. (M)
Dycus, R. W. (A)
Hicklin, W. H., Jr. (A)
Kickler, E. M. (A)
Luscombe, C. F. (M)
McCray, H. R., Jr. (A)
Minor, M. J. (SM)
Ramsey, R. W. (VA)
Ramsey, R. W., Jr. (A)
Sellars, E. A. (A)
Stewart, A. E. (VA)
Walker, L. L. (A)

Clinton
Bell, L. T. (A)

Durham
Block, R. C. (A)
Bowers, G. (A)
Killian, T. J. (F)
Mobley, R. C. (A)
Owen, H. A., Jr. (A)
Seeley, W. J. (SM)

Elizabethtown
Baird, J. W. (A)

Elon College
Welsh, W. A. (SM)

Fayetteville
Tromblay, R. H. (A)
Zakowski, L. F. (A)

Fort Bragg
Deal, W. R. (A)
Dobson, D. B. (A)
Dute, J. C. (A)
Heartz, L. C. (M)
Kovacevich, M. M. (A)
Stinson, I. F. (M)

Gastonia
Franevski, M. (M)
Mills, C. W. (A)

Gibsonville
Rudisill, J. A., Jr. (A)

Goldsboro
Trueblood, D. B. (A)

Greensboro
Adams, T. N. (M)
Aitkenhead, J. (A)
Annas, P. D. (M)
Atcheson, S. E. (M)
Bescherer, E. A. (SM)
Best, R. H. (A)
Bezera, G. (A)
Brooker, E. G., Jr. (A)
Coble, R. P., Jr. (A)
Gardiner, J. G. (SM)
Herman, L. R. (A)
Ivester, H. E. (A)
Langston, J. W. (A)
Marteena, J. M. (VA)
Norwood, C. A. (A)
Schaffer, L. I. (A)
Strandberg, C. F. (A)
Wescott, J. C. (A)

High Point
Bivins, J. F. (SM)
Caldwell, D. J. (M)

Jamestown
Moore, R. L. (M)

Kernersville
Lasley, L. (A)

Kinston
Hurt, A. B., Jr. (A)

Lake Waccamaw
Merritt, C. H. (M)

Laurinburg
Brock, T. N. (A)

Lexington
Myers, A. S., Jr. (A)

Lumberton
Howell, J. E. (A)

Manteo
Shannon, B. F. (A)

Matthews
Mullis, C. B. (A)

Mebane
Mincey, J. H. (A)

Mt. Airy
Epperson, R. D. (A)

New Bern
McKnight, V. J. (A)

Raleigh
Askew, A. B. (A)
Askew, J. B. (A)
Baldwin, C. M., Jr. (A)
Brennecke, C. G. (F)
Carson, V. S. (SM)
Colvert, F. T. (A)
Copper, G. S. (A)
Corns, R. B. (A)
Crenshaw, D. M. (A)
Dawkins, L. L. (M)
Duncan, V. D. (M)
Fullen, R. E. (A)
Hall, W. H. C. (A)
Hartenstein, W. G. (A)
Hawkins, R. L. (A)
Higgins, J. F. (A)
Hoadley, G. B. (SM)
Holland, R. W. (A)
Hulick, H., Jr. (M)
Idol, C. A. (A)
Jenkins, B., Jr. (A)
Kahn, S. H. (M)
Litzaw, H. R. (A)
MacIntyre, A. B. (A)
Manning, E. G. (M)
McArthur, C. S., Jr. (A)
McCotter, J. L., Jr. (A)
McCrary, D. G. (A)
McGehee, R. M. (A)
Meadow, W. L. (M)
Moore, C. H. (A)
Nelson, M. W., Jr. (A)
Oom, D. G. (A)
Overton, J. W. (A)
Pollard, J. W. (A)
Ramey, R. L. (A)
Reopelle, E. (A)
Rothstein, R. I. (A)
Russell, J. F., Jr. (A)
Sanford, B. E. (A)
Sloop, W. B. (A)
Smith, A. D., Sr. (A)
Speed, W. J. (M)
Stearns, H. F. (A)
Stephenson, J. W. (A)
Sugg, C. H. (A)
Thorne, M. G. (A)
Tompkins, E. H., Jr. (A)

Roanoke Rapids
Meares, C. W. (A)

Saluda
Boyle, H. R. (M)

Sanford
Buchanan, T. B. (A)
Kopriver, E. O. (A)

Shelby
Mathis, J. E. (A)

Wendell
Todd, M. C. (M)

Willard
Drew, G. W. (A)

Wilmington
Alexander, C. S. (A)
Aycock, E. H. (A)
Peebles, N. A. (A)
Shain, E. (A)

Wilson
Malone, W. H. (M)

Winston-Salem
Adkins, F. L., Jr. (A)
Arnold, H. H. (SM)
Baity, A. C., Jr. (A)
Bean, H. L. (A)
Beard, C. E. (VA)
Bernhard, H. H. (A)
Bertie, C. E. (A)
Bolston, L. (A)
Coan, J. O., Jr. (A)
Corderman, R. C. (SM)
Disher, R. S. (A)
Dresser, P. L. (A)
Dukes, J. D. (A)
Gegenheimer, W. C. (SM)
Gerth, J. H. (A)
Gordon, J. R. (M)
Haines, M. D. (A)
Hall, R. P. (A)
Hanks, W. R. (A)
Harmon, W. R., Jr. (A)
Hedrick, P. F. (SM)
Hege, A. L. (A)
Hoffman, W. R. (VA)
Hopper, F. L. (SM)
Huffman, J. C. (A)
James, B. O. (A)
King, L. C. (A)
Lanford, W. E. (A)
Leonard, A. B. (A)
Libby, V. A. (A)
McFarland, R. T. (M)
Merchant, S. W., Jr. (A)
Miller, J. R. (A)
Moore, W. C. (A)
Morgan, G. T. (A)
Morris W. L. (A)
Palmer, C. W. (SM)
Peters, R. A. (SM)
Porter, G. R. (A)
Reisenweaver, W. B. (M)
Rollick, W. D. (A)
Solerno, A. (A)
Sharpe, E. F. (A)
Siphers, J. W. (A)
Smith, C. M., Jr. (SM)
Smith, F. C. (A)
Spikula, R. W. (A)
Stavrou, N. C. (A)
Sugg, L. M. (A)
Tardiff, R. C. (A)
Tyack, L. C. (SM)
Van Cott, J. M. (A)
Van Doeren, C. A. (VA)
Ward, D. L. (A)

NORTH DAKOTA

Bismarck
Murdoch, J. P. (A)
Nelson, I. (M)
Zobel, E. R. (A)
Vavra, H. G. (A)

Dickinson
Smith, S. M. (A)

Fargo
Anderson, E. M. (A)
Foerster, A. C. (A)
Heiland, J. M. (VA)
Jallen, G. A. (A)

Grand Forks
Thomforde, C. (M)

Minot
Eri, D. G. (A)

Williston
Aalseth, E. P. (A)

OHIO

Akron
Barnett, C. B. (A)
Batcheldor, W. E. (A)
Berg, B. (M)
Berkey, R. H. (A)
Bock, A. W. (A)
Bosomworth, G. P. (VA)
Brands, F. W. (A)
Byrne, R. M. (M)
Chimera, V. J. (A)
Cleckner, D. C. (SM)
Colletti, N. (A)
Cooper, G. P. (A)
Curtis, W. P., Jr. (A)
Deuser, D. A. (A)
DiCaudo, V. J. (A)
Eddey, E. E. (A)
Felsman, W. O., Jr. (A)
Fordham, C. E. (A)
Forman, H. L. (A)
Funk, R. W. (M)
Gahres, R. S. (A)
Goedde, H. A. (A)
Guthrie, F. W. (A)
Halijak, C. A. (M)
Hively, R. L. (A)
Iix, E. W. (A)
Hogsed, H. B. (A)
Huffman, E. B. (A)
Hutchison, V. M. (A)
Jackson, D. H. (A)
JaQuay, P. T. (A)
Jonard, H. A. (A)
Kane, C. G., Jr. (A)
Kelly, K. O. (M)
Kime, J. M. (A)
Knopp, I. L. (M)
Lambert, C. O. (M)
Lanier, H. F. (M)
Leibowitz, S. (A)
Lewis, A. M. (A)
Miglicco, P. S. (A)
Miller, J. H. (A)
Monaghan, K. J. (A)
Nank, W. A. (A)
Nelson, J. L. (A)
Nerhood, H. E. (A)
Paden, H. R. (A)
Pasquier, C. J. (A)
Paxton, R. K. (A)
Peden, M. (A)
Phares, D. P. (A)
Redmond, J. F. (A)
Ringo, K. A. (A)
Roberts, L. H. (A)
Rohrich, C. G., Jr. (M)
Ryburn, P. W. (M)
Sabol, R. W. (A)
Shaffer, R. C. (M)
Smith, P. C. (SM)
Snooks, W. E. (A)
Strang, J. R. (A)
Stukey, L. E. (A)
Tass, M. H. (A)
Thurnes, D. F. (A)
Vaughan, R. L. (A)
Watkins, W. H. (A)
Weinsheimer, W. E. (A)
Weyrick, R. C. (A)
Winkler, M. A. (A)
Wright, J. L. (A)
Yarnall, W. M. (A)
Ziherl, E. J. (A)

Alliance
Newton, W. P. (M)
Smith, A. E. (A)
Welch, G. H. (M)

Amlin
Rife, W. E. (A)

Apco
Freeland, A. F. (A)

Arcanum
Weber, S. E. (A)

Astabula
Stevenson, L. M. (A)

Ashville
Young, P. D. (A)

Athens
Green, D. B. (VA)

Avon
Child, R. W. (A)
Gilbert, H. G. (A)

Avon Lake
Dobosy, J. F. (SM)

Barberton
Austin, A. O. (F)
Crom, H. D. (A)
Miller, D. A. (M)
Tompkins, F. G. (M)

Bay Village
Day, J. W. (A)
Friswold, F. A. (A)
Odel, M. P. (SM)
Schneider, P. (A)
Smith, C. W. (A)
Smith, T. H. (M)
Stickney, J. B. (A)

Beachwood Village
Petras, W. M. (A)

Bedford
Bell, A. R. (A)
Helber, C. A. (M)
Jerome, W. R. (VA)
Washko, F. H. (A)

Berea
Blackman, C. P. (A)
Epperson, J. B. (SM)
Hajny, E. J. (A)
Hulme, W. P. (A)
Sanderson, R. B. (A)
Sharp, E. M. (A)
Steele, S. E. (A)

Bethel
Krody, J. L. (A)

Bexley
Brooke, E. F. (M)

Bladen
Steele, C. T. (A)

Bluffton
Triplett, M. M. (A)
Triplett, W. R. (A)

Bowling Green
Synnamon, J. H. (A)

Brady Lake
Cory, R. W. (A)

Brecksville
Busalski, R. C. (A)
Csensich, J. E. (A)
Dietrich, J. W. (A)
Grace, C. H. (A)
Hutton, W. G. (SM)
Nace, A. S. (SM)
Sanderson, J. K. (M)
Strong, H. E. (A)
Ulrich, J. F. (VA)

Bridgeport
Snefsky, E. A. (A)

Brilliant
Morgan, W. S. (A)

Brooklyn
Wood, R. M. (M)

Brookville
King, H. B. (M)

Cable
Alty, R. L. (M)

Canton
Arnold, E. N. (A)
Beckerman, L. M. (A)
Burtner, R. L. (SM)
Cable, J. A. (A)
Coppock, R. A. (M)
Duff, J. E. (A)
Greenham, R. L. (A)
Harokopus, W. P. (A)
Jameson, W. B. (A)
Koenig, J. G. (A)
Leist, L. G. (M)
Matzinger, J. R. (M)
Phillips, W. M. (VA)
Phillips, W. S. (A)
Rexroad, R. A. (A)
Roderick, E. R. (A)
Rohrer, G. W. (M)
Vignos, J. P. (A)
Walker, N. S. (VA)

Centerville
Piety, E. W. (SM)
Puterbaugh, W. H. A)
Rineer, I. (A)

Chagrin Falls
Lowe, R. E. (A)
Shields, E. T. (A)

Chesterland
Aitken, K. M. (M)
Mumma, H. A., Jr. (A)

Cheviot
Spinner, L. N. (A)

Christiansburg
Ponticello, J. A. (A)

Cincinnati
Adams, C. E., Jr. (A)
Alberts, W. S. (SM)
Albright, G. F. (A)
Anderson, J. L. (A)
Ashman, A. B. (A)
Berberich, R. J. (A)
Bereskin, A. B. (SM)
Blair, D. (A)
Boothe, A. M. (A)
Bopp, C. (SM)
Boyle, I. G. (A)
Breunig, W. H. (A)
Brockway, R. M. (A)
Brooks, R. D. (SM)
Breuse, H. L. (SM)
Brussard, E. J. H. (SM)
Byard, E. J. (A)
Campbell, D. J. (A)
Cavanaugh, H. D. (A)
Chernikoff, L. (A)
Clement, L. M. (F)
Cook, H. L., Jr. (A)
Cramer, L. F. (A)
Davison, F. A. (A)
Delker, A. G., Jr. (A)
DeLorenzo, V. H. (A)
Doctor, B. (A)
Dold, C. W. (A)
Dowling, E. C. (A)
Drake, J. C. (M)
Duncan, D. B. (A)
Dutton, C. E. (VA)
Ebbeler, J. R. (M)
Edelsohn, C. R. (A)
Edwards, R. L., Jr. (A)
Einbinder, L. W. (A)
Elvis, J. C. (A)
Emmerling, E. J. (A)
Fenstermacher, A. L. (A)
Ferrell, D. (A)
Ficek, J. A. (A)
Fischer, R. E. (M)
Fontenot, R. J. (A)
Foster, A. P. (M)
Fox, W. F. (M)
Frommer, J. C. (SM)
Garcia, A. (A)
George, P. H. (A)
Georger, L. J. (A)
Gieringer, C. K. (SM)
Glover, D. (A)
Grosch, H. R. J. (SM)
Grosse, R. H. (A)
Gulden, W. W. (M)
Haehnle, C. G. (M)
Harmon, C. J. (A)
Heinzelman, G. J. (M)
Heller, E. A. (A)
Helmers, E. C. (A)
Hentz, E. G. (A)
Herb, A. P. (A)
Himes, H. D. (A)
Hoflein, H. F. (A)
Hoeltge, E. J. (A)
Hogan, C. M. (SM)
Holub, P. E. (A)
Hosea, R. A. (A)
Inderhees, J. A. (A)
Jenkins, R. A., Jr. (A)
Johnson, P. C. (A)
Johnson, W. C. (A)
Jones, E. M. (M)
Kay, E. D. (A)
Kilgour, C. E. (F)
King, F. W., Jr. (M)
Kirschner, A. G. (A)
Kiss, J. S. (M)
Kleinman, J. M. (A)
Knoblaugh, A. F. (M)
Koehring, N. G. (A)
Krueger, S. W. (A)
Kuck, B. M. (A)
Lambert, R. (A)
Lehman, R. H. (A)
Lehnhoff, R. G. (M)
Lepple, H. (M)
Linblad, T. N. (A)
Livezey, F. M. (A)
Lorah, P. W. (A)
Lucas, E. J. (A)
Luhn, P. J. (A)
Maher, R. A. (M)
Malbrain, J. P. (A)
Mason, J. M. (A)
McDonald, J. M. (SM)
McNeely, W. E. (A)
Mentink, A. F. (A)
Mette, R. J. (A)
Mever, A. (M)
Miller, R. E. (A)
Montgomery, W. D. (M)
Morse, C. (A)
Murphy, R. L. (A)
Murray, J. W. (A)
Nason, D. B. (M)
Nathan, R. (M)
Nebolsky, S. (A)
Needles, W. F., Jr. (A)
Nord, G. L. (M)
Novy, E. W. (M)
Ohmart, P. E. (M)
Overman, C. I. (A)
Patrick, W. B. (A)
Pohlman, R. B., Jr. (A)
Quitter, J. P. (M)
Ragen, J. R. (A)
Ransom, A. W. (A)
Rockwell, R. J. (F)
Rouse, R. J., Jr. (A)
Schenck, R. L. (M)
Schraer, L. J. (A)
Schroeder, W. R. (VA)
Schwarz, H. G. (A)
Scott, V. J., Jr. (A)
Shadley, F. C. (A)
Shaw, C. B., Jr. (A)
Sheese, O. C. (A)
Shirk, W. B. (M)
Siefker, R. G. (A)
Smith, W. R. (A)
Staab, P. C. (A)
Stacy, R. A. (M)
Starek, R. A. (A)
Stuhlbarg, S. M. (A)
Sutherland, R. V. (A)
Taylor, G. O. (M)
Tenenholtz, R. (A)
Timperman, E. J. (A)
Turrell, R. M. (M)
Tyberg, A. H. (A)
Uphaus, R. H. (A)
Vandoch, S. C. (A)
Ward, W. H. (A)
Warren, J. B. (A)
Wayne, W. C., Jr. (A)
Weber, C. E. (M)
Wedig, F. L., Jr. (SM)
Weinberg, D. (A)
Westerlund, K. I. K. (A)
Wetz, R. H. (M)
Whatley, R. L. (M)
Whatley, W. W. (A)
Williamson, G. F. (M)
Wilson, J. W. (A)
Winder, C. F. (A)
Winkle, L. (A)
Wood, J. J. (A)
Zimov, L. R. (A)
Zito, A. J. (A)

Cleveland
Ackerman, E. K. (SM)
Armstrong, H. L. (A)
Baerwald, H. G. (M)
Bakos, M. A. (M)
Banshak, W. G. (A)
Bartelme, R. R. (A)
Begun, S. J. (F)
Benkelman, G. F. (SM)
Berg, D. F. (A)
Blauvelt, R. C. (SM)
Blount, R. (M)
Bossard, G. L. (M)
Briggs, R. F. (M)
Brincka, J. J. (A)
Cameron, D. B. (M)
Campbell, J. H. (M)
Caponero, S. J. (A)
Caskey, H. B. (M)
Chase, W. H. (SM)
Chatterton, L. N. (A)
Coffe, S. A. (A)
Cornell, P. M. (A)
Collins, D. L. (M)
Crows, H. (A)
Crozier, R. W. (A)
Cull, R. R. (M)
Dannemiller, J. R. (A)
David, B. W. (SM)
Delany, R. H. (A)
Dietrich, E. S. (A)
Dittenberger, R. J. (A)
Dittoe, R. E., Jr. (A)
Elmendorf, D. E. (A)
Farr, H. J., Jr. (A)
Ferrier, J. M. (A)
Flack, S. G. (VA)
Frederico, B. D. (M)
Friedberg, M. R. (SM)
Friedman, T. B. (SM)
Galatl, V. J. (A)
Gehrke, E. P. (A)
Geiger, D. L. (A)
Gerhan, C. F. (A)
Germano, C. P. (A)
Glaeser, A. F. (A)
Granger, L. V. (M)
Grasson, W., Jr. (A)
Gross, I. A. (SM)
Guild, E. G. (A)
Haas, M. L. (A)
Heckelman, R. W. (A)
Heller, H. H. (M)
Hill, J. S. (SM)
Himelar, S. L. (A)
Hooper, J. R., Jr. (A)
Hoover, P. L. (SM)
Howard, W. A. (M)
Humprey, A. J. (A)
Humrick, R. J. (A)
Ingledue, E. F. (M)
Johns, L. T. (M)
Kantura, R. G. (A)
Karbo, D. J. (A)
Kazarian, R. (A)
Keachie, J. H. (SM)
Keithley, J. F. (M)
Ketchum, J. R. (A)
Kinkaid, J. C. (A)
Kres, A. J. (A)
Langevin, R. A. (M)
Leemon, W. (A)

Leonard, S. E. (SM)
Lister, G. H. (SM)
Lomaz, D. D. (A)
Lotzow, M. F. (A)
Ludwig, S. (M)
Managan, W. W. (M)
Marsal, P. (M)
Mason, N. O. (A)
McCollister, D. R. (A)
McNeel, E. L. (A)
Meder, R. (A)
Morrow, L. A. (M)
Nash, H. C. (A)
Newborg, D. S. (A)
Newell, P. A. (A)
Oberrender, G. F., Jr. (A)
Oestermeyer, C. F. (A)
O'Gara, J. J. (A)
Petrarca, T. (A)
Pettus, R. (A)
Piwonka, W. G. (A)
Plakadis, A. P. (VA)
Potter, N. M. (VA)
Roeger, R. E. (A)
Schneider, R. F. (A)
Schramm, F. B. (M)
Schwaller, F. A. (A)
Seaton, G. (A)
Seldner, K. (A)
Semenhuk, M. H. (A)
Seybold, J. F. (A)
Shandy, G. P. (M)
Sheetz, J. I. (A)
Sherman, K. S. (SM)
Shipley, L. L. (A)
Sindelar, E. E. (A)
Snedeker, M. L. (M)
Stoffel, L. L. (A)
Temes, C. L. (A)
Thayer, J. W. (A)
Trebules, V. W. (M)
Ulmer, R. M. (A)
Unger, J. W. (A)
Van Arsdale, L. Jr. (SM)
Venderland, R. N. (A)
Vinton, B. W. (M)
Watson, B. S. (A)
Weiss, W. A. (A)
Wells, M. (A)
Welman, V. A. (A)
Wermelskirchen, L. M. (A)
Westbrook, R. D. (A)
Whipple, G. D. (M)
Whittemore, W. K. (A)
Yochelson, S. (A)

Cleveland Heights
Brown, C. W. (A)
Eggerding, H. B. (A)
Field, B. W. (A)
Fox, R. A. (SM)
Horwitz, G. (A)
Hudson, A. E. (A)
Johannesen, J. D. (A)
Kline, L. H. (M)
Koeblitz, W. E. (A)
Mattiat, O. E. (A)
Newman, H. B. (A)
Rogert, H. E. (A)
Rubin, J. E. (A)
Scott, E. P. (A)
Shearer, R. L. (M)
Smith, C. E. (SM)
Stevens, H. E. (M)

Clifton
Evans, S., Jr. (A)

Clinton
Caulkins, F. A. (M)
Holler, J. R. (M)

Columbus
Anthony, G. E. (A)
Antonevich, J. N. (A)
Autery, R. M. (A)
Bacon, J. (A)
Bauer, W. (M)
Beer, A. C. (A)
Benedict, G. R. (A)
Bertsch, R. A. (A)
Betz, C. R. (A)
Bollinger, L. E. (A)
Boone, E. M. (SM)
Bridges, D. B. J. (A)
Bryant, L. L. (A)
Bulman, W. E. (A)
Carter, C. J. (A)
Chope, W. E. (A)
Clutter, E. C. (A)
Cohen, M. H. (A)
Cornetet, W. H., Jr. (A)
Cosgriff, R. L. (A)
Crane, N. B., Jr. (A)
Crowley, T. H. (A)
Damon, E. K. (A)
Dankworth, J. F. (A)
Dawirs, H. N. (A)
DeJonghe, J. J. (A)
Dew, C. G. (A)
Dunson, P. M. (A)
Eckhardt, F. (A)
Frohlich, R. C. (A)
Gay, J. W. (A)
Gebhardt, C. C. (A)
Glancy, D. R. (M)
Goldis, B. A. (A)
Guernsey, E. D. (A)
Havermann, C. L. (A)
Hayden, J. R. (A)
Higgy, R. C. (SM)
Hines, J. N. (A)
Huffman, D. A. (A)
Huffman, D. L. (A)
Kouyoumjian, R. G. (A)
Kraus, J. D. (SM)
Kreis, R. J. (A)
Lawrence, G. M. (A)
Leonard, J. D. (A)
Levis, C. A. (A)
List, B. H. (A)
Lodge, L. L. (A)
Lorenz, T. J. (A)
Maier, R. H. (A)
Martin, R. E. (A)
Masters, R. W. (SM)
Matt, S. (A)
McNichols, H. B. (A)
McPherson, G., Jr. (M)
Mendenhall, W. S., Jr. (A)
Merrill, R. L. (M)
Metzmaier, M. E. (A)
Middleton, A. E. (A)
Molloy, G. P. (SM)
Mueller, G. E. (SM)
Nafzger, L. H. (VA)
Orr, W. (A)
Papier, J. H. (A)
Pattee, H. E. (A)
Peters, L., Jr. (A)
Pressel, P. I. (A)
Radley, S. A. (A)
Randall, J. E. (A)
Reynolds, F. D. (A)
Roehm, J. D. (A)
Rumsey, V. H. (SM)
Sackett, W. T., Jr. (A)
Schneider, H. U. (A)
Seale, C. L. (A)
Sharr, P. C. (A)
Shepherd, L. P. (A)
Sherwood, E. M. (VA)
Slanti, W. (A)
Sloan, C. B. (M)
Stember, L. H., Jr. (A)
Stewart, J. A. (A)
Tamplin, G. R. (A)
Thurston, M. O. (SM)
Tice, T. E. (A)
Tracy, R. C. (A)
Truxall, F. W. (A)
Walter, C. H. (A)
Warren, C. E. (SM)
Webster, R. E. (A)
Weimer, F. C. (M)
Wetherbee, J. K. (A)
Williams, J. C. (A)
Wolf, F. A. (A)
Wolfe, P. N. (A)
Yaw, D. F. (A)
Young, D. A. (VA)
Young, G. W. (A)

Conneaut
Dvorsky, A. L. (A)
Elston, J. A. (A)
Keskinen, A. R. (SM)
Morrell, G. A., Jr. (A)
Ryan, W. J. (A)

Cuyahoga Falls
Boyce, W. E. L. (A)
Chapman, C. M. (A)
Davis, H. P. (A)
Diamantides, N. D. (A)
Flowers, H. L. (SM)
Hartig, E. O. (A)
Hegbar, H. R. (SM)
Henry, J. R. (A)
Hines, T. H. (A)
Holmes, G. A. (A)
Horton, M. C. (A)
Kennedy, E. D. (SM)
McCauley, C., Jr. (M)
McLaughlin, F. G. (A)
Meneley, C. A. (M)
Miller, R. F. (A)
Morrill, C. D. (M)
Nellis, R. E. (A)
Pamler, R. G. (M)
Saunders, S. R. (A)
Shackelford, W., III (M)
Sibila, K. F. (A)
Smith, B., Jr. (SM)
Steiner, W. L. (M)
Toman, W. J. V. (M)
Tracy, T. J. R. (A)
Trutko, J. M. (A)
Waldvogel, J. (M)

Damascus
Tary, J. (A)

Dayton
Adams, E. L. (SM)
Aldrich, F. W., Jr. (A)
Akin, P. A. (A)
Aleo, J. (A)
Allard, L. C., Jr. (A)
Allen, C. F. (A)
Allen, F. W. (A)
Althouse, J. M. (A)
Amundson, F. A. (A)
Anderson, D. (M)
Anderson, J. C. (A)
Andrew, G. W. (SM)
Anglin, D. (A)
Appleford, L. R. (A)
Amrhein, O. C. (A)
Arenstein, G. H. (SM)
Arnold, G. C., Jr. (A)
Aschbacher, S. J. (A)
Bahret, W. F. (A)
Baker, W. H. (M)
Baran, M. (M)
Barker, W. J. (M)
Bassett, D. M. (SM)
Beck, S. A. (A)
Becker, R. H. (A)
Beresford, H. E., Jr. (A)
Berge, R. L. (A)
Biddle, W. G. (M)
Birochak, E. (A)
Blacksmith, P., Jr. (A)
Blasi, E. A. (SM)
Boario, W. R. (A)
Bordewisch, J. F. (A)
Boehme, C. D. (A)
Borgelt, E. H. (A)
Braden, P. F. (A)
Braun, W. G. (M)
Braverman, N. (A)
Brothers, A. L., Jr. (M)
Bruns, C. R. (A)
Bryan, C. R., Jr. (A)
Bunnell, W. J. (A)
Butler, G. T., Jr. (A)
Byrd, E. W. (A)
Carothers, F. S., Jr. (A)
Carpantier, V. J. (M)
Chamberlain, W. S. (A)
Chapman, J. M. (A)
Charnock, L. J. (SM)
Cherpeski, R. P. (M)
Christian, H. K. (A)
Cichanowicz, H. J. (A)
Clark, A. H. (M)
Clark, P. H. (SM)
Clute, D. G. (M)
Cochran, E. V. (A)
Coffin, W. R. (M)
Cohen, G. S. (A)
Combs, J. A. (A)
Conrad, C. G. (M)
Cook, K. W. (A)
Cooper, E. H. (M)
Cooper, R. E., Jr. (A)
Copp, R. S. (A)
Couch, P. W. (A)
Coyne, J. M., Jr. (A)
Cox, S. M. (A)
Cronin, W. M. (SM)
Curp, W. C. (A)
Daggett, E. H. (A)
Davis, C. E. (M)
Day, J. G. (A)
Deeken, J. W. (A)
DeLuna, J. (M)
Dennis, J. L. (SM)
Desch, J. R. (A)
Dicke, A. H. (A)
Dietrich, D. J. (M)
Dixon, J. E. (A)
Duckwitz, W. G. (SM)
Dunn, F. S. (A)
Eames, F. M., Jr. (A)
Easley, L. E. (M)
Eckert, C. C. (SM)
Edwards, D. F. (A)
Elbeck, A. C. (A)
Elfenbein, W. (A)
Ellis, C. E., Jr. (A)
Ely, C. H. (A)
Falkowski, A. J. (M)
Fanning, G. B. (A)
Federlin, H. M. (M)
Fedotin, L. S. (A)
Felk, R. L. (SM)
Fensler, W. E. (M)
Ferguson, J. L. (A)
Fessler, A. L. (M)
Finders, R. M. (A)
Finocharo, J. J. (M)
Fisher, P. A. (A)
Flanningam, L. A. (A)
Foreman, J. J. (A)
Fouse, G. T. (SM)
Framme, R. J. (SM)
Franklin, C. S. (A)
Fried, W. R. (A)
Friedman, H. (M)
Galbraith, H. J. (A)
Galyean, M. W. (A)
Gardner, B. R. (A)
Garrett, E. T. (A)
General, J. (SM)
Georgi, J. P. (A)
Gerdemann, E. A. (A)
Gerdes, C. V. (A)
Gerling, J. E. (A)
Getty, J. N. (A)
Gibbons, T. J. (SM)
Gibbs, L. L. (A)
Ginsberg, M. P. (M)
Glan, G. (SM)
Glidewell, J. J., Jr. (A)
Goff, W. S., Jr. (A)
Goldfarb, B. J. (SM)
Goldman, A. (SM)
Goodman, I. (A)
Gould, G. T., Jr. (A)
Gregersen, K. J. (A)
Griffing, B. L. (SM)
Grillmeier, E. J. (A)
Groszewski, D. J. (M)
Guernsey, G. F. (SM)
Gulden, E. V. (M)
Hallman, L. B., Jr. (F)
Harmon, W. L. (A)
Harnett, R. J. (A)
Hartwigsen, C. K. (A)
Hartzell, R. A. (A)
Hauser, P. D. (M)
Hayes, T. J. (M)
Hazlett, W. D. (A)
Heffner, P. V. (A)
Helbig, E. M. (A)
Helldoerfer, C. S. (M)
Heller, C. J. (A)
Hemler, C. E. (A)
Henderson, A. B. (SM)
Herzog, W. F. (A)
Hesse, A. W. (A)
Heyd, J. W. (SM)
Hill, M. A. (M)
Hilsabeck, D. M. (M)
Hilt, W. M. (A)
Hinman, W. H. (A)
Hirshfield, J. L. (A)
Hitzenhammer, A. (SM)
Holloway, F. L. (SM)
Hood, W. L. (M)
Horrigan, J. S. (A)
Houpis, C. H. (A)
Huckaby, J. H. (A)
Huff, R. L. (A)
Hull, R. S. (SM)
Huster, L. W. (A)
Hutchinson, J. H. (A)
Hyre, C. C., Jr. (A)
Ittelson, R. W. (SM)
Jackson, W., Jr. (A)
Jacobs, M. (SM)
Jacobs, Y. (A)
Jacoby, G. R. (A)
Jacques, G. E. (A)
Jaeger, J. H. (M)
Jaffe, L. (M)
James, R. L. (M)
Javorsky, J. J. (A)
Jerrell, J. H. (A)
Jesurun, M. M. (A)
Jira, J. W. (M)
Johnson, D. A. (A)
Johnson, R. A. (M)
Jones, E. A. (A)
Jones, L. K., Jr. (A)
Jones, W. D. (M)
Jordan, D. M. (VA)
Jugend, H. E. (A)
Keller, C. N. (A)
Kennedy, J. B. (A)
Kearns, J. H., III (A)
Kercher, R. B. (A)
Kern, J. I. (A)
Kesler, C. K. (A)
Kester, R. E. (SM)
Keto, J. E. (F)
Kidd, G. B. (VA)
Kilheffer, L. D. (SM)
Kilroy, J. W. (M)
Knight, A. R. (SM)
Koenig, P. E. (SM)
Kohls, G. F. (A)
Kozloff, V. S. (A)
Kreitzburg, H. L., Jr. (M)
Krenzer, B. A. (M)
Kress, O. C. (A)
Kuhlman, P. W. (VA)
Lafferty, R. E. (A)
Lahn, F. C. (A)
Lairmore, G. E. (A)
Langston, G. A. (A)
Laschever, N. L. (SM)
Lathrop, R. C. (A)
Lauth, R. E. (A)
Lawrence, J. T. (M)
Lawson, S. A. (A)
Lawyer, J. E. (A)
Lay, C. A., Jr. (A)
Lees, B. J., Jr. (A)
Levine, D. (M)
Leonard, H. O., Jr. (A)
Lewis, L. F. (A)
Linder, W. J. (M)
Littell, C. C., Jr. (M)
Lloyd, L. H. (M)
Lockwood, G. C. (A)
Long, B. J. (A)
Long, L. E. (SM)
Long, R. E. (M)
Lord, A. S. (A)
Lucid, J. R. (A)
Mackin, R. J. (A)
Magee, T. H. (A)
Marshall, C. J. (SM)
Marvin, P. R. (SM)
Matthews, A. R. (M)
Mawdsley, R. L. (SM)
Mays, G. L. (A)
McCarter, H. R., Jr. (A)
McCoy, O. Z. (A)
McCready, K. F. (M)
McElroy, G. A. (A)
McIlrath, R. J. (A)
McLaughlin, C. E. (M)
McLennan, M. A. (M)
McRae, A. H. (M)
Mehron, M. E. (A)
Mendelson, D. A. (A)
Merwin, R. L., Jr. (A)
Meuche, C. H. (M)
Meyer, B. W. (A)
Michalski, E. H. (A)
Mikaelian, M. (A)
Miller, L. G. (A)
Moody, R. B. (A)
Moore, D. R. (A)
Moore, W. E. (A)
Morrison, C. L. (A)
Mumma, R. E. (SM)
Murray, P. R. (SM)
Myers, R. P. (A)
Myszko, R. (A)
Nelson, J. L. (A)
Nelson, N. A. (A)
Nettleingham, M. D. (A)
Nicholson, J. K. (A)
Nielson, W. C. (A)
Niersteimer, P. H. (A)
Noble, J. C. (M)
Noland, J. W. (A)
Oebels, C. J. (A)
O'Neil, W. F. (A)
Ostrem, R. E. (A)
Overcash, F. J. (A)
Overholser, W. E. (A)
Overholt, R., Jr. (SM)
Owen, H. W. (SM)
Palm, W. A. (A)
Parker, A. P. (VA)
Parkinson, G. A. (A)
Pasek, J. (A)
Perdzock, R. C. (A)
Perper, L. (SM)
Peters, A. L., Jr. (SM)
Peters, J. C. (A)
Peterson, L. (A)
Petit, A. H. (SM)
Phillips, S. C. (A)
Pinson, C. C. (A)
Pitinsky, L. (M)
Povlis, A. (A)
Raabe, H. P. (A)
Rappaport, G. (SM)
Raso, F. A. (A)
Rautio, R. W. (A)
Rawhouser, R. (M)
Reck, W. A. (A)
Reeves, O. T. (A)
Regnier, L. A. (A)
Rice, K. J. (A)
Richards, E. L. (M)
Richmond, L. P. (SM)
Ridenour, P. W. (M)
Robbins, C. G. (A)
Robertson, L. C. (A)
Rogers, A. J. (SM)
Root, L. W. (M)
Rose, L. H. (SM)
Rothammer, W. H. (SM)
Rottenberg, M. J. (A)
Rounds, J. M. (A)
Ruble, H. E. (M)
Russ, F. J. (SM)
Russell, H. J. (A)
Rychlik, R. F. (SM)
Rynda, T. C. (A)
Sadow, R. M. (A)
Sandor, L. K. (M)
Sarullo, M. J. (A)
Sather, R. O. (SM)
Schantz, G. W. (A)
Scheer, G. H., Jr. (SM)
Schmeck, J. S. (A)
Schoenberger, W. J. (SM)
Schommer, G. R. (A)
Schonover, R. W. (A)
Schoonover, W. C. (A)
Schram, S. M., Jr. (SM)
Schreiber, E. J. (M)
Schulherr, R. M. (A)
Schwenneesen, A. B. (M)
Scott, S. D. (A)
Selover, E. E. (A)
Sen, W. J. (SM)
Senecal, T. L. (M)
Shannon, F. J., Sr. (SM)
Shelton, J. T. (A)
Shipp, R. L., Jr. (M)
Shively, D. F. (A)
Showen, L. (SM)

Siek, J. R. (A)
Siff, R. G. (A)
Sinex, C. H. (SM)
Smith, D. A. (A)
Smith, D. I. (A)
Smith, F. W. (A)
Sonnanstine, E. H., Jr. (A)
Spector, M. S. (A)
Spence, R. F. (A)
Springer, L. D. (A)
Springer, P. W. (SM)
Stankosky, J. J. (M)
Stanton, J. S. (M)
Stapp, I. P. (A)
Stimmel, R. G. (A)
Stolzenbach, R. W. (M)
Storck, H. C. (M)
Stouch, D. H. (A)
Striebel, D. R. (A)
Sturgill, L. G. (M)
Summers, W. P. (A)
Swanson, W. V. (A)
Tarrants, G. (A)
Taylor, P. B. (SM)
Teegarden, J. W. (A)
Thomas, C. P. (A)
Thomas, E. R. (A)
Thorp, H. R. (A)
Thumser, L. F., Jr. (A)
Tomberg, S. (A)
Turner, E. M. (M)
Underwood, C. J. (A)
Vangunten, L. F. (M)
Van Horn, J. W. (A)
Velesky, J. J. (M)
Vendely, B. (A)
Voltaggio, F., Jr. (A)
Wahl, A. (A)
Wallace, J. F. (A)
Wallin, W. (M)
Walsh, J. D. (A)
Wamboldt, H. (A)
Warner, W. V. (A)
Warshawsky, L. M. (A)
Warwick, J. D. (A)
Watton, A., Jr. (SM)
Webb, W. C., Jr. (A)
Wehner, G. L. (A)
Wehner, G. K. (M)
Wehrman, R. B. (A)
Weiner, G. (A)
Weis, C. F. (A)
Weiss, E. J. (A)
Weissman, S. (SM)
Welch, C. A. (A)
Wells, M. M. (SM)
Whelan, R. E. (A)
White, S. B. (A)
Wiegert, P. G., Jr. (M)
Wieland, E. S. (A)
Williams, H. L. (A)
Wilkinson, J. E. (A)
Winbigler, W. K. (A)
Winn, W. S. (A)
Winston, C. B. (A)
Winters, W. D. (A)
Wolf, E. W. (A)
Wolford, C. E. (A)
Wollin, E. (A)
Wong, M. S. (A)
Worthington, D. T. (A)
Wright, T. O. (A)
Wyse, D. S. (A)
Wyse, H. G. (A)
Yarbrough, L. A. (M)
Yolles, J. (SM)
Yoshida, H. (A)
Young, J. K. (A)
Young, L., McC. (SM)
Zeun, W. C. (A)
Zieman, C. M. (A)
Zimmerman, R. F. (M)
Zwissler, H. R. (A)

Deer Park
Sheridan, C. J. (A)

Defiance
Hanna, R. N. (A)

Delaware
Poast, L. M. (VA)

Doylestown
Nuss, R. J. (A)

East Cleveland
Rety, E. E. (A)
Schunemann, C. F. (M)
Stein, L. E. (A)
Ward, D. O. (A)
Foulks, E. D. (A)

Elmore
Bay, R. J. (A)

Elyria
Finegold, I. (A)
Mull, H. R. (SM)

Enon
Bartman, H. M. (A)
Garman, D. F. (A)

Euclid
Calderhead, H. J. (M)
Frenk, D. R. (A)
Hitt, J. J. (A)
Pfaff, R. W. (A)
Yeager, J. R. (A)
Zbacnik, E. V. (A)

Fairborn
Anderson, H. L. (A)
Archer, C. J. (SM)
Baer, C. E. (SM)
Blasingame, J. J. (M)
Carroll, C. F. (SM)
Chin, W. Y. (A)
Ebert, H. P. (A)
Faust, R. L. (A)
Fish, R. L. (A)
Halverson, R. P. (A)
Helms, W. B. (A)
Hines, C. A. (A)
Knight, L. B. (M)
Kouri, F. G. (SM)
Levy, J. (A)
Lieber, M. (A)
Mayer, I. S. (SM)
McLean, M. H. (A)
Mead, C. E. (A)
Miller, F. P. (A)
Miller, G. S. (A)
Quam, D. L. (A)
Reber, J. H. (A)
Rizos, J. G. (SM)
Scott, J. E. (SM)
Stecher, LeR. (A)
Thom, A. R. (M)
Timineri, A. A. (A)
Vanderpool, H. D. (A)
Varga, M. J., Jr. (A)
Whitlock, R. S. (A)

Findlay
Truman, L. N. (A)

Foster
Porter, J. R. (A)

Fostoria
Peck, J. L. (A)

Franklin
Bryant, V. D. (M)

Fremont
Berlincourt, D. (A)
Leite, R. C. (A)
Swartzlander, G. W. (A)

Gahanna
Daugherty, W. M. (A)

Galion
Blashfield, W. H. (A)
Crissinger, W. W. (A)
Haferd, F. H. (A)
Lewis, F. C. (A)
Murphy, C. E. (A)
Van Valkenburgh, R. (A)

Garfield Heights
Kress, M. (A)
Manley, E. B. (A)

Genoa
Nitschke, N. C. (A)

Germantown
Burns, J. H. (A)

Girard
Williams, W. C. (A)

Glendale
Mark, W. R. (A)

Grafton
Wack, C. B. (A)

Granville
Clark, J. V. (A)
Marlow, W. C. (VA)
Taylor, L. L. (A)

Greenhills
Wahl, A. C. (M)

Groveport
Minor, W. C. (M)

Hamilton
Bange, J. B. (A)
Leet, D. N. (A)
Mize, J. L. (A)
Purdy, J. A. (A)
Staege, S. A. (VA)
Stump, A. M. (M)
Wear, J. (A)
Winkeljohann, A. (A)

Hubbard
Werner, S. A. (A)

Huron
Wilber, B. E. (A)

Ironton
Loftis, H. J. (VA)

Kent
Cobbs, E. R. (A)
Wightman, E. E. (M)

Kingston
Leasure, R. B. (M)

Lafferty
Sulek, F. (A)

Lakewood
Bidlack, C. S. (VA)
Bledsoe, R. E. (A)
Hamman, G. B. (M)
Jacob, W. P. (M)
Matz, W. C. (A)
Pierce, R. M. (SM)
Reeves, H. J. (A)
Seielstad, H. D. (SM)
Thacker, C. E. (A)
Webner, R. D. (M)
White, G. M. (M)

Lancaster
Gamble, E. H. (SM)
Good, J. A. (M)
Iler, G. W. (A)
Magestro, J. C. (A)

Lebanon
Wadsworth, N. L. (A)

Leipsic
Barber, L. E. (A)

Lockland
Heising, C. R. (A)

Logan
Ricketts, F. E. (M)

Lorain
Goodell, W. A. (M)
Heisner, D. A. (M)
Herrick, R. H. (SM)
Huge, H. M. (A)
Kauffman, H. C. (M)
McKee, J. M. (A)
Romoser, P. E. (A)

Louisville
Boudler, A. G. (A)

Loveland
Hancock, H. E. (M)
Reed, J. E. (A)
Sparks, B. H. (A)

Lyndhurst
Dalasta, F. (M)

Macedonia
Weaver, J. H. (A)

Madeira
Schneider, C. A. (M)

Mansfield
Cassidy, R. J. (M)
Kissel, M. M. (A)

Maple Heights
Crail, C. C. (M)
Radcliffe, T. J. (A)

Marietta
Clark, C. E. (A)

Mason
Walker, R. E. (A)

Massillon
Schwab, C. B. (M)

Maumee
Corkey, V. B. (A)

Medway
Cool, P. E. (A)
Soorin, A. J. (A)

Miamisburg
Gnagey, L. B. (A)
Schreiber, P. W. (A)

Middletown
Christner, E. N. (VA)

Mingo Junction
Crisante, A. E. (A)

Mt. Healthy
Bass, H. (SM)
Holst, P. F. G. (SM)

Mt. Vernon
Woodward, R. O. (A)

Munroe Falls
Purcell, W. E. (A)

Napoleon
Roessing, E. F. (A)

New Carlisle
Clark, T. P. (A)
Goode, R. M. (M)
Jeffers, G. N. (A)
Lewis, La. V. (A)
Lower, R. (SM)
Maxim, W. A. (A)
Shanteau, N. G. (A)

New London
Eddleston, J. H. (A)

Newton
Earle, E. W. (A)
Martin, D. W. (M)

New Washington
Kreim, W. J. (A)

North Canton
Bushnell, R. H. (A)
Gray, D. W. (M)
Haas, D. L. (A)
Stahl, M. D. (VA)
Wehl, G. E. (A)
Zurcher, L. A. (A)

No. College Hill
Stewart, A. W. (M)

N. Olmsted
Kennedy, D. D. (M)
Weiler, R. J. (A)

Norwalk
Greulich, H. J. (A)

Norwood
Eisemann, R. K. (A)
Willsey, R. H. (A)

Oakwood
Colwell, R. E. (SM)

Oberlin
Howe, C. E. (M)
Young, M. L. (A)

Orrville
Rouvalis, G. (A)

Ottawa
Forbush, E. G. (A)
Goodkin, S. S. (A)
Schoonover, D. J. (A)

Oxford
Teetzel, F. M. (A)

Painesville
Plaisted, R. J. (A)

Park Ridge
Passow, E. B. (SM)

Parma
Berardi, C. S. (A)
Bloyd, J. E. (A)
Cervenak, E. D. (A)
Dombey, W. C. (A)
Hoff, H. B. (M)
Lippert, G. R. (A)
Miller, K. W. (A)
Millin, I. (A)
Satava, C. R. (A)
Schindler, R. W. (A)
Sommer, R. A. (A)
Tuma, W. S. (A)
Willard, R. C. (A)

Parma Heights
Boyd, B. (M)
Brinkman, H. A. (A)
Chandler, J. A. (A)
Prusha, G. J. (A)

Perrysburg
Forman, H. R. (A)
Griss, C. H. (M)

Piqua
Sprinkle, R. E. (M)

Portage
Klopfenstein, L. R. (A)

Port Clinton
Hrupcho, J. J. (A)
Morgan, W. O. (A)
Wozniak, A. J. (A)

Portsmouth
Gilmer, C. J. (A)

Ravenna
Braden, W. V. (A)
Meilander, W. C. (A)
Morton, R. F. (A)

Reynoldsburg
Walker, K. A. (A)

Rocky River
Douglass, J. D. (A)
Mentzer, P. K. (M)
Stover, F. J., Jr. (A)

Rossford
Perch, D. F. (A)

St. Bernard
St. Villiers, D. R. (A)

St. Clairsville
Skoff, J., Jr. (A)

Sandusky
Conlin, H. T. (A)
Derrick, W. A. (A)
Edwards, D. E. (A)
Fraser, R. J. (A)
Freyberg, J. A. (A)
Henry, W. E. (A)
Hummer, E. W. (A)
Kenyon, H. S. (SM)
Larkin, E. D. (A)
Searle, L. M. (M)
Wild, J. H. (A)

Shaker Heights
Gotschall, G. D. (A)
Kail, W. F. (A)
Rickards, W. H. (A)
Seidman, S. M. (A)
Slor, A. D. (A)

Sharonville
Gorker, G. E. (A)
Kerhulas, A. T. (A)

Shelby
McPherson, R. W. (A)

Sidney
Ulman, W. H. (A)
Wibel, D. (A)

Silverton
Bertram, M. A. (A)

South Euclid
Davis, W. C. (SM)
Louden, W. C. (A)
Lowenstein, J. F. (A)
Monroe, R. T., Jr. (A)

Springfield
Abbitt, C. W. (A)
Adamson, L. B. (M)
Beedy, R. (A)
Bell, A. L. (SM)
Bockenstedt, P. J. (A)
Carey, R. M. (M)
Castillo, H. T. (A)
Cunningham, H. W. (A)
Davis, C. R. (A)
Farinet, F. A., Jr. (A)
Gross, E. H. (A)
Hockman, P. E. (M)
Jones, T. G., Jr. (A)
McLaughlin, I. L. (A)
Nizyborski, E. S. (A)
Parker, A. J. (A)
Pauly, E. C. (A)
Pingel, N. D. (A)
Rosenberg, H. J. (SM)
Stuetzer, O. M. (A)

Spring Valley
Cunningham, R. F. (SM)
Hearsum, D. R. (M)
Holt, T. (A)
Horst, W. R. (A)

Stow
Andresen, G. J. C. (A)

Sugar Creek
Machan, R. D. (A)

Sylvania
Boudouris, A. (M)

Tallmadge
Farnsworth, N. B. (M)

Terrace Park
Jordan, J. F. (M)

Tiffin
Hartman, R. E. (A)

Toledo
Ambrose, J. (A)
Beins, J. K. (M)
Birk, E. V. (A)
Bitter, A. R. (SM)
Brown, W. R. (A)
Cameron, D. F. (M)
Chapman, L. B. (A)
Costanzo, P. A. (M)
Czajka, R. F. (A)

Drescher, L. L. (A)
Eash, G. H. (A)
Ewing, D. J., Jr. (A)
Ferguson, M. L. (A)
Flick, J. R. (A)
Galambos, L. G. (A)
Garing, H. R. (M)
Gramhich, H. F. (A)
Hawley, F. S. (A)
Hedler, R. C. (A)
Herrick, K. P. (A)
Ingersoll, G. F. (A)
Jakab, J. J. (A)
Kearney, J. P. (SM)
Keck, M. W. (M)
Ketcham, A. R. (M)
Kirchenbauer, C. C. (SM)
Kistner, H. R. (A)
Kitchen, F. J. (A)
Kotlewski, J. P. (A)
Laker, F. J., Jr. (A)
Larson, R. G. (M)
Lippmann, R. J. (A)
Marsh, R. H. (A)
McCown, W. E. (A)
Meeker, J. G. (A)
Melcher, R. J. (A)
Morrison, E. (A)
Nagy, L., Jr. (A)
Neuert, H. L. (VA)
Parker, B. G. (A)
Petty, D. E. (A)
Pierce, E. W. (A)
Plummer, J. H. (M)
Radeloff, R. C. (A)
Rowe, H. N. (M)
Rynder, L. S. (A)
Schnell, W. S. (A)
Schoor, V. M. (A)
Sexton, E. M. (M)
Seybold, R. E. (A)
Sheehan, F. J. (A)
Sprengel, W. L. (A)
Stringfellow, W. M. (SM)
Swiderski, E. F. (A)
Szymkowiak, E. (A)
Thomson, C. R. (M)
Thorpe, C. R. (A)
Vincent, H. B. (SM)
Wade, E. H., Jr. (A)
Walker, R. J. (A)
Weeber, R. E. (A)
Yang, T. (A)
Yen, J. T. (A)

Trotwood
Barkley, M. M. (SM)

Troy
James, F. E. (A)
Schmidt, H. J. (A)

Union
Apple, R. C. (VA)

Uniontown
Perry, R. C. (A)

University Heights
Bletcher, A. L. (A)
Goldfarb, J. (A)
Haas, A. N. (A)
Roth, M. S. (M)

Vandalia
Collier, E. C. (A)
Johnston, H. C. (SM)
Kienker, J. E. (A)
Mayer, J. M. (A)

Van Wert
Conley, W. H. (A)
Lindsay, J. T. (A)

Wadsworth
Blair, L. R. (A)

Warren
Atwood, W. L. (SM)
Ensall, T. (M)
Parlas, J. L. (M)

Warrensville
Sahli, B. E. (A)

W. Carrollton
Crystal, A. H. (A)
Miller, R. A. (M)
Williamson, J. A. (A)

Westlake
Fletcher, E. S. (SM)

West Portsmouth
Wiltshire, R. S. (A)

W. Richfield
Bear, N. (A)

W. Toledo
Rees, V. C. (A)

Wickliffe
Schilling, M. O. (M)

Willoughby
Goodman, P. D. (M)
Mason, R. F. (A)

Wooster
King, R. E., Jr. (A)

Worthington
Crooks, R. K. (SM)
Davis, W. C. (M)
Gahm, W. L. (A)
Kean, P. M., Sr. (A)
Neubauer, R. A. (A)
Van Buskirk, R. C. (A)
Work, R. A., Jr. (A)

Wyoming
Bolenbaugh, R. K. (M)
Diehl, J. A. (A)
Walcher, J. F. (A)

Xenia
Anderson, C. W. (VA)
Arment, D. E. (A)
Bird, G. T. (M)
Doran, R. J. (SM)
Ferch, B. C. (A)
Georgia, A. (M)
Halonen, C. A. (A)
Manor, N. D. (A)
Mead, W. L. (M)
Morgan, D. E. (A)
Noble, H. V. (SM)
Nordlund, R. J. (SM)
Palmer, J. C. (A)
Wogan, R. S. (A)

Yellow Springs
Carr, D. L. (A)
Colbert, C. (SM)
Hollinrake, J. M. (A)
Maunder, E. R. (A)
Raney, J. J. (SM)

Youngstown
Cherpack, J., Jr. (A)
Conroy, M. J. (A)
Dieringer, F. A. (VA)
Kikta, E. J. (A)
Phillips, R. G. (A)
Smail, J. P. (A)

Zanesville
Hunt, W. A. (M)
Thompson, C. O., Jr. (A)

OKLAHOMA

Atoka
Glover, B. W. (M)

Bartlesville
Adams, M. M. (A)
Bondurant, J. E. (A)
Burk, M. C. (A)
Hensley, W. A. (M)
Johnson, E. W. (A)
Kindred, R. L. (A)
Owen, J. D. (A)
Parsons, J. R. (A)
Piety, R. G. (VA)
Tolin, E. D. (A)

Bethany
Hill, W. M. (A)

Billings
Rush, O. A., Jr. (A)

Broken Arrow
Baltosser, R. W. (A)
Hawkins, J. E. (A)
Smith, D. (A)

Clinton
Wear, T. O. (A)

Duncan
Benson, H. H. (A)
Hulme, J. R. (A)

Frederick
Jones, J. D., Jr. (SM)

Garber
See, R. M. (A)

Midwest City
Elliott, F. S. (A)
Miller, J. W. (M)
Wallach, C. (M)

Norman
Challenner, A. (A)
Farrar, C. L. (M)
Green, B. B. (A)
Harman, D. G. (M)
Harp, C. E. (M)
Rennie, D. P. (A)
Wright, N. E. (A)

Oklahoma City
Ashby, R. H. (M)
Ashley, A. B. (M)
Baker, D. M. (A)
Barnett, J. E. (A)
Battenburg, N. (A)
Bird, D. W. (A)
Black, E. (M)
Bolay, C. E. (A)
Brown, R. W., Jr. (A)
Chapman, C. W. (A)
Clark, A. D. (A)
Clifton, J. L. (A)
Clinkenbeard, H. A. (A)
Crippen, F. G. (A)
Daniels, C. L. (M)
Dayton, W. P. (A)
Eastman, C. W. (A)
Eaum, C. E. (M)
Ebner, W. H. (A)
Fish, R. L. (A)
Freeland, R. R. (A)
Fricks, W. H. (M)
Hall, M. L. (A)
Hammer, F. E. (A)
Hannan, C. V. III (A)
Hedson, H. D. (A)
Herrmann, F. (M)
Holt, G. W. (M)
Jackson, J. H., Jr. (A)
Kobos, F. (A)
Labarthe, L. C. (A)
Lucey, W. E. (M)
Lyons, E. F. (A)
Macadam, J. F. (M)
Marrinan, H. J. (M)
McClung, R. R. (M)
McCown, J. R. (M)
McGowan, C. W. (A)
McKinley, H. W. (SM)
Mueller, C. W. (M)
Myers, E. N. (A)
Nash, O. A. (M)
Pickens, F. T. III (A)
Ricciotti, S. (M)
Richardson, T. W., Jr. (A)
Rivers, M. D. (A)
Rosenberry, W. J. (M)
Sheaffer, C. F. (VA)
Smith, D. C. (A)
Smith, F. G., Jr. (SM)
Spooner, A. J. (A)
Stetler, R. D. (A)
Straiton, J. C. (M)
Thomas, M. W. (A)
Thompson, L. V. (M)
Todd, H. A. (M)
Trexler, V. L. (A)
Wight, G. S. (A)
Wells, R. A. (A)
Williams, F. G. (A)
Yarian, E. L. (A)
Zuhn, W. E., Jr. (M)

Perry
Bailey, J. M. (A)

Ponca City
Brown, G. L. (A)
Doty, W. E. N. (A)
Mead, W. A. (A)
McFarlin, F. E. (A)
Overall, G. J. (A)

Sand Springs
Bradley, W. H. (A)
Russell, J. D. (A)
Stulliken, R. D. (A)

Shawnee
Kolp, J. S. (M)
Wayne, J. W. (A)

Stillwater
Betts, A. L. (M)
Buck, R. F. (A)
Frisoe, H. (SM)
Johnson, D. L. (SM)
Jones, H. L. (SM)
Norman, R. H. (A)
Schedler, E. W., Jr. (A)

Tinker AFB
Williams, L. D. (A)

Tulsa
Agee, W. B. (A)
Austin, R. A. (A)
Baker, J. T. (A)
Barkman, R. N. (A)
Barsee, E. M. (A)
Biggs, M. A. (A)
Borg, W. T. (SM)
Brown, R. T. (A)
Bryan, R. G. (A)
Buffum, C. E. (SM)
Bunday, D. L. (SM)
Burns, K. N. (A)
Burton, R. G. (A)
Bushnell, J. M., Jr. (A)
Cooper, J. R. (A)
Cordell, R. L. (A)
Crawford, R. L. (A)
Crossland, E. J. (A)
Crow, M. W. (A)
Damerow, R. O. (A)
David, W. O. (A)
Davis, D. R. (A)
Day, C. E. (M)
Deboer, H. H. (A)
Deming, J. M. (A)
Dennis, J. R. (A)
Dikmen, B. (A)
Donley, M. M. (A)
Draheim, L. H. (M)
Dunn, C. S. (A)
Durham, E. R. (A)
Earle, D. E. (A)
Earthman, J. C. (A)
Eckard, P. E. (A)
Egan, D. G. (VA)
Eisler, J. D. (SM)
Ellison, G. E. (A)
Ferguson, H. B. (A)
Field, H. S. (A)
Finn, R. S. (A)
Freeman, F. R. (A)
Freymuth, J. J., Jr. (A)
Gaylor, W. R., Jr. (A)
Giles, C. S. (A)
Gilmartin, T. (M)
Gladson, G. G. (A)
Goetz, L. P. (SM)
Goss, V. J. (A)
Green, G. C. (A)
Hadley, C. F. (SM)
Harper, F. N. (A)
Hearn, D. P. (A)
Hibbard, H. C. (A)
Hidy, J. H. (SM)
Hollingsworth, R. B. (A)
Hooker, L. H. (A)
Huber, A. J. (A)
Hunsicker, W. R. (A)
Hussey, C. V., Jr. (A)
Jacobs, G. G. (A)
Jatras, S. J. (M)
Kammerzell, C. E. (A)
Kartman, D. J. (A)
Keller, B. H. (A)
Kenton, J. K. (A)
Kirby, R. A. (A)
Koeppel, B. W. (A)
Lang, H. M. (A)
Lott, J. C. (A)
Lynn, R. D. (A)
Magnino, T. L., Jr. (A)
Mahoney, E. H. (A)
Marshall, B. R. (A)
Martin, H. H., Jr. (A)
Martin, M. M. (A)
Massmann, P. J. (A)
McCallum, R. D. (A)
McCaskill, R. B. (A)
McCoy, B. F. (A)
McManis, L. B. (SM)
Miller, J. W. (SM)
Neubauer, C. A. (A)
Nichols, R. L. (A)
North, R. C., Jr. (A)
O'Brien, D. G. (A)
O'Reilly, G. A. (SM)
Ownby, W. G. (A)
Palmer, E. B. (A)
Peterson, G. (SM)
Phillips, H. W. (A)
Pierce, W. A. (A)
Rasmussen, H. E. (A)
Ray, W. E. (A)
Redding, P. B. (A)
Roderick, W. P., Jr. (A)
Rodgers, V. P., Jr. (A)
Scott, C. B. (A)
Seldeman, I. M. (A)
Shelton, H. C. (A)
Silverman, D. (SM)
Smith, L. H. (A)
Sorge, W. A. (A)
Stafford, J. A. (M)
Stinson, L. W. (A)
Stouse, L. E., Jr. (A)
Stover, E. B., Jr. (A)
Sutherlin, R. F. (A)
Swift, G. (M)
Teel, A. D., Jr. (A)
Thompson, R. R. (M)
Thompson, W. A. (A)
Tucker, B. L. (A)
Watson, R. E. (A)
Weldon, W. J. (A)
Werlin, J. H. (A)
Whitehill, H. J., Jr. (A)
Whitney, J. W. (A)
Wiese, A. A. (A)
Wilcox, N. E. (A)
Wilcox, R. L. (A)
Willits, G. N. (A)
Wilson, B. F. (A)
Wooster, A. F. (A)
Zongker, R. C. (A)

Watonga
Simonds, C. W. (A)

Watova
Brashear, R. T. (A)

OREGON

Astoria
Stumpf, R. J. (A)

Beaverton
Clifford, D. E. (A)
Eliander, H. F., Jr. (A)
Gasser, C. D. (A)
Kopra, F. O. (A)
Kraxberger, G. S. (A)
Mendoza, D. C. (A)
Nelson, D. E. (A)
Olsen, R. K. (SM)

Condon
Tiedman, C. R. (A)

Coos Bay
Crawford, D. B. (A)

Corvallis
Albert, A. L. (F)
Ballard, B. J. (A)
Barclay, W. J. (SM)
Feikert, G. S. (SM)
Hunnicutt, A. L. (A)
McMillan, F. O. (SM)
Merritt, R. P. (A)
Michael, R. R. (M)
Sein, M. M. (A)
Yunker, E. A. (SM)

Eugene
Hoppe, P. R. (A)
Spaulding, L. R. (M)
Surdam, E. L. (M)
Whipple, M. M. (A)

Gresham
Marsh, W. E. (M)

Klamath Falls
Cramer, K. H. (A)
Woodward, C. (A)

Medford
Walker, V. G. (VA)

Oswego
Ely, T. T. (M)
Smith, D. E. (VA)

Pendleton
Willey, V. E. (A)

Portland
Allison, H. U. (A)
Anderson, C. M. (A)
Arnstein, G. P. (A)
Bargfeld, F. G. (A)
Belleville, D. M. (SM)
Bishop, A. R. (M)
Bookwalter, L. S. (VA)
Brittain, V. M. (M)
Brown, F. M. (M)
Burnside, C. A. (A)
Calnon, D. C., Jr. (A)
Cole, J. A. (A)
Cutting, W. A. (M)
Dallas, W. K. (A)
Davis, R. J. (A)
Deardorff, R. W. (F)
Densmore, M. E. (A)
Doel, D. (A)
Duba, L. (A)
Eastlund, L. C. (A)
Edmonds, S. C. (A)
Ehr, J. R. (A)
Ellis, D. G. (A)
Ellis, P. V. (A)
Ellison, G. C., Jr. (M)
Foster, J. C. (M)
Fox, D. W. (A)
Gert, E. B. (A)
Grossenbacher, A. C. (A)
Harmer, H. S. (A)
Henderson, J. E. (A)
Herren, R. A., Sr. (M)
Herrmann, T. A. (A)
Holtzman, M. (M)
Hood, F. D. (M)
Horseman, T. E. (A)
Huster, G. B. (A)
James, S. D. (A)
James, T. W. (M)
Johnson, R. F. (A)
Kidd, D. E. (A)
Koroch, L. R. (A)
Leech, E. R. (A)
Long, L. A. (A)
Lum, J. S. (A)
Lund, C. W. (SM)
Marihart, D. J. (A)
McAlister, W. H. (A)
McCann, F. H. (SM)
McKay, W. M. (VA)
McLennan, J. D. (A)
Meissner, E. R. (M)
Miller, F. E. (M)
Miller, V. F. (A)
Morey, A. M. (M)
Morin, L. A. (A)
Moulton, C. H. (M)
Murdock, M. J. (M)
Murphy, R. T. (A)
Newhouse, D. R. (A)
Nolan, C. A. (A)
Ogden, J. E. (A)
Parks, H. F. (A)
Paul, B. R. (VA)
Peterson, R. M. (A)
Pittard, F. L. (A)
Plunkett, D. T. (A)
Polits, W. J. (A)
Polzin, E. M. (A)
Pooley, R. R. (A)
Poulin, R. A. (A)
Pyle, S. H. (A)
Quinn, A. C. (A)
Raupach, R. C. (A)
Rhiger, R. R. (M)
Richmond, A. E. (M)
Riley, J. O. (A)
Ritter, H. C. (A)
Roberts, J. M. (A)
Roberts, M. L. (A)
Rogers, E. J. (A)
Ropiequet, R. L. (A)
Schmidt, R. W. (A)
Schmitt, G. W. (A)
Scott, E. D. (SM)
Sells, G. B. (M)
Singleton, H. C. (SM)
Strain, D. C. (A)
Thomson, A. (A)
Tippery, M. W. (M)
Tunturi, A. R. (A)
Tyle, A. B. (M)
Vassallo, W. H. (A)
Vollum, H. (SM)
Warchol, E. J. (M)
Webber, W. B. (A)
Weitzel, E. F. (A)
White, L. C. (M)
Wilgus, D. S. (A)
Wilson, D. R. (A)
Winkler, L. R. (VA)
Witty, H. E. (A)
Woodward, W. E. (A)
Worden, A. E. (A)

Salem
Dingman, E. H. (A)

The Dalles
Sterley, R. R. (A)

Warrenton
Knotts, R. B. (A)

West Linn
Deschamps, T. (A)

PENNSYLVANIA

Abington
Dibos, R. A. (M)
Glassmar, F. P. (A)
Schafer, E. W. (SM)
Tarzian, V. (A)

Aldan
McCurdy, H. B. (M)
Paivinen, J. O. (A)

Aliquippa
Salmento, S. J. (A)
Tomeo, A., Jr. (A)

Allentown
Allerton, G. L. (A)
Buehler, P. R. (A)
Burke, A. M. (A)
Cordaro, C. F. (A)
Erhart, D. L. (A)
Gray, G. E. (A)
Hansen, E. (VA)
Lisicky, A. J. (A)
Newhard, C. E. (M)
Odell, N. H. (A)
Paulsen, J. F. (A)
Purcell, R. H. (SM)
Ronci, V. L. (SM)
Savadelis, I. C. (A)
Simpson, A. D. (SM)
Sittner, W. R. (A)
Slota, W. (A)
Smith, R. T. (A)
Strauss, R. (M)
Sweeney, P. M. (A)
Taylor, R. R. (VA)
Tooker, H. A. (A)
Van Haste, W. (M)
Von Ohlsen, L. H., Jr. (A)
Young, C. S. (SM)

Allison Park
Phillips, D. E., Jr. (A)

Altoona
Burgoon, G. R. (A)
Kilgore, W. (A)
Reitz, N. J. (SM)

Ambler
Allen, W. W., Jr. (A)
Clark, G. F. (M)
Hambleton, P. N. (SM)
Mauchly, J. W. (A)
Schoenberg, J. P. (A)
Swift, M. E. (SM)

Angels
Decino, A. (SM)

Archbald
Bechtol, H. (M)

Ardmore
Brookfield, R. F. (A)
Cheng, T. (A)
Fuller, L. C., Jr. (A)
Merrigan, A. F. (A)
Zentgraf, J. A. (A)

Ardsley
Helfrich, N. (A)
Rabe, W. A. (A)
Schweiss, W. W. (M)

Ashland
Tabor, C. J., Jr. (A)
Tesno, R. R. (A)

Avondale
Stinger, H. J. (M)

Bakerstown
Mag, A. (VA)

Bala-Cynwyd
Julstedt, E. C. (A)
Pitman, J. E. (A)
Sumerlin, W. T. (SM)
Sunstein, D. E. (SM)
Taylor, J. R. (A)

Beaver
Eash, J. J. (A)
McKowen, R. T. (A)

Bedminster
Moyer, L. K. (VA)

Bellefonte
Lyon, C. M. (A)
Passow, R. L. (M)
Stevens, W. T., Jr. (A)

Bernville
Gantert, A. (A)

Berwyn
Phela, L. T. (A)

Bethayres
Smith, F. E. (A)

Bethlehem
Appleman, C. G. (A)
Boandl, J. S. (A)
Curtis, R. B. (A)
Downing, H. L. (VA)
Hanson, F. E. (SM)
Irvine, M. M. (A)
Karakash, J. J. (A)
Kircher, C. J. (A)
Lisle, J. (A)
MacFarland, H. T. (A)
Mode, D. E. (SM)
Nitschke, N. E. (A)
Snyder, H. H. (A)
Stauffer, R. E. (A)

Boalsburg
Cannon, J. B., Jr. (A)

Brackenridge
Monnier, H. E. (A)

Braddock
Zygmunt, H. J. (M)

Bradford
Craumer, H. S. (A)
Schermerhorn, F. G. (A)

Bridgeport
Krell, A. I. (A)
Kutner, N. H. (A)

Bridgeville
Adkins, J. M. (M)
Wirant, J. A. (A)

Bristol
Mathis, J. D. (A)
O'Grady, J. J. (A)

Brookville
Porsch, A. W. (M)

Broomall
Dunn, E. B. (M)
McCarty, F. H. (A)
Walkling, R. W. (A)

Broughton
Gibson, F. C. (A)

Bryn Athyn
Lee, C. F. (A)
Simons, K. A. (M)

Bryn Mawr
Baird, G. A. (A)
Clews, M. M. (A)
Hertzberg, J. M. (M)
Marshall, J. N. (M)
Okada, [illegible] I. (A)
Reich, A. L. (A)

Bustleton
Just, G. A. (A)

Butler
Conabee, C. R. (A)
McIndoe, C. W. (A)

Camp Hill
Dugan, D. J. (A)
Eisenhard, S. E., Jr. (A)
Knerr, G. R. (A)
Morris, G. W. (VA)

Canonsburg
Krulce, F. R. (A)
Sulkowski, E. L. (A)

Carbondale
Malaker, S. F. (M)

Carlisle
Buckbee, J. A. (M)
Fastenau, F. H., Jr. (M)
Hill, B. C., Jr. (SM)
Makinson, G. E. (VA)
Mann, C. W. (A)
Meyers, K. D. (A)
Minnich, E. L. (M)
Ryesky, S. (M)
Samuelson, W. H. E. (A)
Spease, G. E. (A)
Sundius, R. E. (A)
Van Gavree, R. L. (A)

Chalfont
Mulherin, E. M. (M)

Cheltenham
Himmer, F., Jr. (A)
Hoagland, C. C. (SM)

Chester
Goodman, J. (A)
Haakonsen, H. M. (M)
Remorenko, M. S. (A)
Thorpe, W. H. (A)

Chestnut Hill
Woods, L. J. (SM)

Clarks Summit
Ringland, R. S. (SM)
Tate, J. B. (M)
Thomas, J. E. (A)

Claysburg
McKenna, J. V. (A)

Clearfield
Baker, L. T. (A)
Boyd, J. C. (SM)
Diehl, W. F. (F)
Sanborne, J. M. (A)

Clifton Heights
Allen, G. P. (A)
Bradley, W. E. (A)
Caldwell, W. H. (A)
Kurkjian, E. (A)
Monsay, J. (A)
Pressman, A. (M)
Warshaw, J. (M)
Werblckas, J. P. (A)

Coatesville
Bell, W. I. (A)
Kostolansky, V. A. (A)

Collegeville
Kurgan, G. J. (A)

Collingdale
Fritz, C. H. (A)
Schulz, K. A. (A)
Shallcross, D. H. (A)
Streater, A. L. (A)
Thompson, G. H., Jr. (A)

Conemaugh
Buriak, G. (A)
Erwin, G. E. (A)

Conestoga
Landis, C. G. (A)

Coudersport
DuBois, A. F. (A)

Croydon
Heck, N. A. (A)
Nichols, D. L. (A)
Svihel, B. T. (A)

Curwensville
Harcarufka, J. F. (A)

Cynwyd
Eachus, I., Jr. (A)
Polhemus, G. C. (A)

Danville
Williams, L. (A)

Darby
DaGrosa, V. (A)
Mannino, A. J. (M)
Tarca, E. L. (A)

Devon
Denk, W. E. (VA)

Donora
Grant, D. (A)

Doylestown
Ansley, A. C. (VA)
Blake, R. P. (A)
Davis, R. W., Jr. (A)
Gerlach, G. G. (SM)
Manoogian, H. (A)
McGlone, J. M. (M)
Muldoon, R. P. (A)

Dravosburg
Whipple, W. G., Jr. (A)

Dresher
Ellis, W. G. (SM)
Speilman, H. (A)

Drexel Hill
Allgrunn, A. E. (A)
Boonin, N. B. (A)
Borland, R. P. (A)
Free, A. L. (M)
Gensel, W. L. (A)
Gleason, H. H. (SM)
Haber, F. (A)
Hoberg, G. G. (A)
Koch, J. F., Jr. (M)
Marcovitz, M. W. (A)
Mural, F. (VA)
O'Neill, J. F. (A)
Pritchard, C. A. (A)
Reickord, A. W. (A)
Segal, B. (A)

DuBois
Higgs, H. P. (A)
McGarvey, H. J. (A)
Snowdon, T. L. (SM)

Dunlo
Cimba, J. (A)

Dunmore
Halle, C. (A)
Reiner, C. (A)

Easton
Green, D. W. (A)
Krantz, J. E. (A)
Krohn, P. L. (A)
Miller, R. E. (A)
Smith, F. W. (SM)

East Pittsburgh
Angello, S. J. (SM)
Brown, B. K., Jr. (A)
Coles, D. K. (SM)
Conley, P. (A)
Douglas, W. H. (A)
Hanna, C. R. (SM)
Hansen, J. R. (A)
Hollandbeck, R. F. (A)
Hutcheson, J. A. (F)
Kadak, E. (M)
Leonard, F. J. (A)
McCoubrey, A. O. (SM)
Moynihan, J. D. (A)
Osbon, W. O. (VA)
Rowe, W. D. (A)
Schneeberger, R. J. (SM)
Sims, R. U. (A)
Steplan, J. (F)
Smith, C. H., Jr. (A)
Vogl, T. P. (A)

Eightyfour
Obenland, D. K. (A)

Elkins Park
Balck, A. M. (A)
Barnett, G. F. (M)
Beetz, H. J. (A)
Biernbaum, J. W. (A)
Bloomfield, J. A. (A)
Boyd, R. K. (A)
Chang, S. Y. (A)
Greenwood, R. W. (A)
Hansen, A. N. (A)
Keiper, F. P., Jr. (A)
Kraus, M. H. (A)
Krutter, H. (SM)
Lubin, E. (A)
Mertz, H. W. (A)
Milewski, C. A. (M)
Overdeer, R. H. (A)
Porter, H. F. (SM)
Rath, H. B. (A)
Rothschild, L. I., Jr. (A)
Sheldon, H. (M)
Simon, W. (A)
Terzian, J. (A)
Thomas, T. R. (A)
Weinstock, W. W. (A)

Ellwood City
Lesnick, R. (A)

Emporium
Ackman, H. E. (SM)
Allen, J. S. (M)
Anderson, W. J. (M)
Andrews, R. W. (M)
Baldwin, A. V. (SM)
Bisso, R. J. (A)
Boden, E. H. (A)
Boots, W. K. (M)
Brook, R. H. (A)
Brunner, G. V. (SM)
Buescher, W. E. (M)
Buschmann, W. T. (A)
Campbell, V. H. (SM)
Carlstrom, T. H. (M)
Carroll, I. (A)
Clark, J. H. (A)
Cooley, R. M. (SM)
Curry, G. T. (SM)
Dander, D. A. (M)
Dole, L. H. (A)
Dolnick, A. L. (SM)
Dresser, S. R., Jr. (A)
Erdle, P. J. (A)
Fromell, H. J. (A)
Gausman, T. E. (A)
Grow, R. E. (A)
Grund, J. B. (M)
Guild, R. D. (M)
Hagman, H. B. (A)
Heitner, A. J. (M)
Hench, H. S., Jr. (M)
Hesser, C. B. (M)
Kackauskas, J. J. (A)
Kahl, E. (M)
Kamler, H. V., Jr. (A)
Klinestiver, G. H. (SM)
Lambert, R. L. (SM)
Lankard, G. M. (A)
Maguire, L. R. (M)
McClintock, R. K. (SM)
McKain, J. L. (M)
McKeirnan, M. F. (M)
McNaughton, R. A. (M)
Meizer, H. (VA)
Mueller, W. P. (SM)
Neuber, R. E. (SM)
Overmier, E. E. (SM)
Palen, H. A. (M)
Palmateer, R. E. (SM)
Pawlikowski, S. L. (A)
Peterson, A. W. (M)
Peterson, W. J. (A)
Pope, L. A. (A)
Quigley, F. T. (M)
Reinhardt, P. M. (M)
Riehell, G. L. (M)
Robbins, J. D. (M)
Rolf, W. R. (M)
Sassaman, P. H. (SM)
Schultz, A. J. (SM)
Schwint, K. F. (A)
Simon, P. R. (A)
Slinkman, R. W. (SM)
Staples, R. L. (A)
Stumpff, H. G. (M)
Vergason, D. L. (M)
Walsh, R. J. (M)
White, H. A. (M)
Winnette, E. A. (A)

Erie
Davidson, A. R. (M)
Foster, J. H. (M)
Heibel, J. D. (M)
Hestor, K. L. (A)
Kunz, G. A. (A)
Minnium, B. B. (SM)
Mong, R. C. (A)
Orr, R. W. (VA)
Page, R. S. (A)
Raub, L. A. (VA)
Shellito, H. H. (A)
Steward, H. E. (A)
Tusnik, R. H. (A)
Van Arsdell, J. C., Jr. (M)
Velt, N. J. (A)
Wolfskill, J. M. (A)

Evans City
Uhrich, W. J. (SM)
Wahl, M. H. (A)

Fairless Hills
Weinheimer, F. E., Jr. (A)

Fayette City
Weldon, T. P. (A)

Feasterville
Bates, A. E. (A)
Fleury, P. E. (A)
Lofton, J. H. (M)

Finley
Kuzmich, G. (A)

Fort Washington
Rees, W. M., Jr. (A)
Schantz, J. S. (VA)

Forty Fort
Anderson, H. P. (A)

Freeland
Kiseloski, J. M. (A)

Freedom
Swartz, F. E. (A)

Fullerton
Bower, F. H. (M)

Gladwyne
Dever, J. A. (A)
Eckert, J. P., Jr. (A)
Owings, J. L. (A)

Glassport
Czarnecki, E. J. (A)
Leib, F. E. (A)

Glen Moore
Carpenter, J. H. (A)

Glen Olden
Brown, I. (A)
Cavalieri, A. L., Jr. (A)
Killion, R. E. (A)
Teetsel, W. P. (A)
Tidd, T. J. (A)
Wynhoff, F. J. (A)

Glen Rock
Jensenius, J. S. (A)

Glen Shaw
Alexander, F. C., Jr. (M)
Kinney, R. V. (A)
Klinvex, S. H. (A)

Glen Side
Anton, A. (M)
Bamford, H. S. (SM)
Bobb, L. J. (M)
Cooper, D. T. (VA)
Daniels, R. G. (A)
O'Neal, C. D. (A)
Stein, H. B. (A)
Trinkle, W. S. (M)
Wilson, H. R. (A)

Grampian
Moore, W. R. (VA)

Green Lane
Rabb, J. W. (M)

Greensburg
Dimasi, L. A. (A)
Rossi, A. D. (A)
Stark, R. E. (VA)

Groveton
Petrowski, P. (A)

Gwynedd Valley
Dangremond, J. L. (A)
Robinson, R. R. (A)

Hanover
Cumeralto, Q. C. (M)
Rohrbaugh, P. A. (A)

Harrisburg
Cramer, B. G. (A)
Crowell, H. E. (A)
Fairer, W. B. (A)
Gray, N. L. (A)
Lehman, N. D. (A)
Middleton, W. W. (M)
Moretz, L. A. (A)
Peffer, R. M. (A)
Reisman, E. (A)
Wiley, L. G. (M)

Hatboro
Bartik, W. J. (A)
Brenner, W. F. (A)
Brooks, C. E. (A)
Bugay, J. P. (A)
Caffrey, G. H. (A)
Davenport, E. J. (A)
Elmore, E. P., Jr. (A)
Fedde, G. A. (A)
Foley, T. J. (A)
Gelardi, M. (VA)
Gleiter, W. C. (M)
Grzywacz, W. (A)
Gulick, E. C. (SM)
Harrison, R. K. (A)
Long, M. L., Jr. (A)
Machuta, A. J. (A)
Martin, H. B. (A)
Miller, R. L. (A)
Moulton, S. W. (A)
Munster, A. C. (M)
Noll, E. M. (A)
Royce, E. R. (M)
Senausky, P. V. (A)
Spacie, R. W. (A)
Steele, E. R. (A)
Suter, H. (SM)
Tiley, J. W. (M)
Tremblay, H. G. (A)

Hatfield
Insinger, R. H., Jr. (A)

Haverford
Benham, T. A. (SM)
Crawford, A. L., Jr. (SM)

Havertown
Amelotti, E. (A)
Chen, T. C. (A)
Crockett, J. G. (M)
Currie, A. H. (A)
Dougherty, J. W. (M)
Eckersley, A. (A)
Endres, J. M., Jr. (A)
Fulmer, J. W. (VA)
Gibson, H. D. (VA)
Gilligan, T. E., Jr. (A)
Lund, C. E. (A)
Mayer, R. (M)
Miehle, W. (M)
Palmer, G., Jr. (A)
Riegel, R. B. (A)
Sabaroff, S. (M)
Sachs, A. F. (M)
Shea, E. T. (A)
Sohon, H. (SM)
Thomas, R. G. (A)
Trifari, F. R. (SM)
Zappacosta, A. D. (M)

Hazleton
Lucian, T. F. (SM)
Mock, R. E. (A)

Hellertown
Damoc, C. J. (A)

Hershey
Smith, E. C. (A)

Hilliards
Boyd, D. B. (A)

Holmes
Kranzley, A. S. (A)
Warner, H. (A)

Homestead
Link, T. V. (A)

Huntington Valley
Barsky, H. S. (M)
Boothroyd, W. P. (SM)
Hayward, J. W. (VA)
Peirce, T. F. (A)
Schroeder, A. C. (SM)
Spielman, S. C. (SM)
Thompson, M. L. (SM)
Young, C. P. (SM)

Indiana
Hitchcock, R. C. (SM)
Ramaley, C. W. (A)
Yarmack, J. E. (SM)

Irwin
Agnew, N. F. (A)
Brook, A. (A)

Itha
Dilks, U. C. S. (M)

Ivyland
Bicking, H. P. (A)
Lauderdale, D. M. (A)
Lee, W. S. (A)

Jeanette
Kihchel, O. D. (M)

Jeddo
Kallessar, J. J. (A)

Jenkintown
Block, E. (A)
Clark, W. R. (SM)
Koehler, J. F. (SM)
Laurent, G. J. (SM)
Liebscher, A. (SM)
Michaels, C. J., Jr. (A)
Peltz, W. J. (SM)
Stewart, G. H. (A)
Ulrich, V. K. (SM)

Jermyn
Krizanosky, A. (A)

Johnstown
Ackley, R. M. (A)
Campbell, T. E. (A)
Coleman, M. J. (M)
JeSchonek, A. A. (A)
Kardos, L. F. (A)
Kocsan, E. S. (A)
Litman, L. (A)
Straub, N. L. (A)

Johnsville
Drenchko, J. D. (A)
Mitchell, F. O. (A)
Nupp, W. D. (A)
Oliver, J. K. (A)
Vasaka, C. S. (A)

Kennerdell
Smith, S. A. (A)

Kennett Square
Miller, L. D. (A)
Moore, C. B. (A)

Kingston
Sakoski, C. (A)
Shaw, W. R. (A)

Kittanning
Golla, E. F. (A)

Lafayette Hill
Adamson, R. G. (M)
Bloomsburgh, R., Jr. (M)
Clifford, M. L. (A)

Lancaster
Ayer, R. B. (SM)
Ballard, D. C. (A)
Bennett, W. P. (M)
Benway, R. E. (A)
Brett, G. F. (M)
Comins, A. W. (SM)
Dyall, W. T. (SM)
Forman, J. M. (M)
Freund, W. H. (M)
Fry, H. M. (SM)
Glover, A. M. (SM)
Gordon, A. D. (A)
Grimm, A. C. (SM)
Hagmann, R. W. (A)
Hammersand, F. G. (M)
Headrick, L. B. (SM)
Hillegass, H. N. (A)
Holmes, J. L. (A)
Hoover, M. V. (M)
Hudson, J. L. (A)
Janes, R. B. (SM)
Kaseman, P. W. (A)
Kazanowski, H. F. (M)
Kolesnik, M. (A)
Lemeshka, M. B. (M)
Littlefield, B. Z. (A)
Matilot, J. E. (A)
McNees, S. G. (M)
McNickle, R. E. (M)
Metzger, P. A. (A)
Moodey, H. C. (SM)
Nekut, A. G. (SM)
Nicholson, J. F. (A)
Ransom, D. J. (A)
Richards, P. A. (SM)
Rotow, A. A. (SM)
Rueggeberg, W. (M)
Scholes, G. S. (A)
Scott, G. W., Jr. (SM)
Seelen, H. R. (SM)
Smith, C. P. (SM)
Spitzer, E. E. (SM)
Swedlund, L. E. (SM)
Sweet, A. P., Jr. (A)
Tandy, P. C. (A)
Toppmeyer, R. B. (A)
Van Ormer, D. D. (A)
Veith, F. S. (SM)
Wamsley, D. H. (SM)
Weaver, J. L. (A)
Wenger, R. S. (SM)
Wilhelm, J. F. (SM)
Wiseman, P. E., Jr. (A)

Landisville
Sandford, W. H., Jr. (A)

Langhorne
Annett, M. E. (A)
Ryan, R. J. (M)

Lansdale
Boscia, S. J. (A)
Criss, G. B. (A)
Gable, N. P. (M)
Glauber, J. J. (SM)
Ishler, H. K. (SM)
Kennemer, J. R. (A)
Lyle, A. E. (SM)
Pratt, G. W. (M)
Robinson, S. A. (SM)
Schlegel, E. S. (A)
Smith, W. E. (A)
Spencer, G. R. (A)

Lansdowne
Ambrogi, J. N., Jr. (A)
Brumbaugh, J. M. (SM)
Bullard, H. M. (A)
Carlson, P. N. (A)
Felton, W. W. (SM)
McBride, G. H. (M)
Susskind, I. N. (A)
Tunnell, G. W. (A)

Latrobe
Albert, D. E. (A)
Shaffer, R. E. (A)
Smith, B. J. (A)

Lemoyne
Bair, J. H. (A)
Beebe, W. J. (A)
Smiley, W. A. (VA)

Levittown
Barnes, W. L. (A)
Bernstein, F. (A)
Dixon, G. P. (A)
Epstein, H. (A)
Goldstone, B. J. (A)
Greenfield, M. (A)
House, H. J. (A)
Hurford, A. C. (A)
Kahn, H. (A)
Lamnin, M. (A)
Nachman, M. W. (A)
Potosky, M. (A)
Rhodes, R. N. (A)
Weinberg, A. D. (A)
Wood, R. F., Jr. (A)

Lewisburg
Bosted, N. P. (A)
Irland, G. A. (M)
Kornetz, N. S. (SM)
Scheer, F. H. (SM)
Walker, R. C. (M)

Lewistown
Gardner, G. F. (A)

Library
Pudlak, A. (A)

Line Lexington
Laskin, R. S. (A)

Lock Haven
Hartwell, H. G. (M)

Loupurex
LaSota, L. S. (A)

Lynnport
Klingaman, G. W. (A)

Malvern
Lane, J. H. (A)
Wachter, W. J. (A)

Manoa
Vetack, J. E. (A)

Manor
Anderson, J. W. (A)

Mars
Berninger, J. W. (A)

McKeesport
Andrews, F. J. (M)
Durnal, R. G. (A)
Morrison, E. L., Jr. (A)
Wilson, F. A. (A)

Meadowbrook
Bingley, F. J. (F)
Dolberg, C. E. (SM)
Fink, D. G. (F)
Lukens, R., Jr. (SM)
Reynolds, V. F. (A)
Walker, H. (VA)

Meadville
Brown, R. L. (M)

Mechanicsville
Brown, H. W. (A)

Mechanicsburg
Hertzler, P. H. (A)

Media
Miller, A. F. (M)
Posthill, B. N. (A)
Salati, O. M. (SM)
Townsend, C. C., Jr. (A)

Melrose Park
Beardwood, J. T. (A)

Merion
Emurian, A. D. (SM)
Lawler, E. D. (A)

Millersville
Mark, J. T. (A)
Martin, I. E. (A)
Smith, E. M. (A)
Weaver, J. E. (A)

Mill Hall
Schnering, C. J. (M)

Mohnton
Fister, T. J. (A)

Monaca
Powell, D. S. (A)

Monongahela
Mucci, G. (A)

Morrisville
French, C. G. (A)
Steck, G. W. (A)

Morton
Smith, J. W. (M)
Ward, E. P. (A)

Nanticoke
Hyzinski, B. (A)
Pensyl, J. F. (A)
Zarbertski, E. I. (A)

Narberth
Clapp, R. G. (SM)
Forstall, E. L. (VA)
Jeffries, S. A. (A)
Williamson, J. F. (VA)

Neffsville
Ethridge, R. O. (A)
Harsh, M. D. (A)

Nesquehoning
McMichael, H. E. (A)

New Brighton
Klucarich, S. (A)

New Britain
West, H. (A)

New Castle
Sines, W. U., Jr. (A)

New Holland
Yingst, T. E. (A)

New Hope
Bradley, W. E. (SM)
Goodwin, W. N., Jr. (SM)

Newtown
Beck, K. H., Jr. (A)
Cushman, R. W. (M)
Gould, D. F. (A)
Olson, E. G. (A)

Newtown Square
Bachofer, H. L. (A)
Benn, R. E. (M)
Johnson, F. L. (M)
Kende, G. (SM)
Liveseay, R. (A)
Porter, T. J. (A)
Shawhan, E. N. (A)
Stevens, D. L. (M)
Thompson, L. G. (A)

Newville
McElwain, J. L. (M)

Noble
Hilliard, D. M. (A)

Norristown
Anders, R. D. (A)
Applegarth, A. R., Jr. (SM)
Eney, I. N. (A)
Paxson, R. F. (A)
Place, S. W. (VA)
Rogers, R. F. (A)
Takeuchi, H. (A)
Thomas, J. K. (A)
Webb, D. T. (SM)
Zern, R. T. (VA)

North Braddock
Koschik, W. E. (A)

North Hills
Buscher, D. G. (A)
Reichert, H. A. (A)
Tague, C. B., Jr. (A)

Northumberland
Fritz, W. (A)
Shenk, J. J. (A)

North Wales
Burkart, D. P. (A)
Henderson, F. C. (M)
Ottolini, D. F. (A)

Norwood
Niu, T. C. T. (A)

Oakmont
Colten, J. L. (A)
Muffly, G. (SM)
Tittle, C. W. (SM)

Oreland
Axford, W. R. (A)
Chudleigh, W. H., Jr. (A)
Hargens, C. W. (SM)
Hartley, H. F., Jr. (SM)
Hooper, G. A. (M)
Jackson, R., Jr. (A)
Keener, C. E. (A)
Lockhart, J. C. (A)
Michael, F. R. (M)
Nelson, F. H. (A)
Preston, G. W. (SM)

Oxford
Mallalieu, F. R. (A)

Palmerton
Swanson, H. E. (A)

Paoli
Overmiller, C. M. (VA)
Reiss, H. R. (M)

Paradise
Lorch, E. A. (A)

Paxinos
Farr, K. E. (SM)

Perkasie
Moll, W. H. (A)
Smith, H. B. (A)

Philadelphia
Aaron, B. D. (M)
Aarons, C. R. (A)
Aberth, O. G. (A)
Adamson, P. R. (A)
Aires, R. H. (M)
Akeroyd, A. (A)
Albright, R. B. (SM)
Alexander, E. M. (A)
Alpert, D. (A)
Altemus, W. C. (A)
Alter, W. C. (A)
Alter, A. R. (SM)
Ames, M. E., Jr. (M)
Anderson, D. C. (A)
Anderson, T. G. (A)
Andrews, P. C. (A)
Angell, J. B. (A)
Applegate, C. E. (A)
Aprilletti, C. A. (A)
Attarian, R. V. (M)
Auerbach, I. L. (SM)
Backer, C. M. (M)
Baines, E. L. (A)
Balaklan, G. (A)
Balmer, D. W. (M)
Banks, J. (A)
Banks, W. B. (A)
Bardonner, W. J., Jr. (A)
Bargellini, I. P. L. (A)
Barry, P. N. (VA)
Bash, I. F. (A)
Baughman, G. W. (SM)
Baumann, J. A. (A)
Beane, T. E. (A)
Bechler, W. C., Jr. (VA)
Beck, C. (A)
Beck, C. A. (A)
Beckman, C. (A)
Bell, R. A. (M)
Beltramo, J. R. (A)
Benge, J. R. (VA)
Bennon, M. (A)
Benson, S. E. (A)
Berkowitz, R. S. (A)
Bernbaum, B. (A)
Bernbaum, L. M. (A)
Best, D. T. (A)
Beswick, J. D. (A)
Biberman, L. S. (A)
Binstock, L. (A)
Birx, D. L. (A)
Blumenthal, E. I. (A)
Boghosian, W. H. (M)
Bogusz, J. F. (A)
Boileau, O. C., Jr. (A)
Bonaccorsi, J. R. (A)
Bonn, T. H. (A)
Bossi, E. W. (A)
Boyajian, M. M. (A)
Boyle, R. C. (A)
Brachman, R. J. (A)
Brady, P. B. (A)
Brainerd, J. G. (F)
Brandt, W. E. (A)
Braverman, R. (A)
Briles, W. F. (A)
Brinda, J., Jr. (A)
Bristow, F. E. (A)
Broomall, J. M. (M)
Brothers, J. T. (SM)
Brown, D. G. (A)
Brown, E. A. (A)
Brown, W. J. (A)
Broxmeyer, C. (A)
Brunner, D. H. (A)
Bryan, J. S. (A)
Bryson, H. C., Jr. (M)
Buchanan, J. P. (M)
Bucks, R. M. (A)
Buggy, R. V. (M)
Bugnolo, D. S. (A)
Burgett, M. I., Jr. (SM)
Burney, O. F., Jr. (A)
Busser, J. H. (A)
Butterfoss, E. J. (A)
Butts, L. E. (A)
Buzby, J. A. (A)
Byers, A. C. (A)
Callaghan, J. W. (A)
Capek, S. J. (A)
Caplan, D. I. (A)
Carapellotti, L. T. (A)
Carignan, R. J. (A)
Cartwright, L. W. (A)
Carnuccio, J. N. (A)
Cavileer, F. E. (A)
Chadwick, P. S. (A)
Chamberlin, N. K. (A)
Chambers, C. C. (SM)
Chambers, G. S. (A)
Chamow, M. F. (A)
Chance, B. (SM)
Chapline, J. D., Jr. (A)
Chase, C. T. (SM)
Chatten, J. B. (A)
Chatterton, E., Jr. (A)
Chedaker, J. (A)
Chow, S. H. (A)
Chressanthis, A. G. (A)
Christiansen, W. G. (A)
Churchill, H. J. (A)
Ciletti, V. J. (A)
Cilyo, F. F., Jr. (M)
Clark, E. G. (A)
Clark, W. A. (A)
Clarke, C. E. (A)
Clarke, I. A. (A)
Closson, L. E. (SM)
Cohen, B. H. (A)
Cohen, F. (A)
Cola, R. A. (A)
Coles, R. V. (SM)
Colodny, S. H. (SM)
Colussi, E. J. (A)
Connor, J. A. (M)
Conrad, M. (A)
Cooley, C. C., Jr. (A)
Cora, A. M., Jr. (A)
Creamer, E. M., Jr. (A)
Cummings, E. J. (A)
Davies, R. S. (A)
D'Avino, R. F. (A)
DeCoatsworth, C. G. (A)
Dectrow, T. X. (M)
Delling, H. W. (A)
Dempster, B. W. (A)
Devenny, C. F., Jr. (A)
De Zube, L. H. (M)
Diamond, J. M. (A)
Di Campli, B. A. (A)
Diem, G. W. (M)
Diem, J. M. (A)
Dinackus, H. G. (A)
Doerfel, H. V. (A)
Doland, G. D. (A)
Doto, N. J. (A)
Dove, J. B. (A)
Dowds, T. A. (A)
Dunbar, E. E. (A)
Duncan, R. D., Jr. (SM)
Earnshaw, D. P. (SM)
Eckert, J. F., Jr. (A)
Ederer, N. (A)
Eells, W. A. (A)
Ehret, C. D. (F)
Ehret, R. J. (M)
Emerson, K. H. (SM)
Engle, J. L. (A)
Epstein, H. (A)
Estersohn, H. (A)
Etkin, H. A. (VA)
Evans, W. R., Jr. (A)
Evry, A. A. (A)
Fan, S. (A)
Fasko, E. A. (A)
Fath, J. P. (A)
Faust, A. C. (A)
Fegley, K. A. (A)
Fernandez-Rivas, L. A. (A)
Fernbach, M. (A)
Field, L. (A)
Fierstein, J. H. (A)
Fink, L. III (M)
Fisher, E. J. (A)
Fisher, F. (A)
Flomenhoft, M. (A)
Florence, V. H. (M)
Flynn, J. E. (A)
Fogarty, J. D. (A)
Folley, G. M. (A)
Follensbee, W. R. (A)
Forster, W. H. (SM)
Foster, W. P. (M)
Fowler, C. J. (A)
Fox, B. (A)
Frank, A. I. (A)
Frear, W. (SM)
Freeland, E. C. (SM)
Frekot, J. J. (A)
Friedman, G. H. (A)
Friedman, M. (A)
Friedman, M. (M)
Fritsch, H. C., Jr. (A)
Fryburg, C. H. (A)
Gaddis, A. H. (A)
Gallagher, G. J. (A)
Garfinkel, A. R. (A)
Gelchis, M. V., Jr. (A)
Gelles, A. J. (A)
Gelzinas, P. P., Jr. (A)
Georgens, H. H., Jr. (A)
Gilbert, W. E. (SM)
Gillies, J. H. (SM)
Giordano, M. J. (A)
Gittens, V. S. (A)
Glace, K. (M)
Glassman, I. (M)
Gluck, S. E. (A)
Godsho, A. P. (SM)
Golden, H. W. (A)
Golden, R. K. (M)
Goldhirsh, M. (A)
Goldstein, I. E. (SM)
Golubjatnikov, O. (A)
Goodman, R. M. (A)
Goodwin, D. P. (A)
Gordon, H. L. (A)
Gottlieb, M. (A)
Gottschalk, J. M. (A)
Grablec, J. J. (M)
Grande, F. M. (A)
Gray, H. J., Jr. (A)
Greenberg, E. L. (A)
Greiser, T. P. (A)
Gross, I. (A)
Gross, L. S. (A)
Grossman, S. (A)
Gudis, R. S. (A)
Haas, N. V. (A)
Haigh, L. E. (A)
Haimowitz, B. (M)
Haines, B. P. (A)
Haines, J. H. (A)
Halev, I. (M)
Halprin, J. (A)
Halsted, C. P. (A)
Hamilton, S. (SM)
Hand, G. C., Jr. (A)
Haney, F. (A)
Hanson, L. B. (A)
Hardiman, E. R. (A)
Hardy, N. (A)
Harms, A. D., Jr. (A)
Harris, H. H. (SM)
Harrison, W. E. (A)
Hawthorne, E. I. (SM)
Hazeltine, A. V. (A)
Heckelman, T. J. (M)
Heinaman, H. B., Jr. (A)
Hendrixson, L. H. (M)
Henninger, J. H. (M)
Henry, W. P. (A)
Herrmann, D. C. (A)
Hershfield, L. L. (A)
Hicks, J. J. (A)
Hill, E. W. (A)
Hill, R. D. (A)
Hilman, J. (A)
Hinds, J. L., Jr. (A)
Hinkelman, T. D. (A)
Holgood, M. P. (A)
Hockeimer, H. E. (M)
Honda, H. (A)
Hopwood, A. M., Jr. (VA)
Horn, C. H. (M)
Horwitz, J. D. (A)
Houston, R. S. (M)
Howard, J. H. (SM)
Hudson, C. F. (A)
Hunt, D. F. (A)
Husband, R. E. (A)
Hyams, I. (A)
Innes, F. T. (A)
Jacobson, L. J. (M)
Jednacz, J. E. (A)
Jensen, R. O. (A)
Johnson, E. C. (SM)
Jones, A. G. (A)
Jones, C. H. (SM)
Jones, J. T., Jr. (A)
Jones, L. F. (A)
Joseph, D. (A)
Kall, A. R. (A)
Kalos, S. (A)
Kane, J. V. (A)
Kannapel, W. A. (A)
Kappeler, W. H. (A)
Katz, E. S. (A)
Katz, S. (A)
Kauders, R. M. (M)
Kauffmann, J. A. (A)
Kenny, H. W. (A)
Kenosian, H. (M)
Keough, D. D. (A)
Kilpatrick, D. G. (A)
Kimel, H. (A)
King, C. W. (A)
King, S. M. (A)
Kingsley, B. (A)
Kinzinger, W. C. (A)
Kirsch, A. L. (A)
Klein, S. (A)
Knauer, P. E. (A)
Kolodner, M. (A)
Kolts, R. C. (A)
Konrad, L. (A)
Koop, W. S. (A)
Kosich, R. J. (A)
Koss, N. A. (A)
Kozak, M. J. (A)
Kraus, F. A. (A)
Krantz, F. H. (A)
Kraus, C. R. (M)
Kravitz, A. B. (A)
Krieg, S. (A)
Kreitler, C. E. (A)
Krutiansky, J. (A)
Ku, V. H. (SM)
Kugler, F. (A)
Kuzma, P. J., Jr. (A)
Kyne, T. (A)
Lagore, J. A. (SM)
Lande, A. J. (A)
Landrey, L. R. (SM)
Larsen, R. L. (A)
Lathrop, R. J. (A)
Lazarus, F. F. (A)
Lazinski, R. H. (A)
Leader, R. (A)
Lee, D. H. (A)
Leitch, J. G. (SM)
Levonian, P. V. (A)
Lewis, G. (VA)
Lex, R. G., Jr. (A)
Lieberahn, A. (A)
Lilly, J. C. (A)
Linden, A. E. (A)
Linden, D. A. (A)
Lindley, P. L. (A)
Lobel, D. J. (A)
Loeb, J. W. (A)
Loftus, J. A. (A)
Losew, W. S. (A)
Low, F. (A)
Lukoff, H. (A)
Lundberg, C. F., Jr. (A)
Macfadden, W. C. (VA)
Machler, R. C. (SM)
Maddox, J. L., Jr. (A)
Magasiny, I. P. (A)
Magness, P. L., Jr. (A)
Maguire, J. A. (A)
Major, R. P. (M)
Mallison, R. E. (A)
Malta, S. V. (A)
Mapp, H. S. (A)
Markowitz, R. S. (A)
Marks, E. I. (A)
Marple, M. O. (A)
Marsten, J. (SM)
Maser, B. (A)
Mason, E. A. (A)
Mason, J. R. (A)
Masurat, G. (A)
Matthews, A. C. (SM)
Matthews, E. L., Jr. (A)
Mauger, R. S. (A)
Maxwell, F. H. (A)
Mayer, D. F. (A)
McCoskrie, D. (A)
McDowell, A. P., Jr. (VA)
McHugh, R. J. (A)
McKnight, C. F. (A)
McLeod, W. K. (A)
Medoff, J. L. (A)
Miller, E. (A)
Miller, E. (A)
Miller, E. H. (A)
Miller, M. (A)
Millet, J. M. (A)
Milligan, G. M. (A)
Mills, R. E. (A)
Mitchell, H. F., Jr. (A)
Montgomery, A. P. (VA)
Moore, R. C. (SM)
Mouradian, H. (VA)
Moskowitz, N. (A)
Mozenter, M. J. (A)
Murphy, E. G. (M)
Mustico, J. (A)
Myers, A. S., Jr. (SM)
Myers, G. T. (A)
Namaroff, J. H. (A)
Natkin, H. B. (A)
Neppel, W. C. (A)
Neuber, H. K. (VA)
Neumann, A. J. (M)
Neumann, H. J. (A)
Newhoffer, F. L. (A)
Newmeyer, D. R. (A)
Nicholson, V. (A)
Nishino, H. H. (A)
Nistal, G. E. (A)
Norton, R. (A)
Nowak, R. F. O. (A)
Olevsky, B. (A)
Olewine, W. P. (A)
Olsen, T. W. (A)
Orth, R. B. (A)
Packer, W. H. (A)
Parnell, J. (M)
Partin, M. E. (A)
Perkins, G. O. (A)
Perna, F. J. (A)
Peters, A. E. (A)
Peterson, E. F., Jr. (M)
Petri, W. H., Jr. (A)
Pfifferling, F. (A)
Pharo, E. W., Jr. (M)
Pigaty, J. B., Jr. (A)
Piontkowski, J. S. (A)
Platt, B. E. (A)
Podell, E. J. (A)
Poellnitz, F. D. (A)
Raffa, P. E. (A)
Randall, N. C. (A)
Rataski, C. P. (SM)
Reel, W. R. (A)
Richman, R. R. (A)
Richter, F. (A)
Riebman, L. (M)
Ritchey, O. W. (A)
Robins, M. N. (A)
Robinson, H. A. (SM)
Rodgers, L. M. (SM)
Rogell, P. (A)
Rohr, J. G. (A)
Rollo, W. S. (A)
Rolnick, M. A. (A)
Romanofsky, N. K. (A)
Roschen, J. (A)
Rosean, H. M. (A)
Rosenberg, H. (A)
Rosenstein, G. M. (A)
Rosenthal, D. (A)
Rothwarf, F. (A)
Rowe, A. J. (A)
Rowe, C. R. (SM)
Ruben, H. (SM)
Rubinoff, M. (A)
Rudnick, J. J. (A)
Russo, J. S. (A)
Rutledge, J. D. (A)
Saboe, J. (M)
Saltzman, W. P. (A)
Saunders, R. (A)
Sayer, T. C. (A)
Schaefer, H. W. (A)
Schifreen, C. S. (A)
Schiller, R. P. (A)
Scholes, W. R. (A)
Scholtes, P. W. (A)
Schulz, R. B. (M)
Schwartz, I. (A)
Schwartz, M. (A)
Schwartz, R. F. (M)
Schwartzberg, H. L. (A)
Seif, E. (A)
Seligman, J. M. (A)
Shaeffer, I. M., Jr. (A)
Sheppard, C. B. (M)
Sher, N. (M)
Sherman, A. (A)
Sherman, F. L. (A)
Sherman, M. B. (A)
Sherman, S. M. (M)
Showers, R. M. (M)
Shucker, S. (A)
Shulman, M. B. (A)
Sichel, A. T. (VA)
Siedlarz, J. B., Jr. (A)
Siemen, H. A. (A)
Skavicus, A. J. (A)
Slampyak, S., Jr. (A)
Slawek, J. E. (A)
Smith, B. D. (A)
Smith, D. B. (F)
Smith, V. J. (A)
Songster, G. F. (A)
Soorenko, T. (A)
Spandorfer, L. M. (A)
Spector, E. N. (A)
Speed, D. K. (A)
Spence, J. F., Jr. (A)
Spencer, R. W. (A)
Stambaugh, J. C. (M)
Stanton, L. (M)
Stanwood, R. H. (A)
Starks, W. H. (A)
Steinberg, B. D. (A)
Steinberg, S. (A)
Stern, L. M. (A)
Stock, D. C. (A)
Stovall, J. R., Jr. (M)
Stratton, C. H. (A)
Stubbs, G. S. (A)
Suckle, B. W. (A)
Sullivan, H. B. (A)
Sulpizio, T. J. (A)
Swedloff, B. (A)
Sweigart, A. S. (A)
Sysko, S. J. (M)
Talambiras, R. P. (A)
Tarpley, R. E. (VA)
Taylor, H. W. (M)
Tellier, J. C. (SM)
Ten-Cate, W. L. (A)
Thomas, J. E. (A)

Thomson, D. N. (A)
Todd, C. R. (A)
Tonooka, S. (A)
Torrey, R. D. (A)
Tou, J. (A)
Tourshou, S. (A)
Trachtenberg, B. M. (A)
Traub, E. H. (SM)
Travis, I. (SM)
Trocky, E. V. (A)
Tucker, B. W. (A)
Turner, M. L., Jr. (A)
Turner, R. J. (A)
Twist, G. A. (A)
Urkowitz, H. (A)
Usler, W., Jr. (A)
Valesky, C. S. (A)
Van Horn, J. C. (SM)
Van Name, J. M. (A)
Vantine, H., Jr. (SM)
Varallo, F. A. (A)
Vasilevskis, H. S. (A)
Verges, H. P. (A)
Viles, F. M., Jr. (A)
Violante, R. V. (A)
Virgadamo, F. (M)
Voegtlin, E. (A)
Vogel, G. J. (A)
Walant, C. A. (A)
Watson, R. E. (A)
Weber, H. C. (A)
Weidknecht, C. J., Jr. (A)
Weinberg, I. (A)
Weiner, J. R. (A)
Weiner, M. (A)
Weise, R. C. (VA)
Werner, C. P. (A)
West, W. P. (SM)
White, J. P. (A)
White, R. M. (A)
Wightman, R. R. (M)
Wilcox, J. E. (A)
Willenborg, E. J. (A)
Williams, A. J., Jr. (SM)
Williams, J. B. (SM)
Wills, W. P. (SM)
Wilsker, O. (A)
Wilson, L. D. (M)
Winzemer, A. M. (SM)
Wise, B. (A)
Witkin, E. (SM)
Witkowski, J. F. (VA)
Wojcik, J. J. (A)
Wolf, A. A. (A)
Wolin, L. (A)
Wolin, S. (M)
Woll, C. F. (SM)
Wood, H. O. (M)
Woodcock, V. E. (A)
Wright, S. E. (A)
Wye, R. E. (A)
Wyeth, F. H. (A)
Wylen, J. (A)
Yang, C. (A)
Yetter, E. W. (M)
Young, R. T. (A)
Yutz, R. W. (A)
Zappacosta, J. A. (A)
Zebrowitz, S. (A)
Zimmerman, M. S. (A)

Phoenixville
Kaufmann, H. W. (A)
Tevis, J. A. (A)

Pineville
Gallagher, V. C. (A)
Schreiner, W. A. (A)

Pittsburgh
Allen, J. G. (SM)
Anderson, A. E. (M)
Anderson, G. M. (SM)
Aronson, M. H. (M)
Barron, F. E. (M)
Bartholomew, R. R. (A)
Bean, R. H. (A)
Beardsley, R. R. (M)
Benson, H. C. (A)
Bossart, P. N. (SM)
Boyer, J. L. (A)
Blair, H. A., Jr. (A)
Briggs, T. H. (SM)
Bright, R. L. (A)
Browder, F. E. (M)
Bruno, A. R. (A)
Burgard, G. J. (A)
Bush, N. E. (A)
Busse, C. C. (M)
Caplan, H. M. (A)
Caywood, W. P., Jr. (SM)
Chosky, P. (A)
Christensen, B. (A)
Clement, P. F. (VA)
Cole, N. D. (SM)
Coleman, W. E. (M)
Coltman, J. W. (SM)
Coombs, S. H. (A)
Covert, J. R. (A)
Craft, C. J., III (A)
Creps, R. H. (A)
Croke, J. J. (A)
Davis, D. A. (A)
Dean, W. C. (A)
Decker, R. O. (A)
Depian, L. (A)
Diamond, H. (M)
DiCarlo, V. J. (A)
Dodd, A. E. (A)
Dollens, D. J. (A)
Duckett, E. J. (SM)
Engel, F. A., Jr. (M)
Feick, J. C., Jr. (A)
Findley, R. W. (A)
Firschein, O. (A)
Fisher, E. H. (A)
Fitzsimmons, D. P. (SM)
Franz, J. P., Jr. (A)
Gates, P. W. (A)
Gilbert, C. W. (M)
Gilmer, L. B. (A)
Goodboy, G. O. (VA)
Grace, J. N. (A)
Graul, T. A. (M)
Greenwood, J. H. (A)
Hall, C. T. (A)
Hall, R. L. (A)
Hamilton, W. H. (SM)
Hoffman, R. C. (A)
Holzman, G. R. (A)
Horlbeck, W. E. (M)
Hovey, B. K. (SM)
Huggler, L. R. (A)
Imboden, H. B. (A)
Jones, C. I. (A)
Jones, D. H. (A)
Jones, G. E., Jr. (A)
Jonnath, A. J. (A)
Kaiser, H. R. (M)
Keay, F. W. (A)
Kenney, T. C. (A)
Klotzbaugh, G. A. (A)
Knotts, W. L. (A)
Knox, W. G. (A)
Kochanowic, W. A. (A)
Kostalos, J., Jr. (A)
Krasik, S. (A)
Krauss, W. N. (A)
Lazich, B. (SM)
Leahy, E. F. (A)
Leonard, R. R. (A)
Litot, P. A. (A)
Loginow, S. (SM)
Lombardini, P. P. (A)
Long, J. F., Jr. (A)
Lorentzen, P. E. (M)
Luther, G. M. (A)
Maas, W. C. (A)
Madsen, C. J. (SM)
Markle, R. L. (A)
Marlowe, E. W. (M)
Marshall, S. C. (A)
Mathias, R. A. (A)
MacAlister, A. (A)
McConaughy, D. L. (M)
McConnell, R. A. (SM)
McCreary, H. S., Jr. (A)
McIntosh, R. O. (SM)
McKinley, J. G. (A)
Middleton, M., Jr. (A)
Miller, W. M. (VA)
Moore, G. E. (M)
Nagel, G. W. (A)
Nelkin, A. (A)
Nicholson, F. H. (SM)
O'Brien, F. E. (A)
O'Donnell, T. J. (A)
O'Shea, J. G. (M)
Pappas, P. E. (A)
Patterson, T. A., Jr. (A)
Perkins, H. A., Jr. (A)
Peters, L. J. (SM)
Pickholtz, L. (A)
Pierce, J. F. (SM)
Place, W. P. (A)
Plutt, J. A., Jr. (A)
Potter, W. S. (A)
Ramey, R. A. (M)
Rau, F. J. (A)
Reed, J. F., Jr. (A)
Reisman, S. J. (A)
Renkiewicz, H. F. (A)
Roberts, R. W. (A)
Roeder, J. R. (A)
Royer, G. H. (A)
Ruth, D. K. (A)
Ryan, T. M. (A)
Sander, H. F. (A)
Schatz, E. R. (A)
Schultz, J. J. (A)
Schultz, M. A. (SM)
Shafer, W. L. (A)
Shagam, E. M. (A)
Shaw, V. G. (SM)
Shoupp, W. E. (F)
Silverman, R. (A)
Single, C. H. (A)
Sparrow, R. F. (A)
Staubitz, E. J. (VA)
Strasser, A. (A)
Suter, S. G. (A)
Sutton, J. G., Jr. (A)
Tanner, G. O. (A)
Taylor, K. A. (A)
Taylor, W. E., Jr. (A)
Taylor, W. J. (A)
Teare, B. R., Jr. (F)
Thompson, J. H. (A)
Tunell, R. H. (A)
Uleman, T. (M)
Van Nice, R. I. (A)
Vogeley, C. E., Jr. (SM)
Walden, A. (A)
Walker, T. J. (A)
Walters, J. R. (A)
Watkins, K. E. (A)
Welch, A. B. (A)
Williams, E. M. (SM)
Williams, R. W. (M)
Woodford, J. B., Jr. (A)
Worrell, E. A. (A)
Wyckoff, R. D. (SM)
Yarussi, F. P. (A)
Zabetakis, S. G. (A)
Zilles, F. J. (A)
Zionts, S. (A)

Pittston
Miller, A. N. (A)

Plains
Olszewski, L. V. (A)

Plymouth Meeting
Jensen, C. L. (A)

Pottstown
Mellon, R. E. P. (VA)
Oister, G. K. (A)

Quakertown
Bartholomew, R. G. (A)
Cole, W. P. (M)
Hendricks, P. S. (VA)
Keil, O. C., Jr. (M)
Moose, L. F. (A)
Shower, E. G. (SM)

Radnor
Ashmead, D., III (M)

Ranshaw
Sienkiewicz, L. J. (M)

Raubsville
Newell, R. A. (A)

Reading
Brobst, A. K. (A)
Emerich, W. E. (A)
Hall, H. S. (A)
Hornberger, J. E. (M)
Landis, H. O. (VA)
Le Blanc, C. E. (A)
McCormack, J. E. (M)
Rose, F. L. (A)
Wagner, R., Jr. (A)
Zimmerli, R. B. (A)

Riddlesburg
Repogle, J. O. (A)

Ridgway
Cowles, R. J. (A)

Ridley Park
Tompkins, H. E. (M)

Rixford
Herbert, H. W. (A)

Ronks
Perry, H. E. (A)

Roslyn
Baumgartner, W. H. (A)
Beaver, J. A., Jr. (M)
Dahlberg, R. S., Jr. (SM)
Davidson, D. R. (A)
Douglass, F. W. (A)
Grove, L. R. (A)
Pearson, S. S. (A)
Shirley, R. C. (A)
Silverman, J. B. (A)

Rutledge
Bellew, H. P. (A)
Douthwaite, W., Jr. (A)

Rydal
Grimditch, W. H. (SM)
Herr, R. F. (SM)

St. Marys
Bickmire, R. L. (M)
Dressel, H. (A)
Hoffman, R. R. (SM)
McKnight, G. P. (M)
Pierson, I. S. (VA)
Speer, J. S., II (A)

Saxonburg
Cooper, R. W. (A)

Schwenksville
Richard, C. D., Jr. (M)

Scranton
Cooke, K. R. (A)
Corwin, N. J. (M)
Gluck, M. (A)
Kohn, S. A. (A)
McGoldrick, J. P. (A)
Miller, W. A. (A)
Pettersen, R. J. (A)
Quinn, J. M. (A)
Schiller, J. (A)
Slutter, W. R. (A)
Smith, G. (A)
Spady, R. J. (A)
Weiss, H. (A)

Secane
Wagenseller, J. E. (A)

Selinsgrove
Dix, T. S., Jr. (SM)
Esher, M. (A)
Moshier, L. S., Jr. (A)

Sellersville
Soltau, R. H. (A)

Shamokin
Bonshock, S. N. (A)
Thompson, W. B. (M)

Sharon
Bourgeois, N. A., Jr. (A)
Fisher, S. G. (A)
Greene, R. L. (A)
Harrell, J. W. (A)
Jones, L. S. (A)
Laing, J. T. (A)
Zahniser, R. M. (A)
Ziegler, R. E. (A)

Shrewsbury
Sechrist, C. F., Jr. (A)

Silverdale
Boehringer, R. R. (A)

Smethport
Peterson, C. A. (A)
Willardson, F. W. (M)

Solebury
Algeo, B. C., Jr. (SM)

Souderton
Baghurst, W. F. (A)
Fuller, B. K. (A)

Southampton
Auday, W. S. (A)
Ogletree, W. A. (A)
Wernlund, R. F. (A)

South Williamsport
Lavo, H. J. (M)

Spring City
Clevenstine, W. M. (A)

Springdale
Duris, M. W. (A)
Vallasek, J. W. (A)

Springfield
Albee, M. M. (A)
Ebling, W. F., Jr. (A)
Egger, R. J. (A)
Eichert, E. S. (A)
Galluppi, A. J. (A)
Hoepiner, K. B. (A)
Horrocks, S. W. (VA)
Metzger, A. C. (A)
Mitchell, W. J., Jr. (A)
Rhea, H. E. (A)
Schneider, S. (A)
Simpson, O. (SM)
Strinkowski, N. W. (A)
Sylvester, R. A. (M)
Weiss, E. (M)

Spring House
Sims, J. C., Jr. (M)

Springtown
Vance, R. L. (SM)

State College
Ammerman, C. R. (SM)
Baecklund, J. N. (A)
Baker, W. L. (A)
Barry, D. T. (A)
Bastuscheck, C. P. (A)
Bogar, J. E. (A)
Breazeale, W. M. (SM)
Brown, W. N., Jr. (SM)
Crossley, G. L. (SM)
Curry, T. F. (A)
Dawson, D. E. (A)
Diamant, H. B. (A)
Dickey, C. W. (A)
Doerr, C. W. (A)
Ebaugh, P. (A)
Files, W. D. (A)
Freed, P. J. (SM)
Gedance, A. R. (A)
Hall, F. T., Jr. (M)
Haller, G. L. (F)
Harris, D. E. (A)
Harvey, H. B., Jr. (A)
Hemman, R. J. E. (M)
Higdon, R. V. (SM)
Horne, J. F. (A)
Hunter, R. P. (A)
Jenkins, J. W. (A)
John, F. T. (A)
Kay, J. W. (A)
Key, C. L., Jr. (A)
Knausenberger, G. E. (A)
Kush, L. J. (M)
Lopez, A. F. (M)
McLucas, J. L. (SM)
Megarger, L. R., Jr. (A)
Nearhoof, H. J. (A)
Raymond, R. C. (SM)
Riddle, R. L. (A)
Schneider, H. L. (A)
Schrag, R. L. (M)
Skipper, R. E. (A)
Stavely, E. B. (M)
Tomlinson, J. M. (A)
Walker, E. A. (M)
Walker, J. C. F., III (A)
Walker, J. P., Jr. (A)
Warfield, J. N. (A)
Waynick, A. H. (SM)

Sunbury
Bower, H. W. (A)
Bubb, A. H. (M)
Carr, G. W. (M)
Gaul, W. L. (A)
Klemmer, A. E. (A)
Larson, G. C. (SM)
MacDonald, A. F. (SM)
McClane, C. T. (M)
Neidig, K. E. (M)
Reitz, H. W. (A)
Rossig, E. W. (M)
Sloan, F. M. (A)
Stefancic, K. (A)
Stubbe, R. R. (M)

Swarthmore
Barus, C. (A)
Hayes, R. S. (VA)
Patterson, G. W. (A)
Roberts, G. A. (M)

Sykesville
Lesko, J. (A)

Tamaqua
Johnson, A. T. (A)

Tarentum
Chantler, G. D. (A)
Harbaugh, J. R. (A)

Temple
Mueller, P. L. (A)

Towanda
Owen, E. R. (A)

Trafford
Breakey, G. A. (A)

Tunkhannock
Inman, A. D. (A)

Turtle Creek
Brendle, T. A. (A)

Tyrone
Kearney, H. B., Jr. (VA)

Uniontown
Zahradnik, B. V. (A)

Upper Darby
Charp, S. (SM)
Egenstafer, F. L. (A)
Garkav, E. (A)
Gumacos, C. (A)
Houser, W. G. (A)
Mankoff, L. L. (A)
McCoy, C. T. (SM)
Moore, M. J. (A)
Peckham, M. A. (A)
Pope, R. A. (A)
Regan, E. D. (A)
Santaguida, C. (A)

Verona
Brannen, P. M. (M)
Hollobaugh, R. C. (M)

Villanova
Klekotka, J. A., (M)
Sheker, E. B. (A)

Wallingford
Robinson, I. E. (A)

Warren
Kleshauer, F. W. (A)
Myers, S. J. (A)
Wanner, L. R. (M)

Warrington
Beggs, G. E., Jr. (SM)
Clarance, A. L. (A)
Powell, W. E., Jr. (A)
Williams, R. J., III (A)

Washington
Loffredi, A. J. (A)
Paul, D. R. (A)

Wayne
MacInnes, N. A. (A)
Wu, H. H. (A)

Weatherly
Carlson, R. F. (SM)
Kiser, N. L. (SM)

Weisel
Hansburg, M. (A)

Wescoesville
Schlichter, E. S. (A)

Wesleyville
Larson, K. E. (A)

West Chester
Green, R. E., Jr. (A)
Haner, L. P. (SM)
Hayes, H. J., Jr. (M)
Kieselbach, R. (A)
Munns, M. (A)
Veldhuis, A. C. (M)

West Homestead
Cauley, T. K. (A)

West Middlesex
Herr, C. E. (A)

West Mifflin
Domen, S. L. (A)

West Pittston
Barritt, R. C. (A)

White Haven
Slavics, J. W. (A)

Wilkes-Barre
Epstein, J. N. (A)
Hohmann, G. D. (A)
Hohmann, L. A., Jr. (A)
Shuster, E. F. (VA)

Wilkinsburg
Booker, C. A., Jr. (A)
Jones, R. M. (A)

Williamsport
Bresee, W. H. (A)
Canning, J. H. (SM)
Cherry, M. V. (A)
Douglass, C. F. (SM)
Drummeter, W. (A)
Feehrer, M. R. (A)
Lego, J. M. (M)
Lepley, R. C. (SM)
Petts, R. G. (M)
Snook, J. E. (A)
Teno, E. (A)
Wellendorf, J. J. (M)

Willow Grove
Borman, S. H. (A)
Bowley, R. J. (VA)
Gable, A. W. (A)
Lounsberry, E. P. (A)
Lynn, R. B. (A)
Martin, J. A., Jr. (A)
Mason, C. F. (A)
Mason, E. C. (A)
Metz, L. C., Jr. (A)
Oliver, W. G. (M)
O'Lone, C. J. (A)
Phillips, J. W. (A)
Remich, J. E. (A)
Saltzman, A. R. (A)
Shaw, H. H. (A)
Silverman, E. (A)
Steward, R. R. (A)
Zohn, R. L. (A)

Woodlyn
Russo, L. J. (A)

Wyncote
Craig, P. M. (SM)
Dorris, R. C. (M)
Gold, M. B. (A)
Kinnier, D. (VA)

Wynnewood
Collins, H. B., Jr. (A)
Dohan, W. R. (VA)
Fisher, J. F. (SM)
Johnson, N. (M)
Leas, J. W. (SM)

Wyoming
Marshall, J. F. (M)

Wyomissing
Bunnell, N. R. (A)
Huyett, W. I. (A)

Yeadon
Hastings, J. A. (A)
Molieri, J. T. (A)
Myers, E. F. (A)

York
Anderson, A. W. (A)
Boyer, W. H. (A)
Cole, W. S. (A)
DeVoll, R. L. (SM)
Gardner, R. W. (A)
Goodling, G. G., Jr. (VA)
Haas, W. I. (A)
Hirsch, R. O. (A)
Hubley, G. W. (A)
Pueschner, H. (A)
Staub, R. J. (A)
Stonesifer, R. A. (A)
Swengel, R. C. (A)
Umpleby, K. F. (SM)

RHODE ISLAND

Barrington
Thornley, H. W. (VA)

Bristol
Coppolino, L. S. (A)

Central Falls
McPeake, R. B. (A)

Cranston
Cardillo, A. (A)
Soscia, B. L. (A)

East Greenwich
Burn, J. M., Jr. (A)
Tyler, E. M. (A)
Wong, G. J. (A)

East Providence
Parker, G. I. (A)

Greenwood
Hall, G. D. (A)

Kingston
Billmyer, C. M. (A)
Haas, R. S. (A)
Kline, J. (M)
Mowbray, W. H. (A)
Prince, M. J. (A)

Manville
Hembise, P. M. (A)

Middletown
Bowerman, R. H. (A)
Neuland, J. G. (A)

Newport
Craig, A. G., Jr. (A)
Mathison, W. W. (A)
Meader, R. O. (M)
Murphy, E. J. (A)
Ridenour, H. E. (A)
Sologiozy, C. S. (A)
Spear, E. D. (M)

Norwood
Croxville, W. B. (M)

Peace Dale
Van Duzer, K. W., Jr. (A)

Portsmouth
Andres, A. J. (A)

Providence
Angulo, C. M. (M)
Barlow, H. B., Jr. (A)
Cook, D. R. (A)
Dandreta, W. (VA)
Epstein, H. D. (A)
Farrell, F. X. (M)
Fine, S. (A)
Folsom, W. A. (A)
Gordon, M. F. (M)
Halton, E. B. (A)
Homic, S. G. (A)
Klemer, B. H. (A)
Murtaugh, W. A. (M)
Regan, J. V., Jr. (A)
Ruina, J. (A)
Testa, E. (A)
Tilley, H. H. (SM)
Truell, R. (SM)
Verrecchia, T. A. (A)
Weisberg, A. M. (A)
Wilkins, H. A. (A)

Riverside
Allen, G. W. (A)

Rumford
Arnold, R. D. (A)
Prior, T. C. J. (M)

Saylesville
Mills, J. B. (A)

Tiverton
Lizotte, O. A. (M)

Valley Falls
Bailey, L. E. (A)

Warwick
McLaughlin, R. G. (A)
Thoresen, J. C. (A)

Warren
Bowen, H. C. (A)

Westerly
Crandall, C. P. (A)
Finocchiaro, E. C. (A)

Woonsocket
Petrides, C. (A)

SOUTH CAROLINA

Aiken
Bancroft, L. C. (A)
Brockman, J. T. (A)
Karlson, E. L. (M)

Barnwell
Stubbs, D. L. (M)

Bennettsville
Weatherly, R. T., Jr. (A)

Charleston
Bailey, J. H. (VA)
Birchfield, W. P. (A)
Bize, J. T., Jr. (A)
Buehler, E. R. (A)
Cowan, C. D. (A)
Edmonds, J. B. (A)
Goldberg, H. S. (A)
Herring, O. L., Jr. (A)
Jennings, B. B. (A)
Lax, C. B. (SM)
McCarley, H. H. (SM)
McCoy, F. G. (SM)
Nolen, J. F. (A)
Schachte, W. L. (SM)
Schleppegrell, J. R. (A)
Tillman, W. F. (A)
Wilensky, E. (A)

Clemson
Long, J. T. (A)
Tingley, F. T. (A)

Columbia
Gill, C. W. (A)
Lambert, R. D., Jr. (M)
Moore, S. F., Jr. (A)
Scott, A. L. (A)
Snyder, R. J. (A)
Teeple, R. P. (A)
Wilds, A. B. (A)

Easley
Cox, C. W. (A)

Fairforest
Greer, P. A. (M)

Florence
Pritchett, W. A. (A)

Greenville
Fernandez, M. (SM)
Garrison, W. E. (M)
Korf, S. (A)
Pace, M. W. (A)
Tate, G. D. (M)

Isle of Palms
Creighton, C. (A)
Fowler, E. B. (A)
Lee, P. H. (SM)
Quinn, F. S., Jr. (A)

Mount Pleasant
Bennett, J. H. V. S. (A)

Myrtle Beach
Brown, W. J. (A)

Naval Base
Baird, H. S. (A)
Bloomquist, J. C. (A)
Blount, H. L. (M)
Cook, W. H., Jr. (A)
Flynn, L. A. (A)
Gatch, C. E. (A)
Hamilton, W. T. (M)
Hare, R. E. (A)
Jones, R. W. (M)
Klavens, N. I. (A)
Lyerly, E. E. (A)
Powers, E. W. (M)
Rice, J. E. (A)
Ruotolo, M. L. (A)

North Augusta
Correll, D. B. (A)
Dale, J. D. (A)

North Charleston
Booker, J. P. (M)
Martin, J. A. (A)
Thomason, J. G. (M)

Orangeburg
O'Cain, W. L. (A)
Rahner, H. B. (A)

Pendleton
Klein, N. E. (VA)

Summerville
Metts, M. C. (A)

Sumter
Baldwin, A. L., Jr. (A)
Cowgill, L. R. (A)
Slocum, G. V. (A)

Union
Rhymer, W. (A)

Waylyn Naval Base
Lane, J. P. (A)

West Columbia
Hafely, C. H. (A)

SOUTH DAKOTA

Alexandria
Pitts, M. J. (A)

Arlington
Dill, E. C. (M)

Astoria
Hogle, W. I. (A)

Brookings
Cheadle, J. N. (M)

Huron
Meile, J. W. (A)

Pierre
Jones, M. G. (A)

Platte
Touw, C. C. (A)

Rapid City
Colgan, A. R. (A)
Hunt, E. B. (A)
Nelson, E. A. (M)
Range, M. A. (A)

Sioux Falls
Bunday, G. F. (A)
Froke, L. C. (A)
McKenna, W. E. (M)
Pierce, M. E. (A)
Prather, R. D. (A)
Warren, L. C. (A)

Vermillon
Graf, S. J. (M)

Weaver
Bean, R. C. (A)
Michaels, G. (A)
Ward, Q. E. (A)

Yankton
Bedwell, T. H. (M)

TENNESSEE

Alcoa
Warren, M., Jr. (A)

Big Sandy
Dowdy, Q. B. (A)

Bristol
King, L. A. (A)
Wilson, E. M. (A)

Chattanooga
Barnes, B. B. (A)
Dean, W. E., Jr. (A)
Hochdorf, M. (A)
Thurnauer, H. (VA)
Young, B. A. (A)

Clarksville
Bailey, J. H. (A)

Cleveland
Meagher, A. W. (A)
Stuart, W. D. (A)

Concord
Reyling, P. M. (M)

Cordova
Downs, H. I. (A)

Donelson
Pearsall, S. H. (A)

Fountain City
Eason, O. (A)

Franklin
Hobbs, R. V. (A)

Goodlettsville
Genung, N. W. (A)

Johnson City
Garland, O. K. (A)

Kingsport
Devaney, R. G. (A)

Knoxville
Affel, R. G. (A)
Allen, J. W. (A)
Bradley, J. A., Jr. (A)
Bradshaw, R. L. (A)
Evans, R. C. (A)
Horton, J. R. (M)
Kennedy, W. J. (A)
King, S. (A)
Oakes, L. C. (A)
Quinn, R. L. (A)
Schultz, F. V. (SM)
Stampalia, J. T. (A)
Stanbery, J. F. (SM)

Madison
Powell, M., Jr. (A)

Manchester
Chapek, H. T. (A)
Whitehurst, J. D. (A)

Martin
Ams, J. E. (A)

Memphis
Browning, J. W. (A)
Busler, L. F., Jr. (A)
Butt, S. P., Jr. (A)
Chaput, R. L. (A)
Coker, J. H. (A)
Hull, J. (A)
Logan, E. W., Jr. (A)
Marsh, W. (A)
McLin, J. T. (A)
Orr, W. S. (A)
Raney, W. (A)
Reeves, O. W. (A)
Stewart, E. B. (A)
Viser, J. H., Jr. (A)
Weeks, J. P. (A)
Zenon, Z. (A)

Milan
Messner, K. H. (A)

Millington
McKnight, D. R. (A)
Staheli, G. D. (A)

Nashville
Anderson, W. G. (A)
Arnold, T. G., Jr. (A)
Bash, K. F. (A)
Bright, F. W. (M)
Broden, B. W. (A)
Campbell, J. S. (M)
DeWitt, J. H. (F)
Goldberg, A. S. (A)
Goodloe, R. R. (A)
Graham, E., Jr. (A)
Hill, W. A. (A)
Kearley, R. L., Jr. (A)
Montgomery, L. H. (SM)
Rawls, L. E. (A)
Redford, J. L. (A)
Reynolds, G. A. (M)
Schumann, F. (SM)
Shelton, A. C. (M)
Sutton, A. T. (A)

Norris
Manning, F. W. (A)

Oak Ridge
Adams, R. K. (A)
Banta, H. E. (M)
Brashear, C. (A)
Currens, A. B. (A)
Donaldson, M. R. (A)
Evans, E. C. (M)
Fairstein, E. (A)
Fort, W. G. S. (M)
Hagen, E. W. (A)
Hanauer, S. H. (A)
Holt, G. A. (M)
Kelley, G. G. (A)
Knowles, D. J. (M)
Reynolds, J. W. (A)
Richards, H. K. (VA)
Schede, R. W. (A)
Scott, D. W. (A)
Shipley, E. D. (A)
Sidnam, R. D. (A)
Silverberg, M. (A)

Southern, A. L. (A)
Thiel, W. H. (M)
Walchli, H. E. (M)
West, K. W. (A)
Witt, E. C. (A)
Wooldridge, A. L. (A)
Zachry, D. S. (A)

Raleigh
Frase, E. C., Jr. (M)

Signal Mountain
Richmond, R. E. (A)

Tullahoma
Cunningham, J. W. (A)
Severin, J. A. (A)

TEXAS

Abernathy
Anderson, L. G. (A)

Abilene
Farmer, P. E. (M)
Henley, R. D. (A)

Alice
Walters, W. T. (A)
Williams, C. S. (M)

Amarillo
Hankison, W. C. (A)
Harris, H. W. (M)
Killion, D. G. (A)
Martin, J. L. (M)
Michalk, E. R. (A)
Torrey, W. H. (A)
Williams, A. M. (A)

Anson
Gill, R. M. (A)

Arlington
Bushart, G. J., Jr. (A)
Hutcheson, G. C. (SM)
Martin, R. L. (M)

Austin
Adams, R. M. (A)
Baltzer, O. J. (SM)
Barclay, J. N. (SM)
Bondy, M. A. (A)
Britt, C. O. (A)
Brooks, F. E., Jr. (M)
Cook, G. R. (A)
Crain, C. M. (M)
Davis, A. (SM)
Deakins, G. (A)
Deam, A. P. (M)
Dubose, G. P. (A)
Fannin, B. M. (A)
Frobese, C. W. (A)
German, J. P. (A)
Graf, C. R. (A)
Grannemann, W. W. (A)
Harbaugh, A. W. (M)
Holly, L. C. (A)
Huggins, L. L. (A)
Kirksey, T. W. (A)
Kreuz, L. B. (SM)
LaCoste, L. J. B. (A)
LaGrone, A. H. (SM)
Lentz, W. H. (A)
Lin, C. S. (A)
McKinney, C. M. (SM)
Metcalf, D. F. (M)
Mitchell, M. B., Jr. (A)
Morton, O. L. (A)
Opiela, A. D., Jr. (A)
Ripperger, E. A. (A)
Rogers, R. G. (A)
Runyan, W. R. (A)
Rummel, E. C. (A)
Schafer, N. B. (A)
Smith, H. W. (M)
Smith, S. E. (M)
Stratton, A. W. (F)
Tipton, C. D. (A)
Tolbert, C. W. (M)
Wallace, R. H. (A)
Ward, T. L., Jr. (A)
White, G. E. (SM)
Widener, M. W. (A)
Williams, C. E. (A)
Wood, G. W. (A)

Ballinger
Kelley, W. C. (A)

Bay City
Richers, E. E. (A)

Baytown
Hiner, T. L. (A)
Robertson, G. R. (A)

Beaumont
Aubey, L. J. (A)
Bordeman, M. H. (A)
Burgess, C. H. (A)
Bush, C. R. (VA)
Cherry, L. B. (M)
Collins, J. P. (A)
Cunningham, R. E. (A)
Davis, V. E. (A)
DeSutter, D. H. (M)
Dunigan, G. R. (A)
Dutton, C. G. O. (A)
Eckles, W. W., Jr. (A)
Ferguson, J. D. (A)
Horn, B. B. (A)
Hughes, B. F. (M)
Kay, L. E. (M)
Kirby, R. P. (A)
Laughlin, C. E. (M)
Lawrence, T. B. (M)
McDaniel, L. W. (M)
Montague, L. E. (A)
Morgan, J. G. (A)
Normand, A. J. (A)
Pace, T. L. (A)
Petkovsek, J., Jr. (SM)
Phillips, P. S. (A)
Shane, Z. G. (A)
Smith, H. K. (A)
Smith, S. L. (A)
Southwell, J. D. (M)
Stockard, L. C. (M)
Straughn, W. L., Sr. (M)
Trevey, C. B. (M)
Wearden, P. L. (A)
Winterhalter, A. (A)

Bellaire
Arbogast, J. L. (A)
Ball, D. F. (M)
Cowles, L. G. (SM)
Herzog, G. (SM)
Huffman, C. H. (A)
Huhndorff, E. P. (M)
Loofbourrow, R. J. (M)
Manry, L. V., Jr. (A)
Nelsen, H. H. (A)
Stelzer, R. B. (A)
Wheeler, H. T. (M)

Big Spring
Walton, H. T. (A)

Blossom
Crowder, B. S. (A)

Brady
Byler, H. C., Jr. (A)

Brownfield
Spear, R. B. (M)

Brownsville
Brand, J. J. (M)
Johnston, H. M. (A)
Martin, G., Jr., (A)

Bryan
Sosolik, F. J. (A)

Canyon
Thompson, C. E. (A)

Carthage
Culbertson, H. B. (A)

Center
Riley, H. E. (A)

College Station
Baum, J. A. (A)
Dillingham, H. C. (SM)
Melloh, A. W. (SM)

Commerce
Sparkman, W. A. (M)

Cooper
Hodges, S. E. (A)

Corpus Christi
Barrett, L. S. (A)
Cuesta, N., Jr. (A)
Douglas, R. N. (A)
Dunn, E. C. (A)
Lockhart, H. B. (A)
Taylor, P. (M)
Williams, R. J. (A)

Corsicana
Jackson, M. L. (A)

Crystal City
Mayberry, J. H. (A)

Dallas
Albano, J. (SM)
Ankele, E. T., Jr. (M)
Arnett, R. A. (SM)
Aymond, E. F., Jr. (A)
Bailey, W. R. (A)
Batterson, C. C. (A)
Becklund, O. A. (SM)
Bickel, R. L. (A)
Bowling, W. P. (A)
Branum, M. C. (A)
Brawner, C. A., Jr. (A)
Brewer, H. D. (A)
Brock, F. A. (A)
Broding, R. (SM)
Brown, L. E. (A)
Brown, R. L., Jr. (M)
Bruland, R. V. (M)
Bullock, M. W. (M)
Burg, K. E. (A)
Campbell, J. R. (A)
Carter, P. G. (A)
Chapman, A. B. (VA)
Chenault, H. P. (A)
Clewell, D. H. (SM)
Childress, C. B. (A)
Clithero, W. H., Jr. (A)
Collins, F. (SM)
Congdon, R. L. (SM)
Conrad, R. S. (SM)
Crandell, C. F. (M)
Cullum, A. E., Jr. (F)
Daniell, C. M. (SM)
Danier, C. E. (A)
DeLong, C. O., Jr. (A)
Doherty, D. T. (A)
Donohoe, L. J. (A)
Dudley, T. C. (A)
Dunnegan, T., Jr. (A)
Dyer, F. C. (A)
Earhart, C. E. (SM)
Edwards, H. T. (A)
Ellis, W. C. (M)
Elkins, C. C., Jr. (M)
Elmore, C. M., Jr. (A)
Englehart, C. F. (A)
Eriksen, E. M., Jr. (A)
Evans, A. D. (A)
Flath, E. H., Jr. (M)
Flynn, J. G., Jr. (A)
Fox, C. H. (M)
Freund, G. J. (A)
Green, J. A. (SM)
Green, P. M. (A)
Geisel, F. J. (A)
Gilder, E. E. (A)
Godbey, J. J. (A)
Godbey, J. K. (M)
Granberry, D. S. (SM)
Griffith, B. W., Jr. (SM)
Haggerty, P. E. (A)
Hallford, B. R. (A)
Hampton, J. W. (M)
Harmon, F. I. (M)
Hathaway, W. L. (A)
Headington, N. L. (A)
Heizer, K. W. (A)
Herman, H. F. (A)
Hewlett, T. N. (A)
Hirschberg, J. K. (A)
Holaday, D. F. (M)
Holt, I. D. (A)
Homsy, J. H. (SM)
Horne, K. M., Jr. (A)
Hunt, J. T. (A)
Hutchinson, N. D. (A)
Hutson, R. N. (A)
Irwin, C. B., Jr. (A)
Jensen, J. (A)
Jones, J. F. (A)
Jones, T. L. (SM)
Joyce, R. E. (A)
Jurek, W. M. (A)
Kantor, H. I. (A)
Keener, R. F. (A)
Kelly, R. W. (A)
Kelsay, W. D. (A)
Kennedy, F. H., Jr. (SM)
Kerrins, R. K. (A)
Klein, J. H. (A)
Koepsel, W. W. (A)
Krames, C. V. (A)
Kuehne, W. (M)
Lane, E. F. (A)
Lawrence, L. J. (A)
Leedom, J. N. (M)
Legg, B. (A)
Leveille, A. S. (M)
Lewis, M. T. (M)
Lincoln, J. P. (A)
Linker, C. L. (A)
Lipscomb, E. W. (SM)
Logan, J. J. (A)
Loper, G. B. (M)
Loras, J. (A)
Mace, J. W. (A)
Mallory, V. (M)
Martin, G. W., Jr. (A)
Martin, J. L. (A)
Mason, A. E., Jr. (A)
Mathis, J. D. (SM)
Maxson, G. W. (A)
McAnally, D. G. (A)
McDermott, E. (VA)
McNeely, J. S. (SM)
Meyer, A. A. (A)
Miller, J. C., Jr. (A)
Miller, N. D. (A)
Mills, R. L. (M)
Mitchell, W. R. (VA)
Moseley, T. B. (M)
Moyer, J. N. (A)
Mut, S. C. (A)
Myers, J. (A)
Naab, P. J. (A)
Nelson, T. J. (A)
Newell, B. J. (A)
Nilson, O. J. (A)
Norkus, B. S. (M)
Norvell, K. A. (A)
Ocnaschek, F. J. (A)
Olson, R. W. (M)
Oster, R. E. (A)
Palmquist, J. F. (SM)
Paslay, L. C. (VA)
Paxton, T. N. (A)
Peacock, R. M., Jr. (A)
Penn, W. D. (SM)
Peterson, D. A. (SM)
Poole, W. S. (A)
Price, W. E. (SM)
Prickett, T., Jr. (M)
Reed, B. S. (A)
Reiffin, J. L. (A)
Renner, D. S. (VA)
Richards, D. C. (A)
Riley, J. H. (A)
Riser, H. N. (A)
Roberts, J. D. (A)
Robinson, G. C. (M)
Roby, J. W., Jr. (M)
Rogers, T. E. (A)
Ross, C. C. (VA)
Rountree, J. G. (SM)
Royalty, M. C. (M)
Russell, C. A. (A)
Rutherford, C. R. (M)
Sartor, J. O., Jr. (A)
Scammel, B. C. (A)
Scroggins, C. M., Jr. (A)
Seay, C. F., Jr. (SM)
Shaw, B. E. (A)
Shook, E. M. (A)
Shuffler, R. M. (SM)
Smallwood, J. L. (A)
Smith, F. G. (A)
Smith, H. J. (M)
Smith, J. E. (A)
Sorkin, S. A. (A)
Spieker, L. J. (A)
Spieker, M. (A)
Stone, R. M. (A)
Stover, J. S. (M)
Stribling, J. L., Jr. (A)
Strom, L. D. (A)
Stroup, R. M., Jr. (A)
Summers, G. C. (A)
Tobolowsky, J. L. (A)
Townsend, A. R. (A)
Tucker, D. J. (SM)
Vilbig, J. L., Jr. (A)
Wadel, L. B. (M)
Walker, M. C. (M)
Wallace, R. M. (A)
Wallis, T. F., Jr. (A)
Waltz, D. M. (M)
Waters, W. F. (M)
Webb, J. O. (A)
Weefall, W. W. (A)
Weldon, J. O. (SM)
Wenger, W. D. (SM)
Wilkinson, J. D. (A)
Williams, B. M. (A)
Winston, G. R. (M)
Wissemann, H. J. (SM)
Wright, T. A. (A)
Yarbrough, A. D. (A)
Yeagley, F. W. (M)
Zeidlik, W. J. (A)
Zemanek, J., Jr. (A)
Zimmerman, C. W. (A)

Del Rio
Donaldson, C. A. (M)
Sandock, J. (A)

Denison
Henrikson, A. E. (A)

Denton
Perkins, G., Jr. (A)

Duncanville
Kaver, M. (A)
Nemcovsky, R. (A)

Edinburg
Meiners, W. H. (A)

El Paso
Alexander, W. R. (A)
Anker, R. W. (A)
Beattie, F. E. (A)
Birdsey, G. J., Jr. (M)
Brown, J. S. (A)
Bunda, F. E. (M)
Byrd, C. B. (A)
Clanton, H. M. (SM)
Clark, W. E. (A)
Clark, R. N. (A)
Coker, V. A. (M)
Cole, H. H. (M)
Coleman, M. H. (A)
Cook, J. G. (A)
Corkhill, J. M. (A)
Danielson, F. H. (M)
Davis, R. A. (A)
Deese, A. E. (M)
DeLuca, L. A. (A)
Dobkowski, J. T. (A)
Duggan, O. T. (A)
Eve, D. R. (A)
Favret, A. G. (M)
Fernstrom, C. H. (A)
Fleer, W. A. (A)
Fleissner, C. L. (A)
Fogle, R. E. L., Jr. (A)
Fowler, B. V. (A)
French, C. E. (M)
Fulkerson, T. E. (M)
Glassgow, C. R. (A)
Graham, D. A. (M)
Hale, L. C. (A)
Hangartner, J. E. (M)
Hayes, R. W. (M)
Heard, B. E. (A)
Helley, R. M. (A)
Hoefling, J. E. (A)
Holmes, C. J. (A)
Hopp, H. W. (M)
Hopper, M. C. (A)
Howelsen, H. T. (A)
Isenson, R. S. (M)
James, G. F. (A)
Johnson, P. C. (A)
Kampe, E. A. (M)
Katzenberger, H. S. (A)
Kotovsky, S. K. (A)
Lane, L. O., Jr. (A)
Larkin, W. E. (A)
Lewko, J., Jr. (A)
Luchter, D. (A)
Lutener, O. C. (M)
Mankiewicz, E. J. (A)
Marchesano, J. E. (M)
Martin, W. C. (A)
Maury, J. H. (M)
McGraw, J. E. (SM)
Melland, B. T. (A)
Michael, L. E. (A)
Miller, W. E., Jr. (A)
Mortenson, W. R. (A)
Murnick, A. J., Jr. (M)
Murray, W. A. (A)
Neuman, R. E. (A)
Orman, L. M. (SM)
Parnell, C. C., Jr. (A)
Reeves, T. M. (A)
Rexroad, W. F. (A)
Reynolds, D. E. (M)
Robson, A. B., Jr. (A)
Salter, R. A. (A)
Sell, W. B. (SM)
Spanier, B. (M)
Stone, R. F. (A)
Stone, S. H., Jr. (A)
Stuart, J. F. (SM)
Talbott, E. P. (VA)
Tolle, W. T. (A)
Tuttle, J. B. (A)
Uthlaut, H. T., Jr. (A)
Wasser, N. (M)
Wedekind, D. E. (A)
Wells, A. T. (A)
Weber, L. C. (A)
White, L. H. (M)
Williams, W. K. (M)

Farmers Branch
Millis, E. G. (A)

Fort Worth
Abernathy, H. D. (A)
Anderson, K. W. (A)
Applegate, H. E. (SM)
Asendorf, J. A. (A)
Bateman, J. W. (A)
Beisel, R. W. (M)
Blandford, J. T., Jr. (A)
Bodin, J. A. (A)
Brust, M. F. (A)
Bryan, K. W. (A)
Burke, J. F. (M)
Clark, J. E., Jr. (A)
Cochran, U. E. (A)
Collup, D. E. (SM)
Coursey, J. R. (M)
Crosson, J. W. (M)
Dinsmore, J. T. (A)
Dodd, J. M. (A)
Ferguson, A. A. (A)
Fuller, C. M. (M)
Guyton, R. D. (A)
Hay, G. W. (A)
Hebert, M. R. (M)
Hites, W. H. (A)
Hogan, A. W. (M)
Howes, R. B., Jr. (M)
Johnson, C. K. (M)
Kelton, W. (M)
Keplinger, M. (M)
Kimzey, T. (M)
Koski, J. I. (M)
LeGette, J. L. (A)
Lynch, B. (M)
Lynch, J. S. (A)
Matthews, K. B. (A)
Mayfield, S. A. (A)
McKee, C. W. (VA)
Metcalf, J. E. (A)
Neher, H. T. (A)
O'Neal, R. D. (SM)
Palmer, J. E. (VA)

Peterson, W. E. (A)
Philpot, J. W., Jr. (A)
Prior, R. R. (A)
Raymond, W. D. (A)
Rea, R. W. (M)
Richardson, D. J. (M)
Richeson, W. E. (A)
Robertson, G. H. (A)
Sandlin, G. L. (M)
Shell, W. H. (A)
Shepherd, M. F. (M)
Shipman, H. F. (A)
Simmons, D. J. (A)
Simmons, M. W. (M)
Spradlin, J. D. (M)
Stanphill, J. R. (M)
Stansch, H. C. (A)
Stinson, R. C., Jr. (SM)
Summers, G. L. (A)
Sumner, G. C. (SM)
Sybenga, P. M. (M)
Taulman, D. C. (M)
Teasdale, A. R., Jr. (A)
Thomen, M. K. (A)
Thompson, A. C. (A)
Tonahill, S. (A)
Walton, H., Jr. (A)
Wendlandt, C. W. (A)
Wentworth, G. E. (A)

Freeport
Coker, S. G. (A)

Friendswood
Havard, W. L. (A)

Galveston
Benson, W. H., Jr. (A)
Campbell, D. E. (A)
Johnson, E. W. (A)
Lee, J. L. (A)
Pearce, O. M. (A)
Smith, G. B. (M)

Garland
Cawood, J. L. (A)
Daniel, L. A. (A)
Fuller, W. D. (M)
Harton, P. L. (A)
Holt, W. J., Jr. (M)
Lynn, J. C. (A)
Ming, M. M. (M)
Mitchell, W. D. (A)
Thomas, C. R. (A)

Grand Prairie
Askew, W. J., Jr. (A)
Buehrle, C. D. (A)
Howell, J. S., Jr. (A)
Kollar, T. J. (A)
Ladine, D. A. (A)
Lanier, R. E. (A)
Macurak, A. (A)
Terbush, H. W. (A)
Watson, D. E. (A)

Grandview
Ladwig, H. A. (A)

Greenville
Smith, B. J. (M)

Harlington Air Force Base
Beaudette, C. G. (A)

Hempstead
Sherron, R. J., Jr. (A)

Hereford
Surber, D. H. (A)

Holland
Bunker, W. M. (A)

Houston
Anthony, J. P. (A)
Armstrong, R. E. (A)
Arthur, M. A. (SM)
Asbury, R. T. (M)
Atkinson, C., Jr. (A)
Austin, F. M. (SM)
Ball, J. D. (A)
Bambach, A. W. (A)
Beck, E. R., Jr. (A)
Beeman, K. R. (M)
Beyer, A. R. (A)
Blanchard, A. (SM)
Booker, J. L. (A)
Borden, R. R. (A)
Branen, S. M. (A)
Brewer, J. H. (A)
Bricaud, J. M. (SM)
Brougher, R. M. (M)
Browning, C. L. (A)
Buck, H. M. (M)
Buechner, R. H. (SM)
Bulhon, J. J. M. (M)
Busacker, J. W. (A)
Bush, R. S. (M)
Byers, E. G. (SM)
Calhoun, C. W. (A)
Campbell, J. R. (A)
Canup, R. E. (M)
Caplan, R. S. (SM)
Carlise, C. H. (M)
Carlton, L. A., Jr. (A)
Carter, W. H., Jr. (SM)
Chinski, G. R. (SM)
Codington, J. H. (VA)
Connelly, S. B. (A)
Cornett, J. R. (M)
Crews, L. B. (A)
Crossland, O. C. (A)
Crump, E. E. (A)
Curry, C. P. (A)
Curry, W. L. (A)
Dewan, J. T. (M)
Dixon, T. K., Jr. (A)
Drisdale, T. B. (A)
Dupree, E. M. (SM)
DuRapau, J. J. (A)
Edwards, W. H. (A)
Erath, L. W. (M)
Peagin, F. J. (M)
Franklin, P. E. (M)
Freeman, G. A., Jr. (A)
Frosch, A. (A)
Gardner, D. H. (VA)
Geddes, L. A. (A)
Geery, P. W. (A)
Godfrey, R. M. (A)
Gollwitzer, L. H. (A)
Greenwood, H. M. (A)
Greer, W. J. (SM)
Gundlach, E. E. (A)
Hale, E. M. (M)
Hall, H. E. (A)
Hallenburg, J. K. (M)
Hanus, F. J. (A)
Hatchl, S. (A)
Heintz, K. O. (M)
Helken, E. W. (M)
Hiltpold, L. E. (M)
Hougen, H. C. (M)
Hubbard, C. L. (M)
Hudgins, W. T., Jr. (A)
Hurlbert, L. L. (A)
James, W. B. (A)
Jameson, J. P. (A)
Jones, A. H. (A)
Johns, R. W. (A)
Johnson, H. L. (A)
Kannenstine, F. M. (VA)
Kaufman, S. (M)
Keep, H. A. (A)
Klicpera, M. F. (A)
Kokesh, F. P. (M)
Lamb, J. E. (A)
Lenert, R. H., Jr. (A)
Madeley, P. E. (A)
Marcy, W. E. (A)
Martin, S. A., Jr. (M)
Masterson, H. T. (M)
McArthur, H. K. (A)
McCabe, L. L. (SM)
McConnell, H. E. (VA)
McKay, G. C., Jr. (A)
McNatt, W. E. (M)
Melton, D. P. (M)
Menger, W. M. (A)
Miller, W. B. (A)
Mims, A. J. (M)
Mitchell, J. L. (A)
Miller, G. K. (SM)
Monkhouse, J. R. (M)
Moore, R. D., Jr. (A)
Mullan, L. A. (M)
Neuenschwander, E. (M)
Neuman, L. J. (A)
Ording, J. R. (A)
Owen, W. W. (A)
Owens, D. L. (A)
Packard, D. (A)
Page, F. E., Jr. (A)
Palmer, C. C. (M)
Palmer, O. M., Jr. (A)
Parker, R. H. (A)
Pearson, J. B. (M)
Peay, L. W., Jr. (M)
Phelps, W. (A)
Phillips, F. S. (M)
Pierson, A. L. (A)
Rank, W. B. (M)
Ransome, R. L. (A)
Reynolds, R. C. (A)
Rhodes, M. (A)
Richards, D. E. (A)
Richardson, J. G. (A)
Robinson, J. C. (A)
Robidoux, F. T. (A)
Ross, H. A. (A)
Rust, W. M., Jr. (SM)
Sawyer, W. G. (A)
Schmidt, H. (A)
Schmuck, R. H. (M)
Schwartz, R. J. (A)
Scott, R. W. (A)
Sears, G. D. (M)
Sears, H. A. (M)
Sharpe, M. O. (SM)
Shawver, E. F. (M)
Simonds, F. W. (A)
Skellie, A. C. (A)
Steward, W. B. (SM)
Stotler, D. E. (A)
Sullivan, C. L., Jr. (M)
Sutton, R. A. (M)
Tanguy, D. R. (M)
Taylor, A. D. (A)
Teal, E. E. (A)
Thomas, C. W., Jr. (A)
Thornton, L. C. (A)
Thornton, R. D. (A)
Trimmier, W. W. (M)
Tullos, F. N. (M)
Turner, C. G. (SM)
Valcik, J. H. (A)
Vogel, C. B. (M)
Warfield, R. L. (A)
Washburn, W. M. (A)
Waters, J. S. (VA)
Weber, M. E. (A)
Welz, W. C. (M)
Wendenburg, C. F. (A)
Whitaker, T. N. (M)
Wischmeyer, C. R. (SM)
Woehst, K. H. (A)
Woerndel, E. (A)
Wofford, J. H. (A)
Wofford, W. D., Jr. (A)
Wright, D. (VA)
Zenor, H. M. (SM)

Hutchins
Ayres, R. J. (M)

Irving
Dillon, P. (M)
Haskins, D. E. (A)
Herriott, A. H. (A)
Shoulders, K. R. (M)
Swafford, T. W., Jr. (M)

Jacksonville
Laurie, B. (M)

Katy
Burton, J. R. (A)

Killeen
Heine, A. E. (A)

Kingsville
Guinn, J. R., Jr. (A)
Nelson, S. R. (A)
Rawls, H. F. (A)

Lampasas
Mason, A. F., Jr. (A)

Lancaster
Fugate, K. O. (A)

Longview
Bean, R. N. (A)
Maxwell, K. D. (A)
Webb, E. E. (M)

Lubbock
Bryant, R. S. (A)
Fagan, J. R. (A)
Houston, C. E. (M)
Joiner, J. B. (A)
Lee, R. F. (M)
Lewis, R. H. (A)
Pierce, J. R. (A)
Spuhler, H. A. (A)

Lufkin
Hill, F. C. (M)
McFarlane, H. M. (A)
Saxon, M. (SM)

Marlin
McBeath, H. M., Jr. (A)

Mesquite
Lowrey, T. M., Jr. (A)

McLean
Patterson, J. M. (A)

Midland
Graham, W. L. (A)
Jenkins, E. W., Jr. (A)
Yates, T. (A)

Mineral Wells
Mitchell, D. H. (SM)
Raits, E. J. (M)

Nacogdoches
Kruse, O. E. (A)
Seegers, J. A. (A)

Nederland
Coburn, E. D. (M)
Radford, J. V. (A)

Olden
Evetts, S. G. (A)

Orange
Davy, L. H. (A)
Jones, J. N. (A)
Odell, A. C. (A)
Pasadena
Clarke, C. V., Jr. (A)
Davis, J. L. (A)
Williams, W. E. (A)

Port Arthur
Bonner, J. F. (A)
Escagne, I. E. (A)
Kelly, W. T. (A)
Krute, E. H. (A)
Proft, C. R., Jr. (A)
Redwine, O. W. (A)
Staggers, R. D. (A)

Port Neches
Musselwhite, J. C., Jr. (A)

Rogers
Pfeiffer, D. A. (A)

Rusk
Urdal, S. (A)

San Angelo
Perkins, C. S. (A)

San Antonio
Adams, R. M. (A)
Adamson, W. V. (A)
Anderson, W. L. (A)
Arnold, J. B. (A)
Bailey, J. E. (M)
Brogan, F. A. (A)
Buchanan, H. (A)
Burges, E. G., Jr. (A)
Cadena, D. G. (A)
Campbell, H. G. (A)
Case, B. (A)
Chase, W. R. (A)
Christofferson, A., Jr. (A)
Clark, T. H. (SM)
Clee, L. W. (A)
Conroy, E. G. (A)
Crockett, A. E. (A)
Culver, C. A. (SM)
Cunningham, J. B. (A)
Dickson, A. W. (M)
Douglas, J. H. (A)
Duepner, F. (A)
Dunlap, R. H. (A)
Edmonson, J. W. E. (A)
Egerton, W. G. (VA)
Erlandson, P. M. (SM)
Gallagher, J. D. (M)
Glenn, R. F. (A)
Hallam, J. T. (VA)
Haigh, J. B. (A)
Hamm, W. J. (SM)
Hasbrook, A. F. (A)
Hill, L. P. (M)
Hopper, R. W. (A)
Houghton, E. G. (M)
Hyman, K. R. (M)
Ing, G. W. (A)
Jeffers, C. L. (SM)
Johnson, C. R. (A)
Jonas, L. I. (M)
Kennedy, C. R. (A)
Kiley, W. A. (A)
Kolodzie, S. (A)
Lampl, M. B. (A)
LoGatto, S. J. (A)
Lord, W. P. (M)
Marshall, F. M. (M)
McDonald, C. J. (A)
McLin, W. R. (A)
Meranda, J. I. (M)
Meyer, E. F. (A)
Miller, C. M. (A)
Minton, J. P. (F)
Ohman, J. (SM)
O'Meara, J. P. (M)
Parr, J. O., Jr. (M)
Patton, A. D. (M)
Pawkett, L. E. (A)
Pomy, H. J. (M)
Porter, J. B. (M)
Prucha, M. J., Jr. (M)
Rhodes, M. H. (A)
Rives, J. B. (A)
Schock, W. R. (A)
Sears, D. (A)
Siegel, H. A. (A)
Smith, R. J., Jr. (A)
Stubbs, E. D., Jr. (A)
Sullivan, M. C. (M)
Tarrodaychik, P. (M)
Thiemens, A. A. (A)
Thomas, O. D., Jr. (A)
Thorn, D. C. (A)
Travers, D. N. (A)
Turner, H. C. (A)
Zumwalt, B. C. (A)

San Benito
Croney, K. A. (A)

Santa Anna
Johnson, D. M. (A)

Seguin
Gillespie, L. H. (A)

Sinton
Mayer, E. G. (M)

South Houston
Clerc, M. C. (A)
Lathrop, W. A. (A)

Temple
Martin, B. A. (A)

Texas City
Combs, J. F. (A)
DaPrato, B. F. (A)

Tyler
Thompson, O. E. (A)
Wileman, R. A. (M)

Waco
Appleman, L. H. (VA)
Fulwiler, R. J. (A)
Schwetman, H. D. (SM)

Wichita Falls
Adams, J. (A)
Creacy, J. N. (A)
Horn, W. F. (A)
Wiley, H. T. (A)

Yoakum
Beardsley, W. S. (A)

UTAH

Bountiful
Allen, R. L. (A)

Garfield
Kounalis, L. E. (A)

Logan
Clark, C. (SM)
Cole, L. S. (SM)
Jones, W. L. (A)
Loosle, J. W. (A)

Manti
Sondrup, A. O. (A)

Ogden
Arrington, A. C. (A)
Holstead, A. J. (A)
Kershaw, J. H., Jr. (A)
Lee, G. F. (M)
Salisbury, D. L. (A)

Payson
Tew, D. E. (A)

Salt Lake City
Ahearn, J. M. (A)
Alley, C. L. (A)
Carman, F. C. (A)
Christie, W. F. (A)
Clayton, V. E. (A)
Cozzens, W. D. (M)
Diehl, C. E. (M)
Gates, F. V. (A)
Glantz, R. H. (A)
Greene, O. E. (A)
Gunderson, A. L. (A)
Haycock, O. C. (SM)
Hoggan, M. J. (A)
Hooper, J. S. (A)
Hubbard, J. J. (A)
Jepson, L. (A)
Johnson, D. R. (A)
Kartchner, K. A. (A)
McCartney, J. D. (A)
Monsen, G. L. (A)
Neilson, C. C. (A)
Noffsinger, D. T. (A)
Paulson, E. T. (A)
Price, C. S. (A)
Rapp, E. W. (A)
Richardson, R. (A)
Robinson, W. H. (A)
Rudd, F. S. (A)
Simmonds, C. W. (A)
Speir, F. H. (SM)
Van Valkenburg, M. (A)
Welnberg, P. (A)
Wood, J. R. (A)

Sandy
Atwood, K. W. (A)

Spanish Fork
Hone, S. J. (A)

Tooele
Salisbury, R. O. (A)

VERMONT

Bennington
Lillie, D. F., Jr. (A)
Timble, W. H. (SM)

Brattleboro
Cambell, R. H., Jr. (A)
Hadden, G. H. (M)

Burlington
Fleck, J. J. (A)
Horvath, C. (A)
Steinmann, W. L. (A)

Gilman
Podall, B. A. (A)

Northfield
Marshall, R. F. (A)

Plainfield
Frazer, J. F. (A)

South Woodstock
Garceau, L. (VA)

Springfield
Lush, W. G. (SM)

VIRGINIA

Alexandria
Aasen, C. L. (A)
Alba, C. J. (A)
Ashenden, G. K., Jr. (M)
Ashley, D. S. (M)
Bargh, P. F. (A)
Bayston, T. E. (A)
Brown, L. (A)
Bramhall, E. H. (SM)
Babcock, R. L. (A)
Balwanz, W. W. (A)
Cole, R. I. (SM)
Collup, D. O. (SM)
Compton, M. E., Jr. (A)
Coulter, D. C. (A)
Cronin, D. W. (A)
Darcey, R. J. (A)
Davis, T. R. (A)
Dixon, J. T. (A)
Dupree, W. F. (A)
Eggerton, W. H. (A)
Erdle, F. E. (A)
Farago, J., Jr. (A)
Fivel, M. J. (A)
Freeman, J. T. (A)
German, F. M. (A)
Gillett, G. D. (F)
Gills, L. C. (A)
Giser, H. W. (A)
Goeser, J. N. (A)
Goff, L. O. (SM)
Gravlee, G. P. (A)
Greer, W. R., Jr. (M)
Harper, H. (A)
Harris, J. E., Jr. (A)
Hausman, A. H. (A)
Hedrick, C. E. (A)
Hirst, W. B., Jr. (A)
Hopkins, A. F., Jr. (VA)
Horne, C. F., Jr. (SM)
Jones, R. H., Jr. (M)
Keefer, D. E. (A)
Kelleher, K. S. (SM)
Kiblinger, W. H. (A)
Kimble, A. (A)
King, C. J., Jr. (SM)
King, M. E. (SM)
King, W. M. (M)
Kings, L. (M)
Koblick, S. N. (A)
Kohler, E., Jr. (VA)
La Fevre, L. M. (A)
Lair, J. R. (VA)
Larson, C. O. (SM)
Lewis, O. I. (SM)
Longfellow, B. S. (M)
Lorenz, R. J. (A)
McFadden, R. R. (A)
McGuire, T. B. (A)
Meador, A. B., Jr. (A)
Meloy, T. (SM)
Miller, J. W. (A)
Montague, H., III (A)
Morrow, C. M. (A)
Myers, J. C. (SM)
Marsh, H. S. (M)
Oliver, D. S. (M)
Parker, C. V. (SM)
Peake, H. J. (SM)
Pichetto, P. B. (A)
Price, H. W., Jr. (M)
Probert, L. J. (A)
Puro, W. O. (A)
Purple, W. C., Jr. (M)
Seccombe, W. T. (A)
Seddon, J. C. (A)
Shea, J. H. (A)
Shoemaker, J. R. (SM)
Shumaker, J. L. (M)
Sibold, A. P. (A)
Smith, B. D., Jr. (A)
Smith, W. J. (A)
Stastny, G. F. (A)
Stewart, C., Jr. (SM)
Stuckert, E. M. (SM)
Swanson, M. W. (SM)
Swenson, W. J. (A)
Taylor, W. B. (A)
Tucker, G. K. (A)
Tucker, J. W. (A)
Underwood, R. W. (A)
Van Allen, R. L. (A)
Varela, A. A. (SM)
Vary, W. L. (A)
Von Dohlen, H. W. (VA)
Watson, D. L. (A)
Weid, A. C. (M)
Weinstein, A. (A)
White, E. L. (SM)
Wiewara, E. J. (M)
Wissel, F. A. (SM)
Wright, C. S. (A)
Zelazo, N. K. (SM)

Annandale
Garlan, H. (M)
Johnson, C. Y. (A)

Arlington
Albee, C. (M)
Altman, S. S. (M)
Ankers, R. E., Jr. (M)
Arneth, A. P., Jr. (A)
Atkinson, E. E. (A)
Banks, C. R. (SM)
Bankson, H. D. (A)
Bartlett, O. H., Jr. (A)
Bawer, R. (A)
Beecher, W. C. (A)
Bell, W. F., Jr. (A)
Bennett, R. (F)
Bernstein, H. E. (SM)
Black, J. G. (A)
Boehm, W. R. (A)
Bolden, R. L. (M)
Borsody, B. F. (M)
Bowman, D. F. (SM)
Bridges, J. M. (SM)
Buchanan, O. R. (VA)
Burchan, D. P. (M)
Burleson, M. M. (A)
Butts, R. S. (M)
Campbell, W. H. (SM)
Child, A. A. (A)
Christie, C. B. (A)
Clark, R. L. (SM)
Clark, S. F. (A)
Cobb, M. W. (A)
Cochran, J. L. (A)
Cogswell, W. P. (SM)
Cohen, J. (M)
Cole, W. M., Jr. (A)
Combs, D. D. (A)
Cook, D. C. (A)
Cormack, J. G. (A)
Craver, J. N. (M)
Croy, J. R. (M)
Darwin, F. A. (SM)
Davie, M. C. (SM)
Davis, C. H. (A)
Dellitt, J. P. (A)
Dennison, B. H., Jr. (SM)
Dickinson, W. T. (A)
Dingley, E. N., Jr. (SM)
Drescher, L. (A)
Drubin, M. (A)
Dunlap, C. R. (A)
Durkee, J. D. (M)
Dutton, W. P. (A)
Eagan, J. F., Jr. (A)
Eisenschmied, M. D. (A)
Ellis, R. E. (M)
Erni, J. B. (A)
Ernst, A. A. (M)
Etter, W. A. (M)
Gale, M. (A)
Gauss, H. (A)
Gibson, G. B. (SM)
Girard, E. J. (SM)
Glasser, O. J. (SM)
Gregory, C. A. (M)
Griffin, L. L. (A)
Groves, W. E. (SM)
Guest, W. T. (SM)
Hackman, E. H. (VA)
Harding, G. C. (M)
Hauber, E. N. (M)
Higgins, F. V. (M)
Hilburn, E. D. (A)
Himes, B. T., Jr. (A)
Holmes, W. M. (A)
Jackson, R. H. (A)
Jahr, E. F. (M)
Jensen, G. L. (M)
Jones, R. C., Jr. (A)
Kazebee, C. R. (A)
Knight, C. R. (SM)
Kreck, J. A. (A)
Kudlich, K. H. (A)
Lane, T. B., Jr. (A)
Larue, R. S. (A)
Laub, R. E. (SM)
Lee, J. M. (SM)
Lindseth, C. O. (A)
Little, S. (A)
Long, G. A., Jr. (M)
Loughridge, D. H. (SM)
Lyons, R. E. (A)
Martin, D. K. (SM)
Martin, O. L. (M)
Mathews, M. M., Jr. (A)
May, J. P. (A)
McConnell, I. R. (M)
McClurg, G. H. (SM)
McCachren, W. S. (SM)
McCracken, L. G. M. (A)
Merkel, H. E. (A)
Merritt, E. A. (A)
Miller, J. L. (M)
Miller, R. E. (A)
Montgomery, J., III (A)
Moore, W. H. (M)
Morgan, A. H. (M)
Mould, J. C. (A)
Moynahan, G. F., Jr. (A)
Nash, P. E. (SM)
Nelson, C. W., Jr. (A)
Norman, L. S., Jr. (A)
Nyhen, E. M. (M)
Oot, R. F. (A)
Parris, D. S. (A)
Peake, F. E., Jr. (A)
Price, R. L. (A)
Pryor, W. L., Jr. (SM)
Quinn, R. B. (M)
Schuette, H. (A)
Selby, I. A. (A)
Shaw, H. F. (A)
Sherer, L. M. (SM)
Sieck, L. W. (M)
Sinback, W. R. (M)
Smith, A. W. (A)
Smith, R. O. (SM)
Snider, D. A. (A)
Spear, L. P. (A)
Spies, M. C. (VA)
Sprowls, P. H. (M)
Stec, C. L. (SM)
Stephan, H. W. (VA)
Stewart, C. H., II (A)
Stewart, J. M. (A)
Sullivan, A. H., Jr. (SM)
Sutton, B. L. (A)
Syphax, W. T. (A)
Thomasson, H. B. (A)
Tidball, F. E. (M)
Tieman, C. R. (SM)
Trotter, B. E. (A)
Valentine, W. B. (A)
Veatch, J. P. (SM)
Volk, C. M. (A)
Ware, M. (M)
Wearn, W. C. (A)
Weihe, V. I. (SM)
Whitney, R. J. (A)
Wilson, E. C. (A)
Wittig, W. L. (A)
Yarosh, N. P. (A)
Young, A. H. (A)

Bayside
Hahn, H. R. (A)

Blacksburg
Ebert, H. K. (M)
Eller, J. E., Jr. (A)
Nethken, R. T. (A)
Wright, R. R. (SM)

Buena Vista
Bray, J. I., Jr. (A)

Bumpass
Kramer, A. W. (SM)

Charlottesville
Beazell, H. L. (A)
Cuddihy, W. F. (A)
Fleming, R. F., Jr. (A)
Girlamen, M. F. (A)
Goeller, L. F., Jr. (A)
Grymes, J. R. (A)
Harris, O. R. (A)
Lotz, W. E., Jr. (A)
Mace, J. C. (SM)
Siegel, C. M. (A)
Updike, O. L. (A)

Christiansburg
Gannaway, T. C. (A)

Clifton
Duncan, R. L. (SM)
Thornton, R. R. (A)

Colonial Beach
Brooks, F. E. (M)

Cradock
Shepherd, J. F. (A)

Dahlgren
Cardwell, B. B., Jr. (A)
Harkavy, V. M. (SM)
Henderson, J. (A)
Macatician, J. (A)
Payne, J. N. (M)
Potter, R. R. (A)
Sanford, D. C. (A)
Shultz, L. R. (A)
Strother, C., Jr. (A)

Danville
Lea, H. D. (A)
Motley, L. C. (A)

Dunn Loring
Eichberg, R. L. (M)
Griffin, P. W. (M)

Fairfax
Deutsch, J. (A)
Gartzke, F. J. (A)
Lee, F. N. (A)
MacGregor, W. R. (A)
Sharp, D. W. (A)

Falls Church
Allen, E. W., Jr. (M)
Anderson, W. L. (A)
Andrew, R. T. (A)
Arnold, J. B. (A)
Bank, W. J. (A)
Bateman, R. (A)
Benzon, C. G. (VA)
Billheimer, C. R. (M)
Boggs, G. E. (M)
Boland, J. N. (VA)
Bouchey, S. H. (A)
Bradford, H. K. (M)
Brady, R. F. (SM)
Brooks, L. C. (A)
Broughton, T. G., Jr. (A)
Bull, J. T. (A)
Carland, E. (A)
Carr, S. O. (M)
Clauer, C. K. (A)
Coss, W. L. (A)
Courtis, R. P. (VA)
Davis, J. N. (M)
Deeter, C. R. (M)
Delgado, R. (A)
Detrick, D. M. (A)
Dickson, F. H. (A)
Diehl, E. J. (SM)
Disenhaus, N. (A)
Dixson, S. B. (A)
Donics, W. (A)
Eisele, E. J. (A)
Fleming, L. (SM)
Fulton, W. L., Jr. (A)
Garrett, L. F. (A)
Giles, R. C. (M)
Grimm, R. S. (A)
Gundy, G. L. (A)
Haas, D. L. (A)
Harben, L. A. (M)
Harrison, C. E. (A)
Harvey, D. M. (A)
Hobbs, M. (SM)
Hohos, J. A. (A)
Hopkins, R. C. (A)
Jackson, C. H. (SM)
Jones, M. S. (A)
Lambert, T. A. (A)
La Montagne, R. S. (M)
Lohr, L. A. (A)
Mack, S. J. (A)
Mangelsdorf, T. A. (A)
Marshall, E. L. (VA)
Martin, E. O. (A)
McDowell, R. B. (SM)
McGinnis, C. E. (M)
McMahon, J. H. (A)
Morse, J. E. (A)
Munkasey, P. F. (A)
Moffet, J. A. (M)
Norman, S. W. (M)
Patterson, K. P. (A)
Proferes, N. J. (A)
Schaffert, J. C. (A)
Scott, R. M. (A)
Scott, S. R. (SM)
Shapiro, S. (A)
Sheffs, J. F. (A)
Skrivseth, A. G. (SM)
Smith, G. S. (A)
Smith, W. M. (SM)
Steele, R. C. (A)
Stein, A. J. (A)
Stewart, J. L. (A)
Stiles, R. G. (A)
Sunde, D. H. (A)
Svedlow, J. D. (A)
Swinney, R. W. (M)
Tuller, W. G. (SM)
Turner, J. S. (SM)
Waller, S. L. (A)
Winick, A. B. (A)
Wolfand, D. (A)
Zartman, I. F. (M)

Farmville
Hogge, C. R., Jr. (A)

Fort Belvoir
Chasnov, B. (A)
Gage, L. S. (A)
Gang, R. E. (A)
Kaufman, F. H. (A)
Welhe, W. K. (A)
Wencel, M. L. (A)

Fredericksburg
Hall, G. L. (M)

Hampton
Andrews, R. E. (A)
Boyer, W. J. (A)
Bradbury, J. T. (M)
Bradley, E. H. (A)
Brummer, E. A. (A)
Dale, J. R., Jr. (A)
Fuhrmeister, P. F. (A)
Groce, D. C. (A)
Hastings, C. E. (SM)
Haywood, V. M. (M)
Sawyer, R. S. (A)
Smith, F. B. (A)
Swafford, J. E. (M)
Vavra, P. H. (A)
White, J. R. (A)
Wood, R. M., Jr. (A)

Harrisonburg
Braun, W. L. (SM)

Herndon
Brown, J. N. (A)
Loyk, V. (A)

Langley AFB
Harvey, C. C. (M)

Leesburg
Carr, L. H. (VA)

Lexington
Miller, E. A. (M)

Lorton
Davis, G. W. (A)

Lovettsville
Smith, C. V. L. (M)

Lynchburg
Orth, J. T. (M)

Manassas
Fields, R. E. (A)
Stogsdill, M. R. (A)

McLean
Creutz, J. (VA)
Dee, H. E. (A)
Gumb, D. F. (A)
Heckel, R. D. (M)
Nagy, J. J. (A)
Parker, R. O. (A)
Shaull, J. M. (SM)
Smith, A. E. (A)
Smith, J. M. (A)

Newport News
Albro, P. W. (A)
Bjerke, J. O. (A)
Comstock, A. L. (A)
Courtney, R. H., Jr. (A)
Lederer, P. S. (A)
McFall, C. H., Jr. (A)

Norfolk
Barnett, H. A., Jr. (A)
Bernard, W. B. (SM)
Brett, C. F. (A)
Camp, W. W. (A)
Cole, P. P. (A)
Councill, J. W. (M)
Croom, W. J. (A)
Dickerson, B. C. (M)
Dillon, J. C. (A)
Elliot, L. (A)
Gretes, W. P. (A)
Holland, J. T. (A)
Hufnell, R. N. (A)
Kaserman, F. S. (VA)
Koontz, C. E. (A)
Lindell, R. L. (M)
Marcum, W. F. (A)
Miller, C. L. (A)
Myette, R. F. (A)
Peffer, J. C. (SM)
Premo, D. A. (A)
Pressly, W. H. (A)
Sanderson, R. F. (A)
Slaughter, W. R. (A)
Smith, R. S. (A)
Stinnette, H. L. (A)
Stoddert, T. N. (M)
Thompson, L. H. (A)

North Arlington
Bauer, P. S. (VA)

Ocean View
Vansant, W. G., Jr. (A)

Poquoson
Burlock, J. (A)

Portsmouth
Alderman, J. M. (A)
Busby, E. S., Jr. (A)
Cox, J. C. (A)
Dickson, A. L. (A)
Friel, F. J., Jr. (VA)
Hamilton, R. D. (A)
Hoedemaker, R. W. (A)
Howard, K. (A)
Pegniny, J. W. (A)
Perks, A. F. (A)
Petersen, M. E. (A)

Profitt
Quarles, L. R. (F)

Quinby
Cameron, C. E. (A)

Richmond
Bailey, R. C. (SM)
Clark, W. J. (A)
Dickinson, J. O. (M)
Dere, E. B. (A)
Eubank, R. N. (M)
Golding, R. M. (A)
Holup, A. C. (A)
Kyle, J. W. (M)
Miller, A. G. (A)
Palmer, O. A., Jr. (A)
Selden, W. R. (M)
Sturm, F. L. (A)
Thorpe, R. A. (A)
Toms, E. C. (A)
Woods, D. C. (M)
Wrisley, J. C. (A)

Roanoke
Briggs, J. P. (A)
Newman, J. E. (A)
Williams, C., Jr. (A)

Sabot
Jones, T. W., Jr. (A)

Springfield
Bergquist, P. N. (M)
Hamilton, E. E. (A)
Kirby, R. L. (A)
Klotz, J. W. (M)

Victoria
Underwood, W. B. (A)

Vienna
Cooke, N. M. (SM)
Crane, R. R. (A)
Johnson, L. E. (M)
Meisinger, H. P.
Stotler, H. J. (A)

Virginia Beach
Batte, J. T. (M)

Warwick
Woods, A. L. (M)

Waynesboro
Klann, P. A. (A)

Williamsburg
Carr, B. C., Jr. (A)

Woodbridge
Schupak, L. (A)

WASHINGTON

Bellevue
Chewning, W. H. (A)
Taylor, J. M. (A)
Thompson, A. G. (A)
Warshawsky, J. (A)

Bellingham
Collins, R. H. (A)
Harper, E. E. (A)

Bothell
Fleming, H. A. (M)
Mcleod, J. S. (A)

Bremerton
Byer, E. D. (SM)
Gruwell, F. N. (M)
Hart, A. S., Jr. (A)
Levin, R. J. (A)
Linkletter, R. L (A)
Lyngstad, E. O. (M)
Mason, J. E. (M)
Milden, C. W. (A)
Mills, T. L. (A)
Pitts, H. L. (SM)
Schwartz, M. J. (A)
Striebel, J. E. (A)
Tufts, W. F. (A)
Vulliet, P. O. (A)
Whittier, M. L. (A)

Burton
Gelbach, H. R.
Shahan, R. L. (A)

College Place
Brown, R. H. (M)

Cosmopolis
Walker, J. (A)

Edmonds
Gunderson, H. A. (A)
Martin, J. W. (A)

Ellenburg
Lowe, W. G. (A)

Ephrata
Backman, J. A. (A)

Everett
Gleason, E. W. (A)
Hall, T. S. (A)
Jones, W. F. (A)

Fairchild
Stroman, C. F. (A)

Fall City
Gonnason, J. A. (A)

Ferndale
Claar, D. E. (A)

Fort Lewis
Barjian, H. (A)

Gig Harbor
Berkheimer, R. H. (M)

Hoquiam
Husby, A. O. (A)

Kennydale
Titefsky, E. J. (A)

Keyport
Hammill, C. W. (A)

Longview
Collins, E. H. (A)
Manuel, W. O. (A)

Marysville
Short, R. C. (A)

McChord
Evans, R. E. (A)

Mercer Island
Altizer, B. B. (A)
Biggs, J. D., Jr. (A)
Fitch, J. L. (A)
Goddess, E. D. (SM)
Hagler, D. L. (M)
Lomax, J. B. (A)
May, E. L. (A)
Maynard, J. E. (SM)

Neah Bay
Montague, L. L. (A)

Oak Harbor
Baker, N. C. (A)

Olympia
Christensen, A. B. (VA)
Scott, C. V. (A)
Swift, J. D. (A)

Opportunity
Payne, R. S. (A)

Pasco
Crumb, D. F. (A)

Port Angeles
Keller, N. E. (A)

Port Blakely
Hatch, J. A. (A)

Poulsbo
Thorne, C. M. (A)

Pullman
Harbour, R. D. (A)

Puyallup
Haugen, O. B. (A)
Herr, M. D. (M)

Richland
Althoff, P. C. (A)
Campbell, D. A. (A)
Clark, R. G. (A)
Connally, R. E. (A)
Fisk, P. B. (A)
Forbes, H. R. (A)
Forsman, M. E. (A)
Frantz, C. E. (A)
Helgeson, G. L. (A)
Larrick, C. V. (SM)
Libby, H. L. (A)
Ludwig, M. J. (A)
Jacobs, I. M. (M)
Schilling, R. D. (A)
Spear, W. G. (A)
Test, L. D. (A)
Worlton, D. C. (A)

Seahurst
Stroebel, J. C. (SM)

Seattle
Aburano, P. F. (A)
Auvil, C. K. (A)
Ashleman, F. C., Jr. (A)
Andersen, R. K. (A)
Anderst, W. H. (A)
Armour, R. B. (A)
Armstrong, A. B. (A)
Armstrong, C. W. (A)
Bach, R. O. (SM)
Baer, D. D. (A)
Banks, R. B. (A)
Barger, G. K. (A)
Barger, S. D. (A)
Bennett, S. D. (SM)
Bergseth, F. R. (A)
Berkman, R. D. (A)
Berntsen, D. G. (A)
Berry, D. C. (A)
Betten, C. B. (A)
Birch, J. S. (A)
Bishop, D. J. (A)
Black, J. C. (A)
Bower, R. L. (A)
Brett, E. D. (A)
Brott, F. J. (SM)
Brudwig, A. H. (M)
Bull, W. A. (A)
Bush, B. E., Jr. (A)
Bushman, F. W. (M)
Caproni, G. A. (A)
Carmody, W. F. (A)
Chambers, G. R. (A)
Chase, R. F. (M)
Christie, J. W. (A)
Cochran, L. B. (SM)
Cockrill, M. S. (A)
Colby, R. L., Jr. (M)
Colvin, R. S. (A)
Consego, B. J. (A)
Coward, R. W. (A)
Craig, D. I. (A)
Dalby, T. G. (A)
Doolittle, K. H. (A)
Dorband, A. E. (A)
Dorratcague, P. E. (A)
Dorwart, R. J. (A)
Duncan, J. A. (M)
Early, E. W. (A)
Eastman, A. V. (F)
Ebken, A. F., Jr. (M)
Eldridge, D. F. (A)
Eisenbach, M. E. (A)
Ellerbeck, K. H. (VA)
Ellinger, P. B. (A)
Embree, R. R. (A)
Erwin, E. V. (A)
Erwin, R. L. (A)
Estes, F. B. (VA)
Evenson, H. J. (A)
Fantin, P. J. (A)
Fargo, R. J. (A)
Feinstein, H. (A)
Fender, K. L. (A)
Ferguson, R. E. (A)
Fisher, R. C. (SM)
Fluke, J. M. (M)
Fonda, K. A. (A)
Foss, R. N. (A)
Foster, J. H. (A)
Foster, N. H. (SM)
Friedland, R. J. (A)
Frost, J. D. (A)
Galloway, W. C. (A)
Garcia, S. C. (M)
Gellert, M. E. (A)
Gilbertson, S. R. (A)
Glaser, R. A. (A)
Goo, A. M. S. (A)
Gorski, A. A. (A)
Grantham, M. D. (A)
Harms, R. G. (M)
Harris, B. L. (A)
Harrison, A. E. (SM)
Harrold, W. T. (A)
Hatfield, J. B. (A)
Havens, J. D. (A)
Henry, W. O. (A)
Hermanson, K. P. (A)
Hernstad, J. A. (A)
Hilbiber, D. F. (A)
Hill, W. R., Jr. (M)
Himoe, C. E. (M)
Hoard, G. L. (SM)
Hogg, J. E. (M)
Hoglund, R. H. (M)
Hollingsworth, G. L. (A)
Horn, H. T. (A)
Illman, R. W. (A)
Larson, L. A. (A)
Lee, R. C. (A)
Leffler, J. M. (A)
Lennstrom, C. O. (A)
Leonard, D. L. (A)
Leonard, P. W. (A)
Lerchenmueller, W. (A)
Lewis, L. J. (SM)
Libby, T. M. (SM)
Lind, P. C. (A)
Lloyd, W. M. (A)
Lockwood, R. A. (A)
Louie, C. H. (A)
Lundberg, R. M. (A)
Jacobsen, A. B. (SM)
Johnson, J. F. (SM)
Johnson, K. L. (A)
Johnson, O. E. (A)
Johnson, R. L. (A)
Jones, E. A. (A)
Jones, J. (M)
Jones, W. L. (A)
Judson, H. H., Jr. (A)
Kaminoff, M. (A)
Karr, C. S. (A)
Kellar, J. B. (A)
Kelly, J. M. (A)
Kendall, E. L. (A)
Kenoyer, H. W. (A)
Kieburtz, R. B. (A)
Kindall, E. W. (A)
Kiskaddon, W. V. (A)
Koethe, J. W. (A)
Kuzeja, C. (A)
Marsolan, V. C. (SM)
Martilla, A. H. (A)
Martin, G. C. (A)
Maurer, R. A. (A)
McCarthy, D. W. (A)
McHenry, G. A. (A)
McInnis, A. K., Jr. (A)
McLane, A. R. (M)
Mendenhall, G. G. (M)
Middlebrooks, J. L. (A)
Montgomery, R. A. (A)
Moses, H. L. (A)
Mossman, F. B. (SM)
Myers, P. K. (A)
Neal, E. T. (A)
Nelson, D. D. (A)
Newell, S. E. (A)
Nichols, W. R. (M)
Noland, L. J. (A)
Noyes, J. C. (A)
Numrich, H. J. (A)
Nunner, R. J. (M)
Nutting, D. C. (M)
Olson, B. V. (A)
Olson, D. L. (A)
Olson, N. K. (M)
Orth, J. W. (A)
Ostrom, C. W. (A)
Palmer, V. L. (M)
Parker, J. R. (A)
Parr, E. D. (A)
Parrott, J. E. (M)
Pascual, R. A. (M)
Pedersen, R. E. (M)
Perkins, L. C. (A)
Perman, E. M. (A)
Perry, F. E. (A)
Perry, R. E. (A)
Petersen, L. M. (A)
Petrich, R. O. (M)
Polcuch, A. F. G. (A)
Poppe, R. F., Jr. (A)
Porad, B. L. (A)
Post, M. O. (A)
Pratt, L. M. (A)
Quantz, R. G. (A)
St. John, I. S. (A)
Samson, C. A. (A)
Sauber, P. T. (A)
Scovill, J. M. (A)
Scuitto, T. J. (A)
Selfridge, W. E. (A)
Setaro, J. E. (A)
Sharp, B. M. (A)
Sheldon, J. K. (A)
Sheopard, J. J., Jr. (A)
Shipek, R. H. (A)
Shook, W. A. (A)
Siddons, W. J. (A)
Simler, L. L. (M)
Simons, R. J. (A)
Smith, C. R. (SM)
Smith, M. R. (A)
Smith, W. B. (A)
Stedman, C. K. (SM)
Stoner, F. E. (SM)
Stout, T. M. (A)
Strauss, B. (A)
Strohecker, J. P. (A)
Swain, C. W. (A)
Swarm, H. M. (M)
Swindlehurst, W. C. (A)
Takemura, T. P. (A)
Talcott, M. S. (A)
Tate, J. A. (A)
Temple, P. E. (A)
Thomasson, L. T. (A)
Thompson, K. J. (M)
Thompson, M. E. (A)
Thurston, P. H. (A)
Todaro, C. N. (A)
Tolmie, J. R. (SM)
Traub, L. A. (M)
Trip, R. E. (A)
Triplett, W. R. (SM)
Troetschel, W. O. (A)
Tustin, W. (M)
Veith, D. L. (A)
Vermilion, E. E. (A)
Von Tobel, R. (A)
Wagner, W. J. (SM)
Wall, R. E., Jr. (A)
Walsh, J. J. (A)
Wedin, A. G. (SM)
Weinstein, G. (A)
Wellens, E. J. (A)
Williams, C. E. (F)
Willson, A. R. (SM)
Willson, K. R. (A)
Winder, D. E. (A)
Wong, H. V. (A)
Wood, F. P. (A)
Woodbury, J. W. (A)
Woodhouse, G. H. (A)
Wright, C. P. (A)
Young, J. A., Jr. (A)
Young, K. J. (A)

Spokane
Brune, F. A. (A)
Caruana, P. A. (A)
Coates, F. M. (M)
Corman, D. P. (M)
Klinke, E. R. (A)
MacLean, T. W. (A)
Morrison, H. L. (M)
Sparling, A. G. (SM)
Storms, H. H. (VA)
Switzer, W. H. (A)
Trebby, F. J. (A)
Tucker, J. R. (A)
Young, W. E. (A)

Tacoma
Barnett, K. G. (A)
Bice, M. H. (M)
Boze, J. L. (A)
Curtis, G. N. (A)
Hartwell, S. A. (A)
Hendry, A. J. (A)
McClamrock, J. M. (A)
McDonough, D. M. (SM)
Miller, G. E. (A)
Shiplett, K. E. (A)
Utterback, W. J. (M)

Vancouver
Christensen, H. E. (A)
Wohlgemuth, D. G. (A)
Wright, W. E. (A)

Vashon
Bey, W. I. (M)
Miller, C. E. (A)

Walla Walla
Parmelee, W. G. (A)
Wilken, B. W. (A)

Wenatchee
Scroggs, J. P. (A)
Wallace, J. (SM)

Yakima
Morrill, D. W. (A)

WEST VIRGINIA

Alma
Nichols, G. C. (A)

Beckley
Vann, K. C. (A)

Buckhannon
Powell, G. M. (A)

Charleston
Apgar, R. R., Jr. (A)
Bowen, H. R. (A)
Lockwood, E. H. (A)
Lovett, R. S. (A)
Nichols, D. S., Jr. (A)
York, D. E. (A)
Zaharis, G. (A)

Clarksburg
Hough, R. D. (M)

Elkins
Stoller, M. D. (M)

Fairmount
McDowell, M. H. (A)

Folsom
LeMasters, H. G. (A)

Grafton
Sinsel, P. W (A)

Huntington
Bromley, R. A. (A)
Gilmore, J. E. (A)
Harvey, S. A. (M)
Hawes, J. G. (A)
Peters, J. A. (A)
Phillips, K. L. (A)

Keyser
Spencer, D. K. (A)

Malden
Hammer, A. C. (A)

McMechen
Beltz, G. E. (A)

Morgantown
Colwell, R. C. (SM)
Keener, E. L. (A)
Seibert, C. B. (M)
Utt, O. L. (A)

Moundsville
Jones, J. W. (M)

Oak Hill
Thomas, R. R., Jr. (A)

Parkersburg
Spence, R. C. (A)

Ripley
Landfried, H. H. (A)

St. Albans
Fertig, R. B. (A)

Salem
Warren, D. (A)

Welch
Kish, F. (A)

Weston
McEwuen, J. E. (A)

Wheeling
Levenson, D. W. (A)

WISCONSIN

Antigo
Parfitt, R. J. (A)

Appleton
Grist, F. J., Jr. (A)

Beloit
Schutz, G. C. (SM)

Cuba City
Hauser, D. J. (A)

Cudahy
Patrick, P. J. (A)

Elm Grove
Bailey, T. J. (A)

Eau Claire
Jorgenson, T. O. (M)

Fond du Lac
Jensen, K. S. (SM)

Fort Atkinson
Dunbar, L. (M)

Grafton
Konig, V. A. Y. (A)

Hartland
Harry, W. R. (VA)

Janesville
Brandt, R. W. (SM)
Clay, W. A. (VA)
Gates, C. E. (M)
Glander, H. H. (A)
Middleton, J. A. (A)
Pollard, W. J. (A)
Williams, C. R. (A)
Ziehlke, R. J. (A)

Kenosha
Algiers, E. P. (A)
Bauer, W. E. (A)
Boehm, R. F., Jr. (A)
Broughton, G. E. (A)
Grevenow, W. A. (A)
Heide, S. M. (A)
Kovachik, E. (A)
MacDowell, G. E. (A)
Thiel, W. (A)

La Crosse
Leeman, A. (VA)
McCabe, K. E. (A)
Scheel, R. J. (A)
Steele, T. S. (A)
Wiedman, R. E. (A)

Lake Nebagamon
Caspers, G. E., Jr. (A)

Madison
Beamsley, G. V. (A)
Brown, C. J. (A)
Caldwell, R. R. (A)
Davidson, C. H. (A)
Gilson, W. E. (SM)
Groenier, R. S. (M)
Hahn, N. G. (A)
Hughes, M. W. (A)
Kelley, W. V. (VA)
Koehler, G. (SM)
McGilvra, G. E. (A)
Navratil, C., Jr. (A)
Onsgard, C. P. (A)
Ottum, R. W. (A)
Parent, R. J. (M)
Peterson, H. A. (SM)
Petranek, D. J. (A)
Scheibe, E. H. (SM)
Skiles, J. J. (A)
Swift, W. B. (A)
Wickhem, R. J. (A)
Young, C. E. (A)

McFarland
Pierce, R. L. (A)

Menomonee Falls
Luecke, M. W. (A)

Merrill
Bartelt, C. H. (A)

Middleton
Miller, J. B. (A)

Milwaukee
Anthes, J. (A)
Atwood, A. R. (A)
Austin, E. N. (A)
Baird, J. T. (A)
Baker, W. R. (A)
Barszcz, A. M. (A)
Baumeister, E. A. (A)
Behagen, E. L. (A)
Brown, H. W. (A)
Burkhalter, B. L. (A)
Burns, R. E. (A)
Butler, L. W. (M)
Choksy, N. H. (A)
Cordes, E. L. (M)
Crabtree, R. L. (A)
Crago, P. H. (A)
Crowell, G. F. (M)
Ebel, F. E. (A)
Eckert, F. A., Jr. (VA)
Eder, R. H. (A)
Edwards, M. A. (SM)
Elliot, W. H. (M)
Evans, J. A. (M)
Dilger, R. E. (A)
Koylen, D. H. (M)
Farber, E. R. (A)
Frater, G. A. (A)
Gainer, W. P. (M)
Ganiere, H. C. (A)
Geiger, L. C. (A)
Gellerup, D. W. (SM)
Gennrich, A. (A)
Hebal, W. H. (M)
Hoffmann, P. F. (A)
Hogan, H. A. (A)
Horvath, A. E. (A)
Jacobs, J. E. (A)
Jahimiak, R. (A)
Johnson, K. R. (A)
Kaetel, H. C. (VA)
Kaiser, E. H. (A)
Kane, E. W. (M)
Kane, J. R. (A)
Kasdorf, G. R. (A)
Khouri, A. (A)
Kilby, J. S. (A)
Kilpinen, R. L. (A)
Koch, M. E. (A)
Kulosa, A., Jr. (A)
Kurylo, E. F. (A)
Laeser, P. B. (M)
Lecus, C. M. (A)
Lieb, J. S. (A)
Limpel, E. J. (M)
Little, C. W., Jr. (M)
Long, J. W. (A)
Maertz, R. J. (A)
Maklary, J. R. (A)
Makowski, J. J. (A)
Matthews, R. B. (M)
Matthias, L. H. (VA)
McCarthy, R. R. (A)
Mereen, D. E. (M)
Mort, V. A. (A)
Mueller, H. W. (A)
Naslund, R. S. (VA)
Naughton, G. J. (VA)
Ollenburg, M. A. (A)
Paulu, A. (M)
Pfeifer, J. W. (VA)
Pirofer, D. J. J. (A)
Saari, L. V. (M)
Saewert, D. R. (A)
Sandberg, A. J., Jr. (A)
Scheer, D. (A)
Schliehlein, G. J. (A)
Schlicke, H. M. (M)
Schmitzer, R. W. (A)
Schowalter, E. A. (A)
Serota, R. M. (A)
Sherwood, E. T. (SM)
Silverman, D. M. (A)
Smith, C. C. (A)
Snowdon, A. C. (A)
Sperry, L., Jr. (A)
Steffen, R. V. (A)
Tait, R. B. (A)
Van Zeeland, F. J. (SM)
Van Zeeland, W. A. (M)
Weiler, D. A. (SM)
West, B. M. (A)
Wiener, R. (A)
Wille, E. A. (A)
Wille, E. F. (A)
Williams, S. B. (A)
Wilson, R. F. (A)
Wolff, R. L. (M)
Woods, K. C. (A)
Young, T. P. (A)
Zoesch, A. C. (A)
Zolin, F. H. (A)
Zwarra, H. J. (A)

Neenah
Zabel, L. W. (M)

Oshkosh
Williams, N. (A)

Prescott
Borner, E. F. (A)

Princeton
Kalupa, C. J. (A)

Racine
Benedict, D. E. (A)
Chaniga, J. A. (A)
Hassel, E. W. (M)
Smithana, D. R. (A)
Young, R. G. (A)

River Falls
Pearson, R. P. (A)

Saukville
Nunn, E. D. (M)

Sheboygan
Herman, J. J. (A)
Mayer, H. J. (A)

Thiensville
Barthel, E. A. (A)

Tomahawk
McGinnis, H. J. (M)

Waterford
Cummings, H. R. (M)

Waupaca
Danielsen, A. C. (M)

Wausau
Zielesch, B. E. (M)

Wauwatosa
Kluge, J. E. (A)
Pinnow, R. L. (A)
Watts, W. E. (M)
Wollaeger, L. A. (A)

West Allis
Ethelman, C. R. (A)
Smith, D. B., Jr. (A)
Taylor, E. D. (A)
Thoman, R. M. (A)
Wright, B. G. (A)

West Depere
Stangel, W. (A)

Williams Bay
Gibson, J. G. (A)
Hoefle, R. R. (A)

WYOMING

Casper
Hathaway, D. L. (SM)

Cheyenne
Grove, W. C. (A)
Hallen, E. (M)
Paulos, P. J. (A)
Shaw, E. B. (A)

Cody
Dempster, R. J. (A)

Eden
Nelson, C. E. (A)

Laramie
Mallory, W. M. (M)
Willhard, W. J. (A)

Rawlins
Seaverson, O. I. (VA)

Riverton
Schaefer, R. G. (M)

Rock Springs
Adovnik, F. W. (A)

Sheridan
Stanton, J. M. (M)

ALASKA

Anchorage
Beauchamp, F. A. (A)
Deming, H. N. (A)
Donohoe, T. K. (A)
Grimstad, E. J. (A)
Hannon, G. A. (A)
Hart, B. H. (A)
Johnson, C. A. (A)
King, W. J. (A)
Little, J. T. (A)
Manning, C. T. (M)
Morley, L. N. (A)
Silven, J. W. (A)
Singleton, R. L. (A)
Smith, C. H. (M)
Walden, J. M. (M)
Walker, R. E. (M)
Walker, R. T. (M)
Wane, W. M. (A)
Wheaton, T. H. (A)
Whittaker, G. A. (A)

Annette
Pace, R. A. (M)

College
Andersen, S. (A)
Jacobs, G. B. (A)

Cordova
Beals, E. L. (A)

Fairbanks
Daniels, W. H. (A)
Shurtleff, C. H. (A)

Galena
Rhode, F. S. (A)

Ketchikan
Achard, R. H., Jr. (A)
Little, W. A. (A)

Kodiak
Whitney, J. E. (A)

Kuskokwim
Mone, E. A. (A)

Petersburg
Pierce, E. R. (A)

Spenard
Rogers, D. C. (A)
Wayer, C. F., Jr. (A)

Tanana
Fancher, V. M. (A)

ARGENTINA

Banfield
Jaccard, R. H. (A)

Bartolome Mitre
Alcantara, R. (A)

Beccar
Weiss, G. (SM)

Bella Vista
Bolwig, A. C. (A)

Buenos Aires
Arbo, O. (A)
Andrews, G. J. (SM)
Baldwin, E. V. (A)
Barcala, J. M. (A)
Baumann, C. (A)
Benjamin, M. (A)
Bermudez, J. (A)
Bertola, J. (A)
Bilotti, A. (A)
Blanco, H. A. (A)
Brandt, L. (A)
Burundarena, C. A. (A)
Calvino, J. A. (A)
Cambre, C. A. (A)
Canepa, A. M. (A)
Canepa, J. A. (A)
Cassiet, A. H. (M)
Cerrato, E. (A)
Cook, W. A. (SM)
Dickson, A. R. K. (A)
DiNunzio, P. (A)
Feinstein, J. (A)
Garcia, A. N. (A)
Garrido, R. H. (A)
Giron, D. G. (A)
Glucksmann, A. (A)
Goldberger, R. (A)
Gonzalez, F. (A)
Grant, I. C. (SM)
Grinberg, E. E. (A)
Harris, F. (SM)
Hayes, G. W. (A)
Jones, N. (A)
Krahenbuhl, G. (A)
Laconca, F. (A)
Lafon, J. B. (A)
Langhi, M. A. (A)
Levin, J. (A)
Lojkasek, T. C. (A)
Maget, R. (A)
Magno, H. T. (SM)
Margulius, M. (A)
Martinez, J. (A)
McCallum, C. A. (A)
McLoughlin, R. P. (SM)
Noizeux, P. J. (F)
Ooiman, A. (SM)
Penin, R. L. (A)
Pereyra, L. A. (M)
Perez, C. P. (SM)
Picard, A. (A)
Pinasco, S. F. (A)
Pluss, C. P. (SM)
Rojo, A. (A)
Rossi, C. S. E. (A)
Rubenstein, C. (A)
Rueda, J. V. (A)
Schwartz, O. (A)
Schweimer, K. P. (A)
Scott, R. H. (SM)
Sipman, L. C. (A)
Steube, F. R. (A)
Strauss, E. (A)
Sussenguth, C. E. (A)
Svanascini, A. L. (SM)
Valo, C. A. (A)
Valdes, S. A. (A)
Van Spankeren, G. (SM)
Von Trentini, G. (A)
Ziger, A. (A)
Zollfrei, C. D. (A)

Hurlingham
Cosentino, A. T. (F)

Lopez
Arnaud, J. P. (SM)

San Isidro
Coriat, J. L. (A)

Santa Fe
De Toro, A. M. (A)

Tucuman
Frias, D. E. (SM)

AUSTRALIA

NEW SOUTH WALES

Bankstown
Ferguson, G. S. (A)

Bexley
Wardale, A. H. (M)

Burwood
Builder, G. (F)

Chippendale
Cooper, B. F. (M)

Enfield
Hall, G. G. (M)

Glebe
Scott, H. G. (M)

Inverell
Bartle, O. E. (A)

Kirribilli
Martin, A. F. (A)

Longueville
Beard, M. (A)

Mosman
Wyles, D. G. (SM)

Orange
Crouch, E. C. (A)

San Souci
Larkin, J. H. (A)

Sydney
Allsop, R. C. (SM)
Bardin, W. F. (SM)
Bean, L. P. R. (SM)
Brown, B. F. A. (SM)
Bushby, T. R. W. (SM)
Cansick, N. V. C. (A)
Carter, J. K. (A)
Dobble, L. G. (SM)
Hansen, I. C. (M)
Hirschl, H. P. (M)
Hooke, L. A. (SM)
Kerr, F. J. (SM)
Langford-Smith, F. (SM)
McDonald, A. S. (F)
Mingay, O. F. (SM)
Minnett, H. C. (A)
Parish, H. C. (VA)
Ryan, R. D. (A)
Shaw, R. H. (M)
Stevenson, M. H. (SM)

Thom, F. W. P. (SM)
Wade, C. F. N. (SM)
Warner, J. (A)

Thornleigh
Hope, R. S. (M)

Vaucluse
Hall, L. S. (SM)

West Ryde
Benson, J. E. (SM)

QUEENSLAND

Brisbane
Ham, G. (VA)
Oliver, E. (M)
Webster, H. C. (M)

SOUTH AUSTRALIA

Adelaide
Sekny, S. J. (A)
Willoughby, E. O. (A)

Plympton
Davies, R. J. C. (A)

VICTORIA

Ballarat
McCulloch, G. R. (VA)

Beaumaris
Murphy, W. T. (M)

Canterbury
Coate, E. F. (A)

Ellwood
Warner, G. A. (M)

Ivanhoe
Cakanovskis, E. (A)

Melbourne
Brodribb, M. I. (A)
Brownless, S. F. (VA)
Cannon, A. H. (A)
Caro, D. E. (A)
Collins, R. J. (A)
Cox, L. V. (A)
Faudell, C. L. (SM)
Glover, A. J. G. (A)
Hooper, E. M. (VA)
Kennewell, E. M. (A)
Rubenstein, S. J. (VA)
Skelton, T. H. (SM)
Swire, B. E. (A)

Richmond
Webb, A. L. C. (VA)

WEST AUSTRALIA

Bellevue
Laisk, E. (A)

Perth
Hayman, W. G. (A)

BELGIUM

Antwerp
Cornet, J. F. (A)
Van Dyck, E. A. (A)

Brussels
Bernaert, A. L. J. (A)
Tavernier, G. C. (M)
Van de Velde, F. J. (A)

Ghent
Buys, W. L. (M)
Van den Meersche, A. (VA)

Mons
Harmegnies, P. A. (A)

Putte
Liekens, A. F. (A)

Uccle-Brussels
Marique, J. (M)

BAHAMAS

Nassau
Ingraham, K. R. (M)
McCarthy, A. A. (A)

BERMUDA

Pembroke
Watlington, F. W. (A)

Warwick
Harries, J. H. O. (SM)

BOLIVIA

La Paz
Weil, R. B. (A)

BRAZIL

Belem
Maia, J. R. de B. (A)

Isabel Rio
Pradal, H. A. (A)

Porto Alegre
Peizoto, E. S. (SM)

Rio de Janeiro
Benchimol, A. (A)
Bonapace, H. (M)
De Andrade, P. E. (A)
De Britto-Pereira, M. (M)
De Bustamante, I. S. (A)
De Medeiros, L. A. (VA)
De Oliveira, A. M. (SM)
Do Carmo, A. C., Jr. (A)
Dutra, L. G. L. (A)
Frederico, J. C. B. (A)
Grant, F. W. (A)
Greis, W. F. (A)
Heininger, W. W. L. (A)
Lacombe, C. G. (A)
Lezan, G. R. (A)
Mesiano, C. (A)
Nina, J. P. (A)
Obermuller, W. F. (M)
Pareto Neto, J. V. (VA)
Portella, S. M. (A)
Ramos, Z. P. (A)
Ritter, G. (A)
Schenck, H. H. (SM)
Taylor, P. G. (M)

Sao Paulo
Barros Barreto, L. A. (A)
Bastos, P. M. D. (A)
Bezman, W. G. (A)
Brandt, W. L. (A)
Christian, W. (A)
Dantine, W. A. (A)
Da Rosa, A. V. (A)
De Arruda, P. R. (A)
De Macedo, A., Jr. (M)
De Mello, G. H. (A)
Fanta, P. (M)
Gilmore, E. M. (M)
Goldberger, N. (A)
Guimaraes, B. Q. (A)
Heinke, C. B. R. (M)
Kimbark, E. W. (M)
Langdon, G. G. (A)
Levy, G. I. (M)
Meyer, L. V. (A)
Perini, J. (A)
Rubin, L. (M)
Smit, J. (A)
Spangenberg, K. (F)
Stokes, H. S. (SM)
Woelz, A. L. (M)

BRITISH EAST AFRICA

KENYA

Nairobi
Gross, J. (M)
Hastings, D. J. (M)
Panesar, T. S. (A)
Paterson-Jones, E. (SM)
Pegrume, S. A. (M)
Proud, E. (M)
Smailes, G. (A)
Talbot-Jones, R. V. (M)

ECUADOR

Quito
Jacobson, H. P., Jr. (A)
Myhre, P. K. (SM)
Rota, L. (M)

EGYPT

Alexandria
Assaf, E. J. (A)
Mostafa, A. E. (SM)

Cairo
Abu-Zeid, M. M. (A)
Ahmed, M. A-H (M)
Fouad, M. E. (SM)
Grdseloff, L. (M)
Mahmoud, A. A. (M)
Mahmoud, H. M. (A)
Makar, R. T. (A)
Mortada, I. O. (M)
Reda, M. S. (M)
Shahbender, R. A. (A)
Talaat, M. E. (A)

BRITISH GUIANA

Rio Demerara
Greaves, H. A. (M)

BRITISH WEST INDIES

Barbados
Lawson, C. J. V. (M)

Jamaica
Gauntlett, G. A. R. (M)

Trinidad
Borde, E. H. (A)
Fung, J. H. (A)

CANAL ZONE

Ancon
Durling, F. A. (M)

Balboa
Corey, J. F. (A)
Young, J. W. (VA)

Balboa Heights
Carleton, E. O. (A)

Cristobal
Mason, J. L. (A)

Rodman
Loman, J. W. (A)

CANADA

ALBERTA

Bruderheim
Kittlitz, R. S. (A)

Calgary
Allan, W. K. (A)
Caldwell, L. W., Jr. (A)
Cooper, R. J. G. (A)
Davis, A. P. (A)
Hockin, W. J. (A)
Larson, V. C. (A)
Netterville, S. D. (A)
Partin, W. (A)
Rosen, E. W. (A)
Underhill, R. W. (A)
Zelonka, F. A., Jr. (A)
Zowtlak, J. (A)

Camp Wainwright
MacIntosh, R. L. (A)

Edmonton
Cable, R. P. (A)
Carlson, M. E. (A)
Carty, D. G. (A)
Donovan, L. N. (A)
Hall, T. W. (A)
Jones, W. S. (A)
Lambert, R. F. (A)
MacDonald, D. L. (A)
Michie, C. G. (A)
Porteous, J. W. (SM)
Rice, G. R. A. (A)
Smith, O. A. (VA)

Lethbridge
Reagh, R. (A)
Tyrrell, C. (A)

Ralston
Wilson, T. M. (A)

St. Albert
Usher, R. (A)

Standard
Svendsen, G. D. (A)

BRITISH COLUMBIA

Castlegar
Thorp, W. W. (A)

Esquimalt
Davidson, H. H. A. (SM)

Hollyburn P. O.
Manders, D. F. (M)
Miles, W. F. (A)
Tindall, J. R. (A)

Nanaimo
Pirart, M. A. (A)

Nelson
Jeffery, A. P. (A)

New Westminster
McDonald, R. C. (A)

North Burnaby
McInnes, H. W. (A)

North Vancouver
Fitzgerald, M. W. (A)
Koombes, I. (A)
Nasmyth, P. W. (M)
Riddell, A. I. (A)
Wilson, C. M. (A)

Penticton
Paton, I. W. (A)

South Burnaby
Tripp, H. H. (A)

Steveston
Wighton, J. J. (A)

Trail
Gowans, W. K. (A)

Vancouver
Breeze, J. E. (SM)
Carpenter, D. D. (SM)
Chandler, A. H. (A)
Chandler, G. C. (SM)
Chisholm, E. (A)
Cuddeford, R. A. (A)
Cushing, T. D. (M)
Fedoroff, L. N. (A)
Fraser, F. S. (M)
Gray, J. S. (A)
Green, M. (M)
Gregory, A. H. (M)
Hale, S. T. (A)
Hepburn, J. T. (A)
Hill, C. J. (A)
Hilton, B. C. (A)
Hings, D. L. (VA)
Holmes, A. T. (A)
Hoyles, H. A. (A)
Itenson, V. A. (A)
Jones, D. T. (A)
Kersey, L. R. (M)
Knight, A. G. (A)
Knight, G. M. (A)
Kolbeins, E. N. (A)
MacLeod, H. J. (SM)
Marsh, R. A. (A)
McCarter, W. L. (A)
McLennan, D. E. (A)
Moore, A. D. (M)
Nelson, G. A. (A)
Neveroski, F. (A)
Norman, R. O. (M)
Palmer, H. (A)
Pye, R. M. (A)
Reyda, D. C. (A)
Robson, E. E. (M)
Saunders, M. E. (M)
Smith, C. R. (A)
Spencer, R. E. (A)
Stachiewicz, B. R. (A)
Stewart, J. A. (A)
Stott, W. (A)
Trainor, W. J. (M)
Tupper, B. R. (SM)
Varah, L. A. (A)
Wade, D. (VA)

Victoria
Blyth, G. S. (A)
Weir, R. C. (A)

West Vancouver
Bennett, W. F. (A)
Bonnett, J. D. W. (A)
Brown, T. J. (A)
Kent, N. S. (A)

MANITOBA

Churchill
Yankewicz, W. W. (A)

East Kildonan
Perry, S. G. (A)

Fort Garry
Anthes, R. G. (SM)

Lac du Bonnet
Uhlman, J. C. (A)

Norwood
Barschel, E. (A)

St. Vital
Hreczuch, S. F. (A)
Spencer, G. M. (A)

Transcona
Royko, W. (M)

Winnipeg
Ardelian, T. E. (M)
Body, H. T. (A)
Brown, J. R. B. (A)
Cahoon, R. D. (SM)
Charron, J. H. A. (A)
Cross, I. F. (SM)
Cunningham, A. B. (A)
Curtis, R. W. (A)
Denyer, J. H. N. (A)
Dusang, E. B. (M)
Galpin, W. H. (A)
Gissing, H. R. (A)
Greenaway, J. (M)
Gregory, B. J. (A)
Hanchatek, J. (A)
Hooper, A. W. (A)
Horner, S. G. L. (SM)
Hoye, W. (A)
Kennedy, A. E. (A)
Kinnear, H. E. (A)
Kyle, D. V. (A)
Lenz, H. G. (A)
MacDonald, P. A. (SM)
McLaren, G. A. (A)
Mestery, S. (A)
Poloway, A. A. (A)
Reynolds, J. F. W. (A)
Salton, L. V. (SM)
Semmell, R. E. (A)
Seals, M. L. (A)
Simister, R. M. (A)
Sloker, G. H. (A)
Staryk, M. (A)
Stillwater, J. (A)
Thomson, D. R. (A)
Tinkler, R. F. (M)
Wallace, G. R. (A)
Williams, S. A. (A)
Wolff, E. R. (A)

NEW BRUNSWICK

Fredericton
Cassidy, S. B. (A)
Galbraith, R. A. H. (SM)
Tillotson, J. G. (A)

Sackville
Hart, E. S. (A)
Smith, H. M. (SM)

Saint John
Bishop, J. G. (A)

NOVA SCOTIA

Greenwood
Ruddell, J. F. (A)

Halifax
Burchill, G. H. (A)
Duston, R. F. (A)
Fowlie, W. D. (A)
Greig, A. W. (A)
Jefferson, W. E. (M)
Lee, F. B. (A)
Murray, C. W. (A)

Sydney
Oulton, G. R. (A)

ONTARIO

Agincourt
Reesor, G. E. (A)

Ajax
Bayly, B. D. F. (F)
Chaplin, N. J. (A)
Coish, H. O. (A)
Gates, R. E. (A)
Philp, H. E. (A)

Aldershot
Allred, L. D. (A)

Ancaster
Clewes, T. W. (M)
Foy, R. H. (A)
Ratz, A. G. (M)

Arnprior
Boire, P. C. (A)
Godby, E. A. (A)
Logan, R. W. (A)

Ashburn
Anderson, W. H. (M)

Ayler West
Jackson, A. (M)

Barriefield
Sneddon, W. D. (A)

Beamsville
Bodo, A. (A

Belleville
Andrews, A. G. (A)
Blacker, H. L. (A)
Burkett, K. V. (M)

Fort, D. E. (A)
Hunt, C. A. (A)
Lund, D. M. (A)
Moore, N. A. (A)
Punchard, J. C. R. (SM)
Shewchuk, P. D. (A)
Sillitoe, S. (VA)
Smith, R. L. (A)
Tanner, R. H. (SM)

Blenheim
Chase, G. A. (A)

Campbellford
McCulloch, A. R. (A)

Carlton Place
Britney, O. L. (M)

Chatham
Richardson, C. H. (A)

City View
Caton, W. A. (M)
Crouser, E. E. (A)
Risteen, H. C. (A)
Smith, W. B. (M)

Cliffcrest P. O.
Holmquist, C. A. (A)
Otsuki, J. S. (A)

Clinton
Boyczuk, F. P. (A)
Bury, G. J. (M)
Fletcher, R. E. (A)
Heal, J. A. (A)
Miller, B. G. (M)
Musselman, A. L. (A)
Stroud, E. L. (A)
Tahirali, G. W. (A)
Terrell, D. S. (A)
Vernon, H. (A)

Deep River
Cooper, W. (A)
DeGray, E. H. (A)
Drew, T. D. (A)
Dunlop, D. P. (A)
Langmuir, D. B. (SM)

Deseronto
Brand, P. M. (SM)
Leavitt, J. N. (A)

Eastview
Henderson, D. P. (A)

Elora
Hastings, R. (M)

Fort William
Andrews, G. R. (A)

Galt
Sweet, J. L. (A)

Georgetown
Bell, J. W. (M)
Rugg, H. H. (M)

Guelph
Brown, R. M. (A)
Irwin, G. J. (SM)
Mackay, F. S. (SM)
Robinson, C. A. (VA)

Hamilton
Adair, R. J. (A)
Ainlay, A. (M)
Anderson, J. W. (M)
Attack, H. G. (A)
Beaumont, G. F. P. (M)
Bennett, H. W. (A)
Cantlon, C. F. (M)
Connor, J. J. (A)
Conquest, E. A. (A)
Dean, W. W. H. (SM)
Demasson, A. N. (A)
Duvall, J. M. (A)
Farley, T. S. (SM)
Fromanger, A. L. (A)
Gomard, P. (A)
Gray, W. W. (A)
Gregson, J. H. (A)
Griffiths, H. D. (A)
Harris, L. R. (A)
Hayward, J. R. (M)
Hore, H. B. (A)
Houlding, J. D. (M)
Jazbutis, A. (A)
Kelterborn, W. H. (SM)
Litwin, J. D. (A)
Lord, G. W. (A)
Lucyk, J. (M)
McIlroy, C. R. (A)
Miedema, H. (SM)
Moody, R. N. (A)
Newhall, E. E. (A)
Olson, E. (SM)
Parent, A. M., Jr. (A)
Peterson, D. A. (A)
Pickett, J. H. (M)
Ratz, H. C. (A)
Rice, H. (SM)
Roberts, D. M. (A)
Ruse, E. (M)
Ryll, E. (A)
Sandler, A. A. (A)
Schneider, S. S. (SM)
Smith, C. J. (A)
Surtees, W. J. (M)
Thomas, E. A. (M)
Thomson, J. R. (A)
Van Marle, J. C. (M)
White, R. H. (A)
Wilk, J. (A)
Williamson, D. B. (A)

Kenora
Brereton, C. H. (SM)
Hackett, F. J. (A)
Jones, A. W. (M)

Kettleby
Borth, L. A. (A)

King
Stubbs, R. A. (A)

Kingston
Campling, C. H. R. (A)
Cox, G. C. (A)
Robinson, M. R. (A)
Stewart, H. H. (A)
Willing, W. R. (A)

Kitchener
Aikenhead, B. A. (A)
Banks, F. A. O. (M)
Clark, W. B. (SM)
Cox, G. M. (SM)
Marsland, J. W. (A)
Ritz, E. A. (A)
Smallwood, S. G. (A)

Lansing
Fisher, G. W. (A)
Holroyd, W. H. (A)
Leaver, E. W. (M)

Leaside
Brereton, R. L. (M)
Brophy, R. M. (SM)
Byers, V. J. (SM)
Fitzallen, J. H., Jr. (M)
Gillespie, R. M. (A)
Houlgrave, A. G. (A)
Simmonds, L. C. (VA)
Stewart, G. L. (A)
Thompson, W. H. (A)
Van Dyk, T. (A)
Webster, C. G. (A)
Wiggins, J. D. (A)

London
Allen, R. L. (A)
Aselstyne, J. G. (A)
Athersych, F. B. (A)
Bach, J. R. (SM)
Blackburn, W. J. (A)
Blackwell, J. H. (M)
Darling, D. C. (A)
Davis, R. E. (A)
Deatle, R. C. (SM)
Downs, E. E. (A)
Ferguson, A. F. (M)
Fisher, F. J. (A)
Foster, G. L. (M)
Graham, B. (SM)
Gurd, R. H. (A)
Hodge, N. H. (A)
Hosker, G. R. (M)
Hudson, G. W. (A)
Hunt, F. R. (A)
Jackson, N. B. (A)
Jeffery, J. (A)
Johnston, S. N. A. (A)
Kipp, C. F. (A)
Lansing, L. M. (A)
Luke, R. W. (M)
Lumsden, R. B. (M)
MacDonald, C. F. (A)
MacGregor, R. J. (A)
Montreuil, R. E. (A)
Moore, J. D. B. (M)
Nunn, W. A. (A)
Pearce, E. C. (A)
Peters, G. A. (M)
Prodger, A. (A)
Richards, R. S. (M)
Robertson, J. D. (A)
Robitaille, G. A. (M)
Rumbold, D. G. (A)
Ruth, C. G. (M)
Sanders, G. E. (A)
Suchard, D. G. (M)
Tull, E. H. (M)
Warr, R. J. (M)
Wilton, R. (SM)

Malton
Sullivan, J. K. (A)

Maple
Wynn, W. W. (A)

Markham
Dodge, A. (A)

Mimico
Dudley, D. J. (A)
Lomas, E. G. (SM)
Ticknor, A. E. (A)

Monotick
Allworth, J. C. (A)

Mt. Hamilton
Rutledge, C. H. (A)

Newtonbrook
Halina, J. W. O. (A)
Penrose, R. M. (A)

New Toronto
McFadden, H. W. (M)
Wood, L. R. (A)

North Park P. O.
Cotterill, M. J. (A)
Deacon, F. W. (A)
Dulmage, H. B. (A)

Oshawa
Fox, S. J. (A)

Ottawa
Ballard, B. G. (SM)
Beauchesne, L. A. (A)
Belrose, J. S. (A)
Bennett, J. R. G. (A)
Bennett, L. F. (A)
Bradley, J. H. (A)
Bresee, C. W. (A)
Broten, N. W. (A)
Burtnyk, N. (A)
Cairns, F. V. (A)
Carroll, D. V. (SM)
Castleman, D. H. (A)
Chaba, P. (M)
Chown, B. F. (A)
Chrome, J. T. (A)
Coburn, G. S. (A)
Collins, J. A. (M)
Corbett, L. V. (A)
Couzens, D. T. (A)
Covington, A. E. (M)
Cox, L. G. (A)
Cumming, W. A. (M)
Curran, W. T. (A)
Davidson, D. W. (A)
Davidson, G. K. (M)
Dennis, J. (A)
Des Brisay, A. W. Y. (M)
Dingwall, R. A. (A)
Doherty, L. H. (A)
Fawcett, G. M. (VA)
Field, G. S. (SM)
Field, P. A. (VA)
Flynn, H. (A)
Forsyth, P. G. (SM)
Glinski, G. (M)
Grant, A. S. G. (M)
Gruenberg, H. (A)
Halverson, H. D. (A)
Hamilton, A. C. (A)
Hammond, E. K. F. (A)
Hatton, W. L. (A)
Hay, D. R. (A)
Henderson, J. P. (SM)
Henderson, J. T. (F)
Hendry, A. (A)
Hoover, S. G. (A)
Hudson, A. C. (M)
Jones, S. G. (A)
Kalra, S. N. (M)
Kenney, J. R. (A)
Kenniker, A. (M)
Kitces, S. (A)
Knights, S. P. (SM)
LaFerriere, P. J. (A)
Lavrench, W. (A)
Lazecki, S. (M)
Leask, R. D. (A)
Levy, M. M. (SM)
Lindsey, G. R. (A)
Lynch, J. A. M. (M)
MacDonald, V. C. (A)
MacKinnon, K. A. (F)
Makow, D. M. (A)
Marchand, W. C. (A)
Marshall, W. M. (M)
Matte, G. (A)
Matthies, J. G. (A)
Matusiak, M. E. (A)
McBurney, R. E. (A)
McIntosh, J. A. (A)
McKendry, B. A. (M)
McKinley, D. W. R. (F)
McLeish, C. W. (M)
McLeod, J. W. (M)
Merriman, H. O. (VA)
Merritt, H. J. (M)
Miller, G. A. (SM)
Modley-Jones, H. S. (A)
Nikkel, R. F. (A)
Noel, R. Y. M. (A)
Norton, J. A. (A)
Park, F. R. (M)
Parkhill, D. F. (A)
Patterson, C. F. (A)
Pond, J. F. (M)
Prendergast, W. R. (A)
Purvis, W. J. (A)
Redhead, P. A. (A)
Reiche, H. (M)
Roue, J. E. (M)
Rowlatt, J. H. (M)
Ruedy, R. (A)
Rush, W. A. (F)
Scott, J. C. W. (M)
Searle, W. M. (A)
Sheffield, A. G. (M)
Simpson, F. W. (A)
Smith, A. H. R. (SM)
Smyth, H. R. (SM)
Soucy, C. I. (SM)
Staniforth, A. (A)
Stewart, G. H. (A)
Stock, E. H. (A)
Swail, J. C. (A)
Vogan, E. L. (A)
Wackid, C. B. (A)
Walsh, H. E. (M)
Webb, E. L. R. (SM)
White, W. E. (SM)
Wilson, W. R. (SM)
Wong, J. Y. (A)

Ottawa West
Aksim, V. E. (A)

Peterborough
Berube, P. A. (A)
Boorman, K. S. (A)

Picton
Chinnick, R. F. (A)
Grainger, G. E. (A)

Pine Grove
James, W. E. (M)

Port Arthur
Hunter, W. C. (A)

Port Colborne
Turchan, P. J. (A)

Port Credit
McLean, D. F. (M)
McTaggart, J. E. (A)
Roy, D. R. (A)

Port Rowan
Martin, J. O. (A)

Richmond
Chapman, J. H. (A)

Rockcliffe
Kuhn, B. G. (A)
Quimet, J. A. (F)
Sturrock, J. K. (A)

St. Thomas
Onn, W. R. (A)
Warder, J. C. (M)

Sarnia
Thomas, A. (M)

Sault Ste. Marie
McRae, D. W. (A)

Scarboro
Harris n, M. A. (A)

Scarboro Bluffs P. O.
Long, R. G. (M)
Lynch, T. G. (A)
Taylor, M. K. (SM)

Streetsville
Meredith, C. C. (M)

Sunbury
Hitchcock, T. J. (A)

Swansea
Bow, A. (A)

Thornhill
Poulter, R. C. (SM)

Timmins
Amendola, B. (A)
Mott, E. D. (A)

Toronto
Armstrong, H. D. (VA)
Arnold, C. P. C. (A)
Artkin, W. H. (A)
Bain, J. R. (SM)
Baldwin, C. O. (VA)
Balmer, P. D. (SM)
Barclay, A. P. H. (SM)
Beaudoin, D. P. (A)
Bell, C. W. (A)
Bell, H. C. (A)
Bennett, C. J. (A)
Berry, F. G. (A)
Blanchard, J. L. (A)
Boduch, T. S. (A)
Bond, S. (A)
Breckenridge, A. G. (A)
Bridgland, C. J. (SM)
Bridgman, J. M. (M)
Brodsky, S. (A)
Brown, C. J. (A)
Buckles, F. G. (A)
Bullock, R. G. (A)
Burgess, N. M. (M)
Burke, A. C. (M)
Butler, C. A. (A)
Byers, H. G. (SM)
Carew, S. J. H. (M)
Cary, F. C. (M)
Chapman, C. N. (M)
Choat, W. F. (M)
Chrisholm, K. G. (M)
Christensen, A. G. (A)
Cole, W. A. (SM)
Collins, G. S. (A)
Cook, R. M. (A)
Corby, L. A. (A)
Courtice, H. A. (A)
Dakin, O. C. (M)
Davies, B. E. (A)
Dawson, H. S. (SM)
Dinnin, A. J. (A)
Dworkin, A. E. (A)
Fabb, N. R. (A)
Flagg, D. G. (A)
Flemons, R. S. (A)
Flynn, M. W. (A)
Forbes, E. J. (A)
Ford, W. J. (A)
Galloway, N. D. (A)
Gattoni, L. I. (A)
Geiger, D. G. (SM)
George, J. N. S. (A)
Gladys, S. J. (A)
Godfrey, G. F. (A)
Goldin, H. C. (M)
Gracey, T. G. (A)
Graham, G. L. (A)
Graham, H. E. (A)
Guess, A. L. (A)
Hames, A. L. (A)
Hamilton, H. E. S. (A)
Hanna, F. M. (A)
Harris, D. L. (A)
Harris, K. B. (A)
Heath, F. J. (SM)
Hedges, T. C. (A)
Hedley, C. E. (A)
Heenan, P. J. (A)
Henderson, V. L. (M)
Herbert, E. C. (A)
Hicks, E. P. (A)
Hobbs, F. B. (VA)
Hodgson, A. D. (SM)
Holm, H. R. (A)
Hull, S. E. (A)
Hulme, H. (A)
Humeniuk, P. (SM)
Hunter, J. B. (M)
Isserstedt, G. (M)
Jackson, C. M. (M)
Jackson, H. W. (SM)
Jagger, C. E. (A)
Johnston, K. S. (A)
Jones, R. (A)
Katchky, M. (A)
Kates, J. (A)
Kerfoot, J. H. (A)
Knowlton, K. R. (M)
Knudsen, D. F. (A)
Kozak, R. V. (A)
Kravetz, A. J. (A)
Lang, G. R. (A)
Levitt, M. (A)
Liddell, W. E. (A)
Longstaff, F. M. (A)
Longstaffe, J. R. (VA)
Looney, B. W. (A)
Lord, F. B. (A)
Love, S. F. (M)
Low, A. R. (M)
Lower, W. M. (A)
Luke, L. M. (A)
Lyons, K. C. (A)
MacGregor, H. D. (M)
MacKenzie, K. (A)
Mackie, A. S. (A)
Marshall, O. H. (A)
Mathers, F. F. (A)
McCloskey, K. P. (A)
McCurdy, G. E. (M)
McGibbon, G. D. (A)
McKelvie, J. L. (A)
McKim, W. J. G. (A)
McLaughlin, G. H. (A)
McVity, J. R. G. (A)
Millen, T. I. (SM)
Mockler, T. P. (A)
Moore, D. W. (A)
Morfitt, D. C. (A)
Morgulis, I. A. (A)
Mounce, G. R. (M)
Mudry, J. (A)
Muller, R. A. (SM)
Myerson, P. (A)
Neal, J. T. (A)

Newcombe, R. P. (A)
Newton, K. G. D. (A)
Norris, C. A. (SM)
Nylin, M. E. (A)
Ormiston, J. W. (A)
Paisley, S. R. (A)
Palin, E. L. (SM)
Parker, D. L. (A)
Patterson, M. C. (M)
Pfeiffer, J. T. (VA)
Pipe, G. E. (A)
Pointon, C. G. (A)
Ponzo, L. S. (A)
Pouliot, J. A. (A)
Pounsett, F. H. R. (F)
Price, E. G. (A)
Price, L. M. (F)
Publicover, A. M. (A)
Putz, H. R. (A)
Pynn, R. D. (A)
Richards, G. A. (A)
Richardson, G. E. (A)
Robertson, J. J. C. (VA)
Robinson, W. A. (A)
Rogers, H. Z. (A)
Rose, A. B., Jr. (A)
Rosenthal, A. L. (A)
Sale, P. A. (A)
Sandison, T. A. (A)
Sawitzki, N. (A)
Scholfield, W. D. (A)
Schultz, R. M. (A)
Scott, C. R. (A)
Scott, J. V. (A)
Sharf, W. A. (A)
Shino, J. S. (A)
Shoemaker, H. F. (M)
Siezen, G. J. (SM)
Sinclair, A. M. (A)
Sinclair, G. (SM)
Smith, W. R. (M)
Smoke, W. A. (A)
Soanes, S. V. (A)
Spence, C. E. (A)
Stapley, B. E. (A)
Stavrou, S. (A)
Stein, H. H. (A)
Story, R. (A)
Subotich, Z. (A)
Swan, E. O. (SM)
Taylor, A. K. (A)
Taylor, L. A. (A)
Toye, J. M. (M)
Tuchak, W. G. (A)
Turko, D. A. (A)
Turner, K. A. (A)
Turner, R. J. A. (M)
Ward, R. F. (A)
Warren, J. R. (SM)
Weedon, G. F. C. (A)
Whyte, J. R. (M)
Wilburn, P. E. J. (A)
Williams, A. R. (A)
Williams, E. J. (A)
Williams, J. H. M. (A)
Williams, J. K. (M)
Wright, T. C. (A)
Yablo, S. (A)
Yachimec, P. (A)

Toronto Island
Wilson, R. W. (M)

Trenton
Baxter, E. G. (M)
Forman, T. F. (A)
Holmes, W. H. (A)

Walkerville
Walker, G. B. (A)

Wallaceburg
Collins, A. D. (A)
Heath, R. E. (A)
Lawson, R. (A)

Waterloo
Falconer, G. W. (A)

Welland
Weir, D. B. (A)

Westboro
Henshaw, C. H. (A)
Loutit, J. A. (M)

West Hill
Sokolowski, W. E. (A)

Weston
Macumber, M. G. (A)
Thomson, J. M. (SM)

Wexford P. O.
Bacon, W. H. (A)
Orrett, W. S. (A)

Willowdale
Haiblen, A. H. D. (A)
Harben, J. F. C. (M)
Kernohan, E. J. (A)
Paulin, W. P. (M)
Purdy, T. W. (M)
Scott, R. (SM)
Secord, A. H. (A)
Sheppard, R. D. B. (M)
Young, J. A. I. (A)

Wilson Heights P. O.
Cohen, H. A. (A)
Farrell, G. L. (A)

Windsor
Itiniant, L. (A)
MacGregor, A. R. (A)
Ruse, W. A. (A)
Shirley, Q. H. (A)

Woodbridge
Posnikoff, P. W. (M)
Rogers, J. A. (M)

York Mills
Ainsworth, A. L. (SM)
Armitage, G. G. (M)
Hackbusch, R. A. (F)
Kelk, G. F. (M)
Lindsay, L. C. (A)
Paterson, S. G. (M)

PRINCE EDWARD ISLAND

Charlottetown
Rogers, K. S. (A)

QUEBEC

Acton Vale
Boisvert, M. (A)

Asbestos
Halischuk, E. (A)

Aylmer, East
Wells, G. (A)

Beauharnois
Jobidon, L. (A)

Beaurepaire
Lisle, J. R. D. (M)
Watson, A. D. (M)

Beloiel
Kirkby, R. L. (M)

Charlesbourg Village
Fortin, R. A. (A)

Dorion
Hanna, J. L. (A)

Dorval
Tritter, A. O. (A)

Drummondville
Marceau, J. P. (VA)
McWilliam, E. A. (VA)
Payette, R. (A)

Granby
Sterling, J. A. (A)

Hampstead
Wallace, O. C. S. (A)

Hull
Haney, W. L. (M)

Ile Perrot
Stauffer, R. L. (A)

Isle Bigras
Clarkson, L. (M)

Joliette
Ladouceur, C. (A)

Lachine
Brooks, D. A. (A)
Clarke, J. L. (A)
France, J. R. (A)
Isaac, V. E. (A)
Kelsey, E. S. (SM)
Lepine, C. A. (A)
Muirhead, C. R. (SM)
Sharp, D. R. (A)
Smith, D. E. (A)
Wright, D. F. (M)

Lakeside
Anderson, D. A. (A)
Sutherland, J. G. (M)

Longueuil City
Simard, L. R. (A)

Montreal
Aaronson, D. A. (A)
Abugov, B. (A)
Anderson, J. N. (A)
Anderson, L. W. (A)
Andrews, W. (A)
Argue, T. A. (A)
Aubin, W. I. (A)
Audet, H. A. (M)
Baily, F. A. A. (M)
Bantin, W. F. (A)
Barrow, F. A. (VA)
Baylis, G. F. (A)
Beaulieu, W. R. (M)
Bell, S. L. (A)
Bellringer, C. C. E. (M)
Bernier, J. C. (SM)
Berube, R. (A)
Biggar, H. P. (M)
Bonneville, S. (SM)
Booth, S. (A)
Breymayer, K. (A)
Campbell, J. A. (SM)
Cardella, O. (A)
Challis, W. L. (A)
Chapman, K. F. (A)
Chipman, R. A. (SM)
Chipps, G. E. (A)
Christmas, W. L. (A)
Coffin, G. C. (M)
Conroy, J. M. (SM)
Cooke, R. W. (SM)
Cox, J. R. G. (A)
Dandois, G. P. F. (M)
Desaulniers, R. R. (M)
Ditkofsky, H. (M)
Dorey, J. D. (A)
Dubreuil, E. J. (M)
Dumas, J. E. (A)
Farnell, G. W. (A)
Fisher, C. B. (A)
Fisher, F. S. (M)
Fisher, S. T. (SM)
Fisk, P. (A)
Flom, M. (A)
Fratkin, B. (A)
Frenette, C. (M)
Gilmore, J. P. (M)
Ginsberg, G. (A)
Greven, P. J. (M)
Groome, G. R. (M)
Hall, J. S. (A)
Hall, R. D. (A)
Hannan, T. P. (A)
Hatzidakis, K. (A)
Hayes, J. E. (VA)
Hibbs, N. M. (A)
Holten, C. U. (A)
Howes, F. S. (F)
Hudon, G. F. (A)
Hunt, A. B. (SM)
Jackson, J. E. (SM)
Jaderholm, H. W. (VA)
Jamieson, F. C. (A)
Jamshedji, J. S. (A)
Johnson, E. F. (A)
Kahan, J. G. (M)
Kahn, I. (A)
Kassner, M. H. (A)
Katz, L. (A)
Kaufman, H. (A)
Kelton, M. R. (M)
Kingan, J. J. (SM)
Knox, J. B. (F)
Kubina, S. J. (A)
Lalonde, R. P. (A)
Laporte, J. M. (M)
Lavallee, P. (A)
Lavis, A. R. (A)
Leitch, D. H. (A)
Livis, M. J. (A)
Lord, L. M. (A)
Lott, T. M. (M)
Luke, C. H. (SM)
Mackenzie, D. G. (M)
MacKimmie, G. B. (A)
MacRae, R. M. (A)
Marcotte, J. (M)
Margolick, F. H. (M)
Marshall, G. K. (A)
Marshall, J. L. (M)
Matthews, R. P. (SM)
McDonald, D. J. (SM)
McGuire, C. H. (SM)
McKeel, P. D. (SM)
McMurray, J. L. (VA)
McNeil, B. T. (M)
Meek, T. J., Jr. (A)
Meunier, J. L. (M)
Nachfolger, N. (A)
Newman, D. A. H. (A)
Newton, W. K. (A)
Nichols, W. A. (SM)
Nienaltowski, W. (M)
Norton, R. J. (A)
Olding, N. R. (M)
Olive, G. W. (F)
Oxley, A. B. (SM)
Patience, A. M. (SM)
Patrick, K. R. (SM)
Pauch, J. E. (M)
Pavlasek, T. J. F. (M)
Payne, L. S. (F)
Pearson, L. (A)
Peedo, E. (A)
Pinnell, J. E. (M)
Poznanski, Z. (A)
Preziosi, F. W. (A)
Provost, P. (A)
Pscheidt, K. (A)
Pullan, E. (A)
Quinn, J. T. (M)
Reeves, R. (A)
Reid, D. T. (A)
Richardson, W. G. (SM)
Roach, C. L. (A)
Robbins, M. A. (A)
Rolland, S. F. (M)
Ross, A. T. (A)
Russell, W. D. (A)
Ryall, R. W. (A)
Schwartz, H. H. (M)
Scott, W. W. (A)
Seabrook, H. B. (M)
Sherman, B. N. (A)
Smith, F. A. (A)
Smith, R. A. (A)
Soderlund, A. G. (A)
Steel, W. A. (F)
Sweeny, T. V. (M)
Thompson, R. (A)
Thrasher, P. J. (A)
Tipple, H. L. (M)
Turnbull, J. A. (A)
Underwood, W. H. (A)
Vallieres, M. G. (A)
Vogel, N. I. (M)
Wagner, S. (A)
Walker, A. S. (M)
Wallace, R. J. (M)
Warren, F. G. B. (SM)
Wells, A. F. (A)
Whitehead, J. R. (SM)
Williams, A. G. (A)
Wilson, S. S. (A)
Woonton, G. A. (F)
Ziemelis, V. (A)

Noranda
Aitchison, J. H. (A)

Port Alfred
Gagnon, L. A. (A)

Quebec
Boisvert, C. (A)
Boulet, L. (A)
Curon, J. V. (A)
Demers, P. (A)
Hamel, V. (A)
Keeping, K. J. (A)
Letarte, M. (A)
Lortie, A. L. (A)
Nadeau, A. G. (M)
St. Hilaire, R. J. J. (A)
Sarault, G. E. (M)
Watson, G. D. (A)

Riviere de Loup
Montgomery, V. A. (A)

St. Bruno
Davis, J. F. (A)

St. Hilaire Station
Llewellyn-Thomas, E.R.C. (M)

St. Hubert
Gough, M. F. (A)

St. Hyacinthe
Doiron, J. A. B. (A)
Leclerc, J. G. (A)

St. Jerome
Gascon, J. C. (A)

St. Lambert
Ferris, H. A. (SM)
Hammond, R. E. (SM)
Wilmot, R. D. (A)

Ste. Therese de Blainville
Farmer, E. W. (SM)

Sillery
Bricout, P. A. (M)
DuBerger, P. (A)
Moen, H. P. (A)
Robichaud, L. P. A. (A)

Sorel
Lunan, H. S. (A)

Town of Mt. Royal
Bird, L. T. (M)
Dobridge, R. W. (M)
Douglas, J. C. (A)
Glegg, K. C. M. (A)
Hasell, F. W. (M)
Jackson, K. A. (SM)
Letts, R. (M)
Lunn, H. J. (A)

Verdun
Archambault, G. (M)
Charlebois, J. C. (A)
Mechas, M. G. (A)
Morrison, W. B. (A)

Ville St. Laurent
Clarke, H. W. (A)
Doucet, M. (A)
Moore, L. R. (A)
Oakes, H. S. (A)
Rethoret, R. H. (A)

Ville St. Michel
Jedrychowdki, J. L. (SM)

Westmount
Pinnell, S. E. A. (M)
Raynsford, R. P., Jr. (M)
Redpath, D. C. (A)
Stauffer, G. L. (A)

Yamachiche
Bird, C. H. R. (VA)

SASKATCHEWAN

Lucky Lake
Funk, J. A. (A)

Regina
Mowbray, D. R. (A)

Saskatoon
Forst, W. D. (A)
McNamara, A. G. (M)
Michalenko, A. (A)

Uranium City
Weaver, J. H. (A)

YUKON TERRITORY

Whitehorse
Berube, J. P. G. (A)

CEYLON

Colombo
Clarke, K. K. (A)
Makalanda, A. (M)

CHILE

Punta Arenas
Femenias, J. L. (A)

Santiago
Del Rio Bretigrere, J. (A)
Vallarino, A. D. (A)

Sewell
Collyer, J. H. (M)

CHINA

Hopei
Jen, L. (A)

Shanghai
Loo, T. C. (SM)

COLOMBIA

Barranquilla
Villadamigo, R. D. (A)

Bogota
Amore, I. (M)
Arboleda, C. E. (A)
Arce, H. H. (M)
De Boer, J. J. (A)
Gabrunas, K. B. (A)
Jimenez, A. R. (A)
Morales, T. N. (A)
Rafael, R. O. (A)

Cartagena
Ochoa, A. (A)

COSTA RICA

San Jose
Craigie, S. M. (SM)

CUBA

Camaguey
Valdes-Diaz, R. A. (A)

Havana
Aman, O. B. (A)
Condom, I. A. S. (SM)
Cordova, P. A. (A)
De Mello, W. (SM)
Martinez, B. (M)
Mayor, R. (A)
Polanco, G. (A)
Ramirez, C. C. (A)
Rodriguez, E. (A)
Shropshire, A. W. (VA)
Valladares, J. A. (M)

Marianao
Guiral, R. L. (VA)

Oriente
Reguera, J. J. (A)

CYPRUS

Limassol
Abouchanab, M. T. (M)

Nicosia
Dennis, F. L. (M)

CZECHOSLOVAKIA

Prague
Bena, J. J. (A)
Havelka, G. (M)
Horna, O. A. (A)
Nadler, M. (A)
Zacek, A. (SM)

DENMARK

Copenhagen
Carstens, L. (A)
Gronlund, M. P. S. (A)
Gudmandsen, P. E. (A)
Jacobsen, H. V. (M)
Larsen, B. F. (A)
Morch, V. H. (A)
Nielsen, B. A. (A)

Gentofte
Langaard, E. (A)
Svensson, R. (A)

Hellerup
Pedersen, G. (VA)
Rybner, J. (SM)

Lyngby
Christensen, C. L. (A)
Iversen, J. (M)
Jorgensen, B. (A)
Nag, D. S. (A)

Naerum
Kjaer, V. (A)

Sorgenfri
Bruun, G. (A)

Struer
Jensen, S. E. (A)

EIRE

Dublin
Ferguson, J. D. (SM)
Folan, A. J. P. (A)
McGovern, M. C. (A)
Poole, H. H. (A)

ENGLAND

BEDFORDSHIRE

Luton
Sowerby, J. M. (A)

BERKSHIRE

Abingdon
Fry, D. W. (A)
Wells, F. H. (SM)

Aldermaston
Liebmann, G. (A)

Longworth
Cooke-Yarborough, E. (M)

Maiden Head
Cotty, W. F. (A)

Reading
Sperring, F. E. (M)

Wantage
Cox, R. J. (M)

BUCKINGHAMSHIRE

Gerrards Cross
Morton, H. B. (M)

Great Missenden
Reyner, J. H. (SM)

High Wycombe
Simmonds, J. C. (A)

Newport Pagnell
Boswell, I. I. (A)

Slough
Diver, F. G. (SM)
Wilkens, A. F. (SM)

Stoke Poges
McLean, F. C. (SM)

CAMBRIDGE

Cambridge
Coales, J. F. (A)
Daigleish, J. W. (SM)
Germany, L. W. (M)
Moullin, E. B. (SM)
Pound, J. P. (M)
Rao, G. V. (M)
Rao, J. (M)
Ratcliffe, J. A. (A)

Histon
Townsend, F. H. (SM)

CHESHIRE

Cheadlehulme
Fielding, E. A. (A)

Chester
Hunt, T. W. (M)

Port Sunlight
Thomas, H. A. (SM)

Stockport
Weaver, C. (M)

Timperley
Vernon, B. H. (A)

Wirral
Higham, E. H. (M)

CORNWALL

Porthcurno
Hillier, R. J. (A)

CUMBERLAND

Seaton
Williams, C. E. (A)

DERBY

Derby
Buckland, V. (A)

DORSET

Beaminster
Bird, R. J. (SM)

DURHAM

Houghton-Le-Spring
Patterson, T. C. (SM)

Peterlee County
Angell, A. G. H. (SM)

EAST SUSSEX

Hastings
Mortlock, A. (A)

ESSEX

Barking
Bulgin, A. F. (SM)

Burnham-on-Crouch
Robertson, N. C. (SM)

Chelmsford
Amey, S. H. (A)
Cafferata, H. (M)
Deeley, A. R. (A)
Helsdon, P. B. (A)
Partington, G. E. (A)
Maunsell, H. I. G. (A)
Sarkar, N. (A)
Stubbs, P. Q. (A)

Colchester
Churchman, A. (A)

Danbury
Young, A. J. (A)

Gidea Park
Pitts, W. J. (A)

Harlow
Lea-Wilson, C. P. (M)

Hornchurch
Parker, J. W. (A)

Ilford
O'Brien, D. (M)

Little Baddow
Thomasson, J. G. (A)

Romford
Stott, H. T. (SM)

Southend-On-Sea
Davis, T. J. A. (A)

Writtle
Cooper, V. J. (A)

GLOUCESTERSHIRE

Bristol
Horrigan, E. W. (M)

HAMPSHIRE

Andover
Cook, K. L. W. (A)

Christchurch
Fisher, E. C. (M)

Emsworth
Barnsdale, E. A. (A)

Farnborough
Dale, T. G. M. (M)
Debski, J. M. (M)
Hobday, S. W. (M)
Reid, D. G. (VA)

Havant
Rzymowski, E. (A)

Portsmouth
Bettinson, S. F. (M)
Silvester, D. D. (M)

Romsey
James, M. (M)

HERTFORDSHIRE

Aldenham
Johnston, D. L. (A)

Baldock
Pollard, J. (M)

Cockfosters
Cattanes, E. (A)

Letchworth
Cartwright, J. R. (A)

New Barnet
Allen, W. G. (M)

Rickmansworth
Montgomery, A. W. (SM)

St. Albans
Fryer, L. (A)
Hornby, F. R. (A)

Ware
Hicks, B. W. (M)

Watford
Ayers, J. L. (M)

KENT

Beckenham
Herdman, T. L. (A)
Kiryluk, W. (A)

Bexleyheath
Brown, D. C. (A)

Bromley
Stoner, C. R. (M)
Sutherland, J. G. A. (SM)

Chislehurst
Anderson, E. W. (SM)

Dover
Smye-Rumsby, B. A. (A)

Edenbridge
Whitehouse, M. H. L. (M)

Hayes
Binyon, B. (SM)

Longfield
Scully, C. T. (SM)

Orpington
Harrison, K. W. (SM)
Lawrence, E. (A)
Saraga, W. (SM)

Otford
Brooke, H. A. (SM)

Rochester
Vedy, L. G. (A)

Sevenoaks
Van Hasselt, M. (SM)

Sidcup
Ashbridge, N. (F)
Spagnolettl, P. H. (A)

LANCASHIRE

Accrington
Bleasdale, J. (A)
Bleasdale, W. W. (A)

Bolton
Roberts, J. G. (M)

Glazebrook
Rouse, F. W. D. (A)

Liverpool
Chalmers, D. (A)

Manchester
Bowden, B. V. (SM)
Brown, R. H. (M)
Roberts, W. G. (A)
Ross, J. D. (A)
Scarby, N. H. (SM)

Morecambe
Oliver, W. (A)

Prescot
Muir, L. M. (A)

Southport
Fennessy, J. R. (M)

Ulverston
Oxley, R. F. (SM)

LINCOLNSHIRE

Boston
Silson, R. G. (A)

LONDON

Abel-Harry, C. B. (A)
Adorian, P. (SM)
Bargery, C. J. (A)
Barton, F. S. (F)
Bearup, T. W. (SM)
Beck, A. H. W. (A)
Bedford, L. H. (F)
Biship, H. (F)
Boyle, H. (A)
Bruce, D. C. (M)
Bruce, J. R. (VA)
Budge, R. K. (A)
Conway, T. D. (A)
Cronfield, J. F. (A)
Dawe, F. W. (A)
Dawes, E. J. (SM)
Dent, F. D. (A)
Dunn, S. C. (A)
Faulkner, H. (F)
Finney, R. (A)
Fisk, E. (F)
Flack, W. I. (SM)
Glendinning, W. (A)
Godbold, B. C. (M)
Goldup, T. E. (SM)
Graf, V. V. (A)
Greig, C. (M)
Greig, J. (SM)
Griffiths, W. H. F. (SM)
Guobadia, A. S. (A)
Hamilton, D. (VA)
Heaton-Armstrong, L. J. (SM)
Hersch, W. (M)
Hirshman, C. L. (SM)
Jackson, W. (F)
Kinross, R. I. (A)
Knight, S. G. (A)
Lamont, K. (M)
Layzell, L. M. (M)
Lewis, P. S. (A)
Lyons, C. L. (SM)
Mayer, C. G. (SM)
McCully, G. R. (A)
Meyer, L. W. (SM)
Mirk, D. B. (SM)
Nissim, S. (A)
Parr, G. (SM)
Paynter, A. E. (M)
Popock, H. S. (SM)
Primich, R. I. (A)
Pybus, A. W. L. (SM)
Rantzen, H. B. (SM)
Ringham, G. B. (SM)
Roberts, R. S. (VA)
Rose, S. P. (A)
Schwarz, H. F. (A)
Shelley, B. J. (M)
Singh, H. (A)
Slemon, G. R. (A)
Sly, R. J. (A)
Smillie, P. V. (M)
Starr, C. H. (SM)
Straughan, T. A. (M)
Strong, C. E. (SM)
Stuff, A. C. (A)
Trigg, R. J. (A)
Troutbeck, W. H. (VA)
Valder, F. L. (M)
Walker, H. (SM)
Watson-Watt, R. (F)
Wilson, A. G. (M)
Wrede, D. F. (M)
Wynn, R. T. B. (SM)

MIDDLESEX

Enfield
Lee, E. M. (SM)
Oldham, C. A. (A)
Strafford, F. R. W. (SM)
White, G. J. (M)

Greenford
MacLachlan, V. D. (M)

Heston
Williams, H. P. (SM)

Northolt
Mole, G. (A)

Pinner
Horne, R. W. (M)

Potters Bar
Capelli, M. P. (M)

South Ruislip
Singh, W. K. (A)

Stanmore
Barrett, J. (A)
Howse, H. A. G. (SM)
Sheppard, T. W. (A)

Twickenham
Gill, A. J. (F)
Morley, J. E. (A)

Winchmore Hill
Payne, C. E. (VA)

NORFOLK

Gorleston-on-Sea
Rayment, K. I. (A)

Great Yarmouth
Dyson, A. A. (VA)
Fisk, B. C. (A)
Hayes, J. (A)

King's Lynn
McLaren, J. H. (A)

NORTHAMPTON

Kingsthorpe
Kaye, J. B. (VA)

NORTHUMBERLAND

Newcastle-on-Tyne
Hare, J. (A)
Hodgson, C. C. V. (M)
Parsons, D. R. (SM)

Whitley Bay
Keer, A. (M)

NOTTINGHAMSHIRE

Beeston
Hancock, G. N. (SM)
Pollard, J. R. (M)

Bilsthorpe
Stokes, R. (A)

SOMERSETSHIRE

Burnham-on-Sea
Thomas, W. D. (A)

Ilminster
Macnee, D. H. (SM)
Ullrich, E. H. (F)

STAFFORD

Stoke-on-Trent
Gautby, H. R. B. (A)

Walsall
Hardcastle, C. (A)

Wolverhampton
Taylor, D. H. J. (A)

SUFFOLK

Ipswick
Inskip, F. A. (VA)

SURREY

Banstead
Smith-Rose, R. L. (F)

Cheam
Bond, W. (SM)

Croydon
Thompson, A. E. (SM)

East Horsley
Milsom, W. T. (A)

East Molesey
Coursey, P. R. (A)

Elstead
Nobbs, W. J. (A)

Epsom
MacGregor, E. I. R. (SM)

Farnham
Clarke, G. F. (A)

Guilford
Williams, R. C. G. (SM)

Haslemere
Bainbridge-Bell, L. H. (VA)

Hindhead
Rowe, J. H. (A)
Scott-Taggart, J. (F)

Horley
Abel, H. L. (M)

Richmond
Head, J. E. (VA)

Sanderstead
Dupree, F. H. (SM)
Hale, J. A. B. (A)

Seale
Hickson, P. W. (SM)

S. Croydon
Carpenter, R. E. H. (SM)

Surbiton
Brennand, R. (A)
Kerr-Waller, R. B. (M)

Tadworth
Somerville, T. (SM)

Woking
Gabriel, R. P. (VA)
Latham, C. (M)

Worcester Park
Walker, T. H. (M)

SUSSEX

Hove
Copp, J. (A)

Worth
Wilkinson, S. H. (M)

WARWICKSHIRE

Birmingham
Allen, W. S. (SM)
Hibbard, L. U. (A)
Jones, H. H. (A)
Truscott, D. N. (A)

Coventry
Allan, R. G. (A)
Keen, A. W. (M)
Wilson, R. (A)

Rugby
Hulme, F. H. (M)
Kinman, T. H. (SM)
Montagnon, N. B. (A)

WILTSHIRE

Aldbourne
Veevers, J. F. (A)

Devizes
Savage, W. B. (M)

Malmesbury
Irvin, J. L. (A)
Parry, R. Y. (SM)

Shrivenham
Grant, D. A. (A)
Younson, E. J. (M)

WORCESTERSHIRE

Evesham
Smith, C. (A)
Sturley, K. R. (SM)

Malvern
Carter, R. H. A. (SM)

YORKSHIRE

Bradford
Patchett, G. N. (M)

Leeds
Forte, S. S. (A)
Westwood, D. (M)

Sheffield
Benson, F. A. (M)

FORMOSA

Hwalian
Wang, C. C. (A)

Taipeh
Ong, H. Y. (A)
Wei, L. Y. (A)

FRANCE

CORREZE

Brive
Roncier, R. (M)

JEUMONT

Dufossez
Ducastel, G. (A)

RHONE

Lyon
Boilley, E. J. M. (A)

Sceaux
Surdin, M. M. (SM)

SEINE

Antony
Fromageot, A. P. A. (SM)

Asnieres
Kraemer, G. (SM)

Bagneux
Voge, J. P. (SM)

Bois-Colombes
Cosnard, F. F. (A)

Boulogne
Nill, A. A. (A)

Clichy
Warin, M. (A)

Malakoff
Besson, P. (M)

Neuilly-Seine
Lapostolle, P. M. (SM)
Lochard, J. C. (A)

Pantin
Churg, E. (A)

Paris
Algraim, P. R. (A)
Angot, A. M. (SM)
Blassel, P. P. (A)
Bloch, R. M. (A)
Chauchat, J. N. (M)
Chauvierre, M. (SM)
Cohen, R. (A)
David, P. B. (SM)
Dreyfus, P. L. (A)
Du Bourg De Bozas, G. (A)
Fabricant, P. (VA)
Gerten, N. (A)
Giboin, E. (SM)
Goudet, G. (SM)
Grivet, P. A. (A)
Guenard, P. R. G. (SM)
Gustinelli, J. J. L. (M)
Labin, E. (SM)
Lehmann, G. J. (SM)
Levy, L. (M)
Mandel, P. (A)
Maurice, F. (A)
Moisson, A. A. (SM)
Ortusi, J. A. (SM)
Ponte, M. J. H. (SM)
Touraton, E. R. (SM)
Williams, J. R. L. (A)
Wybrands, K. (M)

Villemomble
Warnecke, R. R. (F)

SEINE ET MARNE

Fontainebleau
Manov, F. S. (A)

SEINE ET OISE

Essonnes
Behm, L. F. (A)

Le Vesinet
Bussat, R. M. A. (A)
Raymond, F. H. (SM)

Saint Cloud
Goublin, R. O. (A)

Versailles
De Coligny, G. (M)
Prache, P. M. (M)

GERMANY

Altheguenberg
Zenneck, J. (F)

Dusseldorfer
Matare, H. F. (SM)

Friedrichsdorf
Wagner, K. W. (F)

Hessen
Stucken, H. (A)

Muenchen
Kleen, W. J. (SM)
Overby, H. (M)

Neuershausen
Hess, H. A. (A)

Rehweg
Rothe, H. (M)

GREECE

Athens
Cassapoglou, C. B. (A)
Constantinidis, P. (A)
Icihakis, M. A. (A)
Kariambas, N. (A)
Katzelis, N. G. (M)
Pezopoulos, K. N. (SM)
Siocos, C. A. (A)
Stamopoulos, C. D. (SM)
Tavaniotis, C. (M)
Vallianatos, I. G. (A)
Vaskas, T. B. (A)

GUATEMALA

Guatemala City
Garrison, H. L. (A)
Moller, H. A. (A)

HAWAII

HAWAII

Hawi
Donaldson, W. G. (A)

Hilo
Izumi, G. Y. (A)
Jaeger, J. E. (A)

KAUAI

Lihue
Neifert, K. G. (A)

MAUI

Puunene
Honea, L. W. (A)

Wailuku
Arveschoug, N. F. (A)
Chong, W. S. (A)
Katahara, S. (A)
Reber, G. (SM)

MOLOKAI

Kualapuu
Gordon, H. L. (M)

OAHU

Aiea Heights
Allison, J. B. (A)

Ewa
Powell, L. H. (VA)

Honolulu
Abstein, H. T., Jr. (A)
Alden, R. M. (A)
Anderson, J. W. (A)
Atherton, J. B. (A)
Bostwick, C. B. (A)
Chang, D. C. (A)
Chang, R. H. M. (A)
Chittenden, W. R. (A)
Chow, W. H. P. (A)
Chun, H. W. M. (A)
Colmar, P. V. (SM)
Fenner, P. R. (A)
Fong, C. S. (A)
Fuchikami, A. H. (A)
Gilbert, L. H. (VA)
Goo, J. F. S. (A)
Grubb, D. L. (M)
Higa, K. (A)
Hill, R. R. (M)
James, F. L. (A)
Janitschke, E. O. (VA)
Kam, P. Y. T. (A)
Kang, Y. O. (A)
Kato, R. S. (A)
Kimball, L. L. (A)
Kung, L. (A)
Leong, A. K. (A)
Lewbel, S. H. (A)
Lindemann, E. G. (A)
Lozo, K. G. (A)
Maertz, W. A. (A)
Masching, R. G. (A)
McWilliams, D. R. (A)
Mercer, I. G. (M)
Miyake, I. (VA)
Pang, D. L. (A)
Pickarski, S. (M)
Piety, E. A. (A)
Sanders, J. R. (A)
Schoen, E. C. (A)
Skewis, J. B. (A)
Smith, H. C. (M)
Stagner, G. H. (A)
Takase, R. H. (VA)
Tanaka, T. (A)
Tanigawa, N. F. (A)
Tucker, W. K., Jr. (A)
Rotolo, N. V. (M)
Vaughan, V. (A)
Vittum, M. S. (A)
Young, M. F. (A)
Zambarelon, J. T. (A)

Kahuku
Gray, G. P. (VA)
Serikawa, F. (A)
Tamura, L. T. (A)

Kaneohe
Andrews, F. D. (A)
Graves, J. E. (A)
Turner, H. E. (M)
Walker, P. M. (A)

Lanikai
Brenessel, A. (A)
Clark, G. W. (SM)
Dawson, L. R. (M)
Farinon, W. B. (SM)
Hunter, G. H. (A)
Nenu, O. T. (A)
Tittle, J. F. (A)
Willard, R. S., Jr. (A)

Pearl City
Clarke, C. A. (A)
Kelly, V. (A)

Pearl Harbor
Mason, F. L. (SM)

Wahiawa
Hahn, G. I. P. (A)
Janda, E. G. (A)
Lee, R. T. S. (A)

Wailua
Hendricks, J. C. (A)
Nishimura, K. K. (A)

Waianae
Florez, H. (SM)

HONDURAS

La Lima
Hannay, H. F. (A)

Tegucigalpa
Taft, E. A., Jr. (A)

HONGKONG

Braude, A. N. (M)
Li, N. F. C. (M)
Luk, Y. K. (A)
Monfon, L. (A)

ICELAND

Reykjavik
Thorkelsson, S. (A)

INDIA

Adyar
Rao, V. V. L. (SM)

Agra Cantt
Joshi, K. D. (A)

Ahmedabad
Kotadia, K. M. (M)

Annamalainagar
Vijayaraghavan, K. (M)

Aurangabad
Saifuddin (M)

Bamrauli
Sengupta, D. P. (M)

Bandra
Katrak, B. J. (A)

Bangalore
Collins, A. D. (M)
Mishra, S. (A)
Sreenivasan, A. P. (A)
Sreenivasan, K. (SM)
Thacker, M. S. (A)

Baroda
Bhonsle, S. B. (A)
Sen, S. M. (M)

Basavangudi
Rao, P. L. S. (M)

Belgaum
Paramasivayya, G. S. (M)

Bombay
Bhatnager, H. M. (A)
Bulsara, M. S. (A)
Conesa, R. (M)
Dastur, J. B. (A)
Gandhi, C. D. (A)
Handa, V. P. (A)
Husein, A. E. (A)
Kamat, V. V. (A)
Kantebet, S. R. (F)
Marathe, D. H. (SM)
Mehta, G. K. (A)
Merchant, V. V. (A)
Nair, K. C. (A)
Phatak, R. K. (SM)
Sidhu, H. S. (M)
Subrahamanyan, T. R. (A)
Subramaniam, C. S. (M)
Sukhadia, P. U. (M)
Ventraman, M. P. (A)
Williams, I. J. S. (M)

Calcutta
Banerji, S. (A)
Bhate, A. G. (SM)
Burmanray, P. N. (A)
Chatterjee, S. D. (SM)
Correa, W. R. (A)
Fogg, J. (M)
Gangopadhya, I. (M)
Kar, D. C. (A)
Mitra, A. K. (M)
Mukerji, M. M. (M)
Mukherjee, H. (A)
Raha, H. N. (A)

Chingleput
Filipowsky, R. (A)

Coimbatore
Ramakrishnan, P. R. (A)
Sarma, P. H. N. B. (M)

Dadar
Katre, V. S. (A)

Dehradun
Prasad, K. V. K. (M)
Soni, J. N. (A)
Subramaniam, C. R. (A)

Faridabad
Balasundaram, N. (SM)

Fort Bombay
Gokarn, G. D. (SM)
Huang, G. T. C. (A)
Kohli, F. C. (A)
Toshniwal, G. R. (SM)

Georgetown
Ghose, S. C. (A)
Rajaratnam, T. (A)

Guindy
Subrahmanyam, G. (M)

Jabalpur
Chakaravarti, D. C. (A)
Jain, P. L. (A)
Roy, K. M. (A)
Sarwate, V. V. (A)

Jalahalli
Farley, K. W. J. (M)
Thripp, G. (SM)

Kirkee
Ramabhadran, S. (A)

Kodarma
Sastry, S. S. (M)

Lucknow
Chakravarti, S. P. (SM)
Hulse, B. T., Jr. (M)
Joshi, C. P. (SM)
Saxena, A. P. (A)
Srivastava, G. P. (A)
Sweet, C. M. (M)

Madras
Balasubrahmanyam, V. (A)
Basha, V. N. (A)
Krishnamurthy, K. (A)
Krishnamurti, T. (M)
Krishnamurty, J. (A)
Patel, S. N. (M)
Ramalingam, V. N. (A)
Ramanathan, A. R. (M)
Rao, H. J. (M)
Rao, M. V. S. (SM)
Seshadri, T. N. (M)
Subramanian, C. S. (A)
Thangavelu, K. S. (A)

Mahim
Tejuja, M. M. (A)

Malleswaram
Chatterjee, S. K. (M)

Matunga
Pai, M. V. (A)

Mysore
Rao, K. R. (A)

New Delhi
Baliga, B. V. (A)
Bhashyam, S. R. (A)
Bhatt, N. B. (SM)
Dewan, R. N. (M)
Ganguly, S. K. (M)
John, A. G. (M)
Mahalingam, N. (SM)
Matange, N. D. (SM)
McSweeny, G. M. (A)
Mitra, S. N. (A)
Mohan, M. A. (A)
Pai, N. N. (A)
Pattabirman, J. (A)
Rai, B. K. (A)
Rangan, C. S. (M)
Rao, K. L. (A)
Tandan, R. K. (M)
Tandan, S. P. (A)
Venkatesan, C. V. (A)

New Gamdevi
Khambata, A. J. (A)

Nungambakam
Belgamvala, M. K. (A)

Pilani
Chatterjee, A. K. (M)

Pollachi
Iyer, S. K. (A)

Poona
Aiya, S. V. C. (SM)
Rao, L. P. (A)
Row, D. P. (SM)
Seshadri, G. (A)

Richardstown
Ramachandran, P. (A)

Saidepet
Mani, S. D. (A)

Secunderabad
Bengalli, N. K. (A)
DeSouza, F. X. (A)
Mani, C. V. (A)

Serampore
Das, P. N. (M)

Shankarpur
Rajeswari (A)

Tiruchirapalli
Anantharaman, K. S. (A)

Tirupattur
Sundararajan, S. (A)

Trichinopoly
Felix, E. A. (A)

Trichur
Subbaraman, V. (A)

Trivandrum
Nair, P. R. (A)
Raja, M. V. R. V. (A)
Ramanathan, G. (A)
Venkita, R. K. (M)

Vizagapatam
Rao, M. K. (M)

Waltair
Somayajulu, Y. V. (A)

INDONESIA

Djakarta
Holtz, R. F. (SM)

Sumatra
Morse, D. P. (A)

IRAQ

Basrah
Skerrey, C. E. (M)

ISRAEL

Haifa
Balaban, P. (A)
Bonenn, Z. (A)
Fischmann, A. F. (M)
Herzberg, E. N. (A)
Landsberg, S. J. (M)
Mizrachi, S. (A)
Ollendorff, P. (SM)
Shekel, J. (A)
Silberfarb, E. (A)
Tkatsh, M. (A)
Weissberg, E. (A)
Zakhaim, M. (A)
Zelinger, G. (M)

Kiriat Motzkin
Toth, P. A. (A)

Ramat Gan
Matan, A. A. (A)
Swery, J. S. (M)

Rehovoth
Frei, E. H. (M)
Kass, S. (M)

Tel Aviv
Baer, J. (M)
Fliderblum, D. D. (A)
Hellinger, H. R. J. (A)
Mano, M. (A)
Nathan, A. (A)
Riesel, H. (A)

ITALY

Bologna
Francini, G. (A)

Florence
Fagnoni, E. (A)

Genoa
Rutelli, G. (SM)

Milan
Bacchini, C. (A)
Borsarelli, C. (A)
Canegallo, G. (A)
Castellani, M. F. (A)
Cioni, G. (A)
De Dominicis, C. M. (A)
Ducati, A. (A)
Ducati, M. (A)
Giovacchini, O. (A)
Guglielmo, G. (A)
Gurviz, A. A. (A)
Monti-Guarnieri, I. G. (A)
Palandri, G. L. (A)
Parenti, V. M. (M)
Tescari, A. (A)
Vecchiacchi, F. (A)

Naples
Mazzarella, M. (A)

Palermo
Rizzoni, E. M. (A)

Rome
Alter, A. C. (M)
Canero-Medici, R. (A)
Fogelquist, H. T. (A)
Fox, K. R. (A)
Koch, R. (SM)
Marino, A. (A)
Silleni, S. R. (M)

Turin
Bertolotti, I. S. (A)
Devalle, M. (A)
Pinciroli, A. (SM)

JAPAN

Ehime
Kumagai, T. (A)

Sendai City
Chapman, C. I. (A)

Tokyo
Adams, A. O. (M)
Fujii, T. (A)
Fujiki, S. (A)
Hames, W. A. (A)
Harashima, O. (A)
Kawai, W. T. (A)
Kono, T. (A)
Kurita, M. (A)
Kuroiwa, V. (A)
Kurokawa, H. (A)
Matsuo, S. (A)
Mita, S. (A)
Nishi, E. (A)
Numoto, M. (M)
Okabe, T. (A)
Okabe, T. (A)
Okamura, S. (A)
Oujevolk, G. B. (A)
Seki, H. (A)
Shintani, T. (M)
Tanabe, Y. (A)
Tanimura, I. (A)
Whitehouse, J. E. (SM)

Yokohama
Ikeda, K. (A)
Nishio, H. (A)

KOREA

Taegu
Kim, Y. S. (A)

LEBANON

Beirut
Hoffman, J. D. (A)
Koenreich, J. L. (A)
Mueller, E. H. (A)
Richon, E. (A)
Shoucair, S. F. (A)

Ras Beirut
Fawwaz, R. A. (A)

LIBERIA

Monrovia
Hoffman, G. R. (M)

MALAYA

Kuala Lumpur
Isherwood, C. F. (M)
Roberts, R. E. (M)
Stubbs, W. (M)
Voon, A. K. M. (A)

Penang
Hin, T. K. (M)
Hope, W. J. (A)

MALTA

St. Julian
De Barro, F. (M)
Morgan, S. G. (M)

MEXICO

CHIHUAHUA

Chihuahua
Carrillo, E. A. (A)

Sabinas
Rodriguez, E. (A)

DISTRITO FEDERAL

Mexico City
Caballero, C. A. (A)
Chmilowski, J. B. (M)
Delahay, F. (A)
Diaz, J. M. (A)
Fernandez, M. A. (VA)
Gomez, J. T. (A)
Guaragna, L. F. (VA)
Gutierrez, E. D. (SM)
Horn, C. W. (F)
Kurz de Delara, G. (A)
Marquez, J. (A)
Mendez, E. D. (M)
Montes, G. R. (A)
Nunez, C. (M)
Rodriguez, M. F. (M)
Saul, R. (A)
Simon, T. J. (A)
Spoor, T. A. (A)
Tellez, J. M. B. (M)
Vargas, F. R. (A)
Vazquez, M. (A)
Viggers, A. I. (A)

EDO

Tlalmanalco
Vettorett, J. R. (A)

VERA CRUZ

Poza Rica
Hartig, D. E. (A)

MOROCCO

Casablanca
Haubert, A. (SM)

Tangier
Jorgensen, A. C. (A)
Nicolay, A. A. (M)

NETHERLANDS

Amsterdam
Broersma, C. B. (M)
Levenbach, G. J. (M)
Schotel, G. (SM)

Eindhoven
Rinia, H. (SM)
Stumpers, FL. H. M. (A)
Tellegen, B. D. H. (SM)

Heemstede
Bontekoe, H. (A)

Hilversum
Breimer, S. (M)

Leiden
Hung, C. S. (A)

Oegstgeest
Hekster, S. (M)

The Hague
Blaauw, G. A. (A)
Bloemsma, J. (A)
De Voogt, A. H. (M)
Houtsmuller, J. (SM)
Madson, G. A. (M)

NETHERLANDS WEST INDIES

Aruba
Pughe, E. W., Jr. (A)

Curacao
Bergman, L. C. H. M. (A)
Van Haaren, R. H. C. (A)

NEW ZEALAND

Auckland
Blakewell, W. J. (A)
Cholmondeley-Smith, R. (M)
Crawford, W. C. (A)
Joseph, D. P. (A)
Mayo, L. E. (A)
McRae, I. H. (M)
Orbell, R. J. (A)
Walding, N. N. (A)

Dunedin
Smith, C. A. (A)

Gisborne
Paulson, E. J. (VA)

Nakara
Martin, L. H. (A)

Rotorua
Field, A. N. (A)

Wellington
Gliby, K. B. (M)
Henderson, B. G. (A)
Ryland, A. (M)

NORTH IRELAND

Belfast
Banham, J. C. (A)

Strabane
Smyth, W. (A)

NORTH RHODESIA

Lusaka
Reeves, J. M. (M)

NORWAY

Hamae
Kjerkinn, T. (A)

Lillehammer
Rorholt, B. A. (M)

Oslo
Gaudernack, L. F. (SM)
Hisdal, B. J. (A)
Lehne, O. T. (A)
Taranger, A. (M)

PAKISTAN

Dacca
Ahmed, W. (M)
Qureshi, Z. A. (A)

Gujrat
Ahmad, M. M. (A)

Karachi
Ahmad, B. (M)
Ahmad, K. (M)
Ahmad, R. (SM)
Aziz, S. A. (SM)
Basher, B. A. (A)
D'Cruz, J. (A)
Farrell, R. L. (A)
Khan, A. U. (A)
Qureshi, M. A. A. (M)
Rafi, M. A. (M)
Rizwi, W. A. (A)
Sathar, S. A. (SM)
Ullah, I. (A)

Lahore
Bhatti, M. H. (A)
Khan, M. S. (M)
Mumtaz ud Din, S. (SM)

Lyallpur
Rauf, A. (M)

PANAMA

Panama
Chu, M. (A)

PAPUA

Port Moresby
Gee, W. C. (SM)

PERU

Lima
Kline, J. (A)
Matallana, J. R. (M)
Oboler, L. H. (A)
LaPierre, V. M. (SM)
Pinczowski, J. (A)
Tringham, W. S. L. (A)

D. PHILLIPINE ISLANDS

Baguio City
Dayot, V. D. (A)
Hidalgo, M. T. (M)

Jaro
Knox, J. L. (A)

Manila
Bourret, P. L. (M)
Gil, R. F. (A)
Laschiver, J. (M)
Picornell, J. J. (A)

San Juan
Cheung, M. C. (A)
Ozaeta, E. H. (A)

PORTUGAL

Lisbon
De Bivar, A. M. B. (SM)
Fernandes, A. A. D. (M)
Victorino, J. M. C. (A)

PORTUGUESE WEST AFRICA

Luanda
Alegria, M. G. S. (A)

PUERTO RICO

Caparra Heights
Boyd, L. K. (SM)

Guayama
Blondet-Bloise, L. (A)

Hate Rey
Acota, R. J. (M)

Mayaguez
Garcia de Quevedo, J. L. (SM)

Playa Ponce
Castillo, E. A. (A)

Quebradillas
Soler, J. (M)

Ramey AFB
Martin, G. E. (A)

Rio Piedras
Arce-Blanco, R. (A)
Deig, J. J. (A)
Gordon, J. P. (A)
Mercado, C. R. (A)

San Juan
Alonso, C. J. (A)
Cline, A. T., Jr. (M)
Girard, P. A. (M)
Jones, T. L. (M)
Negroni, J. A. (M)
Perry, R. P. (A)
Serra, M. A., Jr. (A)

Santurce
Biry, V. G. (A)
Collins, P. B. (A)
Petersen, R. L. (VA)
Rich, M. W. (A)

REPUBLIC OF BURMA

Rangoon
Aung, U. M. (M)
Doe, U. P. (A)
Porter, A. H. (A)

SAUDI ARABIA

Bahrein Island
Khan, A. J. (A)

Dammam
Snyder, N. (SM)

Dhahran
Barnes, L. (A)
Coxe, F. S. (A)
O'Brien, D. D. (A)

Djeddah
Andreou, A. J. (M)
Dajani, W. (SM)

SCOTLAND

AYRSHIRE

Ayr
Rodger, J. B. (A)

EAST LOTHIAN

North Berwick
Oliphant, W. D. (SM)

LANARKSHIRE

Glasgow
Chamberlain, E. (A)
Lenihan, J. M. A. (A)
McCadden, M. M. (A)

MIDLOTHIAN

Edinburgh
Appleton, E. V. (F)
Conner, C. I. (A)
Smail, J. E. (M)
Tait, J. S. R. (A)
Thomson, A. G. (M)
Whyte, R. P. (A)

RENFREW

Barnsford
Rhodes, A. J. (M)

SELKERKSHIRE

Galashiels
Groom, B. (M)

STRAIT SETTLEMENTS

Singapore
Hock, T. C. (A)
Snowden, J. (A)
Tan, V. S. (A)
Trafford, W. (M)

SPAIN

Barcelona
Pascucci, A. (SM)
Zobel, E. V. (M)

Madrid
De Onis, A. (M)
Golmayo, M. C. (A)
Huerta, A. F. (A)
Millan, A. (A)

SUDAN

Khartoum
Hudson-Davies, J. (M)

SWEDEN

Alvsjo
Svala, C. G. (M)

Arboga
Olsson-Seffer, R. (A)
Roll, A. (A)

Bromma
Wallmark, M. (A)
Wallmark, J. T. (A)

Enskede
Axeling, G. S. (A)
Carlander, A. (M)

Erstavikvagen
Lundgren, E. H. (A)

Goteborg
Lundwall, B. H. (A)

Gothenburg
Hellstroem, P. G. (A)

Johanneshov
Granier, S. G. (SM)

Lidingo
Friden, S. G. (A)
Granquist, C. E. (A)
Norrelgen, G. A. (A)
Scholdstrom, R. K. O. (A)
Solders, G. P. (A)
Stannow, J. C. (A)
Westerhult, B. C. O. (A)

Norrkoping
Braune, E. H. J. (M)

Stockholm
Ahlgren, S. I. (A)
Aurell, C. G. P. (M)
Backmark, N. (A)
Blomberg, H. (F)
Bolinder, E. F. (A)
Dalen, G. S. (M)
Feichtinger, A. F. (A)
Hullegard, E. W. (A)
Kruse, O. S. N. (A)
Lindstrom, G. (A)
Lofgren, E. O. (SM)
Lofgren, L. E. (M)
Nelson, R. H. (M)
Nilsson, B. N. A. (A)
Ollner, J. A. (A)
Overby, S. L. (SM)
Person, L. B. (A)
Scheftelowitz, H. (A)
Schleimann-Jensen, A. (F)
Sivers, C. H. V. (SM)
Stalemark, F. R. V. (A)
Sundquist, A. (A)
Von Utfall, J. C. J. (A)
Vos, M. (SM)
Werthen, H. L. O. (A)
Wikland, T. E. (A)

SWITZERLAND

Baden
Rathe, E. J. (A)
Schonsleben, M. W. (A)
Schupbach, R. (A)

Basle
Fenyves, F. L. (SM)
Hagger, H. J. (A)

Berne
Anselmi, S. C. (M)
Fontanellaz, G. (A)
Gerber, W. (A)

Bettlach
Guggi, W. B. (A)

Geneva
Hayes, L. W. (F)
Mason, W. (SM)
Miles, P. D. (SM)
Van Der Pol, B. (F)

Hegnau
Gloor, B. (A)

Herisau
Kruesl, G. G. (A)

Lausanne
Demieville, H. (A)

Neuchatel
Christeler, A. (M)

Nussbaumen
Weiss, H. (A)

Solothurn
Giger, A. J. (A)

Vaud
Gross, G. C. (SM)

Wettingen
Guettinger, P. (A)
Neck, H. (A)

Zurich
Barut, A. O. (A)
Baumann, E. (SM)
Braun, A. F. (A)
Brumm, G. (A)
De Quervain, A. P. (A)
Fehlmann, H. (A)
Guanella, G. (A)
Haffter, T. F. (A)
Hohermuth, H. U. (M)
Keller, J. (A)
Klauser, H. U. (A)
Klein, A. L. (A)
Kretz-Muller, D. (A)
Lurlon, E. (A)
Margna, C. R. (A)
Neu, W. (A)
Strohschneider, W. (SM)
Strutt, M. (SM)
Stuber, R. (A)
Tank, F. (F)
Villars, C. (A)
Walders, E. (A)
Weber, G. C. (A)
Weinberger, I. (A)

SYRIA

Damascus
Atassi, A. D. (A)
Husayni, S. W. (A)
Saba, F. N. (A)

TURKEY

Ankara
Argon, R. S. (A)
Balkanli, H. (A)

Eskisehir
Arpaci, F. (A)

Istanbul
Ataman, A. (A)
Basacik, N. (A)
Berkmen, A. S. (A)
Duru, O. (A)
Uzgoren, F. (A)

Izmit
Celebi, I. (A)

Kars
Kaya, P. (A)

THAILAND

Bangkok
Sookswasdi, S. (A)

UNION OF SOUTH AFRICA

CAPE OF GOOD HOPE

Capetown
Brickhill, G. A. (A)
Dejong, A. C. (A)
Dunbar, J. (A)
Gilmour, R. R. (M)

Kimberley
Morris, H. R. (A)

Stellenbosch
Olen, C. L. (A)

Worcester
Smuts, M. N. (A)

NATAL

Durban
Phillips, W. E. (SM)
Stack-Forsyth, E. F. (M)

Stanger
Karodia, A. M. (A)

TRANSVAAL

Benoni
Grobler, J. J. (M)
Simons, A. H. (SM)

Honeydew
Morris, R. (A)

Johannesburg
Aron, C. L. (A)
Berkowitz, R. (A)
Bozzoli, G. R. (SM)
Hers, J. (M)
How, F. (A)
Jacobs, A. J. (M)
Jamieson, R. T. (A)
Krause, V. R. (M)
Kucera, F. L. (M)
Lichtenstein, A. H. (A)
Lipschitz, S. (M)
Price, M. (A)
Silbermann, H. (SM)
Sive, F. (A)
Smith, M. M. (A)
Stephen, I. R. G. (A)
Suttner, R. (A)
Velleman, F. F. (A)
Wilson, J. L. (A)

Pretoria
Haupt, G. E. (A)
Malan, D. G. (A)
Van Niekerk, T. (A)

Roodepoort
Rex, D. F. (A)

Springs
Semmelink, A. (A)

Zwartruggens
Goodman, J. (A)

URUGUAY

Montivideo
Guimaraes, A. (A)
Moran, W. F. (M)

VENEZUELA

Caracas
Applewhite, V. C. (A)
Fonseca, N. J. (M)
Gula-Monasterio, A. E. (A)
Guitian, J. E. (A)
Hackett, A. H. (M)
Jimenez-Michelena, L. G. (SM)
Lopez, A. L. (SM)
McCullough, E. C. (A)
Pachano, P. I. (A)
Santos, P. J. (M)
Suarez-Flamerich, O. (A)
Vargas, A. (A)

Edo Miranda
Siblesz, G. M. (A)

Maricaibo
Christie, G. A. (A)
Collins, E. W. J. (A)

VIRGIN ISLANDS

Saint Thomas
Greer, W. N. (M)

WALES

Colwyn Bay
Whale, G. S. (A)

Glamorgan
Payman, H. S. (SM)

NOTES

How to Use Our Business and Product Sections

The Business and Product Sections of this Directory are included for the service of members so that this book will be complete as an index of an industry—listing Engineers, the Businesses they have founded, and the Products they have created for radio, television, communications, and electronics.

The following 4 Parts of the IRE DIRECTORY are:

Part		Page
	Pink Section—Guide to Products	i-viii
2	Company List of Radio-Electronic Manufacturers	3
3	Product Index of Engineering Equipment and Parts	97-359
4	Catalogs and Complete-Data-Spreads Section	361
	—Advertisers Index—Facing Cover III	

Part 2

2570 firms have supplied us voluntarily with information about the components, equipment and services which they render the radio-electronic industry. The manufacturers are listed alphabetically in this section beginning on page 3 and ending on page 96. 1225 non-manufacturers such as distributors and representatives are listed under heading 10, a special directory. This index therefore gives the names of manufacturers of specific products available for purchase, with their addresses and code numbers indicating 100 types of products which they offer.

The completeness of this list depended on information voluntarily supplied us. Our most vigorous efforts may not have made it complete, but the excellent cooperation received from most of the industry is directly responsible for the up-to-dateness of our product data. We will welcome additions and suggestions for the 1954 edition.

Part 3

The Product sections start on page 97 and continue through 360. In both the alphabetical and the product indexes advertisers who have made it financially possible to provide a really comprehensive Directory to IRE members, have been listed in bold face type with a cross index to the page on which their display advertisement appears—giving complete information on their products and services. Non-advertisers have been listed in the product indexes giving firm name and state only. For full address the reader must turn to the alphabetical index for these companies.

To find the advertisers of a given product, let us say "Amplifiers" look this product up in the Pink Section, just after Part 1—Members. You will see that it is classification Number 1. A full listing of Amplifier manufacturers starts on page 97. Turn to this classification in part 3.

As a service to engineers, both buyer and seller, we have included a list of 1225 firms and individuals who are distributors. Each name is further classified by number to indicate its place in the field—representative, distributor, exporter, etc. This is class #99, starting on page 343.

There are several other helpful indexes. Advertisers are given on insert facing Cover III (inside back cover); and an index to 1953 Radio Engineering Show Exhibitors is on pages 450-455.

To get a comprehensive picture of what a given firm manufactures for engineers in our field, you will find in the alphabetical index of companies that all their products are listed by code number after the firm's name and address. These products are classified into ten separate Product Directories, serving basic sections of our industry. We have tried vigorously to make this truly a useful "Radio Engineers Directory."

Part 4

Part 4 is one of the most informative and valuable sections of this Directory. Here manufacturers are supplying engineers with the maximum amount of detailed information possible through the use of multiple page spreads of their products (see page 455). This is followed by a complete catalog file supplied by 15 manufacturers. These catalogs are filed in alphabetical order. The purpose of this section is to give the engineer a complete and ever available catalog file right in his IRE Directory where he can always see it easily and quickly. We believe that the services of this section will be of the utmost help to you.

Please submit all changes, corrections, additions and classification questions to Industry Research Div., Institute of Radio Engineers, 1475 Broadway, New York 36, N.Y.

How to Use the Machol Edge Index

High speed reference is a major objective of the IRE Directory. To this end we have adopted the Machol Edge Index system, and these indexes:

Advertisers Index, facing inside back cover.

Key to Products, Pink Section

Index to Spreads & Catalogs, 456.

Guide to Machol Thumb Indexes facing 96 & 128.

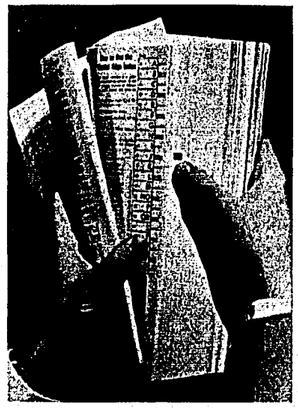
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INSTRUCTIONS

1. **Place the four fingers of your RIGHT hand back of the last page of this book.**
2. **Place your RIGHT thumb just below the 1 or 2 line symbol adjacent to the section you want.**
3. **Raise your RIGHT hand slightly and push it to the left bending the pages almost double. *This will spread the edges and cause the edge marks to show more clearly.***
4. **Move your RIGHT thumb across the page edges, fanning the pages until you reach the corresponding symbol.**
5. **Open there—that will be the page you want.**

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Page	
3	A
9	B
17	C
25	D
29	E
35	F
39	G
45	H
49	I
51	J
53	K
57	L
59	M
65	NO
69	PQ
73	R
79	S
85	T
89	UV
93	W
95	XYZ



1953 Edition prepared by The Advertising Department of The Institute of Radio Engineers, 1475 Broadway, New York 36, N.Y.
William C. Copp, Mgr.; Lillian Petranek, Asst.; Carl Maier, Production; Frank G. MacAloon, Research

Alphabetical Index of Products

Product	Page
—a—	
acetylene	267
adhesive labels & tapes	267
air wheels & housings	131
alloys	295
ammeters	171
amplifiers, dc	97
amplifiers, decade	97
amplifiers, geophysical	231
amplifiers, hearing aid	97
amplifiers, high fidelity	97
amplifiers, inter-com	97
amplifiers, magnetic	167
amplifiers, public address	97
amplifiers, servo	235
analog to digital converters	227
anodes	299
antenna, feeder line	129
antenna, insulators	129
antenna, mounting hardware	129
antenna supporting towers	113
antennas, AM broadcast transmitting	113
antennas & antenna accessories, rotator, etc., amateur	123
antennas, all-wave receiving	129
antennas, dummy	129
antennas, FM broadcast transmitting	113
antennas, indoor types	129
antennas, mobile	125
antennas, radar, microwave & UHF feed systems	241
antennas, radar, microwave & UHF receiving	241
antennas, radar, microwave & UHF reflectors	241
antennas, radar, microwave & UHF rotating mechanisms	241
antennas, radar, microwave & UHF transmitting	241
antennas, small towers	129
antennas, TV broadcast transmitting	113
antennas & towers, point-to-point equipment	127
argon	267
attenuators, decade	100
attenuators, impedance matching	100
attenuators, volume controlling	100
—b—	
batteries, dry	131
batteries, mercury	131
batteries, storage—lead acid	131
batteries, storage—nickel-alkali	131
beat frequency oscillators	305
blower assemblies, complete	131
book publishers	339
bridges, capacitance	313
bridges, impedance	313
bridges, resistance	313
bushings & bearings	267
—c—	
cabinets, metal	133
cabinets, moulded plastic	133
cabinets, wood	133
cable & wire, aluminum	249
cable & wire, co-axial	249
cable & wire, copper, bare	249
cable & wire, low-loss hf types	249
cable & wire, precious & rare	249
cable & wire, pre-formed harnesses	249
cable & wire, rubber insulated	249
cable & wire, shielded	249
cable & wire, synthetic insulated	249
cable & wire, wire braid	249
cambric sheeting	279
cambric tubing	279
cans	267
capacitors: fixed, ceramic	135
capacitors: fixed, electrolytic	135
capacitors: fixed, metallized paper	135
capacitors: fixed, mica	135
capacitors: fixed, oil filled	135
capacitors: fixed, paper	135
capacitors: fixed, plastic insulated	135
capacitors: fixed, silvered mica	135
capacitors, fixed, vacuum	135
capacitors: variable, neutralizing	139
capacitors: variable, precision	139
capacitors: variable, temperature compensating	139
capacitors: variable, trimmers	139
capacitors: variable, tuning	139
capacitors: variable, vacuum	139
cardiographs	233
carrier current, complete terminal equipment	124
carrier current equipment, installation & maintenance	124
carried current equipment, repeat & relay equipment	124
cauterizing, electronic	233
ceramics, coil forms	255
ceramics, custom fabrication	255
ceramics, insulators	255
ceramics, proprietary forms	255
chassis, aluminum	140
chassis, steel	140
chemicals	309
chokes, audio frequency	143
chokes, rf	143
choppers, dc	155
citizen radio	125
clamps, vacuum tube	299
coil dope	285
coil forms, ceramic	255
coil forms, paper	267
coil winding machines	289
coils, focusing	143
coils, tuning	143
commutators	151
computers, analog	227
computers, digital	227
conducting paint	285
connectors, AN standard types	151
connectors, co-axial	151
connectors, microphone	151
connectors, multiple circuit	151
connectors, power	151
connectors, slip ring & commutating	151
consoles & speech input equip., studio	119
consulting engineers, acoustical	256
consulting engineers, electrical	256
consulting engineers, mechanical	256
consulting engineers, radio	256
contacts	267
contract fabrication & assembly	259
converters, analog to digital	227
core materials, laminations	259
core materials, metallic powders	259
cores, ferrites	159
cores, powdered metal	159
cores, preformed, spirally wound	159
cotton tapes	279
counters, continuous	227
counters, pre-set	227
crystal holders	161
crystal ovens	161
crystals, oscillating quartz	161
crystals, piezo electric	161
crystals, tourmaline	161
cutting heads, recording	109
—d—	
decades, capacitance	313
decades, resistance	313
deflection yokes	143
despatching equipment, emergency communications	124
dials & dial assemblies	267
diathermy	233
di-electric heating	233
disks, blank	109
distortion & noise analyzers	305
dosimeters, nuclear	329
dynamic noise suppressors	97
dynamotors	177
—e—	
elapsed time measuring equip.	321
electro-encephalographs	233
electro-plating	259
electronic control equip., burglar-alarm & protective systems	230
electronic control equip., combustion & smoke-nuisance	230
electronic control equip., production control, counting & sorting	230
electronic control equip., variable speed	230
embedment	259
envelopes, glass	299
envelopes, metal	299
equalizers, dialogue	100
equalizers, line	100
equalizers, magnetic recording	100
equalizers, recording diameter	100
equalizers, sound effect	100
etched or screened prewired chassis	187
export & import	343
—f—	
facsimile, receiving equip ment	124
facsimile, sensitized paper	124
facsimile, transmitting equip.	124
fan blades, blower	131
fiberglass tapes	279
fiberglass tubing	279
field strength meters	333
filters, band pass & band rejection	101
filters, loudspeaker dividing network	101
filters, mechanical	163
filters, rf noise reduction	163
filters, variable band pass	101
finishing & protecting lacquer	285
flexible shafts	267
FM/FM modulators	239
foot switches	208
frequency measurement services	117
fungus preventatives	285
fuses	165
fuse holders	165

Alphabetical Index of Products

Product	Page
—g—	
GCA equipment, etc.	121
galvanometers	171
gaskets	267
general laboratory equipment	309
general production machinery	289
geophysical, complete exploration equipment	231
geophysical control & equipment	231
geophysical recording galvanometers	231
germanium diodes	205
getters	299
graphic recorders, charts and papers	319
graphic recorders, ink writing	319
graphic recorders, inkless types	319
graphic recorders, fixed speed types	319
graphic recorders, variable speed types	319
grids & grid wire	299
grommets	267
—h—	
hardening & heat treating service	259
headphones	105
hermetic sealing service	259
hermetic seals, complete headers	275
hermetic seals, ceramic to metal seals	275
hermetic seals, glass to metal seals	275
hydrogen	267
—i—	
impedance & admittance meters	333
incandescent lights, pilot	181
individual item builders	281
induction heating equipment	233
induction heating equipment, brazing, soldering & welding	233
insulators	297
intermodulation meters	305
ionization chambers	329
—j—	
jack fields	103
jacks	103
jobbers & wholesalers	343
—k—	
knobs & parts	297
krypton	267
lacing cord, nylon	267
lightning arrestors	129
loudspeakers, commercial grade	105
loudspeakers, high-frequency	105
loudspeakers, low-frequency	105
loudspeakers, wide-range, 2 & 3 way systems	105
—m—	
machine screw products	267
machinery	289
magazines	339
magnet wire	249
magnetic recording, playback & erase heads	109
magnets, electro	169
magnets, permanent	169
manufacturers representatives	343
marine equipment, contract installers	125
marker generators	339
marking & engraving machines	289
megohm meters	313
metal stamping & spinning	259
metals, base, copper	295
metals, base, ferrous	295
metals, base, non-ferrous, excluding copper	295
metals, base, powdered	295
metals, base, precious & rare	295
meters, elapsed time	171
meters, field strength	333
meters, frequency indicating	171
meters, power output, rf	333
meters, volume level, (db & vu)	171
micro-ammeters	171
microphone stands	107
microphones, carbon	107
microphones, condenser	107
microphones, crystal	107
microphones, dynamic	107
microphones, geophysical	231
microphones, velocity	107
milli-ammeters	171
moisture proofing lacquers	285
monitors, frequency	114
monitors, modulation	114
monitors, remote control	114
monitors, video	114
motor-generators	177
motors, blower & fan	177
motors, frequency changers	177
motors, phonograph	107
motors, synchronous	177
motors, timing	177
multi-vibrators	333
multimeters	313
—n—	
neon	267
neon lights, pilot	181
—o—	
ohm meters	313
oscillators, rc	305
oscilloscope cameras	331
oscilloscopes, general purpose	331
oscilloscopes, recording	331
oscilloscopes, special UHF & pulse analysis equipment	331
oscillosynchroscopes	331
output power meters	305
oxygen	267
—p—	
packaged program services	117
packaging	259
panels	267
paper preforms, for coil foundations	267
patch cords	103
phonograph motors	107
pick-ups—crystal	107
pick-ups—dynamic	107
pick-ups—magnetic	107
pick-ups—reluctance	107
pilot lights, brackets, jewels, mounts, sockets, etc.	181
pilot run plants	281
pin & prongs	299
plastic fabricators	259
plastic moulders	259
plastic tubes	298
plastics, extrusions	298
plastics, raw powders	298
plastics, rods	298
plastics, sheets	298
playback arms	107
plugs	103
potentiometers	197
power amplifiers—recording	97
power output meters, rf	333
power supplies, high voltage (kilovolt)	181
power supplies, low voltage	181
power supplies, medium voltage	181
power supplies, primary power sources, fuel-engine driven	181
power supplies, voltage regulated power sources	181
pre-amplifiers, phonograph	97
primary standards of frequency	321
primary standards of time	321
printed electronic assemblies	187
proprietary mouldings	297
pulse count integrators	235
pulse generators	325
—q—	
"Q" meters	333
—r—	
racks, relay & cabinets	140
radiation detectors	235
radiotelephones, pleasure craft	125
receivers, AM broadcast	115
receivers, AM shortwave	115
receivers, airborne	121
receivers, airport	121
receivers, FM broadcast	115
receivers, microwave relay	243
receivers, mobile	125
receivers, mobile-central station	125
receivers, point-to-point equip.	127
receivers, position indicators	243
receivers, radar	243
receivers, TV broadcast	115
receiving equipment, amateur	123
record changers	107
record players	107
recorders, disk	111
recorders, embossing types	111
recorders, magnetic tape	111
recorders, magnetic wire	111
rectifiers, copper oxide, etc.	189
rectifiers, grid-controlled vacuum tubes	223
rectifiers, mercury vapor vacuum tubes	223
rectifiers, selenium	189
rectifiers, silicon	189
rectifiers, vacuum	223
relay broadcast & STL equipment	120
relay rack panels, metal	133
relays, co-axial	191
relays, D'Arsonval	191
relays, frequency selective	191
relays, hermetically sealed	191
relays, keying	191
relays, mercury contact	191
relays, polarized	191
relays, power control & overload	191
relays, stepping	191
relays, telephone	191
relays, time delay	191
remote controls	230
research & development	281
resistors, carbon fixed, moulded	197
resistors, carbon, variable	197
resistors, deposited carbon	197
resistors, vacuum sealed	197
resistors, very high megohm	197
resistors, wirewound, fixed	197
resistors, wirewound, precision	197
resistors, wirewound, variable	197
rheostats	197
rivets	267

Alphabetical Index of Products

Product	Page
—s—	
sales & service	343
scalers, nuclear	235
screen rooms	309
screws, nuts & washers	267
sealing & potting compounds	285
secondary standards of frequency	321
secondary standards of time	321
selective calling equipment, mobile	125
selenium diodes	205
servo amplifiers	235
servo-mechanisms, gears, gear-trains, etc.	235
servo motors & generators	235
shielded enclosures	309
shielding materials	309
shipborne communications equip.	125
shock mounts	267
signal generators, AM	333
signal generators, FM	333
signal generators, TV	333
silicones	285
slotted lines & measuring accessories	325
sockets, capacitor, plug-in	205
sockets, receiving tube	205
sockets, transmitting tube	205
sockets, UL approved industrial types	205
solder, acid core	299
solder dipped prewired chassis	187
solder, fluxes	299
solder, plain	299
solder, precious metal	299
solder, pre-forms	299
solder, rosin core	299
soldering irons & guns	289
solenoids	208
sound systems, industrial	102
sound systems industrial—installation & rental	10[illegible]
speech input equipment	119
springs	267
square wave generators	305
stimulators	233
strain gauges	313
strain reliefs	267
stroboscopes	313
styli, cutting	109
styli-diamond	107
styli-metalic	107
styli-sapphire	107
stylus resharpening	109
suction pumps & equipment, recording	109
surplus dealers	343
survey meters	329
SWR meters	333
sweep generators	333
switches, band	208
switches, co-axial	208
switches, foot	208
switches, key	208
switches, mercury	208
switches, momentary contact	208
switches, power	208
switches, precision snap-acting	208
switches, rotary	208
switches, slide	208
switches, spring-return	208
switches, thermally operated	208
switches, toggle & push button	208
switches—wave guide	245
synthetics, insulating	279
—t—	
TV boosters	115
TV camera control equipment	119
TV cameras	119
TV color adapters	115
TV film projectors	119
TV studio lighting equipment	119
tape-acetate base, magnetic recording	109
tape-paper base, magnetic recording	109
tape phonographs & playback equipment	107
tape splicing equipment	109
technical instruction—home study	339
technical instruction—resident	339
telegraph keys, manual	211
telegraph keys, mechanical high speed	211
telegraph keys, semi-automatic	211
telemetering data storage mechanisms	239
telemetering equipment	239
telemetering recorders	239
terminal boards	267
terminals, rivet or stud	267
terminals, wire end	267
testing & certifying organizations	281
thermistors	197
thermostats	213
time delay generators	325
toroids	143
tower lighting equipment	113
tower erection & maintenance service	113
towers, antenna supporting	113
transcription libraries	117
transformers, audio	213
transformers, geophysical	231
transformers, hermetically sealed	213
transformers, horizontal output & flyback	213
transformers, power components	213
transformers, pulse	213
transformers, radio frequency	213
transformers, voltage regulating	213
transistor testers	313
transistors	205
transmitters, AM broadcast	120
transmitters, FM broadcast	120
transmitters, TV broadcast	120
transmitters, airborne	121
transmitters, airport	121
transmitters, amateur	123
transmitters, microwave	244
transmitters, microwave relay	244
transmitters, mobile	125
transmitters, mobile—central station	125
transmitters, point-to-point equip.	127
transmitters, radar	244
tubing, cathode	299
tuners, AM	115
tuners, FM	115
tuners, TV	115
tuning forks	321
turntables, studio type	119
—u—	
UHF tuners	115
—v—	
vacuum pumps	289
vacuum tube machinery	289
vacuum tube parts, guns & gun parts	299
vacuum tube parts, spacers & insulators	299
vacuum tube parts, stampings	299
vacuum tube testers	313
vacuum tube voltmeters	313
vacuum tubes, electrometer	223
vacuum tubes, Geiger-Mueller	223
vacuum tubes, phototubes	223
vacuum tubes, pirani	225
vacuum tubes, receiving cathode-ray	221
vacuum tubes, receiving, miniature	221
vacuum tubes, receiving, standard types, glass & metal	221
vacuum tubes, receiving, subminiature, miniature	221
vacuum tubes, thyratrons	223
vacuum tubes, transmitting air-cooled power	225
vacuum tubes, transmitting iconoscopes	225
vacuum tubes, transmitting image orthicons	225
vacuum tubes, transmitting klystrons	225
vacuum tubes, transmitting magnetrons	225
vacuum tubes, transmitting monoscope	225
vacuum tubes, transmitting water-cooled power	225
vacuum tubes, vacuum rectifiers, receiving	223
vacuum tubes, vacuum rectifiers, transmitting	223
varistors	225
vibration analyzers	313
vibration exciters	289
vibration mounts & isolating pads	267
vibrators	155
voltage regulators, automatic	225
voltage regulators & ballasts, vacuum tube	223
voltage regulators, manually operated	225
voltmeters-audio frequency	305
voltmeters, panel	171
—w—	
walkie-talkies	124
wattmeters & watt hour meters	171
waveguide couplings	245
waveguide, delay lines, etc.	245
waveguide, sampling lines, reflectors, etc.	245
waveguides, flexible	245
waveguides, rigid	245
wavemeters	333
welders & brazers	289
wire	249
wire, magnetic recording	109
wire mesh	249
—x—	
xenon	267

Machol Edge Indexes facing pages 96 and 128 will help you locate major products faster.

Guide to Directories and Product Classes

1. Audio Frequency Equipment.

01 Amplifiers. Page 97
- 05 Decade amplifiers
- 10 DC amplifiers
- 15 Dynamic noise suppressors
- 20 Hearing aid
- 25 High fidelity
- 30 Inter-coms
- 35 Phonograph pre-amplifiers
- 40 Power amplifiers—recording
- 45 Public address

02 Attenuators. Page 100
- 05 Decade
- 10 Impedance matching
- 15 Volume controlling

03 Equalizers. Page 100
- 05 Dialogue equalizers
- 10 Line equalizers
- 15 Magnetic recording
- 20 Recording diameter equalizers
- 25 Sound effect equalizers

04 Filters. Page 101
- 05 Band pass & band rejection
- 10 Loudspeaker dividing networks
- 15 Variable band pass

05 Industrial Sound Systems. Page 102
- 05 Complete systems
- 10 Installation & rental contractors

06 Jacks, Jack Fields & Plugs. Page 103
- 05 Jacks
- 10 Jack fields
- 15 Patch cords
- 20 Plugs

07 Loudspeakers & Headphones. Page 105
- 05 Commercial grade loudspeakers
- 10 Headphones
- 15 High-frequency loudspeakers
- 20 Low-frequency loudspeakers
- 25 Wide-range, 2 & 3 way systems

08 Microphones & Stands. Page 107
- 05 Carbon
- 10 Condenser
- 15 Crystal
- 20 Dynamic
- 25 Velocity
- 30 Microphone stands

09 Phonographs, Pick-ups, Record Changers, etc. Page 107
- 05 Phonograph motors
- 10 Pick-ups—crystal
- 15 Pick-ups—dynamic
- 20 Pick-ups—magnetic
- 25 Pick-ups—reluctance
- 30 Playback arms
- 35 Record changers
- 40 Record players
- 45 Styli-diamond
- 50 Styli-metallic
- 55 Styli-sapphire
- 60 Tape phonographs & playback equipment

10 Recording Accessories & Supplies. Page 109
- 05 Blank disks
- 10 Cutting heads
- 15 Cutting styli
- 20 Magnetic recording, playback & erase heads
- 25 Magnetic recording tape-acetate base
- 30 Magnetic recording tape-paper base
- 35 Magnetic recording wire
- 40 Stylus resharpening
- 45 Suction pumps & equipment
- 50 Tape splicing equipment

11 Recording Equipment. Page 111
- 05 Disk recorders
- 10 Embossing types of recorders
- 15 Magnetic tape recorders
- 20 Magnetic wire recorders

2. Broadcasting: Both Aural & Visual; Receivers, Transmitters & Associated Equipment.

12 Antennas & Accessories. Page 113
- 05 AM broadcast transmitting
- 10 FM broadcast transmitting
- 15 TV broadcast transmitting
- 20 Supporting towers
- 25 Tower lighting equipment
- 30 Tower erection & maintenance service

13 Monitor Equipment. Page 114
- 05 Frequency
- 10 Modulation
- 15 Remote control monitors
- 20 Video monitors

14 Receivers. Page 115
- 05 AM Broadcast
- 10 AM Shortwave
- 15 FM Broadcast
- 20 TV Broadcast
- 25 TV Boosters
- 30 TV Color adapters
- 35 TV Tuners

15 Services for the Broadcaster. Page 117
- 05 Frequency measurement
- 10 Packaged program services
- 15 Transcription libraries

16 Studio Equipment. Page 119
- 05 Consoles & speech input equip.
- 10 TV cameras
- 15 TV camera control equipment
- 20 TV film projectors
- 25 TV studio lighting equipment
- 30 Turntables

17 Transmitters. Page 120
- 05 AM Broadcast
- 10 FM Broadcast
- 15 TV Broadcast
- 20 Relay broadcast & STL equip.

3. Communications: All non-broadcast forms of communication; Amateur, Emergency, Facsimile, Mobile, etc.

18 Aircraft & Airport Equipment. Page 121
- 05 Airborne receivers
- 10 Airborne transmitters
- 15 Airport receivers
- 20 Airport transmitters
- 25 GCA Equipment, etc.

19 Amateur Equipment. Page 123
- 05 Antennas & antenna accessories, rotators, etc.
- 10 Receiving equipment
- 15 Transmitters

20 Carrier Current Equipment. Page 124
- 05 Complete terminal equip.
- 10 Installation & maintenance
- 15 Repeat & relay equip.

21 Emergency Communications Equipment. Page 124
- 05 Despatching equipment
- 10 Walkie-talkies

22 Facsimile Equipment. Page 124
- 05 Receiving equipment
- 10 Sensitized paper
- 15 Transmitting equipment

23 Marine Equipment. Page 125
- 05 Contract installers
- 10 Pleasure craft radiotelephones
- 15 Shipborne communications equip.

24 Mobile Equipment. Page 125
- 05 Antennas
- 10 Central Station receivers
- 15 Central Station transmitters
- 20 Citizen Radio
- 25 Mobile receivers
- 30 Mobile transmitters
- 35 Selective Calling equipment

25 Point-to-Point Equipment. Page 127
- 05 Antennas & towers
- 10 Receivers
- 15 Transmitters

4. Component Parts

26 Antennas & Accessories. Page 129
- 05 All-wave receiving
- 10 Dummy
- 15 Feeder line
- 20 Indoor types
- 25 Insulators
- 30 Lightning arrestors
- 35 Mounting hardware
- 40 Small towers

27 Batteries. Page 131
- 05 Dry batteries
- 10 Mercury batteries
- 15 Storage batteries—lead-acid
- 20 Storage batteries—nickel-alkali

28 Blowers & Cooling Fans. Page 131
- 05 Air wheels & housings
- 10 Complete blower assemblies
- 15 Fan blades

29 Cabinets, Consoles, & Enclosures. Page 133
- 05 Metal cabinets
- 10 Metal relay rack panels
- 15 Moulded plastic cabinets
- 20 Wood cabinets

30 Capacitors: Fixed. Page 135
- 05 Ceramic
- 10 Electrolytic
- 15 Metallized paper
- 20 Mica
- 25 Oil filled
- 30 Paper
- 35 Plastic insulated
- 40 Silvered mica
- 45 Vacuum

31 Capacitors: Variable. Page 139
- 05 Neutralizing
- 10 Precision variable
- 15 Temperature compensating
- 20 Trimmers
- 25 Tuning
- 30 Vacuum

32 Chassis & Racks. Page 140
- 05 Aluminum chassis
- 10 Steel chassis
- 15 Relay racks & cabinets

33 Coils. Page 143
- 05 Audio frequency chokes
- 10 Deflection yokes
- 15 Focusing coils
- 20 RF chokes
- 25 Toroids
- 30 Tuning

34 Connectors. Page 151
- 05 AN Standard types
- 10 Coaxial
- 15 Microphone
- 20 Multiple circuit connectors
- 25 Power
- 30 Slip ring and commutating connectors

35 Converters. Page 155
- 05 DC Choppers
- 10 Vibrators

36 Cores, Complete. Page 159
- 05 Ferrites
- 10 Pre-formed, spirally wound
- 15 Powdered metal

37 Crystals & Accessories. Page 161
- 05 Crystal holders
- 10 Crystal ovens
- 15 Oscillating quartz crystals
- 20 Piezo electric
- 25 Tourmaline

38 Filters. Page 163
- 05 RF noise reduction
- 10 Mechanical

39 Fuses & Fuse Holders. Page 165
- 05 Fuses
- 10 Fuse Holders

40 Magnetic Amplifiers. Page 167
- 05 Complete assemblies

41 Magnets. Page 169
- 05 Electro
- 10 Permanent

42 Meters (Indicating Instruments). Page 171
- 05 Ammeters
- 10 Elapsed time
- 15 Frequency indicating
- 20 Galvanometers
- 25 Micro-ammeters
- 30 Milli-ammeters
- 35 Voltmeters
- 40 Volume level, (DB & VU)
- 45 Wattmeters & watt hour meters

43 Motors & Motor-Generators. Page 177
- 05 Blower & fan motors
- 10 Dynamotors
- 15 Frequency changers
- 20 Motor-generators
- 25 Synchronous motors
- 30 Timing motors

44 Pilot Lights & Assemblies. Page 181
- 05 Brackets, jewels, mounts, sockets, etc.
- 10 Incandescent lights
- 15 Neon lights

45 Power Supplies. Page 181
- 05 High voltage (kilovolt)
- 10 Low voltage
- 15 Medium voltage
- 20 Primary power sources, fuel-engine driven
- 25 Voltage regulated power sources

46 Printed Circuits. Page 187
- 05 Etched or screened prewired chassis
- 10 Printed electronic assemblies
- 15 Solder dipped prewired chassis

47 Rectifiers, Metallic. Page 189
- 05 Copper oxide, etc.
- 10 Selenium
- 15 Silicon

48 Relays. Page 191
- 05 Coaxial
- 10 D'Arsonval
- 15 Frequency selective
- 20 Hermetically sealed
- 25 Keying
- 30 Mercury contact
- 35 Polarized
- 40 Power control & overload
- 45 Stepping
- 50 Telephone
- 55 Time delay

49 Resistors. Page 197
- 05 Carbon fixed, moulded
- 10 Carbon, variable
- 15 Deposited carbon
- 20 Potentiometers
- 25 Rheostats
- 30 Vacuum sealed
- 35 Very high megohm
- 40 Wirewound, variable
- 45 Wirewound, fixed
- 50 Wirewound, precision

50 Semi-Conductors. Page 205
- 05 Germanium diodes
- 10 Transistors

51 Sockets. Page 205
- 05 Capacitor, plug-in sockets
- 10 Receiving tube
- 15 Transmitting tube
- 20 UL approved industrial types

52 Switches. Page 208
- 05 Band
- 10 Coaxial
- 15 Key
- 20 Mercury
- 25 Momentary contact
- 30 Power
- 35 Precision snap-acting
- 40 Rotary
- 45 Slide
- 50 Spring-return
- 55 Thermally operated
- 65 Toggle & push button

53 Telegraph Keys. Page 211
- 05 Manual
- 10 Mechanical high speed
- 15 Semi-automatic

53X Thermostats. Page 213

Guide to Directories and Product Classes

54 Transformers. Page 213
- 05 Audio
- 10 Hermetically sealed
- 15 Horizontal output & flyback
- 20 Power components
- 25 Pulse
- 30 Radio frequency
- 35 Voltage regulating

55 Vacuum Tubes, Receiving. Page 221
- 05 Cathode-Ray
- 10 Miniature
- 15 Standard types, glass & metal
- 20 Sub-miniature

56 Vacuum Tubes, Rectifiers & Special Purpose. Page 223
- 05 Electrometer tubes
- 10 Geiger-Mueller
- 15 Grid-controlled rectifiers
- 20 Mercury vapor rectifiers
- 25 Phototubes
- 30 Pirani tubes
- 35 Thyratrons
- 40 Vacuum rectifiers, receiving
- 45 Vacuum rectifiers, transmitting
- 50 Voltage regulators & ballasts

57 Vacuum Tubes, Transmitting. Page 225
- 05 Air-cooled power tubes
- 10 Iconoscopes
- 15 Image orthicons
- 20 Klystrons
- 25 Magnetrons
- 30 Monoscope tubes
- 35 Water-cooled power tubes

58 Voltage Regulators. Page 225
- 05 Automatic
- 10 Manually operated
- 15 Varistors

5. Applications of Electronics, Industrial, Medical & Military.

59 Computers & Counters. Page 227
- 05 Analog to digital converters
- 10 Computers, analog
- 15 Computers, digital
- 20 Counters, continuous
- 25 Counters, pre-set

60 Electronic Control Equipment. Page 230
- 05 Burglar-alarm & protective systems
- 10 Combustion & smoke-nuisance controls
- 15 Production control, counting & sorting equipment
- 20 Variable speed controls

61 Geophysical Apparatus. Page 231
- 05 Amplifiers
- 10 Complete exploration equipment
- 15 Control equipment
- 20 Microphones
- 25 Recording galvanometers
- 30 Transformers

62 Induction Heating Equipment. Page 233
- 05 Brazing, soldering & welding
- 10 Di-electric heating
- 15 Induction heating

63 Medical Equipment. Page 233
- 05 Cardiographs
- 10 Diathermy
- 15 Electronic cauterizing
- 20 Electro-encephalographs
- 25 Stimulators

64 Nuclear Equipment. Page 235
- 05 Pulse count integrators
- 10 Radiation detectors
- 15 Scalers

65 Servo-Mechanisms. Page 235
- 05 Servo amplifiers
- 10 Gears, gear-trains, etc.
- 15 Servo motors & generators

66 Telemetering Equipment. Page 239
- 05 Data recorders
- 10 FM/FM Modulators
- 15 Data storage mechanisms

6. Radar, Microwave, UHF Equipment.

67 Antennas. Page 241
- 05 Feed systems
- 10 Receiving
- 15 Reflectors
- 20 Rotating mechanisms
- 25 Transmitting

68 Receivers. Page 243
- 05 Microwave relay
- 10 Position indicators
- 15 Radar

69 Transmitters. Page 244
- 05 Microwave
- 10 Microwave relay
- 15 Radar

70 Waveguides & Accessories. Page 245
- 05 Couplings
- 10 Delay lines, etc.
- 15 Flexible waveguides
- 20 Rigid waveguides
- 25 Sampling lines, reflectors, etc.
- 30 Switches

7. Materials, Fabricating Equipment & Services, Machinery & Tools, Contract Assemblers, Laboratories for Custom Built Equipment, Consulting Engineers.

71 Cable & Wire. Page 249
- 05 Aluminum
- 10 Coaxial cables
- 15 Copper, bare
- 20 Low-loss, high-frequency types
- 25 Precious & rare metals wire
- 30 Pre-formed wire harnesses
- 35 Rubber insulated
- 40 Shielded
- 45 Synthetic insulated
- 50 Woven wire braid

72 Ceramics. Page 255
- 05 Coil forms
- 10 Custom fabrication
- 15 Insulators
- 20 Proprietary forms

73 Consulting Engineers. Page 256
- 05 Acoustical
- 10 Electrical
- 15 Mechanical
- 20 Radio

74 Core Materials. Page 259
- 05 Laminations
- 10 Metallic powders

75 Fabricators & Services. Page 259
- 05 Contract fabrication & assembly
- 10 Electro-plating
- 15 Hardening & heat-treating
- 20 Hermetic sealing service
- 25 Metal stamping & spinning
- 30 Plastic fabricators
- 35 Plastic moulders

76 Gasses & Vapors. Page 267
- 05 Acetylene
- 10 Argon
- 15 Hydrogen
- 20 Krypton
- 25 Neon
- 30 Oxygen
- 35 Xenon

77 Hardware, Findings, & Manufacturing Aids. Page 267
- 05 Adhesive labels & tapes
- 10 Bushings & bearings
- 15 Cans
- 17 Contacts
- 20 Dials & dial assemblies
- 25 Flexible shafts
- 30 Gaskets
- 35 Grommets
- 40 Machine screw products
- 50 Rivets
- 55 Screws, nuts & washers
- 60 Springs
- 65 Terminals, rivet or stud
- 70 Terminals, wire end
- 75 Terminal boards
- 80 Vibration mounts & isolating pads

78 Hermetic Seals. Page 275
- 05 Complete headers
- 10 Ceramic to metal seals
- 15 Glass to metal seals

79 Insulating Materials. Page 279
- 05 Cambric sheeting
- 10 Cambric tubing
- 15 Cotton tapes
- 20 Fiberglass tapes
- 25 Fiberglass tubing
- 30 Synthetics

Guide to Directories and Product Classes

80 Laboratories & Custom Builders.
Page 281
05 Individual item builders
10 Pilot run plants
15 Research & development labs.
20 Testing & certifying organizations

81 Lacquers, Paints, Compounds & Waxes.
Page 285
05 Coil dope
10 Conducting paint
15 Finishing & protecting lacquer
20 Fungus preventatives
25 Moisture proofing
30 Sealing & potting compounds
35 Silicones

82 Machinery & Tools.
Page 289
05 Coil winding machines
10 General production machinery & tools
15 Marking & engraving machines
20 Soldering irons & guns
25 Vacuum tube machinery
30 Vacuum pumps
35 Vibration exciters
40 Welders & brazers

83 Metals.
Page 295
05 Alloys
10 Copper
15 Ferrous
20 Non-ferrous, excluding copper
25 Powdered
30 Precious & rare

84 Moulded Products.
Page 297
05 Insulators
10 Knobs & parts
15 Proprietary mouldings

85 Plastics.
Page 298
05 Extrusions
10 Raw powders
15 Rods
20 Sheets
25 Tubes

86 Solder.
Page 299
05 Acid core
10 Fluxes
15 Plain
20 Precious metal
25 Pre-forms
30 Rosin core

87 Vacuum Tube Parts.
Page 299
05 Anodes
10 Envelopes, glass
15 Envelopes, metal
20 Getters
25 Grids & grid wire
30 Guns & gun parts
35 Pins & prongs
40 Spacers & insulators
50 Tube clamps
55 Tubing-cathode

8. Test & Measuring Equipment, Laboratory Standards & Supplies.

88 Audio Frequency Test Equipment.
Page 305
05 Beat frequency oscillators
10 Distortion & noise analyzers
15 Intermodulation meters
20 Output power meters
25 RC oscillators
30 Spectrum analyzers
35 Square wave generators
40 Voltmeters-audio frequency

89 General Laboratory Equipment & Supplies.
Page 309
05 Chemicals
10 General laboratory equipment
15 Screen rooms
20 RF Shielding materials

90 General Test Equipment.
Page 313
05 Bridges, capacitance
10 Bridges, impedance
15 Bridges, resistance
20 Decades, capacitance
25 Decades, resistance
30 Multimeters
35 Ohm & megohm meters
40 Strain gauges
45 Stroboscopes
50 Vacuum tube testers
55 Vacuum tube voltmeters
60 Vibration analyzers

91 Graphic Recorders.
Page 319
05 Charts & papers
10 Ink writing
15 Inkless types
20 Fixed speed types
25 Variable speed types

92 Laboratory Standards of Frequency & Time.
Page 321
05 Elapsed time measuring equip.
10 Primary standards of frequency
15 Primary standards of time
20 Secondary standards of frequency
25 Secondary standards of time
30 Tuning forks

93 Microwave & Radar Test Equipment.
Page 325
05 Pulse generators
10 Slotted lines & measuring accessories
15 Time delay generators

94 Nuclear Test.
Page 329
05 Dosimeters
10 Ionization chambers
15 Survey meters

95 Oscilloscopes—Cathode-Ray.
Page 331
05 General purpose
10 Oscilloscope cameras
15 Oscillosynchroscopes
20 Recording oscillographs
25 Special UHF & Pulse Analysis equipment

96 Radio Frequency Test Equipment.
Page 333
05 Field strength meters
10 Impedance & admittance meters
15 Marker generators
20 "Q" Meters
25 RF power output meters
30 Multi-vibrators
35 Signal generators, AM
40 Signal generators, FM
45 Signal generators, TV
50 SWR meters
55 Sweep generators
60 Wavemeters

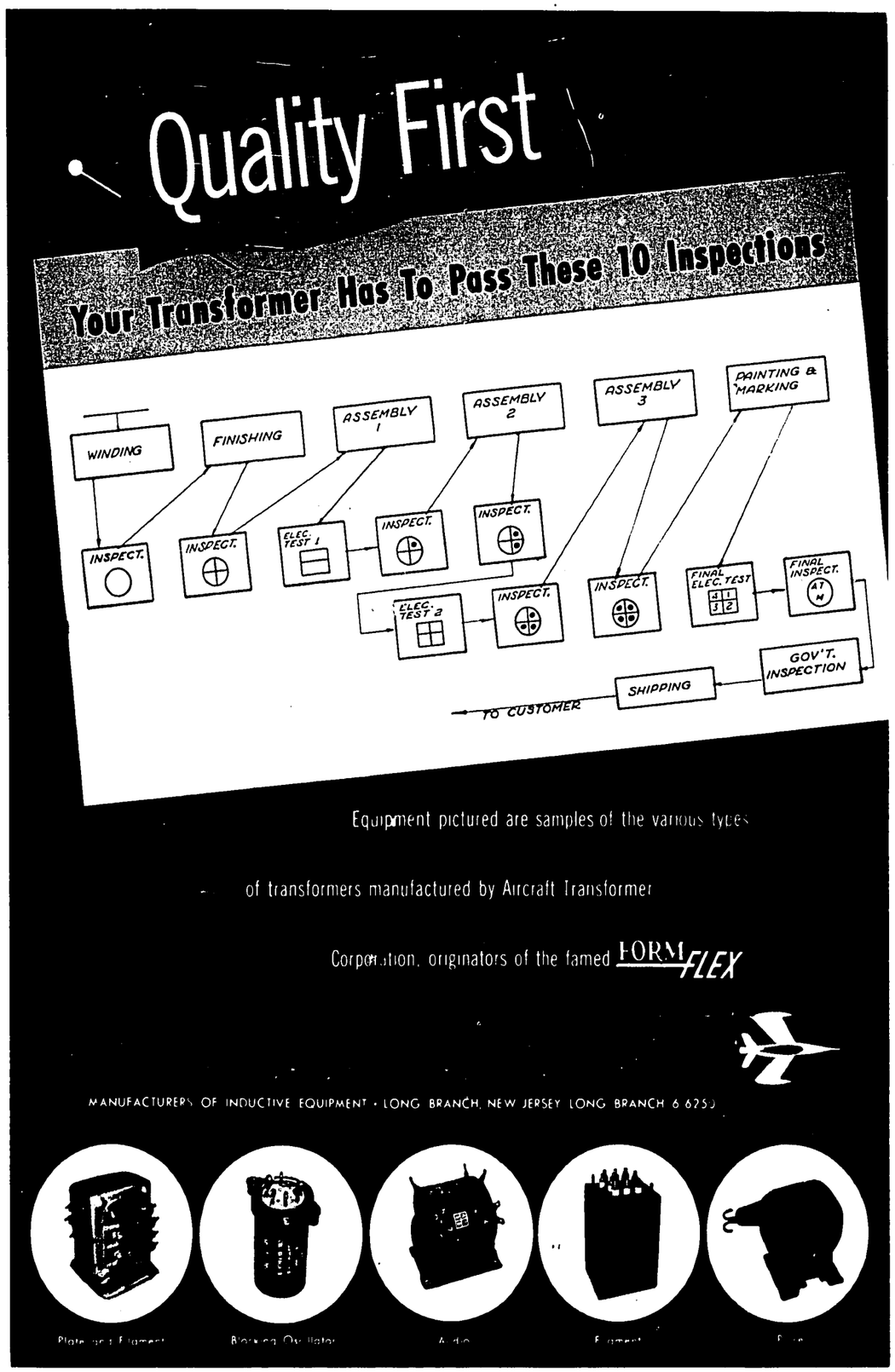
9. Education & Publishing.

97 Education.
Page 339
05 Technical instruction—home study
10 Technical instruction—resident

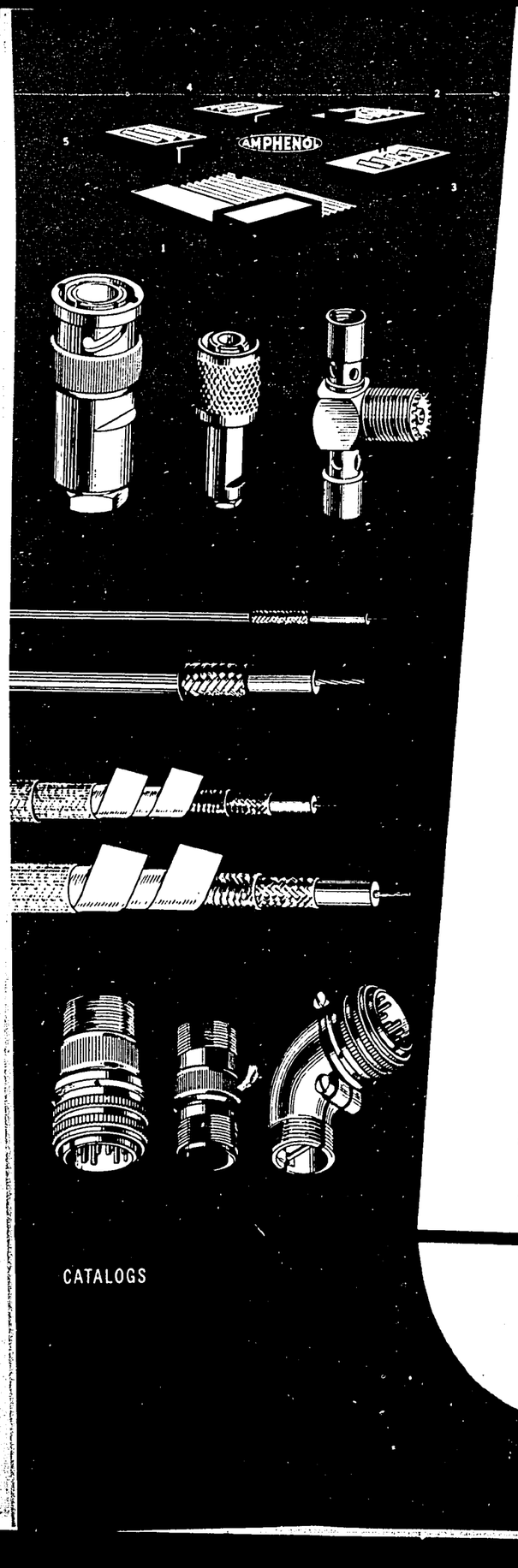
98 Publishing.
Page 339
05 Book publishers
10 Magazines

10. Distributional Functions for the Industry.

99 Distribution.
Page 343.
05 Export & Import
10 Jobbers & Wholesalers
15 Manufacturers Representatives
20 Sales & Service
25 Surplus dealers



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CATALOGS

A. B. Metal Products, Ltd., Abercynon, Glamorgan, England, 49, 52

ABC Radio Laboratories, 3334 N. New Jersey St., Indianapolis 5, Ind., 24

AGA Division, Elastic Stop Nut Corp. of America, 1027 Newark Ave., Elizabeth 3, N.J., 48
For details see ad on page 3

A. J. F. Industries, Inc., 852 Monroe St., Brooklyn 21, N.Y., 33, 54, 73

A-K Manufacturing Co., Inc., 115 S. Northwest Hwy., Barrington, Ill., 71, 79, 85

A1 Recording Corp., 7915 Vineland Ave., Sun Valley, Calif., 73

A. P. W. Company, 72 West Main St., Rockaway, N.J., 33

A. R. F. Products, Inc., 7627 Lake, River Forest, Ill., 1, 2, 13, 14, 24, 60, 68, 73, 80, 88, 96

Aaron & Assoc., Inc., Irvin I., 829 N. Marshall St., Milwaukee 2, Wis., 99
For details see ad on page 343

Abalon Precision Mfg. Corp., 540 Casanova St., New York 59, N.Y., 29, 32, 74, 75, 77
For details see ad on page 140

Accurate Electronics Corp., 1312 Ontario St., Cleveland 13, Ohio, 26, 34, 44, 46, 51, 75, 77, 84

Accurate Insulated Wire Corp., 25 Fox St., New Haven 13, Conn., 71

Ace Coil & Electronics Co., 914 Middlesex Ave., Metuchen, N.J., 33, 49, 54
For details see ad on page 143

Ace Engineering & Machine Co., Inc., 3644 N. Lawrence St., Philadelphia 40, Pa., 89
For details see ad on page 309

Acheson Colloids Co., 1555 Washington Ave., Port Huron, Mich., 81, 87

Acme Battery Corp., 59 Pearl St., Brooklyn 1, N.Y., 27

Acme Electric Corp., 44 Water St., Cuba, N.Y., 54
For details see ad on page 215

Acme Electronics, Inc., subsidiary Aerovox Corp., 300 N. Lake Ave., Pasadena 4, Calif.
For details see Aerovox ad on pages 362-363

Acme Paper Box Co., 149 E. 25 St., New York 10, N.Y., 77

Acme Wire Co., 1255 Dixwell Ave., New Haven, Conn., 71, 79, 81

Acro Mfg. Co., 2040 E. Main St., Columbus, Ohio, 43, 52, 53X

Acro Products Co., 369 Shurs Lane, Philadelphia 28, Pa., 33, 40, 54

Acro Tool & Die Works, 4554 Broadway, Chicago 40, Ill., 82

Acro Transformer & Mfg. Corp., 26-02 Fourth St., Long Island City 2, N.Y., 4, 33, 54

Acromark Co., 9-13 Morrell St., Elizabeth 4, N.J., 75, 77, 82
For details see ad on page 293

Adair Engineering Co., George P., 1610 Eye St., N.W., Washington 6, D.C., 73, 80

Adams & Westlake Co., 1107 N. Michigan St., Elkhart 1, Ind., 48
See complete catalog in last section

Adler Communications Labs., 1 Le Fevre Lane, New Rochelle, N.Y., 6, 13, 16, 24, 42, 45, 68

Admiral Corp., 3800 Cortland St., Chicago 47, Ill., 14

Advance Electric & Relay Co., 2435 N. Naomi St., Burbank, Calif., 48
For details see ad on page 191

Advance Electronics Co., 451 Highland Ave., Passaic, N.J., 1, 33, 42, 80, 88, 93, 95, 96
For details see ad on page 325

Advance Insulated Wire & Cable Co., 8 Tingley Lane, Plainfield, N.J., 71
For details see ad on page 248

Advance Recording Products Co., 36-12 34 St., Long Island City 6, N.Y., 10

Advanced Vacuum Products, Inc., 22 Liberty St., Stamford, Conn., 75, 78

Aero Electronics Co., 1512 N. Wells St., Chicago 10, Ill., 1, 59, 60, 61, 65, 73, 75, 80, 82, 90

Aero Instrument Co., 11423 Vanowen St., N. Hollywood, Calif., 4, 15, 42, 92

Aero Materials Co., 4 Water St., Brooklyn 1, N.Y., 18

Aerocoil, Inc., 24 Cliff St., Jersey City, N.J., 33, 38
For details see ad on page 143

Aeroflex Research, Inc., 34-06 Skillman Ave., Long Island City 1, N.Y., 10, 35, 65, 80

Aerolite Electronics Corp., 507 26 St., Union City, N.J., 6, 26, 39, 44, 75, 77
For details see ad on page 103

Aerolux Light Corp., 653 11th Ave., New York 36, N.Y., 22, 42, 44, 56, 63, 76, 82, 90

Aeronautical Communications Equip., Inc., 3090 Douglas Road, Miami 33, Fla., 18, 25, 96

Aeronautical Electric Co., 5103 W. Lawrence Ave., Chicago 30, Ill., 44, 75, 77
For details see ad on page 180

Aeronautical Radio, Inc., 1520 New Hampshire Ave., N.W., Washington 6, D.C., 80

Aerovox Corp., 740 Belleville Ave., New Bedford, Mass., 4, 30, 33, 38, 40, 45, 46, 49, 54
For details see ad on pages 362-363

Affiliated Products, Inc., 4802 N. Broad St., Philadelphia 41, Pa., 38

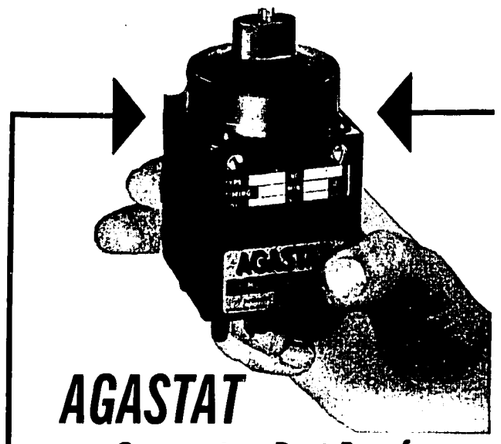
Affiliated Screw Products Co., 757 Waveland, Chicago, Ill., 77, 87

Ahrendt Instrument Co., 4910 Calvert Road, College Park, Md., 59, 65, 75

Air Associates, Inc., Teterboro, N.J., 18, 21, 24, 25, 38, 54, 60, 61, 62, 66, 68, 69, 72, 73

Air Marine Motors, Inc., 2183 Jackson Ave., Seaford, L.I., N.Y., 43, 65
For details see ad on page 177

(Continued on page 5)



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(Continued from page 3)

Airborne Instruments Laboratory, 160 Old Country Rd., Mineola, L.I., N.Y., 75, 80, 93

Aircraft Armaments, Inc., P.O. Box 1777, Baltimore 3, Md., 54, 59, 65, 67, 68, 69, 93, 95

Aircraft Marine Products, Inc., 2100 Paxton St., Harrisburg, Pa., 77, 82

Aircraft Radio Corp., Boonton, N.J., 18, 24, 93, 96
For details see ad on page 123

Aircraft Transformer Corp., West & Willow Aves., Long Branch, N.J., 33, 40, 54
For details see ad on page 1

Airdesign, Inc., 241 Fairfield Ave., Upper Darby, Pa., 54

Airflyte Electronics Co., 19-21 Cottage St., Bayonne, N.J., 34, 44, 48, 49, 75, 81
For details see ad on page 5

Airmec, Limited, High Wycombe, Buckinghamshire, England, 45, 59, 62, 64, 88, 90, 92, 95, 96

Air-O-Tronics, P.O. Box 1, Lancaster, Calif., 42, 60, 73, 80, 90

Airpax Products Co., Middle River, Baltimore 20, Md., 4, 33, 35, 40, 45, 48, 54

Airphone Co., Inc., Calumet Bldg., Miami, Fla., 2, 7, 73, 80

Airplane & Marine Instruments, Inc., Clearfield, Pa., 2, 18, 23, 29, 32, 34, 45, 52, 59, 65, 75, 77, 80

Airtron, Inc., 101 E. Elizabeth Ave., Linden, N.J., 70, 92
For details see ad on page 244

Airtronix Development Corp., 20-26 W. 22 St., New York 10, N.Y., 1, 9, 14, 80

Akron Rubber Co., 53 Warren St., New York 7, N.Y., 77, 84

Aladdin Radio Industries, Inc., 705 Murfreesboro Rd., Nashville, Tenn., 33, 36

Alear Instruments, Inc., 2 Godwin Ave., Fair Lawn, N.J., 1, 33, 45, 54, 73, 80, 82

Alco Electronics Mfg. Co., 102 Marston St., Lawrence, Mass., 45, 46

Alcor Electronics Corp., 610 Hart St., Brooklyn 21, N.Y., 1, 3, 4, 17, 20, 25, 45, 80, 88

Alden Electr. & Impulse Recording Co., P.O. Box 125, Westboro, Mass., 22, 91
For details see ad on page 125

Alden Products Co., 117 N. Main St., Brockton 64, Mass., 6, 29, 32, 34, 36, 39, 44, 46, 51, 53, 54, 59, 71, 74, 75, 77, 84, 87
For details see ad on pages 150-151

Alden Systems Co., P.O. Box 125, Westboro, Mass., 22
For details see ad on page 125

Alertronic Protective Corp. of America, 116 John St., New York 38, N.Y., 60, 80

Alfax Paper & Engineering Co., P.O. Box 125, Westboro, Mass., 22
For details see ad on page 125

All Channel Antenna Corp., 70-07 Queens Blvd., Woodside 77, N.Y., 26

All Star Products, Inc., Defiance, Ohio, 31, 41

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Airflyte ELECTRONICS COMPANY 21 COTTAGE ST. BAYONNE, N.J.

Allard Instrument Corp., 30 Broad St., New York 4, N.Y., 43, 48, 52, 65

Allegany Instrument Co., Inc., 1000 Oldtown Rd., Cumberland, Md., 1, 61, 95

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh 22, Pa., 83

Allen-Bradley Co., 136 W. Greenfield Ave., Milwaukee 11, Wis., 30, 36, 48, 49

Allen-Stevens Corp., 90-35 Van Wyck Expy., Jamaica 35, N.Y., 75, 77

Alliance Manufacturing Co., Lake Park Blvd., Alliance, Ohio, 9, 14, 19, 43, 67

Alliance Tool & Motor Co., Ltd., 591 Queensway, Toronto 14, P.Q., Canada, 9, 14, 28, 32, 43, 67, 74, 75

Allied Allegri Machine Co., Inc., 141 River Road, Nutley, N.J., 33, 75, 77

Allied Control Co., Inc., 2 East End Ave., New York 21, N.Y., 33, 41, 48

Allied Industries, Inc., 1023 S. 21 St., Louisville 10, Ky., 34

Allied Radio Corp., 833 W. Jackson Blvd., Chicago 7, Ill., 99
For details see ad on page 342

Allis Co., Louis, 427 E. Stewart St., Milwaukee 7, Wis., 43

All-Metal Screw Products Co., Inc., 33 Greene St., New York 17, N.Y., 77

Alloy Metalsmiths, Inc., 85 Commerce Road, Cedar Grove, N.J., 32, 75

All-Tronics, Inc., 2 Secatoag Ave., Port Washington, L.I., N.Y., 38

Alpha Electronics, Inc., 53 Bergen Turnpike, Little Ferry, N.J., 33, 48, 54

Alpha Metals, Inc., 56 Water St., Jersey City 4, N.J., 77, 83, 86

Alpha Wire Corp., 430 Broadway, New York 13, N.Y., 71

Altec Lansing Corp., 9356 Santa Monica Blvd., Beverly Hills, Calif., 1, 4, 5, 7, 8, 16, 29, 32, 45

Amalgamated Electronics, Electronic Rd., Clinton Corners, N.Y., 49

American Brass Co., 414 Meadow St., Waterbury 20, Conn., 75, 77, 83, 87
For details see ad on page 266

American Chronoscope Corp., 316 W. First St., Mount Vernon, 88, 90, 92

American Electric Cable Co., 181 Appleton St., Holyoke, Mass., 71

American Electric Motors, Inc., 4811 Telegraph Rd., Los Angeles 22, Calif., 43, 45

American Electrical Heater Co., 6110 Cass Ave., Detroit 2, Mich., 82

American Electro Metal Corp., 320 Yonkers Ave., Yonkers 2, N.Y., 71, 82, 83, 87

American Electroneering Corp., 5029 W. Jefferson Blvd., Los Angeles 16, Calif., 1, 18, 21, 24, 25, 45, 69, 80, 93, 96

American Electronic Labs., Inc., 641 Arch St., Philadelphia 6, Pa., 1, 45, 63, 88, 95

American Encaustic Tiling Co., Inc., 9th St. & Kenilworth Ave., Lansdale, Pa., 60, 75, 96

American Gen. Thermostat Corp., 2066 Bronx St., New York 60, N.Y., 53X

American Hinge Corp., 206 Wallabout St., Brooklyn 6, N.Y., 77, 87

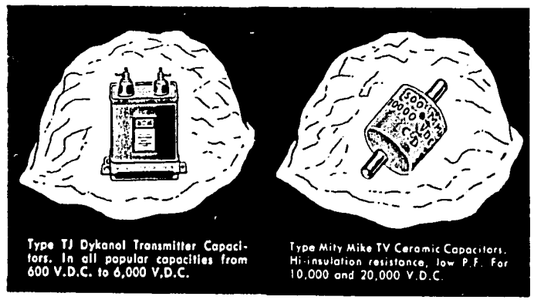
American Hydromath Corp., 145 W. 57 St., New York 19, N.Y., 59, 60, 73

American Instrument Co., Inc., 8030 Georgia Ave., Silver Spring, Md., 89, 90

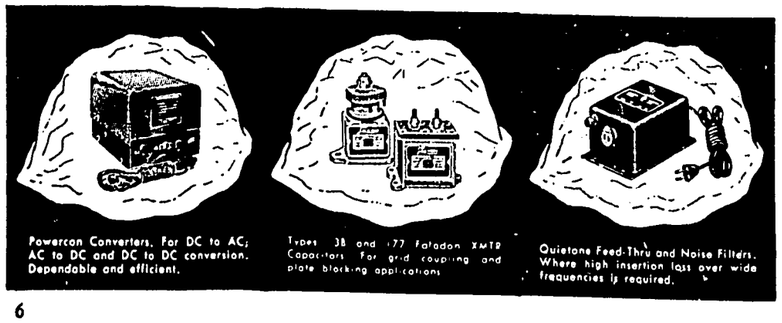
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(Continued from page 5)

American Insulator Corp., New Freedom, Pa., 29, 84
American Laubscher Corp., 333 W. 52 St., New York 19, N.Y., 77
American Lava Corp., Chattanooga 5, Tenn., 26, 72, 78, 84, 87
For details see ad on page 4
American Machine & Foundry Co., Electronics Div., 1085 Commonwealth Ave., Boston, Mass., 1, 2, 3, 4, 11, 18, 22, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 54, 55, 56, 57, 58, 59, 60, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 77, 78, 79, 80, 81, 82, 83, 84, 85, 88, 89, 90, 91, 92, 93, 95, 96
American Mach. & Metals Co., Sellersville, Pa., 42
American Mica Insulation Co., 410 Frelinghuysen Ave., Newark 5, N.J., 30, 75, 79, 85, 87
American Microphone Co., 370 S. Fair Oaks, Pasadena 1, Calif., 8, 9
American Molded Products, 2727 W. Chicago Ave., Chicago 22, Ill., 72, 77
American Phenolic Corp., 1830 S. 54 Ave., Chicago 50, Ill., 6, 19, 24, 25, 26, 34, 37, 51, 67, 71, 75, 79, 81, 84, 85
For details see ad on page 2
American Platinum Works, 231 New Jersey R.R. Ave., Newark 5, N.J., 71, 83, 86
American Products Mfg. Co., Inc., 8127-33 Oleander St., New Orleans 18, La., 77, 81
American Radio Hardware Co., 152 Macquesten Pkwy. S., Mt. Vernon, N.Y., 6, 39, 44, 51, 52, 53, 75, 77, 84, 85
American Radio & Television, Inc., 5th & Cornish Sts., N. Little Rock, Ark., 14, 29, 73, 80
American Radionic Co., Inc., 33 Flatbush Ave., Brooklyn 17, N.Y., 30
American Relay & Controls, Inc., 3621 W. Howard St., Skokie, Ill., 48
American Screw Co., 1670 W. Main St., Willimantic, Conn., 77
American Silver Co., Inc., 36-07 Prince St., Flushing 54, N.Y., 83, 86
American Smelting & Refining Co., 120 Broadway, New York 5, N.Y., 83, 86
American Television, Inc., 5050 Broadway, Chicago 40, Ill., 97
American Television & Radio Co., 300 E. 4th St., St. Paul 1, Minn., 35, 45
American Thermo Electric Co., 198-11 Hollis Ave., Hollis, L.I., N.Y., 90
American Time Products, Inc., 580 Fifth Ave., New York 36, N.Y., 92
For details see ad on page 322
Amertronic, Inc., 1471 Church St., N.W., Washington 5, D.C., 75, 93
Amglo Corp., 2037 W. Division St., Chicago 22, Ill., 43, 55
Amperex Electronic Corp., 230 Duffy Ave., Hicksville, N.Y., 30, 50, 56, 57
Amperite Co., 561 Broadway, New York 12, N.Y., 48, 56
For details see ad on page 193
Ampex Electric Corp., 934 Charter St., Redwood City, Calif., 11, 60, 61, 66
For details see ad on pages 364-365
Amplex Mfg. Co., Subsid. Chrysler Corp., 6501 Harper Ave., Detroit 31, Mich., 36, 77
Amplifier Corp. of America, 396 Broadway, New York 13, N.Y., 1, 4, 9, 11, 33, 45, 54, 58, 88
Amy, Aceves & King, Inc., 11 W. 42 St., New York 36, N.Y., 14, 19, 26, 73
Anaconda Wire & Cable Co., 25 Broadway, New York 4, N.Y., 71
Analytical Measurements, Inc., 585 Main St., Chatham N.J., 90
Anchor Metal Co., 244 Boerum St., Brooklyn 6, N.Y., 83, 86
Anchor Plastics Co., Inc., 533-541 Canal St., New York 13, N.Y., 85
Anchor Specialty Mfg. Co., 300 N. Industrial Ave., Teterboro, N.J., 29, 32, 75, 80, 82, 89
Andersen Laboratories, Inc., 39 Talcott Rd., West Hartford 10, Conn., 70
Andrea Radio Corp., 27-01 Bridge Pl. N., Long Island City 1, N.Y., 14, 95, 96
Andrew Corp., 363 E. 75 St., Chicago 19, Ill., 12, 24, 25, 67, 70, 71, 96
Anelex Corp., Concord, N.H., 59, 66
Annis Co., R. B., 1101 N. Delaware St., Indianapolis 2, Ind., 54, 82

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	Page
PINK SECTION gives guide to Products Index by products in the 10 Product Directories.	I-VIII
PART 2—Alphabetical List of Firms	3-96
PART 3—Product Directory in 10 Sections	97-360
1. Audio Equipment	97
2. Broadcasting	113
3. Communications	121
4. Components	129
5. Electronic Applications	227
6. Radar-Microwave	241
7. Services, Materials and Consultants	249
8. Test Equipment	305
9. Educational	339
10. Distribution	343
PART 4—Complete Data Spreads	361-455
CATALOGS	456
Ad Index:	Cover 3

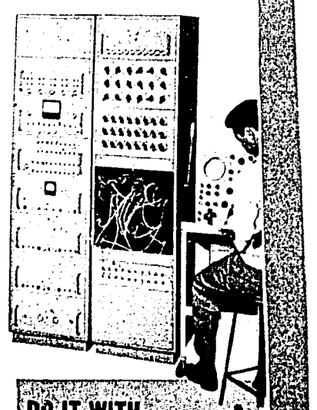
Ansley Mfg. Co., Arthur, Doylestown, Pa., 1, 9, 14, 29
Ansonia Wire & Cable Co., 63 Main St., Ansonia, Conn., 71
Antara Chemicals Div., See General Dyestuff Corp.
Antenna Specialists Co., 12415 Euclid Ave., Cleveland 6, Ohio, 19, 24, 25
Anton Electronic Labs., Inc., 1226 Flushing Ave., Brooklyn 37, N.Y., 45, 55, 56, 58, 64, 80, 94
For details see ad on page 226
Apahouser Corp. of N.E., 104 Brookline Ave., Boston 15, Mass., 75, 77, 93
Apple Frequency Measuring Service, H. L., 409 Union Ave., Burlington, N.C., 15, 92
Applegate & Co., C. J., 1816 Grove St., Boulder, Colo., 45, 58, 63, 73, 75, 80, 92, 93
Applied Electronics Co., Inc., 1246 Folsom St., San Francisco 3, Calif., 1, 23, 24, 25
Applied Science Corp. of Princeton, P.O. Box 44, Princeton, N.J., 52, 66, 73, 75, 80
For details see ad on page 238
Approved Electronic Instrument Corp., 928 Broadway, New York 10, N.Y., 1, 14, 45, 96
Arc Equipment Co., 85 Fifth Ave., Paterson 4, N.J., 13, 45, 80
Arco Electronics, Inc., 103 Lafayette St., New York 13, N.Y., 99
See complete catalog in last section
Ardente Acoustic Laboratories, Ltd., 62 Horn Lane, Acton, London, W. 3, England, 1, 5, 7, 8, 9, 14, 29, 32, 46, 54, 73, 80
Arenberg Ultrasonic Laboratory, 94 Green St., Jamaica Plains 30, Mass., 70, 73, 80, 93
Arey Machine Co., 38 Long Ave., Hillside 5, N.J., 6, 34, 71
Arma Corp., Roosevelt Field, Garden City, L.I., N.Y., 43, 49, 59, 65, 75, 80
Armco Steel Corp., 703 Curtis St., Middletown, Ohio, 83
Armstrong Co., A. T. R., 50 St. Clair Ave., W., Toronto, Ont., Canada, 9, 14, 26, 34, 39, 44, 47, 48, 49, 52, 99
Armstrong Cork Co., Lancaster, Pa., 77, 81
Arnhold Ceramics, Inc., 1 E. 57 St., New York 22, N.Y., 30, 31, 49
Arnold Engineering Co., P.O. Box G, Marnego, Ill., 36, 41
Arro Expansion Bolt Co., North Boone Ave., Marion, Ohio, 26
Arrow-Hart & Hegeman Electric Co., 103 Hawthorn St., Hartford 6, Conn., 52
Arrow Radio Co., 1829 Davenport Rd., Toronto, Ont., Canada, 30, 38
Art Wire & Stamping Co., 227 High St., Newark 2, N.J., 87
For details see ad on page 299
Art-Lloyd Metal Prods. Corp., 2973 Cropsey Ave., Brooklyn 14, N.Y., 29, 32, 75
Artos Engineering Co., 2757 S. 28 St., Milwaukee 46, Wis., 82
For details see ad on page 289
Arvin Industries, Inc., Columbus. Ind., 14

(Continued on page 9)

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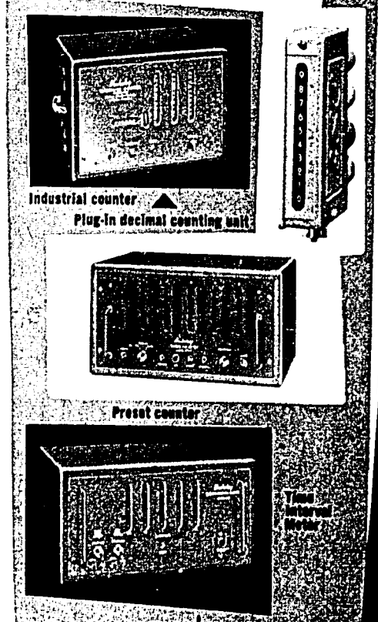
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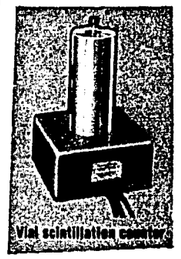
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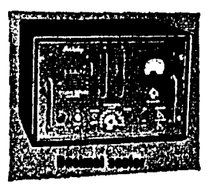
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Askania Regulator Co., 240 E. Ontario St., Chicago 11, Ill., 65

Assembly Products, Inc., 35 N. Main St., Chagrin Falls 17, Ohio, 42, 48

Associated Electronics Co., 132 Nassau St., New York 7, N.Y., 15, 73, 75, 80, 98

Associated Research, Inc., 3758 W. Belmont Ave., Chicago 18, Ill., 45, 49, 54, 61, 73, 90

Associated Specialties Co., 1751 Main St., Orefield, Pa., 45
For details see ad on page 185

Astatic Corp., 250 Harbor St., Conneaut, Ohio, 8, 9, 10, 14

Astron Corp., 255 Grant Ave., East Newark, N.J., 30, 38
For details see ad on page 136

Atlantic Electronics Corp., 4 Manhasset Ave., Pt. Washington, L.I., N.Y., 1, 33, 39, 40, 59, 60, 65, 73

Atlantic India Rubber Works, Inc., 571 W. Polk St., Chicago 7, Ill., 77, 81, 84
For details see ad on page 9

Atlas E. E. Corporation, Bedford Airport, Bedford, Mass., 39, 77

Atlas Electric Products Co., P.O. Box 1591, Erie, Pa., 77

Atlas Metal Stamping Co., Kensington & Castor Ave., Philadelphia 24, Pa., 60, 65, 67

Atlas Resistor Co., 423 Broome St., New York 13, N.Y., 49

Atlas Sound Corp., 1449 39 St., Brooklyn 18, N.Y., 7, 8, 29

Atomic Instrument Co., 84 Massachusetts Ave., Cambridge 39, Mass., 45, 56, 59, 60, 61, 64, 66, 88, 93, 94
For details see ad on page 229

Auburn Button Works, Inc., Auburn, N.Y., 75, 84, 85

Auburn Mfg. Co., Stack St., Middletown, Conn., 77, 79

Audel & Co., Theo., 49 W. 23 St., New York 10, N.Y., 97, 98

Audicraft, Inc., 77 S. 5th St., Brooklyn 11, N.Y., 7

Audio Corp. of America, 1111 E. Elizabeth Ave., Linden, N.J., 60, 72, 73, 75, 80

Audio Development Company, 2833 Thirteenth Ave., S. Minneapolis 7, Minn., 4, 6, 54

Audio Devices, Inc., 444 Madison Ave., New York 22, N.Y., 10

Audio Equipment Co., Inc., 805 Middle Neck Rd., Great Neck L.I., N.Y., 7

Audio Industries, Inc., 532 W. Fourth St., Michigan City, Ind., 9, 10, 11, 14

Audio Instrument Co., Inc., 133 W. 14 St., New York 11, N.Y., 1, 8, 88, 90, 91

Audio Master Corp., 341 Madison Ave., New York 17, N.Y., 9, 10 11

Audio-Tone Oscillator Co., 237 John St., Bridgeport 3, Conn., 1, 5, 65, 88, 91

Augat Bros., Inc., 33 Perry Ave., Attleboro, Mass., 75, 87

Auricon Div., Berndt-Bach, Inc., 7377 Beverly Blvd., Los Angeles 36, Calif., 1, 9, 16, 43

Austin Company, 76 9th Ave., New York 11, N.Y., 59, 60, 64, 65, 66, 73, 75, 80, 90

Auto-Test, Inc., 600 S. Michigan, Chicago 5, Ill., 32, 45, 52, 54, 73, 75, 80

Automatic Electric Co., 1033 W. Van Buren St., Chicago 7, Ill., 6, 8, 20, 25, 30, 44, 48, 49, 52, 69

Automatic Elec. Mfg. Co., 10 State St., Mankato, Minn., 48, 52

Automatic Manufacturing Corp., 65 Gouverneur St., Newark 4, N.J., 30, 33, 54

Automatic Switch Co., 391 Lakeside Ave., Orange, N.J., 48

Automatic Temperature Control Co., 5212 Pulaski Ave., Philadelphia 44, Pa., 48, 59, 60, 61, 65

Aviation Accessories, Inc., Box 4178, Ft. Worth 6, Tex., 1, 18, 80

Avion Instrument Corp., 299 State Highway No. 17, Paramus, N.J., 1, 10, 35, 45, 49, 58, 59, 61, 65, 66, 67, 73, 80, 96

Avimo, Ltd., Taunton, Somerset, England, 58, 80

Babillus, John, 1381 Elmhurst Dr., N.E., Cedar Rapids, Iowa, 73

Bace Television Corp., Green & Leveningg St., S. Hackensack, N.J., 14

Bache & Co., Semon, 636 Greenwich St., New York 14, N.Y., 89

Baer Company, N. S., 91-11 Montgomery St., Hillside 5, N.J., 75, 77, 85, 87

Bailey Meter Co., 1050 Ivanhoe Road, Cleveland 10, Ohio, 35, 40, 59, 60, 65, 66, 91

Baird Associates, Inc., 33 University Rd., Cambridge 38, Mass., 90

Baker Co., Inc., 113 Astor St., Newark 5, N.J., 77

Baker Co., Inc., Maplewood, Maine, 29, 82

Baker Co., George W., 29 Holly Pl., Stamford, Conn., 55, 56, 80

Balco Research Laboratories, 49-53 Edison Pl., Newark 2, N.J., 4, 30, 38, 46, 49, 73

Baldwin Engineering Service, 11168 Santa Monica Blvd., Los Angeles 25, Calif., 73

Ballantine Laboratories, Inc., Boonton, N.J., 1, 35, 88, 90
For details see ad on page 304

Ballastran Corp., 1701 North Calhoun St., Fort Wayne 7, Ind., 33, 54, 61

Baltic Metal Products Co., 120 Sutton St., Brooklyn 22, N.Y., 29, 32

Barber-Colman Co., Rockford, Ill., 53X

Barber Laboratories, Alfred W., 32-44 Francis Lewis Blvd., Flushing 58, N.Y., 25, 80
For details see ad on page 282

(Continued on page 11)

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Barco, Inc., Box 1222, Milwaukee 1, Wis., 30
For details see ad on page 11
Bardwell & McAlister, 2950 N. Ontario, Burbank, Calif., 1, 4, 16, 32, 38, 44, 73, 90
Barker Sound Reproducers, 3 Newman Yard, London W. 1, England, 7
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 1, 4, 8, 19, 22, 24, 25, 31, 33, 38, 40, 52, 54, 88, 96
For details see ad on page 408
Barnes & Reinecke, Inc., 230 E. Ohio St., Chicago 11, Ill., 65, 73, 80
Barry Corporation, The, 718 Pleasant St., Watertown 72, Mass., 77
Barry Electronics Corp., 136 Liberty St., New York 6, N.Y., 47
Bart Laboratories Co., Inc., 227 Main St., Belleville 9, N.J., 67, 70, 75, 93
For details see ad on page 259
Bartlett, Frederick P., 6114 N. Lawndale Ave., Chicago 45, Ill., 7, 30
Baruch, Sydney N., 1476 Broadway, New York 36, N.Y., 80
Bassett, Inc., Rex, Bassett Bldg., Fort Lauderdale, Fla., 13, 14, 18, 19, 23, 24, 25, 37, 42, 45, 88, 92, 96
Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio, 73, 80
Bauman & Bluzat, 2763 W. North Ave., Chicago 47, Ill., 99
For details see ad on page 344
Bead Chain Mfg. Co., 11 Mountain Grove St., Bridgeport 5, Conn., 77, 87
For details see ad on page 268
Becker Electronics Mfg. Corp., 1091 Rockaway Ave., Valley Stream, L.I., N.Y., 7
Beckman Div., Beckman Instruments, Inc., 820 Mission St., South Pasadena, Calif., 42, 64, 65, 90, 94
Beede Electrical Instrument Co., Inc., West St., Penacook, N.H., 42, 88
Bel Fuse, Inc., 311 Mountain Rd., Union City, N.J., 39
For details see ad on page 165
Belden Mfg. Co., 4641 W. Van Buren St., Chicago 44, Ill., 26, 71
For details see ad on Cover II
Bell Sound Systems, Inc., 555 Marion Rd., Columbus 7, Ohio, 1, 5, 11, 45
Bell Telephone Laboratories, 463 West St., New York 14, N.Y., 80
Bell Television, Inc., 254 W. 54 St., New York 19, N.Y., 14
Bellaire Electronics, Inc., 30 Prince St., Brooklyn 1, N.Y., 33, 54, 96
Belock Instrument Corp., 111-01 14 Ave., College Point 56, N.Y., 1, 45, 59, 60, 65, 73
Bendix Aviation Corp., Bendix Radio Div., Towson 4, Md., 18, 21, 24, 25, 68, 69
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Cincinnati Div., 203 W. 3rd St., Cincinnati 2, Ohio, 64, 90, 94
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Eclipse-Pioneer Div., Teterboro, N.J., 43, 45, 58, 65, 67
For details see ad on pages 366-367
Bendix Aviation Corp., Friez Instr. Div., 1400 Taylor Ave., Baltimore 4, Md., 49
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, North Hollywood, Calif., 46, 59, 61, 65, 66, 67, 68, 69
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Red Bank Div., Highway 35, Eatontown, N.J., 35, 43, 56, 57
For details see ad on page 176
Bendix Aviation Corp., Research Div., Fisher Bldg., Detroit 2, Mich., 14, 18, 21, 24, 34, 40, 43, 46, 55, 56, 57, 58, 59, 64, 65, 66, 67, 68, 69, 72, 94
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Scintilla Magneto Div., Sherman Ave., Sidney, N.Y., 34
For details see ad on pages 176, 366-367
Bentley, Harris Mfg. Co., Hector & Lime Sts., Conshohocken, Pa., 79
Berkeley and Assoc., Edmund C., 36 W. 11 St., New York 11, N.Y., 59, 97, 98
Berkeley, Div. of Beckman Instruments, Inc., 2200 Wright Ave., Richmond 3, Calif., 13, 15, 42, 59, 60, 64, 93, 94
For details see ad on page 8
Berkshire Laboratories, 584 Beaver Pond Rd., Lincoln, Mass., 1, 4, 45, 50, 54, 60, 73, 77, 80, 88, 90, 93, 96
For details see ad on page 315
Berkshire Transformer Corp., 15 South Avenue, New Milford, Conn., 54
Berlant Associates, 4917 W. Jefferson Blvd., Los Angeles 16, Calif., 1, 3, 9, 10
Berndt-Bach, Inc., 7377 Beverly Blvd., Los Angeles 36, Calif., 1, 9, 16, 43
Berry Engineers, James S., Savannah, Tenn., 73, 80
Best Mfg. Co., Inc., 1200 Grove St., Irvington 11, N.J., 7, 33, 54
Besteraft Products Co., Inc., 626 Broadway, New York 12, N.Y., 7, 79
Beta Electric Corp., 333 E. 103 St., New York 29, N.Y., 42, 45, 90
Beva Laboratory, P.O. Box 478, Trenton, N.J., 45, 95
Bibbero, M. S. E., Robert J., 773 Potomac Ave., Buffalo 9, N.Y., 73
Biddle Co., James G., 1316 Arch St., Philadelphia 7, Pa., 42, 48, 49, 90
Biophysical Instruments, Inc., 37 Herman St., Philadelphia 44, Pa., 1, 45, 63, 64, 90, 94
Bird Electronic Corp., 1800 E. 38 St., Cleveland 14, Ohio, 26, 38, 52, 96
Birmingham Sound Reproducers, Ltd., Claremont Works, Old Hill, Staff., England, 1, 9
Birnbach Radio Co., Inc., 145 Hudson St., New York 13, N.Y., 6, 19, 26, 52, 71, 72
For details see ad on pages 103 & 248
(Continued on page 13)

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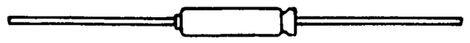
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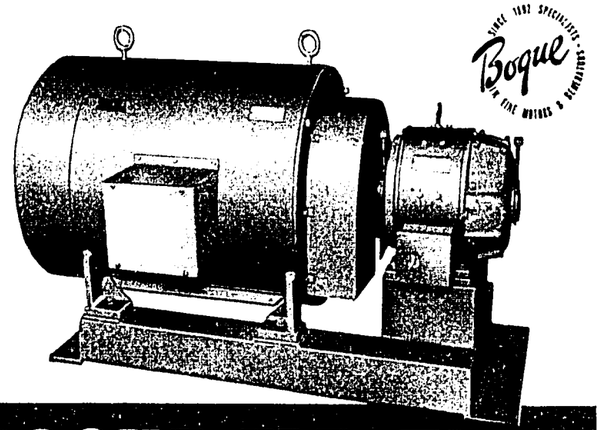
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Alphabetical Directory

(Continued from page 11)

Bishop Manufacturing Corp., 10 Canfield Rd., Cedar Grove, N.J., 77, 79, 81
Bitter, A. R., 1702 Wayne St., Toledo 9, Ohio, 73
Bittermann Electric Co., Canaan, Conn., 33, 41, 54
Biwax Corp., 3445 Howard St., Skokie, Ill., 81
For details see ad on page 287
Blackstone Electric Co., 561 Hillgrove Ave., La Grange, Ill., 33, 62, 72, 75
Blaw-Knox Co., Farmers Bank Bldg., Blaw-Knox 22, Pa., 12, 67
Bliley Electric Co., Union Station Bldg., Erie, Pa., 37, 70, 92
For details see ad on page 12
Bliss-Warren Electronic Corp., Box 123, Sussex, N.J., 1, 45, 60, 71, 75, 80
Blonder-Tongue Laboratories, Inc., 526-536 North Ave., Westfield, N.J., 2, 14, 52, 54, 60
Bludworth Marine Div., National-Simplex-Bludworth, Inc., 92 Gold St., New York 38, N.Y., 23, 24, 25, 43, 67, 68, 69
Bodnar Industries, Inc., 19 Railroad Ave., New Rochelle, N.Y., 35, 45, 75, 77
For details see ad on page 269
Boehme, Inc., H. O., 915 Broadway, New York 10, N.Y., 53, 75, 80, 91
Boesch Mfg. Co., Inc., 45 River St., Danbury, Conn., 73, 75, 82
Bogart Mfg. Co., 315 Siegel St., Brooklyn 6, N.Y., 2, 26, 34, 52, 67, 70, 93, 96
Bogen Co., Inc., David, 29 Ninth Ave., New York 14, N.Y., 1, 5, 9, 14, 29
Bogue Electric Manufacturing Co., 52 Iowa Ave., Paterson 3, N.J., 43, 45, 47, 58, 60
For details see ad on page 13
Bolt-Beranek and Newman, 16 Eliot St., Cambridge 38, Mass., 73
Bomac Laboratories, Inc., Beverly, Mass., 50, 56, 57
For details see ad on pages 382-383
Bond Electronics Corp., 60 Springfield Ave., Springfield, N.J., 33, 49
Bone Engineering Corp., 701 W. Broadway, Glendale 4, Calif., 45, 67, 70, 75, 82, 90, 93

(Continued on page 15)

NOTES

Alphabetical Directory

(Continued from page 13)

Boom Electric & Amplifier Co., Inc., 1227 W. Washington Blvd., Chicago 7, Ill., 1, 5

Boonton Radio Corp., Intervale Rd., Boonton, N.J., 90, 93, 96
For details see ad on page 332

Borden Company, Chemical Div., 350 Madison Ave., New York 17, N.Y., 81, 85

Borden Engineering Co., 63 Clinton Ave., New Providence, N.J., 42, 61, 90

Borg Equipment Div., Geo. W. Borg Corp., Janesville, Wis., 4, 43, 49, 67, 92

Borthig Co., Inc., George C., P.O. Box 115, E. Rutherford, N.J., 81

Boston Insulated Wire & Cable Co., 65 Bay St., Dorchester 25, Mass., 71

Bourns Laboratories, 6135 Magnolia Ave., Riverside, Calif., 49, 90

Bowmar Instrument Corp., 2415 Pennsylvania Ave., Fort Wayne 4, Ind., 65

Boyle Metalcraft Corp., 150 Sullivan St., Brooklyn 31, N.Y., 29, 32, 80
For details see ad on page 132

Bozak Company, The R. T., 114 Manhattan St., Stamford, Conn., 7

Brach Mfg. Corp., 200 Central Ave., Newark 3, N.J., 6, 19, 26, 39

Bradley Laboratories, Inc., 168 Columbus Ave., New Haven, Conn., 47

Brady Company, W. H., 727 W. Glendale Ave., Milwaukee 12, Wis., 77

Brainin Company, C. S., 320 Washington St., Mt. Vernon, N.Y., 52, 77, 83
For details see ad on page 208

Brand and Co., Inc., William, North & Valley Sts., Willimantic, Conn., 71, 79, 85, 87
For details see ad on page 15

Branson Corp., 113 Cornelia St., Boonton, N.J., 48

Branson Instruments, Inc., 430 Fairfield Ave., Stamford, Conn., 90

Braun Tool & Instrument Co., Inc., H., 140 Fifth Ave., Hawthorne, N.J., 75, 83
For details see ad on page 261

Breeze Corporations, Inc., 41 S. 6th St., Newark 7, N.J., 34

Bremer Electronics, 43 Washington Ave., Lake Hiawatha, N.J., 1, 19, 24

Brentano's Technical Department, 586 Fifth Ave., New York 36, N.Y., 98

Breon Laboratories, 1520 Evergreen Rd., Williamsport, Pa., 37

Brevel Products Corp., 508 Broome St., New York 13, N.Y., 65

Brew and Co., Inc., Richard D., 106 Concord Ave., Belmont 78, Mass., 70, 78

Brick Electronic Equipment Co., Norwood, N.J., 22, 73, 80

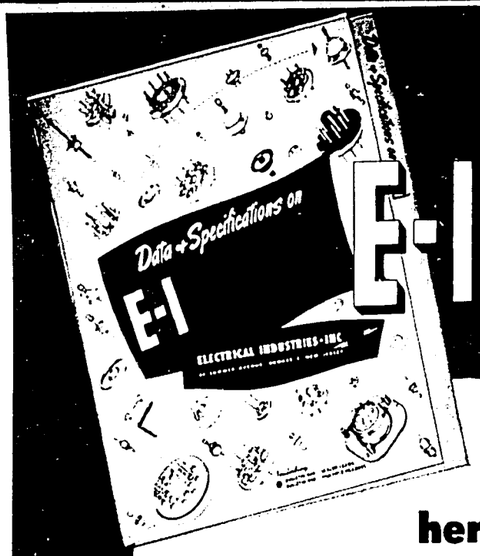
Bridgeport Brass Co., 30 Grand St., Bridgeport 2, Conn., 83

Bright Star Battery Co., 600 Getty Ave., Clifton, N.J., 27

Brilhart Plastics Sales Corp., P.O. Box 31, Mineola, L.I., N.Y., 6, 75

(Continued on page 17)

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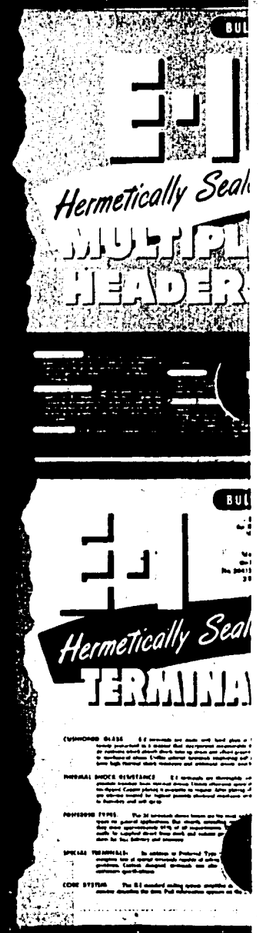
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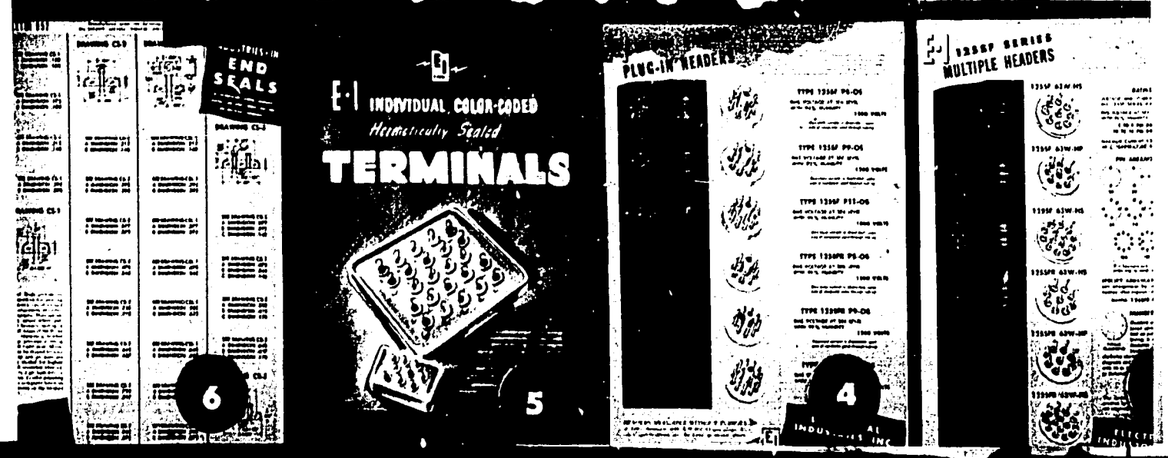
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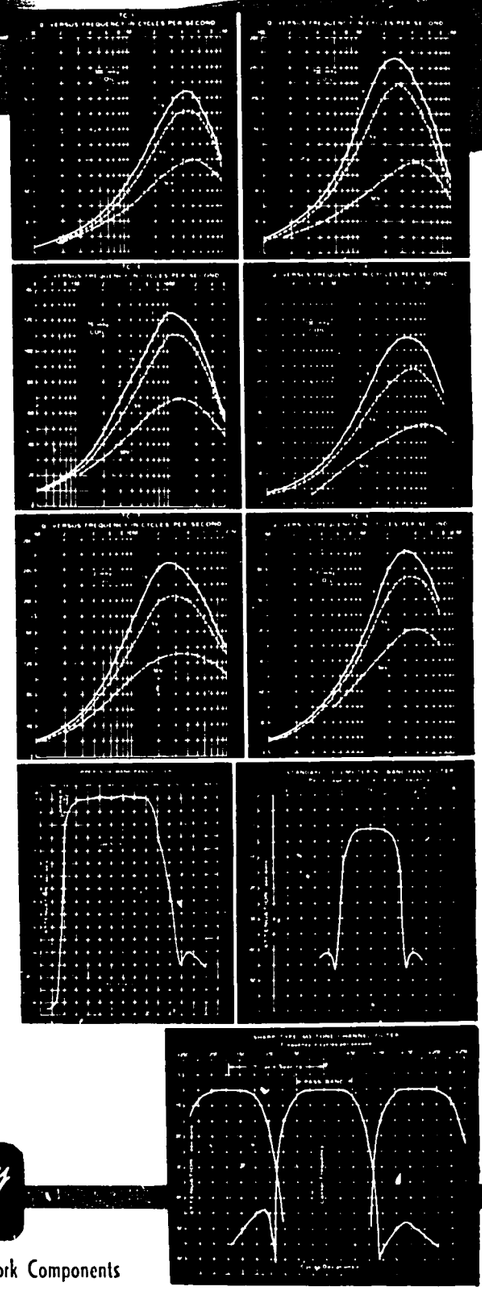




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	Page
PINK SECTION gives guide to Products Index by products in the 10 Product Directories.	i-viii
PART 2—Alphabetical List of Firms	3-96
PART 3—Product Directory in 10 Sections	97-360
1. Audio Equipment	97
2. Broadcasting	113
3. Communications	121
4. Components	129
5. Electronic Applications	227
6. Radar-Microwave	241
7. Services, Materials and Consultants	249
8. Test Equipment	305
9. Educational	339
10. Distribution	343
PART 4—Complete Data Spreads	361-455
CATALOGS	456
Ad Index:	Cover 3

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Alphabetical Directory

(Continued from page 15)

Brilmayer Laboratories, Inc., E. W., 80 Fulton St., New York 38, N.Y., 90
Bristol Co., Waterbury 20, Conn., 20, 35, 42, 52, 53X, 60, 65, 66, 77, 91
Bristol Motor, Old Saybrook, Conn., 43
Broadcast Equipment Specialties Corp., 135-01 Liberty Ave., Richmond Hill 19, L.I., N.Y., 11
Brociner Electronics Lab., 154c Second Ave., New York 28, N.Y., 1, 4, 7, 8
Brofman Machine Corp., 2 Merle Ave., Oceanside, L.I., N.Y., 75, 77
Brook Electronics, Inc., 34 Dehart Pl., Elizabeth 2, N.J., 1
Brookhaven Electronics Corp., P.O. Box 931, Sanford, N.C., 34
Brooks & Perkins, Inc., 1950 W. Fort St., Detroit 16, Mich., 29, 67, 75
Brooks Radio & Television Corp., 84 Vesey St., New York 7, N.Y., 29, 87
Brown-Brockmeyer Co., 1000 S. Smithville Rd., Dayton 1, Ohio, 43
Brown Electro-Measurement Corp., 4635 S.E. Hawthorne Blvd., Portland 15, Ore., 2, 49, 90
Brown, W. J., 71 Gurley Rd., Stamford, Conn., 73
Browning Laboratories, Inc., 750 Main St., Winchester, Mass., 13, 14, 45, 60, 95
For details see ad on page 326
Brownthorn Electronics, 162 E. 58 St., New York 16, N.Y., 45, 58, 60, 73, 80
Bruning Co., Inc., Charles, 125 North St., Teterboro, N.J., 82
Brush Electronics Co., 3405 Perkins Ave., Cleveland 14, Ohio, 1, 7, 8, 10, 11, 37, 42, 61, 72, 88, 90, 91
Brush Nail Expansion Bolt Co., Greenwich, Conn., 77
Buchanan Electrical Products Corp., 234 Route 22, Hillside, N.J., 77, 82
Buck Engineering Co., Inc., 37-41 Marcy St., Freehold, N.J., 29, 32, 75, 80, 90
Bud Radio, Inc., 2118 E. 55 St., Cleveland 3, Ohio, 6, 12, 26, 29, 31, 32, 33, 38, 75, 77
For details see ad on pp. 267 & 346
Budelman Radio Corp., 375 Fairfield Ave., Stamford, Conn., 1, 5, 17, 20, 24, 25, 67, 68, 69, 80
Buggie, Inc., H. H., 726 Stanton St., Toledo 1, Ohio, 6, 24, 34
For details see ad on page 153
Burgess Battery Co., Freeport, Ill., 27
For details see ad on page 131
Burke Electric & X-Ray Co., Ltd., 61-63 Yorkville Ave., Toronto 5, Ont., Canada, 23, 45, 73, 80
Burke & James, Inc., 321 S. Wabash, Chicago 4, Ill., 95
Burlington Instrument Co., 203 N. Third St., Burlington, Iowa, 42, 58, 88, 92
For details see ad on page 173
Burndy Engineering Co., Inc., Norwalk, Conn., 34, 77
Burnell & Co., 45 Warburton Ave., Yonkers 2, N.Y., 3, 4, 33, 70
For details see ad on page 16
Burnett Radio Laboratory, Wm. W. L., 4814 Idaho St., San Diego 16, Calif., 15, 33, 37, 73, 80
Burroughs Corp., New Products Div., 511 N. Broad St., Philadelphia 23, Pa., 45, 54, 59, 80, 89, 93
See complete catalog in last section
Burstein-Applebee Co., 1012 McGee St., Kansas City 6, Mo., 99
For details see ad on page 346
Burton-Rogers Co., 292 Main St., Cambridge 46, Mass., 12, 42
Busse & Schroeder, 1575 Noblestown Rd., Pittsburgh 20, Pa., 73
Bussmann Mfg. Co., University at Jefferson, St. Louis, 7, Mo., 39
For details see ad on page 166
CBS Hytron Div., Columbia Broadcasting System, 100 Endicott St., Danvers, Mass., 50, 55, 56, 57
C. G. S. Laboratories, 391 Ludlow St., Stamford, Conn., 2, 3, 66, 69, 80, 90, 96
C and H Sales Company, 2176 E. Colorado St., Pasadena 8, Calif., 19, 28, 37, 42, 43, 52, 65, 67
C & H Supply Company, Metal-Cal Div., Adm. Bldg., King County Airport, Seattle 8, Wash., 77
Caddell-Burns Mfg. Co., Inc., 40 E. 2 St., Mineola, L.I., N.Y., 33, 38
Cadillac Employment Agency, Inc., 220 S. State St., Chicago 4, Ill.
For details see ad on page 17
Cadre Industries Corp., 19 Delaware Ave., Endicott, N.Y., 71, 75
Calbest Engineering & Electronics Co., 828 N. Highland Ave., Hollywood 38, Calif., 14, 52, 56, 57
Caldwell Clements, Inc., 480 Lexington Ave., New York 17, N.Y., 98
Caldyne Co., Winchester, Mass., 82, 90
Calfone Corp., 1041 N. Sycamore Ave., Hollywood 38, Calif., 9, 11
Caltron Products Co., 1406 S. Hobart Blvd., Los Angeles 6, Calif., 10, 52
Cambridge Thermionic Corp., 445 Concord Ave., Cambridge 38, Mass., 31, 33, 54, 72, 75, 77
For details see ad on page 254
Cambridge University Press, 32 E. 57 St., New York 22, N.Y., 98
Camera Equipment Co., 1600 Broadway, New York 19, N.Y., 11, 16, 73, 80
For details see ad on page 119
Camloc Fastener Corp., 420 Lexington Ave., New York 17, N.Y., 77, 82
Campbell Co., Colin, Westville Ave. Extension, Danbury, Conn., 33, 40, 54
Campbell Industries, Inc., St. Elmo Station, Chattanooga 9, Tenn., 49
For details see ad on page 199

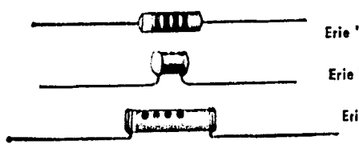
(Continued on page 19)

Campbell Mfg. Co., Ltd., 45 Sheppard Ave., E., Willowdale, Ont., Canada, 7, 8, 9, 11, 24, 84
Canada Wire & Cable Co., Ltd., Postal Sta. R, Toronto 17, Ont., Canada, 71
Canadian General Electric Co., 830 Lansdowne Ave., Toronto, Ont., Canada, 1, 5, 12, 13, 16, 17, 18, 20, 22, 23, 24, 25, 67, 68, 69, 73, 93
Canadian Industries, Ltd., P.O. Box 10, Montreal, Que., Canada, 81, 85
Canadian Marconi Co., 2442 Trenton Ave., Montreal 16, Que., Canada, 1, 5, 24, 25, 33, 37
Canadian Porcelain Co., Ltd., Box 428, Hamilton, Ont., Canada, 72
Canadian Radium & Uranium Corp., 630 5th Ave., New York 20, N.Y., 80, 83, 89
Canadian Research Institute, 46 St. George St., Toronto 5, Ont., Canada, 1, 16, 42, 43, 45, 58, 59, 60, 61, 62, 63, 80, 88, 89, 90, 96
Canadian Westinghouse Co., Ltd., Hamilton, Ont., Canada, 14, 17, 18, 23, 25, 33, 36, 40, 54, 55, 56, 59, 60, 62, 68, 69
Cannon Co., C. F., Springwater, N.Y., 7
Cannon Electric Co., 3209 Humboldt St., Los Angeles 31, Calif., 6, 34, 52
For details see ad on page 148
Canoga Corp., 5955 Sepulveda, Van Nuys, Calif., 32, 65, 67, 69, 70, 73, 80
Capehart Farnsworth Corp., Fort Wayne 1, Ind., 14, 59, 65, 67, 68, 69, 70, 80
Capitol Radio Eng. Institute, 3224 16 St., N.W., Washington 10, D.C., 97
Capps & Co., Frank L., 20 Addison Pl., Valley Stream, L.I., N.Y., 8, 9, 10
Carboloy Dept., General Electric Co., 11177 E. Eight Mile Rd., Detroit 32, Mich., 41, 49, 83
Carbonneau Industries, 100 Lexington S.W., Grand Rapids, Mich., 7
Carborundum Co., Globar Div., Niagara Falls, N.Y., 49
Cardwell Mfg. Corp., The Allen D., 97 Whiting St., Plainville, Conn., 16, 19, 22, 31, 35, 46, 52, 60, 65, 67, 68, 69, 70
Cargo Packers, Inc., 73 Rutledge St., Brooklyn 11, N.Y., 75, Packing for electronic equipment
For details see ad on page 260
Carling Electric, Inc., 505 New Park Ave., West Hartford 10, Conn., 52
Carolina Sound Equipment Service, 614 Clement Ave., Charlotte, N.C., 73, 80, 99
Carpenter Steel Co., The, Front & Bern Sts., Reading, Pa., 83
Carrier Corp., 300 S. Geddes St., Syracuse, N.Y., 82
Carter Motor Co., 2644 N. Maplewood Ave., Chicago 47, Ill., 35, 43, 45
For details see ad on page 19
Carter Parts Co., 213 Institute Pl., Chicago 10, Ill., 6, 49, 52
Cascade Research Corp., 53 Victory Lane, Los Gatos, Calif., 70, 93
Cast Optics Corp., 1010 Post Rd., Riverside 6, Conn., 75, 79, 85
Castlewood Manufacturing Co., 12th & Burnett Sts., Louisville 10, Ky., 29
Cathodeon, Ltd., Church St., Cambridge, England, 37, 55, 57, 78
Celanese Corporation of America, 180 Madison Ave., New York 16, N.Y., 85
Celomat Corp., 521 W. 23 St., New York 11, N.Y., 75, 84, 85
Central Rediffusion Services, Ltd., Carlton House, Lower Regent, London, S.W.1, England, 1, 5, 15, 17, 18, 23, 60, 62, 75, 96
Central Research Laboratories, Inc., Red Wing, Minn., 73, 75, 80, 93, 95
Central Sales & Mfg. Corp., 1 Richwood Pl., Denville, N.J., 56, 57, 82, 90
Central Scientific Company, 1700 Irving Park Rd., Chicago 13, Ill., 49, 82, 89, 90, 92, 95
Central Stamping & Mfg. Co., 900 S. Division, Polo, Ill., 29, 32, 75, 87
Central Transformer Co., 910 Jackson Blvd., Chicago 7, Ill., 3, 4, 33, 41, 54
Centralab, Div. Globe Union, Inc., 900 Keefe Ave., Milwaukee 1, Wis., 1, 2, 26, 27, 30, 31, 37, 38, 46, 49, 52, 72, 78
See complete catalog in last section
Centronics Co., 21-04 122nd St., College Point 56, L.I., N.Y., 46, 78
For details see ad on page 186
Century Electric Co., 1806 Pine St., St. Louis 3, Mo., 43
Century Electronics, Div. Century Metalcraft Corp., 14806 Oxnard St., Van Nuys, Calif., 17, 67, 68, 69, 70, 92, 93, 96
For details see ad on page 329
(Continued on page 21)

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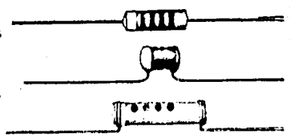
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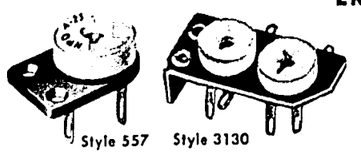


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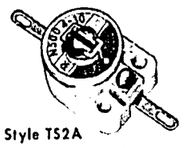


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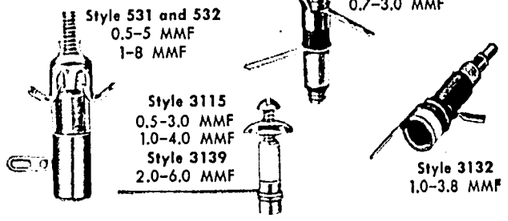


Style 557
1.5–7 MMF
3–12 MMF
5–25 MMF
150–190 MMF

Style 3130
5–30 MMF
8–50 MMF
65–95 MMF

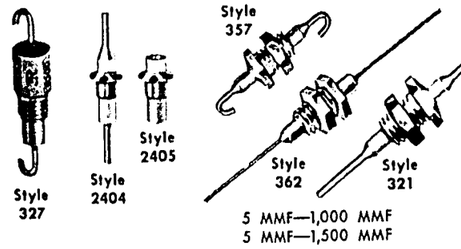


Style TS2A
1.5–7 MMF
3–12 MMF
3–13 MMF
5–20 MMF
4–30 MMF
7–45 MMF



Style 531 and 532
0.5–5 MMF
1–8 MMF
Style 535
0.7–3.0 MMF
Style 3115
0.5–3.0 MMF
1.0–4.0 MMF
Style 3139
2.0–6.0 MMF
Style 3132
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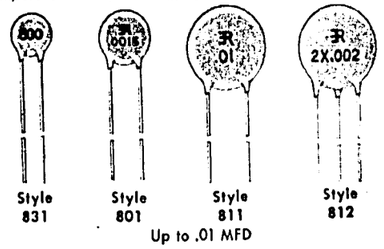
ERIE FEED-THRU CERAMICONS



Style 327
Style 2404
Style 2405
Style 362
Style 357
Style 321
5 MMF—1,000 MMF
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Style 2416
Style 2418

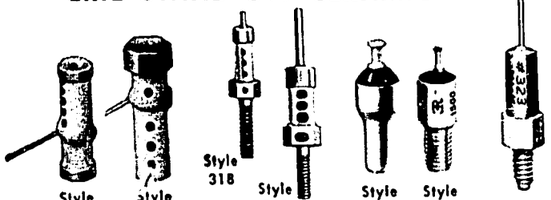
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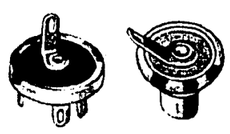
Style 831
Style 801
Style 811
Style 812
Up to .01 MFD

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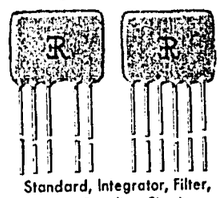
Style 2322
Style 2336
Style 318
Style 319
Style 325
Style 326
Style 323 and 324
5 MMF—5,000 MMF

ERIE BUTTON* MICA CAPACITORS



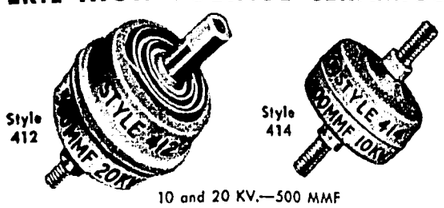
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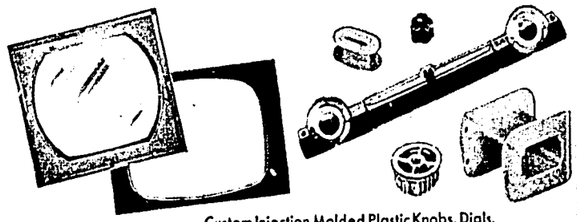
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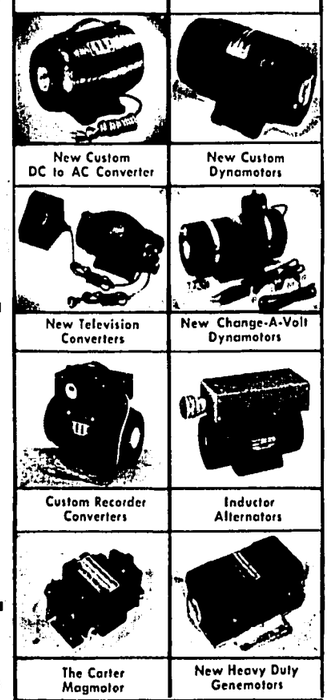
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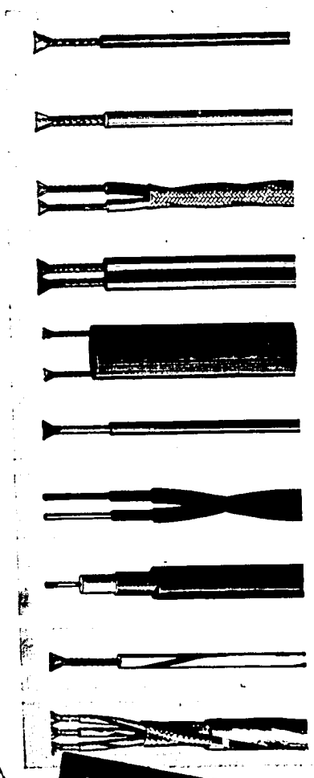
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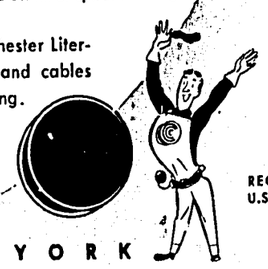
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(Continued from page 19)

Century Geophysical Corp., 1333 North Utica, Tulsa, Okla., 42, 61, 91, 95
Century Lighting, Inc., 521 W. 43rd St., New York 36, N.Y., 8, 16, 60
Century Projector Corp., 729 Seventh Ave., New York 19, N.Y., 1, 16
Ceramaseal Co., The, Box 25, New Lebanon Center, N.Y., 78, 87
Ceramic Specialties Co., 444 W. Sixth St., East Liverpool, Ohio, 30
Certified Radio Laboratories, 5507 13th Ave., Brooklyn 19, N.Y., 14
Champion Electric Corp., The Drove 1, New Haven, Sussex, England, 1, 14, 18, 19, 21, 43
Channel Master Corp., Ellenville, N.Y., 26, 67
Charp, S., 39 Maple Ave., Upper Darby, Pa., 73
Chase Brass & Copper Co., 236 Grand St., Waterbury 20, Conn., 71, 77, 86
Chase Resistor Co., 9 River St., Morristown, N.J., 49
Chatham Electronics Corp., 630 Mt. Pleasant Ave., Livingston, N.J., 45, 49, 55, 56, 62, 64, 94
For details see ad on pages 404-405
Chemo-Vac Electronic Corp., 760 Reed St., Santa Clara, Calif., 30, 31
Chemical Development Corp., Endicott St., Danvers, Mass., 79, 81
Cherry-Channer Corp., 1488 Skokie Blvd., Highland Park, Ill., 71
For details see ad on page 248
Cherry Electrical Products Corp., 3080 Skokie Valley Rd., Highland Park, Ill., 52
Chester Cable Corp., Chester, N.Y., 26, 71
For details see ad on page 20
Chicago Condenser Corp., 3255 W. Armitage Ave., Chicago 47, Ill., 30
For details see ad on page 134
Chicago Die Mold Div., U.S. Rubber, 4001 W. Wrightwood Ave., Chicago 39, Ill., 84
Chicago Electronic Eng. Co., 3223 Armitage, Chicago 47, Ill., 4, 33, 38, 40, 54, 60
Chicago Electronic Laboratories, 800 N. Clark St., Chicago 10, Ill., 80, 95
Chicago Midway Laboratories, 6040 S. Greenwood Ave., Chicago 37, Ill., 80
Chicago Rivet & Machine Co., 9600 W. Jackson Blvd., Bellwood, Ill., 77, 82
For details see ad on page 21
Chicago Telephone Supply Corp., 1142 W. Beardsley, Elkhart, Ind., 49, 52
For details see ad on pages 376-377
Chicago Transformer Div., Essex Wire Corp., 3501 W. Addison St., Chicago 18, Ill., 4, 33, 54
For details see ad on page 212
Chisholm Industries, Ltd., 4515 Main St., Vancouver 10, B.C., Canada, 1, 14, 17, 23, 24, 25, 29, 89
Church Co., George H., 5109 Halifax Ave., Minneapolis 10, Minn., 30, 38
Churchill Cabinet Co., 2119 W. Churchill St., Chicago 47, Ill., 29
Churchill Corp., 7 North Ave., Wakefield, Mass., 29, 32, 75



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For details see ad on page 24
Cima Corp., 119 Braintree St., Allston 34, Mass., 49
Cinaudagraph Speakers, 7334 N. Clark St., Chicago 26, Ill., 7, 9, 54
Cincinnati Molding Co., 2037 Florence Ave., Cincinnati 6, Ohio, 84
Cinch Mfg. Corp., 1026 S. Homan Ave., Chicago 24, Ill., 6, 34, 39, 51, 77
For details see ad on pages 384-385
Cinematic Developments Co., 2125 Thirty Second Ave., San Francisco 16, Calif., 80
Circle Mfg. Co., Inc., P.O. Box 152, Route 6 & 23, Little Falls, N.J., 34
Circuit Controls Co., 3201 Peoria St., Steger, Ill., 6, 29, 52
Citation Products Co., 233 E. 146 St., New York 51, N.Y., 6, 26, 46, 75, 77, 85
For details see ad on page 269
Clare & Co., C. P., 4719 Sunnyside Ave., Chicago 30, Ill., 48, 52
Clark Crystal Co., 2 Farm Road, Marlboro, Mass., 37, 45, 92
Clarke Instrument Div., National Elec. Mach., 919 Jessup Blair Dr., Silver Spring, Md., 6, 14, 34, 53, 75, 80, 87, 94, 96
Clarostat Mfg. Co., Inc., 1 Washington St., Dover, N.H., 2, 49, 52
For details see ad on pages 394-395
Clary Multiplier Corp., 408 Junipero St., San Gabriel, Calif., 46, 59, 64, 92
Clear Beam TV Antennas, 100 Prospect Ave., Burbank, Calif., 26, 67, 71
Cleveland Electronics, Inc., 6611 Euclid Ave., Cleveland 3, Ohio, 7, 26
Clifton Precision Products Co., Marple & Broadway, Clifton Heights, Pa., 40, 43, 65, 75, 80
Clippard Instrument Laboratory, Inc., 7390 Colerain Rd., Cincinnati 24, Ohio, 33, 90
Clough-Brengle Co., 6014 Broadway, Chicago 40, Ill., 88, 90, 96
Coax Electronics Co., 1524 E. 15 St., Brooklyn 30, N.Y., 73, 80
Coaxial Connector Co., 35 North 2nd Ave., Mt. Vernon, N.Y., 6, 24, 26, 34, 48, 52, 67, 70
For details see ad on page 155
Codetyper Laboratories, 550 Fifth Ave., New York 19, N.Y., 53, 80
Cohan-Epner Co., Inc., 142 W. 14th St., New York 11, N.Y., 75
For details see ad on page 263
Cohn Corp., Sigmund., 121 S. Columbus Ave., Mt. Vernon, N.Y., 71, 83
Coil Engineering and Mfg. Co., Roanoke, Ind., 45, 54
Coil Winders, Inc., New York Ave., Westbury, L.I., N.Y., 26, 33, 54
Coil Winding Equipment Co., 19 Maxwell Ave., Oyster Bay, L.I., N.Y., 82
For details see ad on page 291
Coilcraft, Inc., 3716 N. Cicero Ave., Chicago 41, Ill., 26, 33, 49, 54
Cole Instrument Co., 1320 S. Grand Ave., Los Angeles 15, Calif., 1, 2, 28, 29, 32, 33, 38, 40, 41, 42, 45, 48, 49, 52, 54, 58, 59, 60, 64, 73, 75, 80, 88, 90, 96
Coleman Instruments, Inc., 318 Madison St., Maywood, Ill., 58

(Continued on page 23)

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Coles Electronic Corp., 3212 Market St., Philadelphia 7, Pa., 6, 18, 19, 29, 32, 33, 63, 73, 75, 82

Collectron Corp., 216 E. 45th St., New York 17, N.Y., 34
For details see ad on page 23

Collins Radio Co., 855 35th St., N.E., Cedar Rapids, Iowa, 3, 7, 12, 14, 16, 17, 18, 19, 38, 67, 68, 69
For details see ad on pages 428-429

Colortone Television Co., Inc., 238 William St., New York 38, N.Y., 1, 14

Columbia Electric Mfg. Co., 4519 Hamilton Ave., Cleveland 14, Ohio, 42, 43, 49

Columbia Technical Corp., 5 E. 57th St., New York 22, N.Y., 70, 71, 90
For details see ad on page 245

Columbia Wire and Supply Co., 2850 Irving Pk. Rd., Chicago 18, Ill., 71

Comar Electric Co., 3349 W. Addison St., Chicago 18, Ill., 41, 48, 52, 54
For details see ad on page 195

Combustion Control Corp., 77 Broadway, Cambridge 42, Mass., 60

Commercial Plastics Co., Merchandise Mart, Chicago 54, Ill., 75, 85, 87
For details see ad on page 298

Commercial Radio-Sound Corp., 652 First Ave., New York 16, N.Y., 1, 34, 71, 75

Communicating Systems, Inc., 203 E. 18th St., New York 3, N.Y., 1, 5, 18, 24, 25, 26, 38, 45, 65, 75, 77, 80

Communication Accessories Co., 110th St. & Hillcrest Rd., Hickman Mills, Mo., 3, 4, 20, 33, 54
For details see ad on page 144

Communication Devices Co., Inc., 2331 Twelfth Ave., New York 27, N.Y., 17, 18, 21, 23, 24, 25

Communication Equip. & Engineering Co., 5646 W. Race St., Chicago 44, Ill., 1, 4, 5, 14, 20, 21, 24, 29, 32, 88

Communication Measurements Lab., Inc., 350 Leland Ave., Plainfield, N.J., 45, 46, 80, 88, 90
For details see ad on page 312

Communication Parts, 7215 W. Irving Park Rd., Chicago 34, Ill., 4, 33, 38, 54

Communication Products Co., Inc., Broadway and Clark St., Marlboro, N.J., 24, 26, 52, 70, 71, 81, 82
For details see ad on page 285

Communications Company, Inc., 339 Greco Ave., Coral Gables 34, Fla., 18, 21, 23, 24, 25

Component Manufacturers, Inc., 11-04 Jackson Ave., Long Island City 1, N.Y., 33, 54

Components Supply Co., 161 Washington St., New York 6, N.Y., 1, 45

Computer Corp. of America, 149 Church St., New York 7, N.Y., 1, 45, 59, 75, 80, 90

Computer Research Corp., 3348 W. El Segundo Blvd., Hawthorne, Calif., 59, 64, 66, 90

Computing Devices of Canada, Ltd., 338 Queen St., Ottawa, Ont., Canada, 5, 7, 8, 21, 45, 59, 60, 65, 73, 80, 88, 90, 95

Conant Laboratories, 6500 O St., Lincoln 5, Neb., 47

Condenser Products Co., 7517 N. Clark St., Chicago 26, Ill., 30, 31, 45

Condor Radio Mfg. Co., 2705 S. Kramer, Tucson, Ariz., 21, 24, 33, 77, 79

Conn, Ltd., C. G., Electronics Div., 1161 E. Beardsley Ave., Elkhart, Ind., 90

Connecticut Hard Rubber Co., 407 East St., New Haven 9, Conn., 77, 79

Connecticut Marine Instrument Co., Essex, Conn., 23

Connecticut Telephone & Electric Corp., 70 Britannia St., Meriden, Conn., 1, 3, 5, 7, 8, 10, 14, 24, 25, 41, 42, 43, 52, 60, 68, 69, 88, 96

Conrac, Inc., 19217 E. Foothill Blvd., Glendora, Calif., 13, 14

Consolidated Engineering Corp., 300 N. Sierra Madre Villa, Pasadena 15, Calif., 9, 59, 64, 66, 90, 94, 95

Consolidated Molded Products Corp., 309 Cherry St., Scranton 2, Pa., 75

Consolidated Radio Products Co., 350 W. Erie St., Chicago 10, Ill., 7, 9, 54

Consolidated Vacuum Corp., 735 Ridge Road W., Rochester 3, N.Y., 56, 82

Consolidated Wire & Associated Cos., 1635 S. Clinton St., Chicago 16, Ill., 19, 26, 71

Constable Engineering Co., J. M., 101-05 77 St., Ozone Park 17, N.Y., 45, 62, 64

Constantine Engineering Labs. Co., P.O. Box 471, Mahwah, N.J., 33, 40, 54, 61

Constantin & Co., L. L., Rt. 46 & Franklin Ave., Lodi, N.J., 77, 78
For details see ad on page 393

Content, Edward J., Pan American Radio Bldg., 16 Rue Delacroix, Tangier, International Zone, Morocco, 73
For details see ad on page 256

Continental Carbon, Inc., 13900 Lorain Ave., Cleveland 11, Ohio, 49
For details see ad on page 199

Continental-Diamond Fibre Co., 16 Chapel St., Newark, Del., 77, 79, 85
See complete catalog in last section

Continental Electric Co., 715 Hamilton St., Geneva, Ill., 56

Continental Electric Co., Inc., 325 Ferry St., Newark 5, N.J., 43

Continental Electronics, Ltd., 302 Oakland St., Brooklyn 22, N.Y., 73

Continental Electronics Mfg. Co., 4212 S. Buckner Blvd., Dallas 10, Tex., 12, 17, 33

Continental Screw Co., 125 Mt. Pleasant St., New Bedford, Mass., 77

Control Corp., 718 Central Ave. N.E., Minneapolis 14, Minn., 4, 20, 33, 54, 58, 66

Control Engineering Corp., 560 Providence Highway, Norwood, Mass., 90

Control Electronics Co., Inc., 1925 New York Ave., Huntington Station, L.I., N.Y., 70, 90, 96

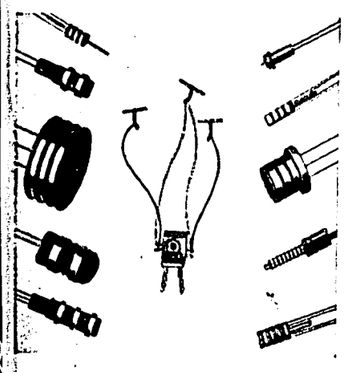
Control Instrument Co., Inc., 67 35 St., Brooklyn 32, N.Y., 45, 59, 64, 70, 93

Controlectric, P.O. Box 68, Gracie Station, New York 28, N.Y., 35, 43, 65

Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill., 48, 52, 73, 75, 80

Cook Laboratories, Route 2, Stamford, Conn., 1, 8, 11

(Continued on page 25)



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CN-503	Liquid	1 year	Heat cure Self cure	3-6 hrs. 1-4 hrs.	Excellent	½-2%	Casting, impregnating glass cloth for wet lay-up.
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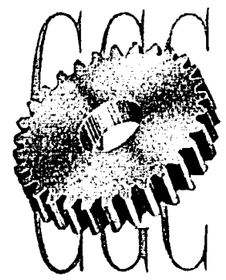
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	Page
PINK SECTION gives guide to Products Index by products in the 10 Product Directories.	i-viii
PART 2—Alphabetical List of Firms	3-96
PART 3—Product Directory in 10 Sections	97-360
1. Audio Equipment	97
2. Broadcasting	113
3. Communications	121
4. Components	129
5. Electronic Applications	227
6. Radar-Microwave	241
7. Services, Materials and Consultants	249
8. Test Equipment	305
9. Educational	339
10. Distribution	343
PART 4—Complete Data Spreads	361-455
CATALOGS	456
Ad Index:	Cover 3

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(Continued from page 23)

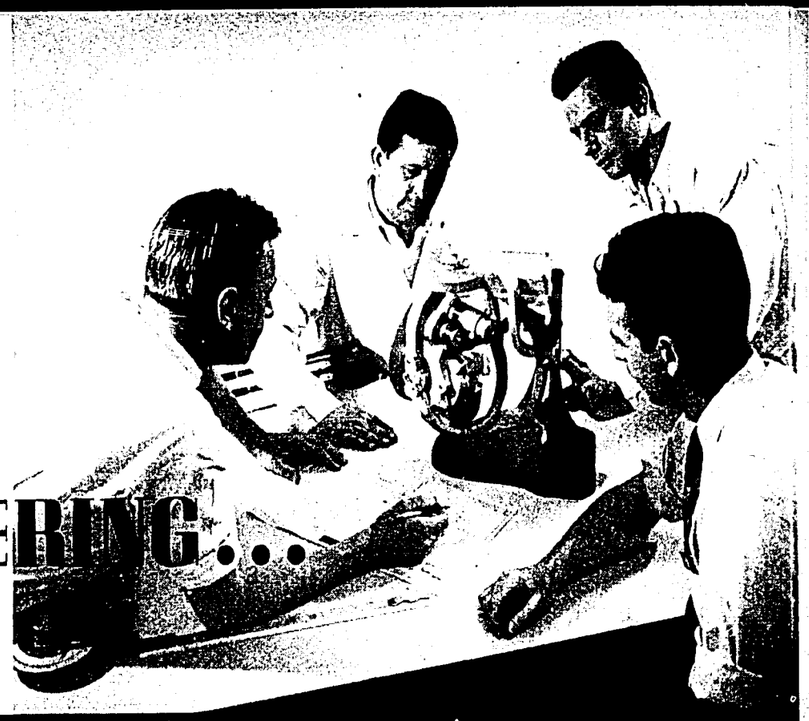
Co-Da

Cooper Electronic Products Co., 4500 Melrose St., Philadelphia 24, Pa., 1
Copper Wire Products, Ltd., 137 Oxford St., Guelph, Ont., Canada, 4, 7, 33, 54
Coral Designs Div., Dietz Co., H. G., 12-16 Astoria Blvd., Long Island City 2, N.Y., 9, 52, 75, 80
Copperweld Steel Co., Glassport, Pa., 71
Cornell-Dubilier Electric Corp., 333 Hamilton Blvd., South Plainfield, N.J., 4, 19, 24, 26, 30, 35, 38, 45, 46, 90
For details see ad on page 6
Cornell Electronics Corp., 40-33 Main Ave., Douglaston, L.I., N.Y., 49
Corning Glass Works, Corning, N.Y., 30, 31, 33, 49, 70, 72, 78, 87
Cornish Wire Co., Inc., 50 Church St., New York 7, N.Y., 71
Corona Engineering Service, 94-52 Corona Ave., Elmhurst, L.I., N.Y., 33, 48, 53, 70, 73, 95
Corry Jamestown Mfg. Corp., Center St., Corry, Pa., 29, 32
Corson Electric Mfg. Corp., 540 39 St., Union City, N.J., 30, 70
Cortland Industries, Inc., 4545 W. Cortland, Chicago 39, Ill., 29, 75, 77, 85
Cosa Corp., 405 Lexington Ave., New York 17, N.Y., 82
For details see ad on page 288
Cosmic Radio Corp., 853 Whittier St., New York 59, N.Y., 30
Cosmo Engineering Labs., Inc., Mountain Ave., Hackettstown, N.J., 82
Cossor (Canada) Limited, 301-303 Windsor St., Halifax, Nova Scotia, Canada, 1, 5, 12, 33, 69, 71, 95
Cottrell Paper Co., Inc., Rock City Falls, N.Y., 79
Cox & Co., Inc., 115 E. 23rd St., New York 10, N.Y., 37, 77
Coyne Electrical & TV Radio School, 500 S. Paulina St., Chicago 12, Ill., 97, 98
Craig Machine, Inc., 90 Holten St., Danvers, Mass., 24, 25, 29, 32, 67, 73, 75, 80
Cramer Co., Inc., The R. W., Box 22, Centerbrook, Conn., 42, 43, 48, 92
Crane Packing Co., 1800 Cuyler Ave., Chicago 13, Ill., 75, 85
Cratex Mfg. Co., 81 Natoma St., San Francisco 5, Calif., 82
Craven, Lohnes and Culver, 1242 Munsey Building, Washington 4, D.C., 73
Crescent Industries, Inc., 5900 Touhy Ave., Chicago 31, Ill., 7, 9, 11, 29, 32, 82
Crescent Co., Inc., 20 Central Ave., Pawtucket, R.I., 71
Crest Laboratories, Inc., 84-11 Rockaway Beach Blvd., Rockaway Beach 93, N.Y., 14, 33, 54, 61, 63, 75, 80, 96
Crest Transformer Corp., 1834-36 W. North Ave., Chicago 22, Ill., 54
Crosby Enterprises, Inc., Bing, Electronics Div., 9030 Sunset Blvd., Los Angeles 46, Calif., 73
Crosby Laboratories, Inc., Box 233, Robbins Lane, Hicksville, L.I., N.Y., 14, 73, 80, 96
For details see ad on pp. 114 & 282
Cross Co., H., 15 Beekman St., New York 38, N.Y., 83
For details see ad on page 294
Crowley & Co., Inc., Henry L., 1 Central Ave., West Orange, N.J., 26, 36, 41, 72, 84, 87
Crown Engineering, 3821 Commercial N.E., Albuquerque, N.M., 1, 3, 4, 18, 25, 66, 68, 80, 88, 96
Crown Engineering & Sales Co., 421 Hill St., Harrison, N.J., 75
Crucible Steel Co. of America, 405 Lexington Ave., New York 17, N.Y., 41, 83
For details see ad on page 10
Crystal Research Products, W. Madison & Prospect, Dumont, N.J., 75, 80
Cubic Corp., Scott & Canon Sts., San Diego 6, Calif., 18, 42, 45, 67, 68, 69, 70, 80, 88, 93, 96
For details see ad on page 327
Cullum Jr., A. Earl, Consulting Engineers, Highland Park Village, Dallas 5, Tex., 73
Curtis Development & Mfg. Co., 3266 N. 33rd St., Milwaukee 16, Wis., 77
Curtiss-Wright Corp., Electronics Div., 631 Central Ave., Carlstadt, N.J., 11, 45, 58, 59, 60, 65, 91, 92
Custom Electronics Corp., 738 Speedwell Ave., Morris Plains, N.J., 14, 17
Custom Electronics, Inc., 813 Chartres, New Orleans, La., 80
Custom Gear Co., 120 E. Sample St., South Bend 18, Ind., 65
For details see ad on page 25
Cutler-Hammer, Inc., 372 N. 12 St., Milwaukee 1, Wis., 2, 48, 49, 52, 69, 70
Cycle Electronic Labs., 356 Glenwood Ave., East Orange, N.J., 9, 33, 41, 43, 54
Cyclotron Specialties Co., Moraga, Calif., 42, 56, 64, 95

D & R, Limited, P.O. Box 1587, Santa Barbara, Calif., 33, 40, 43, 80
DX Radio Products Co., 2300-10 W. Armitage, Chicago 47, Ill., 4, 7, 33, 37, 54, 80
Dade Brothers, Inc., Eng. & Mfg. Div., Old Country Road, Mineola, L.I., N.Y., 73, 80
Dage Electronics Corp., 69 N. 2 St., Beech Grove, Ind., 13, 14, 16, 60, 66
Dahlstrom Metallic Door Co., 419 Buffalo St., Jamestown, N.Y., 29, 32, 77
Dale Products, Inc., 1318 28 Ave., Columbus, Neb., 26, 29, 32, 49, 75
For details see ad on pages 452-453
Dalis, Inc., H. L., 175 Varick St., New York 14, N.Y., 99
For details see ad on page 348

(Continued on page 27)

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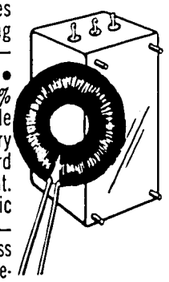
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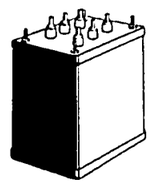
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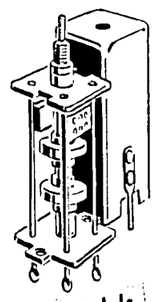
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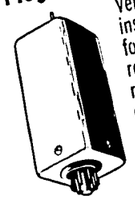


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(Continued from page 25)

Dallons Laboratories, 5066 Santa Monica Blvd., Los Angeles 29, Calif., 37, 63, 70, 80

Dalmo Victor, Inc., 1414 El Camino Real, San Carlos, Calif., 59, 61, 65, 67, 70, 73, 80, 91
For details see ad on page 26

Danbury Transformer Corp., 27 River St., Danbury, Conn., 4, 33, 45, 54, 61

Dante Elec. Mfg. Co., Bantam, Conn., 34, 39

Daven Co., The, 191 Central Ave., Newark 2, N.J., 2, 3, 42, 49, 52, 80, 84, 88, 90

Davidoff, Charles, 198 Broadway, New York 7, N.Y., 73
For details see ad on page 257

Davies Molding Co., Harry, 1428 N. Wells St., Chicago 10, Ill., 75, 77, 84

Davies Laboratories, Inc., 4705 Queensbury Road, Riverdale, Md., 59, 66, 80, 90

Davis Electronics, 4313 W. Magnolia Blvd., Burbank, Calif., 19, 26, 67

Davis, George C., 504 Munsey Building, Washington 4, D.C., 73

Dawe Instruments, Ltd., Instr. Div., 130 Uxbridge Road, Hanwell, London W. 7, England, 2, 83, 90, 96

Daystrom Electric Corp., Crestwood Recorder Div., Poughkeepsie, N.Y., 10, 11, 71, 75, 80

Daystrom Instrument Div., Daystrom, Inc., Archbald, Pa., 75

Dazor Manufacturing Corp., 4481-87 Duncan Ave., St. Louis 10, Mo., 8

Dearborn Glass Co., 2400-44 W. 21 St., Chicago 8, Ill., 77, 87

Decade Instrument Corp., Box 153, Caldwell, N.J., 1, 59, 88, 92, 96
For details see ad on page 321

Decimeter, Inc., 1430 Market St., Denver 2, Colo., 14, 19, 46, 64, 77, 80, 96

De Coursey Engineering Laboratory, P.O. Box 235, W. Los Angeles 25, Calif., 3, 4, 33, 40, 48, 65

Dee Electric Co., 1101 N. Paulina St., Chicago 22, Ill., 82, 86

DeForest's Training, Inc., 2533 N. Ashland Ave., Chicago 14, Ill., 97

DeJur-Amsco Corp., 45-01 Northern Blvd., Long Island City 1, N.Y., 6, 34, 42, 49
For details see ad on pages 152 & 168

Delta Electrical Instrument Co., 2700 S. Hill St., Los Angeles 7, Calif., 42, 48, 49

Delta Radio Co., 115 Worth St., New York 13, N.Y., 33

Deltron Associates, Inc., 2738 W. Belmont Ave., Chicago 18, Ill., 60, 73, 75, 80, 82

Deltron, Inc., P.O. Box 192, Glenside, Pa., 88

De Ment Laboratories, New Fliedner Bldg., Portland 5, Ore., 73, 80

Demornay-Bonardi, Inc., 3223 Burton Ave., Burbank, Calif., 67, 68, 69, 70, 80, 92, 93, 96

Denrad Mfg. Co. Inc., 310 W. Woodward St., Denison, Tex., 1, 5, 19, 25, 60, 80

DeRyder, Herbert, 610 Bloomfield Ave., Bloomfield, N.J., 90

Designers for Industry, Inc., 2915 Detroit Ave., Cleveland 13, Ohio, 73, 80

Detectron Co., 5420 Vineland Ave., North Hollywood, Calif., 42, 59, 64, 92 94

Deutschmann Corp., Tobe, 921 Providence Highway, Norwood, Mass., 4, 30, 33, 38, 70, 73, 93

Devenco, Inc., 117 Liberty St., New York, N.Y., 73

Devol Research Co., Brookside Dr., Greenwich, Conn., 10, 60, 73, 80

DeWald Radio Mfg. Corp., 35-15 37 Ave., Long Island City 1, N.Y., 1, 9, 14, 15, 18, 31, 45, 59, 64, 68, 90, 94, 95, 96

Dialight Corp., 60 Stewart Ave., Brooklyn 37, N.Y., 34, 44
For details see ad on page 182

Diamond Drill Carbon Co., 53-63 Park Row, New York 38, N.Y., 37

Diamond Manufacturing Corp., 7 North Ave., Wakefield, Mass., 34, 37

Diamond Microwave Corp., 7 North Ave., Wakefield, Mass., 37, 75, 80, 93, 96

Diamond Tool Engineering Co., 25 Huntington Ave., Boston 16, Mass., 9

Diamond Wire & Cable Co., 445 Park Ave., Sycamore, Ill., 71

Dice Co., J. W., 1 Engle St., Englewood, N.J., 90

Dictograph Products, Inc., 95-25 149th St., Jamaica 35, N.Y., 1, 5, 21, 48, 73

Dictaphone Corp., 375 Howard Ave., Bridgeport 5, Conn., 11

Diehl Manufacturing Co., 1188 Finderne Ave., Somerville, N.J., 43, 65

Dielect, Inc., P.O. Box 827, Perth Amboy, N.J., 79

Dietz Design & Mfg. Co., Grandview, Mo., 4, 33, 38, 54
For details see ad on page 27

Dietz Co., The Henry G., Coral Design Div., 12-16 Astoria Blvd., Long Island City 2, N.Y., 32, 46, 77, 80

Digital Instrument Co., Inc., 212 Almeria Ave., Coral Gables, Fla., 59, 92

Dilectron Co., 138 Delaware St., Walton, N.Y., 30

Dimco-Gray Co., 207 E. 6th St., Dayton 2, Ohio, 75, 77, 84, 92

Dinion Coil Co., Inc., P.O. Box D, Caledonia, N.Y., 54

Dit-Mco Inc., 505 W. 9th St., Kansas City 6, Mo., 54

Division Lead Co., 7742 W. 61st Place, Summit, Ill., 83, 86

Doelcam Corp., 1400 Soldiers Field Road, Boston 35, Mass., 1, 40, 65

(Continued on page 29)

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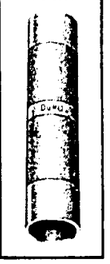
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(Continued from page 27)

Doliar Co., The Robert, 947 Broadway, Redwood City, Calif., 56, 57, 90
Dolin Metal Products, Inc., 315 Lexington Ave., Brooklyn 16, N.Y., 29, 32
Dolinko & Wilkens, Inc., 1901-07 Summit, Union City, N.J., 30, 31, 78
Dominion Electrohome Industries, Ltd., 39 Edward St., Kitchener, Ont., Canada, 1, 14
Dormeyer Industries, 3418 N. Milwaukee, Chicago 41, Ill., 33, 41, 54
Dormitzer Electric & Mfg. Co., Inc., 5 Hadley St., Cambridge, Mass., 5, 54
Dorne and Margolin, 30 Sylvester St., Westbury, L.I., N.Y., 26, 67
For details see ad on page 130
Douglas Instrument Labs., 170 Norfolk Ave., Boston 19, Mass., 64, 90, 95
Douglas Labs., Inc., 373 Fourth Ave., New York 16, N.Y., 1, 45, 80, 90, 93
For details see ad on page 401
Douglas Microwave Co., Inc., 338 E. 95 St., New York 28, N.Y., 26, 52, 67, 70, 93, 96
For details see ad on page 324
Douglas Radio Labs., 170 Norfolk Ave., Boston 19, Mass., 19, 45, 64, 90
Dow Corning Corp., Midland, Mich., 79, 81
Drake & Co., Frederick J., 117 Green Bay Road, Wilmette, Ill., 98
Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio, 19, 38
For details see ad on page 165
Drake Electric Works, Inc., 3654-56 Lincoln Ave., Chicago 13, Ill., 82
Drake Mfg. Co., 1711 W. Hubbard St., Chicago 22, Ill., 44
For details see ad on page 28
Dresser-Stacey Co., 875 Michigan Ave., Columbus 8, Ohio, 12
Driver-Harris Co., 201 Middlesex St., Harrison, N.J., 71, 82, 83
Driver Co., Wilbur B., 150 Riverside Ave., Newark 4, N.J., 71, 83
For details see ad on page 32
Dumont Airplane & Marine Instruments, Inc., 308 Dyckman St., New York 34, N.Y., 30
DuMont Labs., Inc., Allen B., Cathode-Ray Tube Div., 750 Bloomfield Ave., Clifton, N.J., 55
For details see ad on page 29
DuMont Labs., Inc., Allen B., Instrument Div., 760 Bloomfield Ave., Clifton, N.J., 45, 55, 56, 80, 95
For details see ad on page 29
DuMont Labs., Inc., Allen B., TV Transmitter Div., 1500 Main Ave., Clifton, N.J., 12, 13, 16, 17, 67, 68, 69, 80
For details see ad on page 29
DuMont Labs., Inc., Allen B., TV Receiver Div., 35 Market St., East Paterson, N.J., 14
For details see ad on page 29
Duncan & Bayley Div., 785 Hertel Ave., Buffalo 7, N.Y., 65, 67
Duotone Company, Inc., Locust St., Keyport, N.J., 7, 9, 10
DuPont De Nemours & Co., Inc., E. I., Wilmington 98, Del., 74, 81, 84, 85, 86
Durez Plastics & Chemicals, 1941 Walck Rd., North Tonawanda, N.Y., 85
Duro Specialty Co., Inc., 8 Bennett St., Lynn, Mass., 75, 77
For details see ad on page 29
Dyna Labs., Inc., 132 Lafayette St., New York 13, N.Y., 7, 8, 73, 90
Dzus Fastener Co., Inc., Box 185, Babylon, L.I., N.Y., 77

ESC Corporation, 578 E. 161st St., New York 56, N.Y., 38, 70, 80, 93
Eastern Air Devices, Inc., 585 Dean St., Brooklyn 17, N.Y., 43
Eastern Brass & Copper Co., Inc., 1122 E. 180 St., New York 60, N.Y., 83, 86
Eastern Mike-Stand Co., 56 Christopher Ave., Brooklyn 12, N.Y., 8
Eastern Specialty Co., 3617 N. 8th St., Philadelphia 40, Pa., 49, 52, 75, 77
Eastman Kodak Co., 343 State St., Rochester 4, N.Y., 16, 89, 95
Ebert Electronics Co., 212-26 Jamaica Ave., Queens Village, L.I., N.Y., 48
Eby, Inc., Hugh H., 4700 Stenton Ave., Philadelphia 44, Pa., 6, 34, 39, 46, 51, 75, 77, 84
For details see ad on page 207
Eckstein Radio & TV Co., 3400 E. 42nd St., Minneapolis 6, Minn., 14, 24
Ectro, Inc., 425 S. Sandusky St., Delaware, Ohio, 8, 11
Eder Engineering Co., 1568 South 1st St., Milwaukee 4, Wis., 45, 59, 60, 62, 65, 75, 80, 93
Edin Co., Inc., 207 Main St., Worcester 8, Mass., 1, 61, 63, 84, 90, 91, 95
Edison, Inc., Thomas A., Instrument Div., 62 Lakeside Ave., West Orange, N.J., 48, 52, 53X
For details see ad on page 194
Edmar Communication Co., 1137 W. Cambria St., Philadelphia 33, Pa., 5, 16, 45, 80
Edo Corp., 13-10 111th St., College Point 56, N.Y., 29, 68, 69
Egan Laboratory, 107-56 113th St., Richmond Hill 19, N.Y., 73, 80
Ehrlich, Charles N., 130 W. 12 St., New York 11, N.Y., 73
Eichwald & Co., Inc., B., 237 E. 39 St., New York 16, N.Y., 15
Eicor, Inc., 1501 W. Congress, Chicago 7, Ill., 17, 43, 45
Eitel-McCullough, Inc., 198 San Mateo Ave., San Bruno, Calif., 30, 31, 51, 55, 56, 57, 87,
For details see ad on pages 402-403
Elastic Stop Nut Corp. of America, 2330 Vauxhall Road, Union, N.J., 48, 54, 77
For details see ad on page 36
Eldico of New York, Inc., 44-31 Douglaston Parkway, Douglaston, L.I., N.Y., 4, 18, 19, 21, 23, 45, 53, 73, 80, 89
For details see ad on page 257
Elco Corp., 190 W. Glenwood Ave., Philadelphia 40, Pa., 6, 34, 51, 84
Electra Manufacturing Co., 2537 Madison Ave., Kansas City 8, Mo., 49
For details see ad on page 201

(Continued on page 31)

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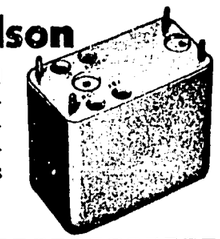
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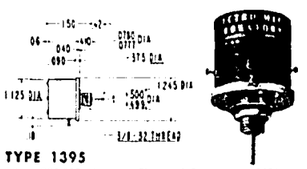
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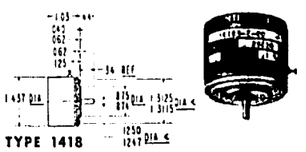
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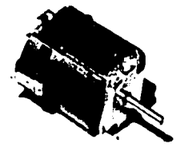
(Continued from page 29)

Elec

Electralab Inc., 105 First St., Cambridge 41, Mass., 46
For details see ad on page 186
Electran Mfg. Co., 1901 Clybourn Ave., Chicago 14, Ill., 54, 61, 80
For details see ad on page 215
Electric Design & Mfg. Co., Jefferson St., Burlington, Iowa, 42, 48
Electric Eye Equipment Co., 6 W. Fairchild, Danville, Ill., 60
Electric Products Co., 1725 Clarkstone Rd., Cleveland 12, Ohio, 43
Electric Regulator Corp., Pearl St., Norwalk, Conn., 48, 58
Electric Specialty Co., 211 South St., Stamford, Conn., 43
Electric Storage Battery Co., 42 S. 15 St., Philadelphia 2, Pa., 27
Electrical Device Mfg. Co., 741 W. Front St., Plainfield, N.J., 45, 55, 60, 62, 80, 82, 90
Electrical Industries, Inc., 44 Summer Ave., Newark 4, N.J., 37, 78
For details see ad on page 14
Electrical and Physical Instrument Corp., 42-19 27 St., Long Island City 1, N.Y., 63, 73, 80, 88, 93
Electrical Products Corp., Specialties Div., 1100 N. Main St., Los Angeles 12, Calif., 48, 75
Electrical Tower Service, Inc., P.O. Box 1205, Peoria, Ill., 12
Electrical Windings, Inc., 2015 N. Kolmar Ave., Chicago 39, Ill., 33, 54
Electricoil Transformer Corp., 5 Westerly Road, Ossining, N.Y., 54
Electro Craft Industries, Inc., 68 Jackson St., Stamford, Conn., 11, 17, 21, 23, 24, 25, 43, 45, 67, 75, 80
Electro Development Corp., 6014 W. Washington Blvd., Culver City, Calif., 34
Electro Devices, Inc., Servospeed Div., 4-6 Godwin Ave., Paterson 1, N.J., 60, 65
Electro Engineering Products Co., 609 W. Lake St., Chicago 10, Ill., 43
For details see ad on page 31
Electro Engineering Works, 6021 College Ave., Oakland 18, Calif., 54, 58
Electro Impulse Laboratory, Inc., 62 White St., Red Bank, N.J., 26, 67, 69, 70, 93, 96
For details see ad on page 240
Electro-Mec Laboratory, 21-09 43rd Ave., Long Island City 1, N.Y., 33, 49
For details see ad on page 31
Electro-Mechanical Research, Inc., 64 Main St., Ridgefield, Conn., 42, 66, 88
Electro-Medical Laboratory, Inc., South Woodstock 12, Vt., 42, 53, 63, 91, 95
Electro Motive Mfg. Co., Willimantic, Conn., 30, 31
For details see ad on page 40
Electro-Physics Co., 287 Broadway, New York 7, N.Y., 75, 77, 80, 84, 86
Electro Precision Products, Inc., 119 St. and 20 Ave., College Point, L.I., N.Y., 34, 70
Electro Products Laboratories, Inc., 4501 N. Ravenswood Ave., Chicago 40, Ill., 45, 60, 80, 89, 90
For details see ad on page 231
Electro-Seal Corp., 946 North Ave., Des Plaines, Ill., 48, 75
For details see ad on page 262
Electro-Search, 4337 N. 5th St., Philadelphia 40, Pa., 73, 80, 89
For details see ad on page 283
Electro Tec Corp., 4 Romanelli Ave., South Hackensack, N.J., 34
For details see ad on page 44
Electro-Voice, Inc., Buchanan, Mich., 1, 4, 7, 8, 9, 14, 34
Electrochemical Industries, Inc., Jacques St., Worcester 3, Mass., 75, 81
Electrodyne Co., 32 Oliver St., Boston, Mass., 1, 60, 63, 65, 66, 73, 75, 80, 88, 91
Electronics, Inc., Woodstock, Ill., 33, 54
Electronic Associates, Inc., Long Branch, N.J., 49, 59, 80, 91
For details see ad on page 318
Electronic Batteries, Inc., 34 35th St., Brooklyn 32, N.Y., 27
Electronic Coils, Inc., 33 Lyman St., Springfield 3, Mass., 33
Electronic Components Corp., 2655 W. 19th St., Chicago 8, Ill., 33, 54
Electronic Computer Div., Underwood Corp., 35-10 36 Ave., Long Island City 1, N.Y., 54, 59, 70, 80
Electronic Control Corp., 1573 E. Forest Ave., Detroit 7, Mich., 1, 59, 60, 80
Electronic Design Magazine, 127 E. 55 St., New York 22, N.Y., 98
Electronic Designs, Inc., 28-30 School St., Yonkers, N.Y., 38, 49, 68, 69, 90
Electronic Devices, Inc., 429 12th St., Brooklyn 15, N.Y., 47
Electronic Engineering Associates, 1109 Brittan Ave., San Carlos, Calif., 90

(Continued on page 33)

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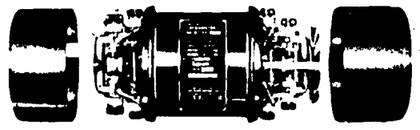


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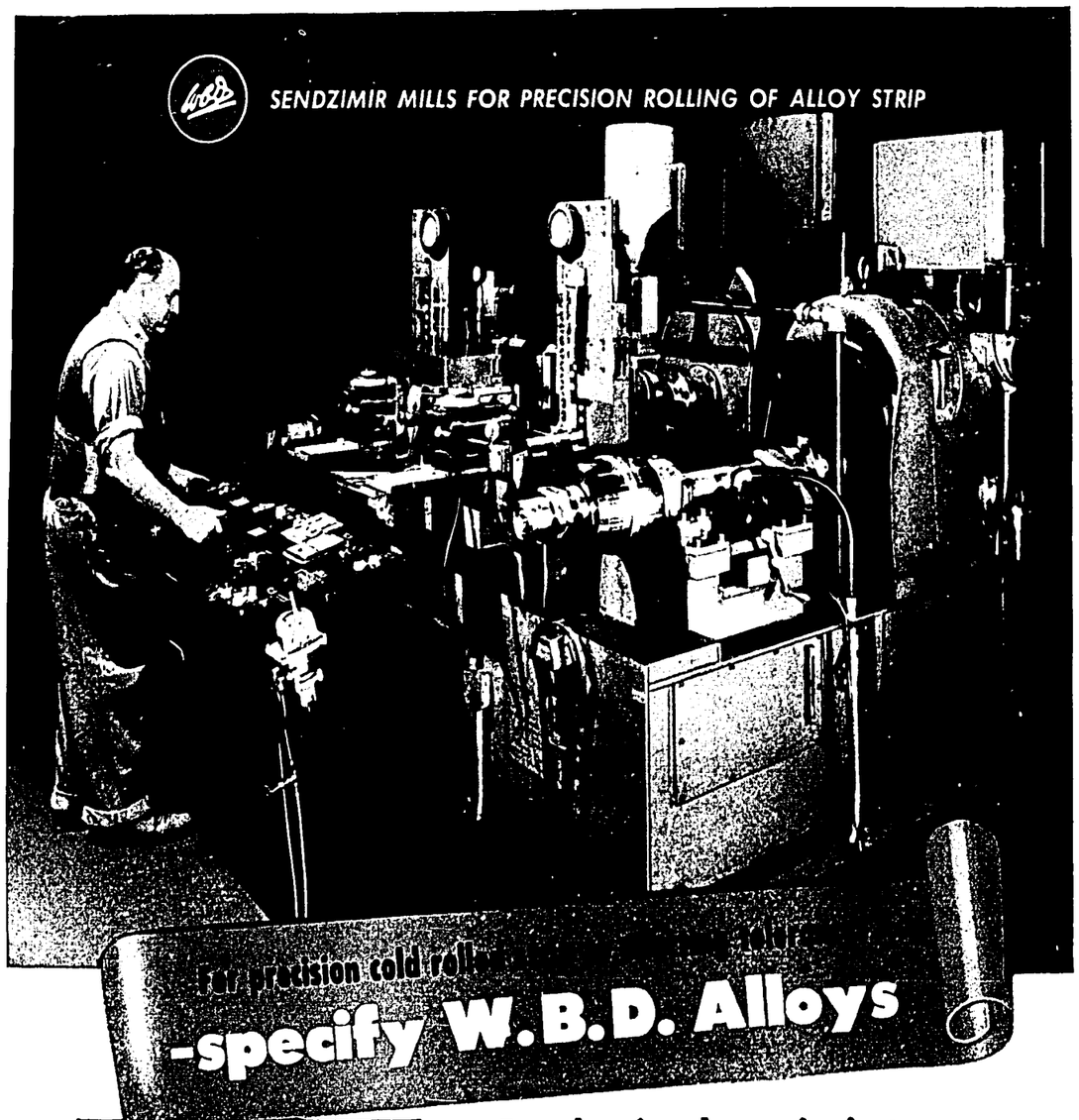


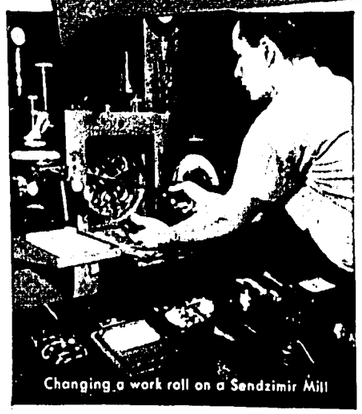
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Alphabetical Directory

(Continued from page 31)

Electronic Engineering Co. of Calif., 180 S. Alvarado St., Los Angeles 57, Calif., 59, 61, 73, 80, 93, 96

Electronic Heating Corp., 66 Needham St., Newton Highlands 61, Mass., 45, 51, 54, 62, 89

Electronic Industries, Inc., 2451 Hennepin Ave., S. Minneapolis, Minn., 1, 5, 9, 20, 60, 73, 75, 80

Electronic Instrument Co., Inc., 84 Withers St., Brooklyn 11, N.Y., 88, 90, 95, 96

Electronics Instruments Div., Burroughs Corp., 511 N. Broad St., Philadelphia 23, Pa., 45, 54, 59, 80, 89, 93

Electronic Instruments, Ltd., Richmond, Surrey, England, 1, 88, 90, 92

Electronic Manufacturing Co., 20 Orange St., Newark 2, N.J., 71, 75, 87
For details see ad on page 303

Electronic Measurements Co., Inc., Lewis St. & Maple Ave., Eatontown, N.J., 45, 90

Electronic Measurements Corp., 280 Lafayette St., New York 12, N.Y., 88, 90, 95, 96

Electronic Mechanics, Inc., 101 Clifton Blvd., Clifton, N.J., 26, 51, 72, 77, 78, 79, 84, 85
For details see ad on page 278

Electronic Parts Mfg. Co., Inc., 540 39th St., Union City, N.J., 75, 80, 87
For details see ad on page 33

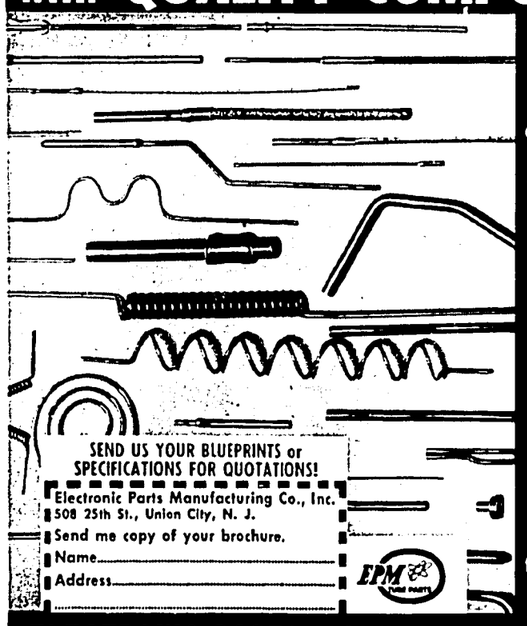
Electronic Processes Corp., 328 N. Market, San Jose, Calif., 62

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Electronic Products Co., 111 E. Third St., Mt. Vernon, N.Y., 56, 64, 78

Electronic Products Co., P.O. Box 50, North Aurora, Ill., 60

Electronic Rectifiers, Inc., 2102 Shaw Ave., Indianapolis 3, Ind., 47

Electronic Research Associates, Inc., Box 29, North Caldwell, N.J., 35, 45, 61, 73, 80, 96
For details see ad on pp. 180 & 335

Electronic Specialty Co., 3456 Glendale Blvd., Los Angeles 39, Calif., 18

Electronic Specialty Products Co., Pleasant Plains Road, Millington, N.J., 33, 45, 49, 54

Electronic Systems Co., 578 E. 161 St., New York 56, N.Y., 4, 33, 38, 54, 70, 93, 95

Electronic Transformer Co., 207 W. 25th St., New York 1, N.Y., 3, 4, 33, 54
For details see ad on page 214

Electronic Tube Corp. 1200 E. Mermaid Lane, Philadelphia 18, Pa., 1, 55, 90, 95

Electronics of Colorado, Inc., 1026 S. Tejon St., Colorado Springs, Colo., 49

Electronics Devices Co., 405 Lexington Ave., Rm. 426, New York 17, N.Y., 1, 11, 30

Electronics Research, Inc., 2300 N. New York Ave., Evansville 4, Ind., 80

Electron-Radar Products, 1041 N. Pulaski Road, Chicago 51, Ill., 2, 26, 46, 49, 50, 56, 60, 67, 70, 80, 96

Electrons, Inc., 127 Sussex Ave., Newark 3, N.J., 56
For details see ad on page 223

Electro-Temp, Inc., 8155 Huron St., Dexter, Mich., 33, 49

Electyme Motor Products Corp., 565 W. Washington Blvd., Chicago 6, Ill., 43

Elizabeth Iron Works, Inc., P.O. Box 360, Elizabeth 8, N.J., 12, 25

Elk Electronic Laboratories, Inc., 333 W. 52 St., New York 19, N.Y., 2, 4, 73, 96
For details see ad on page 257

Elliott Brothers London, Ltd., Lewisham, London, S.E. 13, England, 42, 59, 60, 70, 90, 91, 93, 95

Elm Laboratories, 18 South Broadway, Dobbs Ferry, N.Y., 4, 14, 42, 45, 46, 73, 75, 80, 90

El Mec Laboratories, Inc., 380 Hillside Ave., Hillside, N.J., 2, 31, 45, 46, 48, 60, 73, 75, 80, 90, 92, 96

El Rad Mfg. Co., 2800 W. Cullom, Chicago 18, Ill., 33, 54, 75

Elso Mfg. Co., Inc., 1218 W. Girard Ave., Philadelphia 23, Pa., 9, 11

El-Tronics, Inc., 5th & Noble Sts., Philadelphia 23, Pa., 1, 18, 24, 45, 59, 60, 64, 65, 80, 88, 90, 92, 95, 96

Embassy Engineering Co., 224 E. 204th St., New York 68, N.Y., 45

Emeloid Co., Inc., 1239 Central Ave., Hillside 5, N.J., 46, 75, 77, 80, 84

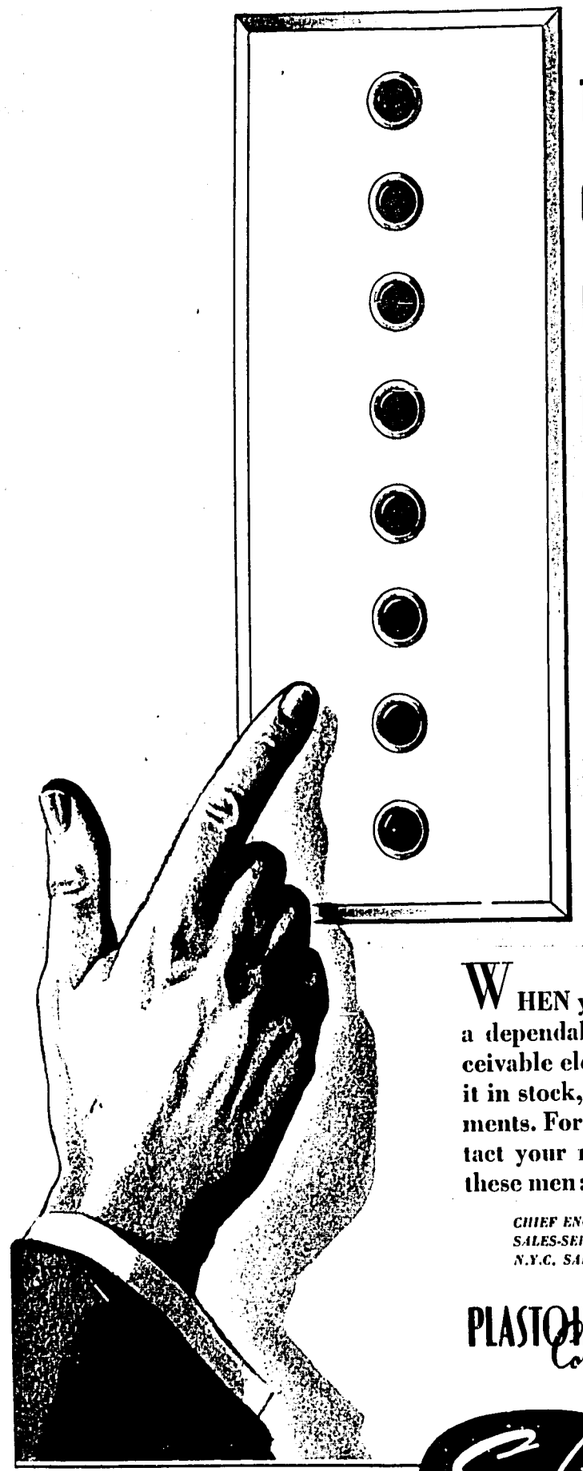
Emerald Mfg. Co., 6025 N. Keystone Ave., Chicago 30, Ill., 30, 31, 33, 38, 46, 48, 54

Emerson & Cuming, Inc., 869 Washington St., Canton, Mass., 67, 73, 75, 80, 81, 84

Emerson Radio and Phonograph Corp., 111 Eighth Ave., New York 11, N.Y., 14, 18, 21, 24, 64, 66, 68, 69

(Continued on page 35)

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Empire State Laboratories, 2608 Merrick Road, Bellmore, L.I., N.Y., 4, 65, 70, 73, 80
Endevco Corp., 630 S. Arroyo Parkway, Pasadena 1, Calif., 1, 72, 82, 90
Engineered Instruments, Inc., 815 Soto St., Hayward, Calif., 29, 33, 54, 73, 75, 80
Engineering Co., The, 27 Wright St., Newark 5, N.J., 26, 75, 87
Engineering Development, Box 37, Sta. C., Lincoln, Neb., 53X, 59, 60, 73, 75, 80, 90
Engineering Developments, Inc., P.O. Box 1046, Portsmouth, R.I., 89
Engineering Research Associates, Inc., 1902 W. Minnehaha Ave., St. Paul 4, Minn., 11, 54, 59, 60, 61
Engineering Research Corps., P.O. Box 294, Englewood, Colo., 80, 95
Engineering Research & Dev. Co., Addison, Ill., 1, 60, 62
English Electric Value Co., Ltd., Waterhouse Lane, Chelmsford, Essex, England, 55, 56, 57
Enthoven & Sons, Ltd., H. J., 89 Upper Thames St., London, E.C. 4, England, 83, 86
Entwistle Co., James L., 1475 Elmwood Ave., Providence 7, R.I., 82, 90
Epco Products, Inc., 2500 Atlantic Ave., Brooklyn 7, N.Y., 4, 33, 54, 61
For details see ad on page 217
Eppley Laboratory, Inc., 12 Sheffield Ave., Newport, R.I., 90
Equipment and Service Co., 6815 Oriole Dr., Dallas 9, Tex., 16, 73, 80
Eraser Co., Inc., Rushwire Stripper Div., 1068 S. Clinton St., Syracuse 4, N.Y., 73, 82
Erco Radio Labs., Inc., Stewart Ave., Garden City, L.I., N.Y., 14, 17, 18, 23, 24, 25, 73
Erf Acoustical Co., H. A., 3868 Carnegie Ave., Cleveland 15, Ohio, 73
Erickson Specialties, c/o Paul B. Gebhardt, 306 Lincoln Ave., Lutherville, Md., 52
Erie Resistor Corp., 644 W. 12th St., Erie, Pa., 29, 30, 31, 37, 38, 46, 49, 51, 70, 75, 84
For details see ad on page 18
Erwood, Inc., 1770 West Berteau Ave., Chicago 13, Ill., 65, 73, 75, 80, 96
Espey Manufacturing Co., Inc., 528 E. 72nd St., New York 21, N.Y., 1, 4, 22, 23, 26, 54, 90, 93, 96
Esquire Radio Corp., 6210 15th Ave., Brooklyn 19, N.Y., 14
Essex Electronics, 550 Springfield Ave., Berkeley Heights, N.J., 33, 45, 54, 70
Essex Wire, Easton, Pa., 54
Essex Wire Corp., 200 Godfrey St., Logansport, Ind., 48
Esterline Angus Co., Box 596, Indianapolis, Ind., 91
Etablissements (ELVECO), 70, rue de Strasbourg, Vincennes Seine, France, 31
Etched Products Corp., 39-01 Queens Blvd., Long Island City 4, N.Y., 46, 77
Ethylene Chemical Corp., 245 Broad St., Summit, N.J., 79, 85
Eureka Television & Tube Corp., 69 Fifth Ave., Hawthorne, N.J., 48, 55
Executone, Inc., 415 Lexington Ave., New York 17, N.Y., 1, 5

F & M Sales, Inc., 1054 Cahuenga Blvd., Hollywood 38, Calif., 82
F-R Machine Works, Inc., 44-14 Astoria Blvd., Long Island City 3, N.Y., 34, 67, 68, 69, 70, 75, 92, 93, 96
For details see ad on page 283
F S D Laboratories, 2660 North Ave., Bridgeport 4, Conn., 30, 45, 73, 80, 90
Fada Radio & Electric Co., Inc., 525 Main St., Belleville, N.J., 14
Fairchild Camera & Instrument Corp., Robbins Lane, Syosset, L.I., N.Y., 49, 95
See complete catalog in last section
Fairchild Recording Equipment Corp., 154 St. & Powells Cove Blvd., Whitestone 57, N.Y., 1, 3, 9, 10, 11, 16, 45, 66
Falls Metal Works, Ltd., 414 Main St., Little Falls, N.J., 29, 32, 75
For details see ad on page 132
Falstrom Co., 46 Falstrom Court, Passaic, N.J., 29, 32, 75
Fansteel Metallurgical Corp., North Chicago, Ill., 30, 47, 77, 83, 87
Farley, Ltd., T. S., 174 Catharine St. N., Hamilton, Ontario, Canada, 33, 54
Farmers Engineering & Mfg. Co., 549 Brushton Ave., Pittsburgh 21, Pa., 1, 5, 20
Fast & Co., John E., 3117 N. Pulaski Rd., Chicago 41, Ill., 30
Faximile, Inc., 155 Perry St., New York 14, N.Y., 22
Federal Anti Capacity Switch Corp., 72 Kingsley St., Buffalo 8, N.Y., 52
Federal Electric Mfg. Co., Ltd., 9600 St. Lawrence Blvd., Montreal 14, Que., Canada, 4, 6, 12, 13, 14, 17, 18, 21, 23, 24, 25, 47, 57, 68, 69, 96
Federal Electric Products Co., 50 Paris St., Newark 5, N.J., 29, 52
Federal Instrument Corp., 14-02 Broadway, Long Island City 6, N.Y., 49
Federal Mfg. & Engineering Corp., 199-217 Steuben St., Brooklyn 5, N.Y., 11, 14, 25, 45, 68, 93, 96
Federal Screw Products, Inc., 224 W. Huron St., Chicago 10, Ill., 6, 39, 44, 52, 77
For details see ad on page 270
Federal Shock Mount Corp., 1077 Intervale Ave., New York 59, N.Y., 77
Federal Telecommunication Labs., Inc., 500 Washington Ave., Nutley 10, N.J., 12, 13, 15, 16, 17, 46, 67, 68, 69, 93
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 1, 4, 17, 18, 20, 24, 25, 33, 35, 40, 45, 47, 48, 50, 52, 54, 55, 56, 57, 58, 59, 60, 65, 67, 68, 69, 71, 75, 78, 87, 93, 95, 96
For details see ad on pages 368-373
Federal Tool Engineering Co., 1384 Pompton Ave., Cedar Grove, N.J., 82, 87
Federal Tool & Mfg. Co., 3600 Alabama Ave., Minneapolis 16, Minn., 75, 77
Federated Metals Div., American Smelting & Refining Co., 120 Broadway, New York 5, N.Y., 83, 86
Federated Semi-Conductor Co., 66 Dey St., New York 7, N.Y., 50
For details see ad on page 204
Feiler Engineering & Mfg. Co., 8026 N. Monticello Ave., Skokie, Ill., 73, 80
Feiner & Sons, Inc., P., 522 W. 45 St., New York 36, N.Y., 29, 32, 75, 80
Feldman Co., Henry, 1244 S. Grand Ave., Los Angeles 15, Calif., 1, 4, 9, 14, 33, 54, 82, 90
Felsenthal & Sons, Inc., G., 4100 W. Grand Ave., Chicago 51, Ill., 29, 75, 77, 84
Felt Products Mfg. Co., 1504 Carroll Ave., Chicago 7, Ill., 75, 77
Fenwal Inc., Pleasant St., Ashland, Mass., 53X
Ferranti Electric, Inc., 30 Rockefeller Plaza, New York 20, N.Y., 4, 9, 33, 42, 54, 59, 61, 75
Ferranti Electric, Ltd., Mount Dennis, Toronto, Ont., Canada, 42, 59, 60, 65, 66, 80
Ferricore, Inc., 15 School St., Yonkers, N.Y., 36
Ferris Instrument Co., 110 Cornelia St., Boonton, N.J., 93, 96
Ferro-Co Corp., 21 N. 11 St., Brooklyn 11, N.Y., 29, 32, 75, 77
Fidelitone, Inc., 1616 Devon Ave., Chicago 26, Ill., 10
Fidelity Amplifier Co., 703 Willow St., Chicago 14, Ill., 9, 75
Fidelity Chemical Products Corp., 470 Frelinghuysen Ave., Newark 5, N.J., 77
Fidelity Hearing Aid Co., 4 Green St., Newark 2, N.J., 1
Fidelity Tube Corp., 900 Passaic Ave., East Newark, N.J., 55
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(Continued on page 37)

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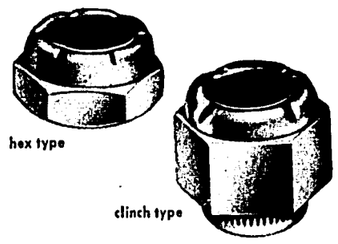
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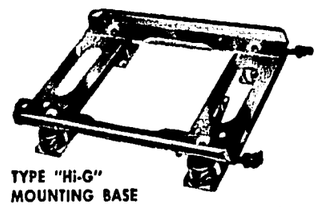
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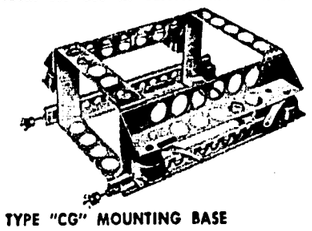
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Alphabetical Directory

(Continued from page 35)

Film Capacitors, Inc., 337 East 139 St., New York 54, N.Y., 30
For details see ad on page 135
Filtron Company, Inc., 131-05 Fowler Ave., Flushing 55, N.Y., 4, 30, 33, 38
Finn & Co., Inc., T. R., 333 Jackson Ave., New York 54, N.Y., 73, 77
For details see ad on page 37
Fish-Schurman Corp., 70 Portman Rd., New Rochelle, N.Y., 78
Fischer & Co., H. G., 9451 W. Belmont Ave., Franklin Park, Ill., 63
Fischer-Smith, Inc., 164 State St., West Englewood, N.J., 60, 80
Fisher Radio Corp., 41 E. 47 St., New York 17, N.Y., 1, 14
Fisher Research Lab., Inc., 1961 University Ave., Palo Alto, Calif., 14, 17, 23, 24, 25, 61, 64
Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa., 89, 94
Five Star TV & Radio Co., 59A Church St., Cambridge 38, Mass., 1, 14
Fleetwood Laboratories, Inc., 821 Bronx River Rd., Bronxville, N.Y., 60
Flexilab Products Co., 2229 Bellaire St., Denver 7, Colo., 6, 77
For details see ad on page 102
Flexonics Corp., 1315 S. Third Ave., Maywood, Ill., 71
Fluke Engineering Co., John, 1111 W. Nickerson St., Seattle 99, Wash., 1, 45, 90
Foote Mineral Co., Inc., 18 W. Chelten Ave., Philadelphia 44, Pa., 71, 83, 87
Forbes & Wagner, Inc., 339 Central Ave., Silver Creek, N.Y., 33, 54
Ford Engineering Co., 129 East A St., Upland, Calif., 49
Ford Instrument Co., Div. The Sperry Corp., 31-10 Thomson Ave., Long Island City, N.Y., 40, 43, 59, 65
For details see ad on page 235
Forman Co., Inc., B. G., 238 William St., New York 38, N.Y., 81
Formica Co., The, 4669 Spring Grove Ave., Cincinnati 32, Ohio, 46, 75, 79, 85
For details see ad on page 48
Foss, Inc., William L., 927 15th St., N.W., Washington 5, D.C., 73
Foster Transformer Co., 3820 Colerain Ave., Cincinnati 23, Ohio, 54
Foxboro Co., 38 Neponset Ave., Foxboro, Mass., 31, 91
Frankel Connector Co., 27 Vestry St., New York 13, N.Y., 77
Franklin Electronics, Inc., 415 W. Pike St., Philadelphia 40, Pa., 1, 4, 32, 43, 45, 60, 64, 66, 88, 90, 92, 95, 96
Franklin Fibre-Lamitex Corp., Wilmington, Del., 72, 77, 79, 84, 85
Franklin Institute of the State of Pa., 20th & Parkway, Philadelphia 3, Pa., 80
Franklin TV Laboratories, Inc., 18 Johnson Ave., Brooklyn 6, N.Y., 54
Frederick Research Corp., 4560 East-West Highway, Bethesda 14, Md., 80, 98
For details see ad on page 283
Freed Electronics & Controls Corp., 200 Hudson St., New York 13, N.Y., 1, 14, 18, 22, 64, 66, 68, 93, 94, 95

(Continued on page 39)

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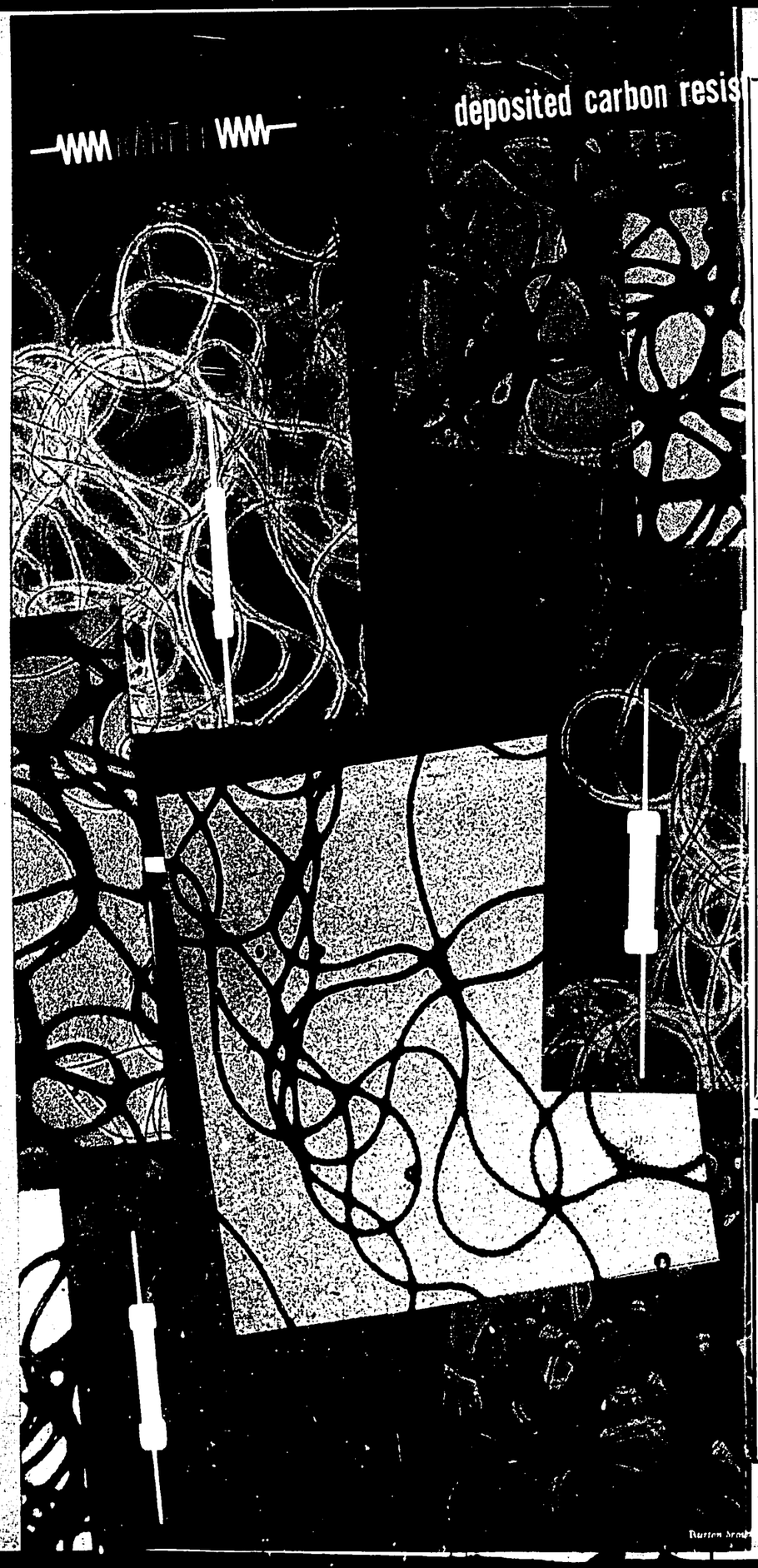
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	Page
PINK SECTION gives guide to Products Index by products in the 10 Product Directories.	i-viii
PART 2—Alphabetical List of Firms	3-96
PART 3—Product Directory in 10 Sections	97-360
1. Audio Equipment	97
2. Broadcasting	113
3. Communications	121
4. Components	129
5. Electronic Applications	227
6. Radar-Microwave	241
7. Services, Materials and Consultants	249
8. Test Equipment	305
9. Educational	339
10. Distribution	343
PART 4—Complete Data Spreads	361-455
CATALOGS	456
Ad Index:	Cover 3

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(Continued from page 37)

Freed Transformer Co., Inc., 1718 Weirfield St., Brooklyn 27, N.Y., 1, 3, 4, 33, 42, 54, 88, 90, 92, 96
See complete catalog in last section

Freeland Products Co., 700 Dryades St., New Orleans 12, La., 57

Frenchtown Porcelain Co., Frenchtown, N.J., 72, 78

Frequency Standards, Box 504, Asbury Park, N.J., 82, 96
For details see ad on page 335

Fretco, Inc., 400 N. Craig St., Pittsburgh 13, Pa., 2, 12, 19, 24, 25, 26, 67, 71, 84

Friedman Co., The, 220 E. 23rd St., New York 10, N.Y., 51, 52, 75, 77, 84

Frommer, Joseph C., 1525 Teakwood Ave., Cincinnati 24, Ohio, 73

Fryling Mfg. Co., 639 W. 12 St., Erie, Pa., 75, 77

Fugle-Miller Laboratories, 398 Main St., Metuchen, N.J., 33, 49
For details see ad on page 145

Furst Electronics, 19A S. Jefferson St., Chicago 6, Ill., 1, 45, 80, 88, 99

Furzehill Laboratories, Ltd., Boreham Wood, Herts., England, 2, 45, 88, 90, 92, 95

Fusite Corp., 6000 Fernview Ave., Cincinnati 13, Ohio, 37, 78
For details see ad on page 50

G. L. Electronics, 905 S. Vermont Ave., Los Angeles 6, Calif., 23, 24, 25

G M Laboratories, Inc., 4300 N. Knox Ave., Chicago 41, Ill., 42, 65

G. P. C. Incorporated, P.O. Box 197, Southport, Conn., 49, 78

G-V Controls, Inc., 28 Hollywood Plaza, East Orange, N.J., 48, 52, 53X

G. W. Associates, P.O. Box 2263, El Segundo, Calif., 2, 42, 70, 93, 96

Gadgets, Inc., 3029 N. Dixie Dr., Dayton 4, Ohio, 26, 80, 84

Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago 14, Ill., 89, 92

Gair Co., Inc., Robert, 155 E. 44 St., New York 17, N.Y., 77

Galbraith & Son Electric Corp., C. C., 450 Avenue of the Americas, New York 11, N.Y., 1, 5, 7, 21, 23, 45, 54, 75, 80
For details see ad on page 104

Gallant Engineering Co., 261 Constitution Ave. N.W., Washington, D.C., 11, 80

Gallay, Harris, Electronic Consultant, 60 Perry St., Belleville 9, N.J., 73, 80
For details see ad on page 257

Gamewell Co., 1238 Chestnut St., Newton Upper Falls, Mass., 49, 52, 60

Gamma Laboratories, 82 College Ave., Poughkeepsie, N.Y., 73

Gancher Co., Louis, 468 West Broadway, New York 12, N.Y., 77, 79, 84

Garde Manufacturing Co., 588 Eddy St., Providence, R.I., 75, 77, 78, 84
For details see ad on page 270

Garlock Packing Co., Main St., Palmyra, N.Y., 75, 77, 84, 85

Garod Radio Corp., 70 Washington St., Brooklyn 1, N.Y., 9, 10, 11, 14, 18

Garrard Sales Corp., 164 Duane St., New York 13, N.Y., 9

Garrett Co., Inc., George K., D & Tioga Sts., Philadelphia 34, Pa., 75, 77

Gately Development Laboratory, Box 68, Barrington, N.J., 1, 29, 73

Gates & Co., Inc., George W., Franklin Square, Long Island, New York, N.Y., 37, 44, 89

Gates Radio Co., 123 Hampshire, Quincy, Ill., 1, 3, 4, 5, 6, 9, 11, 12, 13, 16, 17, 18, 19, 24, 25, 26, 29, 32, 33, 38, 42, 45, 54, 59, 61, 69, 70, 71, 77, 80, 84, 88, 92

Gautney, George E., 1052 Warner Bldg., Washington 4, D.C., 73

Gavco Corp., 540 E. 80 St., New York 21, N.Y., 48, 58

Gavitt Mfg. Co., Central St., Brookfield, Mass., 71

Geddes, Consulting Engineer, L. A., 157 Trenton Ave., Mt. Royal, Montreal, Que., Canada, 73, 80

Gee Lar Mfg. Co., 1330 10 Ave., Rockford, Ill., 6, 12, 25, 26, 34, 39, 52, 84

General Cable Corp., 420 Lexington Ave., New York 17, N.Y., 71

General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill., 6, 10, 26, 34, 39, 44, 51, 52, 71, 75, 77, 79, 81, 84, 86, 89

General Ceramics & Steatite Corp., Crows Mill Rd., Keasbey, N.J., 36, 72, 78, 87
For details see ad on pages 52, 54, 349

General Chemical Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N.Y., 70, 71, 76

General Communication Co., 681 Beacon St., Boston 15, Mass., 48, 52, 96
For details see ad on page 210

General Communications, Box 169, Ft. Atkinson, Wis., 1, 13, 16, 29, 45, 47, 48, 58, 80

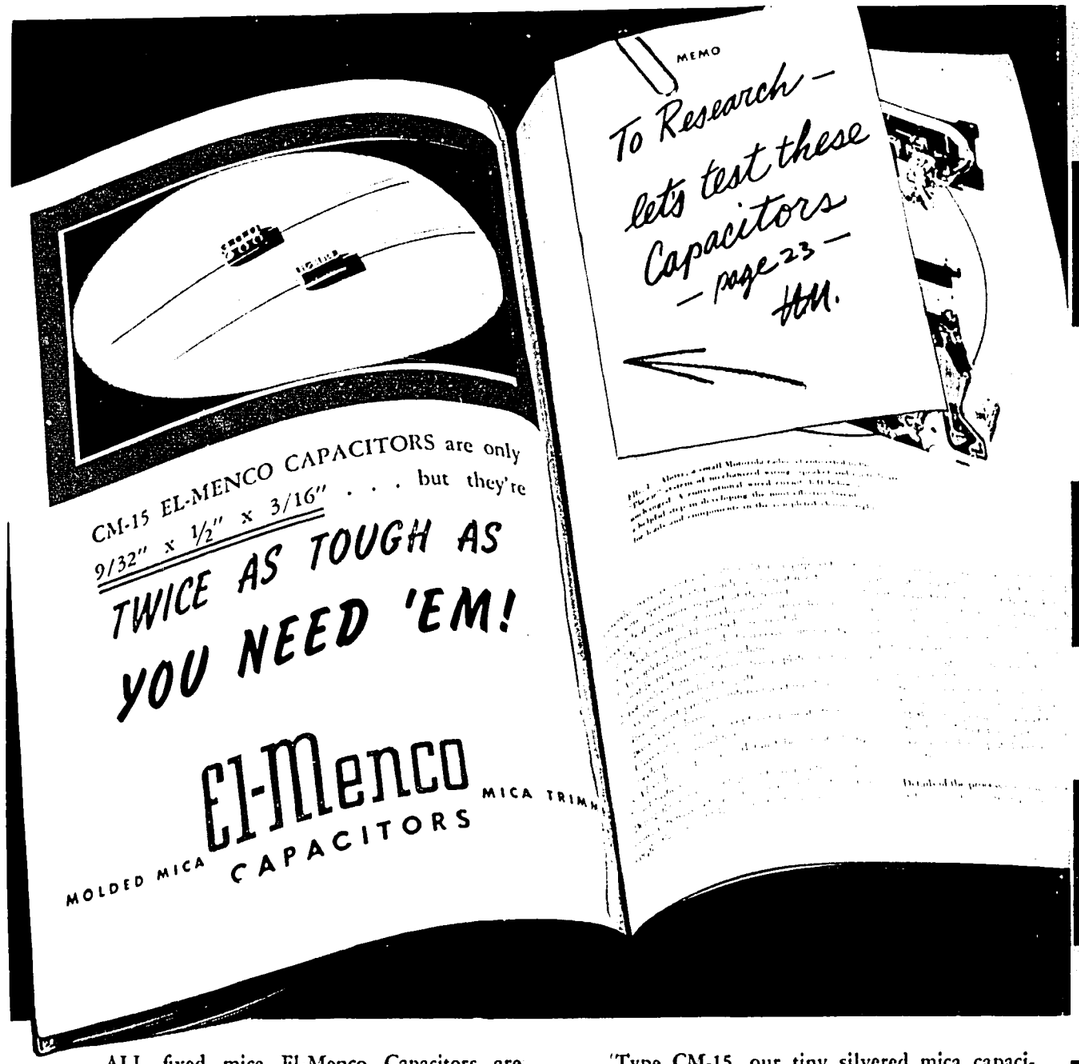
General Control Co., 1200 Soldiers Field Rd., Allston 34, Mass., 48, 52

General Dry Batteries, Inc., 13000 Athens Ave., Cleveland 7, Ohio, 27

General Dyestuff Corp., Antara Chemicals Div., 435 Hudson St., New York 14, N.Y., 74, 83
For details see ad on page 56

(Continued on page 41)

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ALL fixed mica El-Menco Capacitors are *factory-tested at double their working voltage.* Yet, you pay no premium for their superior performance. Meeting all significant specifications of JAN-C-5, they are being used in more and more military and civilian electronic applications.

'Type CM-15, our tiny silvered mica capacitors, includes capacities from 2 to 420 mmf. at 500vDCw — 2 to 500 mmf. at 300 vDCw. Our other types — silvered and regular — offer ranges up to 10,000 mmf. Why not test them? *The Electro Motive Manufacturing Co., Inc., Willimantic, Conn.*

Jobbers and distributors are requested to write for information to Arco Electronics, Inc., 103 Lafayette St., New York, N. Y. — Sole Agent for Jobbers and Distributors in U. S. and Canada.

WRITE FOR FREE SAMPLES AND CATALOG ON YOUR FIRM'S LETTERHEAD

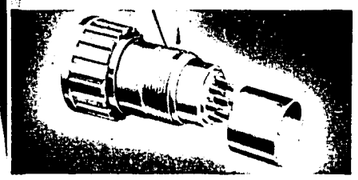


MOLDED MICA El-Menco MICA TRIMMER CAPACITORS

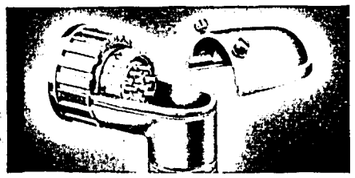
Foreign and Electronic Manufacturers Get Information Direct from our Export Dept. at Willimantic, Conn.

THE ELECTRO MOTIVE MFG. CO., INC. WILLIMANTIC, CONNECTICUT

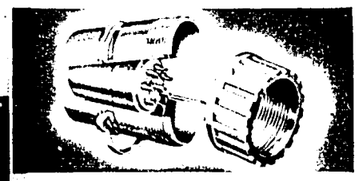
Here's Help with AN Connector Performance and Assembly Problems



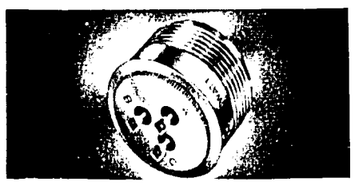
Solid Shell AN. Snap-in retaining sleeve (exclusive with G.E.) cannot work loose, yet releases quickly with a screw driver and insert removes for inspection or soldering. Design permits use in tight places normally requiring split shell connectors. Meets MIL-C-5015.



Split-Shell 90° Angle AN. Top removable for wire inspection without unmating or disassembling from conduit or cable. Split-shell ease of wiring with advantages of solid shell construction. Meets MIL-C-5015.



Split-Shell Straight AN. Reduced number of metal parts and weight — plus — improved connector performance. Full length split permits rapid and complete disassembly. Meets MIL-C-5015.



Hermetically Sealed. Extremely rugged. Withstand the mechanical shock of 100G's, thermal shock from —300°F. (liquid air) to +500°F. (in oil), high potentials of over 1000V., operating pressures up to 7000 p.s.i. (depending on applications) and brazing temperatures as high as 1500°F.

For complete catalog showing all shell styles and insert arrangements send this coupon.

GENERAL ELECTRIC COMPANY
Wiring Device Department 0-9
95 Hathaway Street, Providence 7, R. I.
Please send Monowatt Catalog D-1

Name .....
Title .....
Company .....
Address .....
City ..... Zone ..... State .....

Alphabetical Directory

(Continued from page 39)

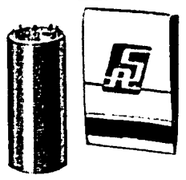
General Electric Co., Plainville, Conn., 52
General Electric Co., Telechron Dept., 199 Homer Ave., Ashland, Mass., 42
General Electric Co., Tube Dept., 1 River Rd., Schenectady 5, N.Y., 30, 51, 52, 55, 56, 57
General Electric Co., Carboloy Dept., 11177 East 8 Mile Rd., Detroit 32, Mich., 41, 49
General Electric Co., Capacitor Dept., John St., Hudson Falls, N.Y., 30
General Electric Co., Specialty Transformer & Ballast Dept., 1635 Broadway, Fort Wayne 2, Ind., 40, 45, 54, 58
General Electric Co., Chemical Div., 1 Plastics Ave., Pittsfield, Mass., 75, 79, 81, 85
General Electric Co., 1 River Rd., Schenectady 5, N.Y., 20, 26, 28, 40, 42, 43, 44, 45, 47, 48, 49, 52, 54, 56, 58, 59, 60, 62, 64, 65, 66, 70, 80, 82, 90, 93
General Electric Co., Wiring Device Dept. 0-9, 95 Hathaway St., Providence 7, R.I., 34, 71
For details see ad on page 41
General Electric Co., X-Ray Dept., 4855 Electric Ave., Milwaukee 1, Wis., 63
General Electric Co., Electronics Park, Syracuse, N.Y., 47, 50, 88, 90, 94, 95, 96
General Electronics, Inc., 101 Hazel St., Paterson, N.J., 55, 56, 57
General Electrosonics, Inc., 32 W. 22 St., New York 10, N.Y., 23, 45, 67, 73, 75, 80, 88, 89
General Fuse Co., 201 Main St., Matawan, N.J., 39
For details see ad on page 167
General Hermetic Sealing Corp., 99 E. Hawthorne Ave., Valley Stream, L.I., N.Y., 1, 45, 48, 49, 75, 78
For details see ad on page 275
General Instrument Corp., 829 Newark Ave., Elizabeth 3, N.J., 9, 14, 31
For details see ad on page 60
General Insulated Wire Works, 69 Gordon Ave., Providence 5, R.I., 71
General Laminated Products Co., Inc., 2857 S. Halsted St., Chicago 8, Ill., 26, 39, 44, 51, 75, 77, 79, 81, 85, 87
General Magnetics, Inc., 135 Bloomfield Ave., Bloomfield, N.J., 35, 40, 45, 54, 58, 65
General Plastics Corp., 1011 Main Ave., Clifton, N.J., 75, 79
General Plate Div., Metals & Controls Corp., 34 Forest Ave., Attleboro, Mass., 34, 70, 71, 83, 86
General Precision Lab., Inc., 63 Bedford Rd., Pleasantville, N.Y., 4, 13, 14, 16, 33, 45, 54, 56, 70, 71
For details see ad on page 116
Geotechnical Corp., 3712 Haggar Dr., Dallas 9, Texas, 1, 4, 42, 43, 45, 61, 73, 80, 91
General R-F Fittings Co., 702 Beacon St., Boston 15, Mass., 26, 34, 37, 70, 71, 93
For details see ad on page 151
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 1, 2, 4, 6, 13, 30, 31, 34, 49, 54, 58, 60, 71, 77, 84, 88, 90, 92, 93, 95, 96
For details see ad on Cover IV and pages 380-381
General Transformer Co., 18240 Harwood Ave., Homewood, Ill., 33, 45, 54
General Winding Co., 420 W. 45 St., New York 36, N.Y., 33
Georator Corp., Box 210, Manassas, Va., 43, 45, 56, 61
Germanium Products Corp., 26 Cornelison Ave., Jersey City 4, N.J., 50, 58, 83
Gering Products, Inc., N. 7 St. & Monroe Ave., Kenilworth, N.J., 85
Gertsch Products, Inc., 11846 Mississippi Ave., Los Angeles 25, Calif., 4, 31, 59, 66, 73, 96
Giannini & Co., Inc., G. M., 117 E. Colorado, Pasadena, Calif., 49, 59
Gibson Electric Co., 8350 Frankstown Ave., Pittsburgh 21, Pa., 52, 77
Gilfillan Brothers, Inc., 1815 Venice Blvd., Los Angeles 6, Calif., 18, 65, 67, 68, 69, 70, 93, 95
Gillett & Bergquist, 982 National Press Bldg., Washington 4, D.C., 15, 73, 80
Gillett & Associates, Glenn D., 982 National Press Bldg., Washington 4, D.C., 73, 80
Girard-Hopkins, 1000 40th Ave., Oakland 1, Calif., 30, 49
Glaser Lead Co., Inc., 21-31 Wyckoff Ave., Brooklyn 27, N.Y., 83, 86
Glaser-Steers Corp., 2 Main St., Belleville 9, N.J., 7, 33, 34, 41
Glass Products Co., 6911 S. South Chicago Ave., Chicago 37, Ill., 46
For details see ad on page 189
Gleason-Avery, Inc., 45 Aurelius Ave., Auburn, N.Y., 9, 43, 65
Glenco Corp., 212 Durham Ave., Metuchen, N.J., 4, 30, 37, 46, 49, 63, 72, 90
For details see ad on page 137
Glens Falls Laboratory, Inc., 284 Glen St., Glens Falls, N.Y., 80, 94
Glyco Products Co., Inc., 26 Court St., Brooklyn 1, N.Y., 79, 81
Godfrey Manufacturing Co., 2642 S. Michigan Ave., Chicago 16, Ill., 1
Godley Co., Paul, P.O. Box J, Upper Montclair, N.J., 73
For details see ad on page 257
Golden Corp., L., 1054 38 St., Brooklyn 19, N.Y., 29, 32
Goldsmith Bros. Smelting & Refining Co., 111 N. Wabash Ave., Chicago 2, Ill., 75, 83, 86

(Continued on page 43)

NOTES

Subminiature Precision

RATE-GYROS



less than 1 inch diameter

less than 2 inches long

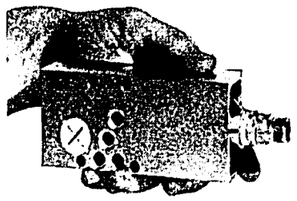
weight only 3 ounces

The smallest rate gyroscope in production. Performance and accuracy are not sacrificed with this reduction in size. The high degree of sensitivity is achieved through the unique design of the pick-off which is basically a differential transformer. The wheel is a hysteresis-type synchronous motor rotating at 24,000 RPM with an angular momentum of 32,600 C.G.S. units. Due to the small mass of its components the gyro is practically insensitive to shock and vibration. The flexibility of the design allows modifications to meet specific requirements.

GENERAL SPECIFICATIONS (Model 7)

Dimensions — 13/16" O.D., 1 11/16" long
Weight — 3 oz.
Range — 420°/second
Pick-off Excitation — 6.3 Volts, 400 Cycles
Motor Excitation — 6.3 Volts or 26 Volts, 400 Cycles
Resolution — Better than .05°/second
Sensitivity — 14 millivolts/degree/second
Resonant Frequency — 85 cps
Damping — 0.5 Critical
Altitude — 0-60,000 feet
Maximum Linear Acceleration — 60 G any axis
Maximum Shock Acceleration — 60 G any axis
Maximum Vibration (0 to 300 cps) — 5 G any axis

Self Clearing **HYDRAULIC SERVO VALVE**



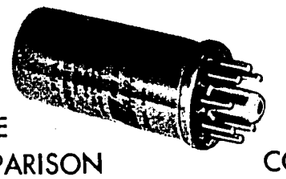
- *TWO STAGE*
- *FOUR WAY*

Absolutely sealed against magnetic particles, this two stage transfer valve exerts a clearing force of several hundred pounds in the first stage in removing any sludge, dirt or metal particles that tend to jam the valve. By amplifying low level electric energy into controlled hydraulic energy, the valve is suitable for any servo system where greater accuracy and high response are of prime importance. Modifications of the torque motor characteristics and valve flow are possible to meet a variety of applications.

GENERAL SPECIFICATIONS

Weight — Less than 1 3/4 lbs.
Size — 1 3/16" x 2 7/16" x 5 1/2"
Volume — Less than 18 cubic inches
Output — Up to 14 HP
Dirt Clearing Force — Up to 500 lbs.
Power Amplification — 5000 times
Input Power — Less than 2 Watts
Input Current — 15 MA
Flow — Up to 12 GPM
Pressure — Up to 3000 PSI
Leakage at Zero Signal — 60 cc/min.
External Leakage — None
Resolution — 0.03%
Response — Flat to 150 cps
Time Constant — 0.001 Sec.
Life — Over 4,000,000 Cycles

PACKAGED BRIDGE COMPARATOR



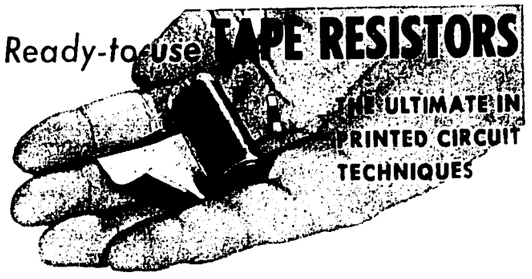
PHASE COMPARISON — AMPLITUDE COMPARISON

A well balanced hermetically sealed bridge for both phase and amplitude comparison. Utilizing two complete bridges with appropriate switching resistors, the phase comparator has a wide frequency range and high dynamic response. This permits its use as a modulator, demodulator, switch, rectifier or chopper. Having no moving parts, the Sanders Associates Phase Comparator is mechanically secure against shock, acceleration and vibration. It has standard octal mounting and is mechanically interchangeable with mechanical choppers and electronic tube comparators.

GENERAL SPECIFICATIONS

Frequency Response — 0-5000 CPS
Maximum Reference Voltage — 120 Volts RMS
Maximum Signal Voltage — 60 Volts RMS
Dynamic Range (Fixed Reference Amplitude) — 46 DB
Dynamic Range (Variable Reference Amplitude) — 60 DB
Conversion Efficiency — 85%
Maximum Ambient Temperature — +85 degree C
Mounting — Standard Octal Socket
Size — 1" Diameter x 3" Long
Weight — 2 Ounces

Ready-to-use **TAPE RESISTORS**



THE ULTIMATE IN PRINTED CIRCUIT TECHNIQUES

An advanced technique in printed circuitry now makes available tape resistors for commercial and military applications. The flexibility of the Sanders Associates Tape Resistor permits this resistive component to be engineered into the initial printed circuit design. The Tape Resistor is sold in uncut tape rolls or as cured precut resistors, in a wide range of performance characteristics which makes it suitable for a variety of printed circuit applications.

GENERAL SPECIFICATIONS (Precut Resistors)

Size — 1/2" Long, 1/8" Wide, 1/100" Thick
Resistance Range — 100 Ohms to 10 Megohms
Resistance Tolerance — Plus or Minus 10%
Power Rating — 1/4 Watt at +200 degree C
Operating Temperature Range — Minus 55 degree C to plus 200 degree C
Humidity — 95% at 40 degree C for 250 Hours
Temperature Coefficient — Within Requirements of JAN-R-11
Shelf Life — 18 Months Minimum
Load Life — 500 Hours Minimum 1/4 Watt at 200 degrees C
Voltage Coefficient — 0.035% per Volt

"The Minicube"

SUBMINIATURE BLOWER



1 INCH LONG
1 INCH WIDE
1 INCH HIGH
1 OUNCE

DELIVERS 3 CU. FT./MIN.

OPERATES BETWEEN —200°C AND +200°C.

A truly subminiature blower designed for cooling or circulation of air for all subminiature applications. The universal mounting, negligible space and weight allow the "Minicube" to be used in almost any type of equipment. The hysteresis-type motor rotating at 24,000 RPM is designed for operation at temperatures up to +200° C. Models are also available for normal temperature operation (−55° to +85° C).

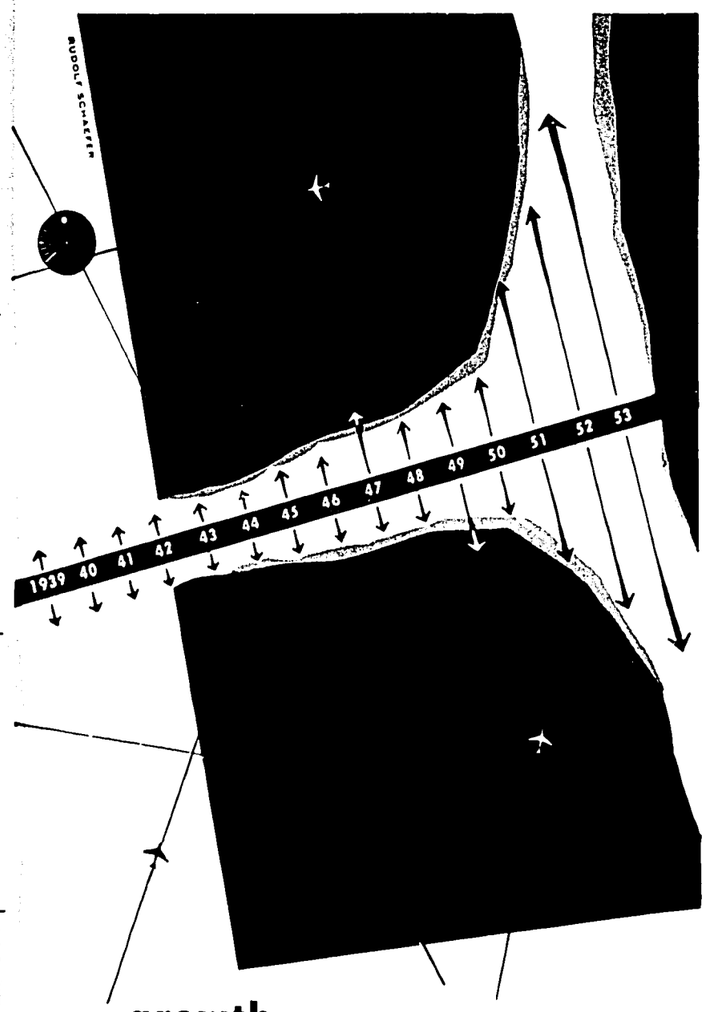
GENERAL SPECIFICATIONS (Model 2)

Size — 1" x 1" x 1"
Weight — 1 ounce
Capacity — 3 cubic feet per minute
Power — 3 Watts, 400 Cycles, 6.3 Volts or 26 Volts
Temperature Range — Minus 200° C to Plus 200° C
Expected Life — Over 1000 Hours

SANDERS ASSOCIATES INCORPORATED

137 CANAL STREET
NASHUA, NEW HAMPSHIRE
TELEPHONE: NASHUA 5570

reliability in electronics



growth

Due to our long experience, the demand for our engineering services in designing new precision devices and systems has increased tremendously. Our activities now embrace the four distinct yet allied fields of

- AIRCRAFT INSTRUMENTS AND CONTROLS
- OPTICAL PARTS AND DEVICES
- MINIATURE AC MOTORS
- RADIO COMMUNICATIONS AND NAVIGATION EQUIPMENT

Current production is largely destined for our defense forces; but our research facilities, our skills and talents, are available to scientists seeking solutions to instrumentation and control problems.

kollsman INSTRUMENT CORP.

ELMHURST, NEW YORK • GLENDALE, CALIFORNIA • SUBSIDIARY OF Standard COIL PRODUCTS CO., INC.

Alphabetical Directory

(Continued from page 41)

Gombos Co., Inc., John, 103-109 Montgomery Ave., Irvington 11, N.J., 6, 34, 70, 72
For details see ad on page 154
Good-All Electric Mfg., Co., 112 W. 1 St., Ogallala, Neb., 30
Goodrich Chemical Co., B. F., 2060 E. Ninth St., Cleveland 15, Ohio, 79, 85
Goodyear Aircraft Corp., 1210 Massillon Rd., Akron 15, Ohio, 59, 75
Gordon Associates, Inc., 157 Broad St., Red Bank, N.J., 73
For details see ad on page 257
Gordon, Herman L., Warner Bldg., Washington 4, D.C., 73
Gorrell & Gorrell, Haworth, N.J., 63, 65, 80, 91
Goslin Elec. & Mfg. Co., 2921 W. Olive Ave., Burbank, Calif., 33, 45, 48, 54
Gottschalk Engineering, 37 W. 52 St., New York 19, N.Y., 73, 80
Gow-Mac Instrument Co., 22 Lawrence St., Newark 5, N.J., 90
Grady Instrument Co., 689 Belmont St., Belmont 78, Mass., 21, 24, 25
Graham Mfg. Co., Inc., 47 Bridge St., East Greenwich, R.I., 70, 93
Graham Transmissions, Inc., Menomonee Falls, Wis., 60
Gramer Transformer Corp., 2734 N. Pulaski Rd., Chicago 39, Ill., 4, 33, 45, 54, 58
Graner, Inc., L. P., 40 E. 49 St., New York 22, N.Y., 73
Grant Pulley & Hardware Co., 31-87 Whitestone Pkwy., Flushing 54, N.Y., 32
For details see ad on page 142
Graphite Metallizing Corp., 1057 Nepperhan Ave., Yonkers, N.Y., 77
Grason-Stadler Co., 106 Hampshire St., Cambridge 39, Mass., 1, 59, 63, 73, 80, 88
Grass Instrument Co., 101 Old Colony Ave., Quincy 70, Mass., 63, 91, 95
Gray Instrument Co., 64 W. Johnson St., Philadelphia 44, Pa., 49, 90
Gray Radio Co., 501 Forest Hill Blvd., West Palm Beach, Fla., 23
Gray Research & Development Co., Inc., Hilliard St., Manchester, Conn., 3, 9, 16
For details see ad on page 118
Grayburne Corp., 4-6 Radford Pl., Yonkers, N.Y., 33, 36
Grayhill, 561 Hillgrove Ave., La Grange, Ill., 52, 75
Great American Industries, Inc., Rubatex Div., Bedford, Va., 77
Green Instrument Co., Inc., 385 Putnam Ave., Cambridge 39, Mass., 82
Greenlee Tool Co., 2136 Twelfth St., Rockford, Ill., 82
Greer Hydraulics, Inc., 454 18 St., Brooklyn, N.Y., 90
Greibach Research & Development Labs., 80 Pryer Terr., New Rochelle, N.Y., 8, 42, 48, 73, 80, 88
Gremar Manufacturing Co., Inc., Wright St., Lynn, Mass., 6, 34
Gries Reproducer Corp., 730 E. 133 St., New York 54, N.Y., 36, 65, 75, 77, 84
Grieve-Hendry Co., Inc., 1815 W. Lake St., Chicago 12, Ill., 82

(Continued on page 45)

Now available the revolutionary process* for your SLIP RING ASSEMBLIES

featuring

• LOWER COST • CLOSER TOLERANCES • ONE-PIECE CONSTRUCTION • JEWEL-LIKE FINISH • UNIFORM RING HARDNESS • REDUCED WEIGHT



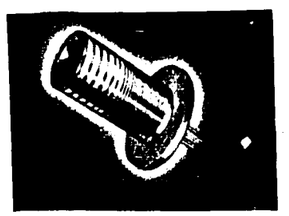
Now a Complete Service in all sizes of Slip Ring Assemblies

↑ An assembly with 14 concentric, hard silver rings electro deposited into machined plastic blank. Dovetail locks rings in place. Machined blank insures accuracy. Diameter approx. 11", thickness approx. 5/16".

➡ An assembly with 30 rings of various widths to accommodate various current requirements. Unit is approx. 4-5/16" long, designed for flange mounting.

➡ Cylinder type assembly approx. 3¾" long with 24 hard silver rings. 1⅝" O.D. with wall thickness less than ¼".

➡ Cylindrical assembly with 25 rings. Three wide rings accommodate large contact area brushes for high current capacity. Length 14", O.D. approx. 5⅞".





*PATENTS PENDING

ELECTRO TEC is now tooled up, with new expanded facilities for production of large Slip Ring Assemblies to exact customer specification Sizes range up to 24" in diameter, either cylindrical or disc type.

The exclusive ELECTRO TEC PROCESS*—the electro-deposition of hard silver rings into an accurately machined plastic blank—consistently yields a high degree of dimensional accuracy, excellent concentricity, and a jewel-like ring finish. This process also eliminates expensive tooling and mold charges, frequently lowers costs to 30% of other methods of manufacture. The silver rings are uniformly hard for long life—75-90 Brinell.

ELECTRO TEC one-piece construction precludes dimensional variation due to accumulated errors. The plastic base is fully cured before rings are plated into it, thus preventing separation of base material from the rings.

ELECTRO TEC LARGE SLIP RING Assemblies are widely used in Radar Equipment, Fire Control Systems, Test Tables and many other critical applications. Light weight combined with rugged durability recommends their use in airborne applications.

Every user knows the ELECTRO TEC reputation for quality and superiority in miniature and sub-miniature slip ring assemblies.

Our Engineering Department is available for consultation on any of your slip ring problems without obligation.

ELECTRO TEC CORPORATION

SOUTH HACKENSACK • NEW JERSEY

At least one of your interests is now served by one of IRE's 21 Professional Groups

You should join and get these benefits!

Each group publishes its own specialized papers in its *Transactions*, some annually, and some bi-monthly. The larger groups have organized local Chapters, and they also sponsor technical sessions at IRE Conventions.

Airborne Electronics (G 11)	Fee $2
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The Institute of Radio Engineers

1 East 79th Street, New York 21, N.Y.

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Miss Emily Sirjane — DIR 53
IRE—1 East 79th St.
New York 21, N.Y.

Please enroll me for these IRE Professional Groups

.....$.....

.....$.....

Name .....

Address .....

Place .....

Please enclose remittance with this order.

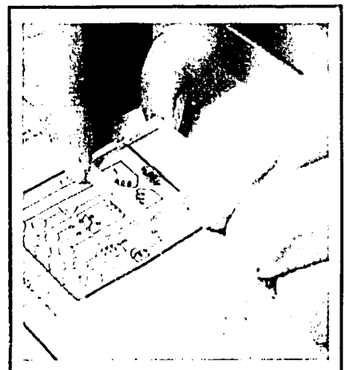
Alphabetical Directory

(Continued from page 43)

Griffin Co., John, 2157 James Ave., St. Paul 5, Minn., 82
For details see ad on page 45
Grigsby-Allison Co., Inc., 407 N. Salem Ave., Arlington Hts., Ill., 14, 52, 70, 75
Grimwood and Co., Inc., Fred O., 2025-26 Rwy. Exchange Bldg., St. Louis 1, Mo., 15, 73
Guardian Electric Mfg. Co., 1621 W. Walnut St., Chicago 12, Ill., 33, 48, 52
For details see ad on page 62
Gudebrod Bros. Silk Co., Inc., 225 W. 34 St., New York 1, N.Y., 77
Gudeman Company, 340 W. Huron St., Chicago 10, Ill., 4, 30, 38, 50
For details see ad on page 22
Guild Electronics, Inc., 108-110 Duane St., New York 7, N.Y., 62
Gulton Mfg. Corp., 212 Durham Ave., Metuchen, N.J., 1, 4, 8, 9, 30, 46, 49, 63, 90
Guthman & Co., Inc., Edwin L., 15 S. Throop St., Chicago 7, Ill., 31, 33, 54
Gyromechanisms, Inc., Halesite, L.I., N.Y., 49, 80

H & B American Machine Co., 211 63 St., Brooklyn 20, N.Y., 29, 32
Hadley Co., Robert M., 5112 S. Hoover St., Los Angeles 37, Calif., 29, 32, 33, 54, 61, 75
Haledy Electronics Co., 57 William St., New York, N.Y., 59

(Continued on page 47)



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—PRINT IT—

• TRANSPARENT
• ASA Standard Symbols
• 27 Stamps Per Kit
• Large Selection
• Special Pads
• Opaque Ink
• Under $30.00

John Griffin Company
2157 James Avenue
St. Paul 5, Minn.

TRANSISTORS AND DIODES

POINT-CONTACT AND JUNCTION



FOR CIVILIAN AND MILITARY APPLICATION

NATIONAL UNION RADIO CORPORATION

HATBORO, PENNSYLVANIA

TUBES: TV PICTURE; TV & RADIO RECEIVING; SPECIAL PURPOSE; OSCILLOSCOPE, RADAR & SPECIAL PURPOSE CATHODE RAY • ELECTRON TUBE RESEARCH • SPECIALIZED TUBE & TRANSISTOR TESTING EQUIPMENT

Halldorson Transformer Co., 4500 Ravenswood Ave., Chicago 40, Ill., 33, 54, 61

Haller, Raymond and Brown, 124 N. Atherton, State College, Pa., 48, 59, 80

Hallicrafters Co., 4401 W. Fifth Ave., Chicago, Ill., 1, 14, 17, 18, 19, 21, 24

Halross Instruments Corp., 387 Sutherland Ave., Winnipeg, Canada, 64, 94

Hammarlund Mfg. Co., Inc., 460 W. 34 St., New York 1, N.Y., 18, 19, 25, 31, 60
For details see ad on pages 424-427

Hammond Manufacturing Co., Ltd., Wellington St. W., Guelph, Ont., Canada, 29, 32, 33, 54, 58

Hanauer, M. B., 6 W. 48 St., New York 36, N.Y., 37

Handy & Harman, 82 Fulton St., New York 38, N.Y., 71, 83, 86

Hansell, Inc., C., 50 Liberty St., Westerly, R.I., 30, 72

Hansen Co., Wm., 165 Silverbrook, Niles, Mich., 60, 75, 80

Hanson-Gorrill-Brian, Inc., 1 Continental Hill, Glen Cove, L.I., 58, 59, 60, 65, 80

Harder Co., Donald C., 2031 Chatsworth Blvd., San Diego 7, Calif., 82

Hardman Co., Inc., H. V., 571 Cortlandt St., Belleville 9, N.J., 81

Hardwick, Hindle, Inc., 40 Hermon St., Newark 5, N.J., 49

Harman-Kardon, Inc., 52 W. Houston St., New York 12, N.Y., 1, 46, 68, 73, 90

Harmon Electronics Co., 11431 Truman Rd., Independence, Mo., 1, 4, 8, 20, 24, 32, 45, 60, 66, 75, 77

Harnett Electric Corp., 138 Haven Ave., Port Washington, L.I., N.Y., 2, 4, 33, 46, 54, 70, 75
For details see ad on page 264

Harries Thermionics, (Overseas) Ltd., Warwick, Bermuda, 73, 80

Hart Manufacturing Co., 110 Bartholomew Ave., Hartford 1, Conn., 44, 48, 52, 53X

Hartenstine-Zane Co., Inc., 225 Broadway, New York 7, N.Y., 12

Hartford City Paper Co., Hartford City, Ind., 79
For details see ad on page 282

Hartley Co., Inc., H. A., 521 E. 162 St., New York 56, N.Y., 1, 4, 7, 9, 14, 54

Hartley Co., Ltd., H. A., 152 Hammersmith Rd., London, W. 6, England, 1, 7, 9

Hartman Engineering Co., 117 Oakland St., Springfield, Mass., 45, 60, 73, 75, 80, 89

Harvey Wells Electronics, Inc., 143 North St., Southbridge, Mass., 14, 19

Harwood Mfg. Co., 466 W. Superior, Chicago 10, Ill., 16

Hasler-Tel Co., 39 Vesey St., New York 7, N.Y., 90

Hastings Instrument Co., Inc., Super Hwy. & Pine Ave., Hampton, Va., 18, 24, 45, 61 68, 80

Hathaway Instrument Co., 1315 S. Clarkson, Denver, Colo., 1, 59, 61, 63, 90, 92, 95

Hawley Products Co., St. Charles, Ill., 7, 29, 75
For details see ad on page 132

Haydon Co., A. W., 240 N. Elm St., Waterbury 20, Conn., 43, 48
For details see ad on page 178

Haydon Manufacturing Co., Inc., 245 E. Elm St., Torrington, Conn., 42, 92

Haydu Brothers, Box 1226, Plainfield, N.J., 55, 56, 75, 82, 87

Health-Therapy Research Trust, 41 E. 42 St., New York 17, N.Y., 63

Heath Co., 305 Territorial Road, Benton Harbor, Mich., 1, 14, 19, 42, 88, 90 95, 96
For details see ad on page 331

Heffelfinger, John B., 815 E. 83 St., Kansas City 10, Mo., 73

Heiland Research Corp., 130 E. Fifth Ave., Denver 9, Colo., 42, 61, 66, 91, 95
For details see ad on page 232

Heinemann Electric Co., P.O. Box 299 D, Trenton, N.J., 48, 52

Heinze Electric Co., 685 Lawrence St., Lowell, Mass., 28, 43
For details see ad on page 132

Heldor Bushing & Terminal Co., Inc., 44 N. Park St., East Orange, N.J., 78

Heldor Manufacturing Corp., 238 Lewis St., Paterson, N.J., 29, 32, 74, 75, 77, 78
For details see ad on page 276

Heli-Coil Corp., Shelter Rock Lane, Danbury, Conn., 77

Helipot Corp., 916 S. Meridian Ave., South Pasadena, Calif., 49, 77
See complete catalog in last section

Helko Products Co., Inc., 243 W. 55 St., New York 19, N.Y., 75

Heller Co., Gerald K., 1540 Ridgely St., Baltimore 30, Md., 32, 45, 60, 77, 78, 80

Heller & Co., W. C., Montpelier, Ohio, 29

Heminway & Bartlett Mfg. Co., 500 Fifth Ave., New York 36, N.Y., 77
For details see ad on page 47

Henry & Miller Industries, Inc., 424 W. 33 St., New York 1, N.Y., 24, 32, 75, 77, 82

Heppner Mfg. Co., Box 1207, Round Lake, Ill., 7, 33, 41, 54
For details see ad on page 64

Herlee Corp., 6 & Beech Sts., Grafton, Wis., 30, 31, 46

Hermaseal Co., Inc., 1101 Lafayette St., Elkhart, Ind., 75, 78
For details see ad on page 277

Hermetic Seal Products Co., 29-37 S. Sixth St., Newark 7, N.J., 37, 77, 78
For details see ad on page 66

Hermetite Corp., 702 Beacon St., Boston 15, Mass., 37, 72, 78

Hertner Electric Co., 12690 Elmwood Ave., Cleveland 11, Ohio, 43, 65

Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif., 2, 4, 13, 15, 45, 59, 64, 88, 90, 92, 93, 96
See complete catalog in last section

Hewson Co., John, 106 Water St., New York 5, N.Y., 56, 90

Hexacon Electric Co., 161 W. Clay Ave., Roselle Park, N.J., 82

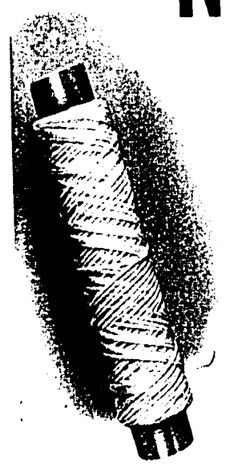
Heyman Manufacturing Co., 300 Michigan Ave., Kenilworth, N.J., 77
For details see ad on page 271

Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland 8, Ohio, 42, 88, 90, 95, 96
For details see ad on page 170

(Continued on page 49)

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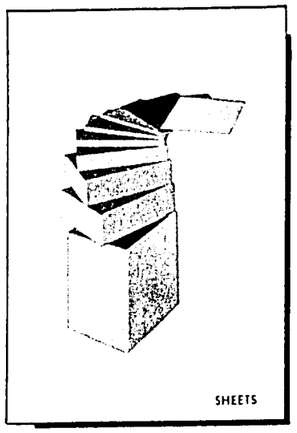


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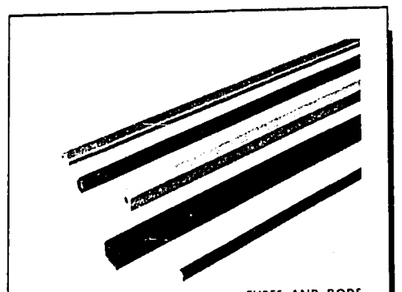
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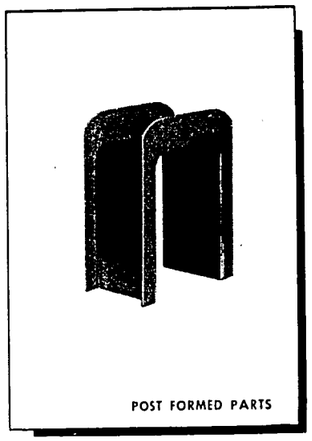
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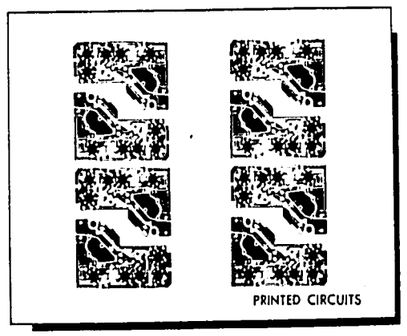
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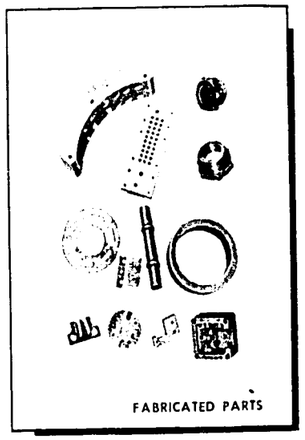
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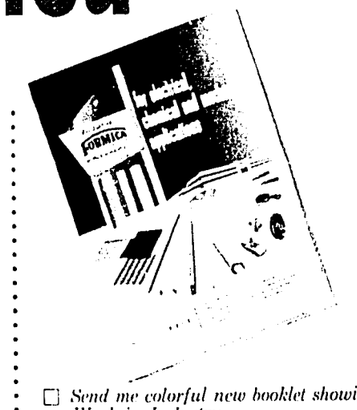
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Alphabetical Directory

(Continued from page 47)

High Fidelity Magazine, Great Barrington, Mass., 98
High Speed Hammer Co., Inc., 313 Norton St., Rochester 21, N.Y., 82
High Voltage Engineering Corp., 7 University Rd., Cambridge 38, Mass., 45
Highland Engineering Co., Main & Urban, Westbury 21, L.I., N.Y., 33, 45, 54, 61, 75, 80
For details see ad on pages 217 & 283
Hill Electronic Engineering & Mfg. Co., Inc., New Kingstown, Pa., 4, 37, 38
For details see ad on page 160
Hill Sales Co., J. T., 800 W. 11 St., Los Angeles 15, Calif., 95
Hillburn Electronic Products Co., 55 Nassau Ave., Brooklyn 22, N.Y., 33, 54
Hillyer Instrument Co., Inc., 54 Lafayette St., New York 13, N.Y., 80
Hi-Lo TV Antenna Corp., 3540 N. Ravenswood Ave., Chicago 13, Ill., 26
Hindle Transformer Co., Inc., Woods Church Rd., Flemington, N.J., 54, 71
Hi-Q Division, Aerovox Corp., P.O. Box 237, Olean, N.Y.
For details see Aerovox ad on pages 362-363
Hitemp Wires, Inc., 26 Windsor Ave., Mineola, L.I., N.Y., 26, 71
Hi-Test Chemical Corp., 722 64 St., Brooklyn 20, N.Y., 81
Hi-Video, Inc., Pearl River, Newburgh, N.Y., 1, 5, 14, 45
Hobson Brothers, 4049 W. Fullerton, Chicago 39, Ill., 34, 84
Hoffman Co., P. R., 321 Cherry St., Carlisle, Pa., 37, 82
For details see ad on page 163
Hoffman Radio Corp., 3761 S. Hill St., Los Angeles 7, Calif., 14, 21, 68, 69, 92
Hogan Laboratories, Inc., 155 Perry St., New York 14, N.Y., 4, 22, 59, 66, 73, 80, 91
For details see ad on page 283
Hoisington, David B., 150 Ford Rd., Carmel Valley, Calif., 73, 80
Holl Audio, Inc., 5020 N. Encinita Ave., Temple City, Calif., 1, 7
Holland Electronics, 572 Broome St., New York 13, N.Y., 73, 80
Hollywood Radio & TV Institute, 7078 Hollywood Blvd., Hollywood 28, Calif., 97
Holyoke Wire & Cable Corp., 720 Main St., Holyoke, Mass., 71
Home Recording Products Corp., 50 Mill Rd., Freeport, L.I., N.Y., 10
Hopp Press, Inc., 460 W. 34 St., New York 1, N.Y., 46, 75
Horlick Co., William L., 266 Summer St., Boston 10, Mass., 43
Horn Co., Inc., A. C., 10 St. & 44 Ave., Long Island City 1, N.Y., 81
Horton Machine Products Co., 1091 Rockaway Ave., Valley Stream, L.I., N.Y., 7
Hose-McCann Telephone Co., Inc., 761 Third Ave., Brooklyn 32, N.Y., 1, 5, 14, 17, 23
Houghton Laboratories, Inc., 322 Bush St., Olean, N.Y., 74, 75, 78, 79, 80, 81, 85
Houlihan Co., T. J., 2508 W. Lawrence, Chicago 25, Ill., 33, 54
Howard Industries, Inc., 1760 State St., Racine, Wis., 28, 43, 65
For details see ad on page 179
Howard Moldings, Inc., 2600 Grand Ave., Kansas City 8, Mo., 37, 84
Howes, F. S., McGill University, Montreal, Que., Canada, 73
Hudson Radio & Television Corp., 48 W. 48th St., New York 19, N.Y., 99
For details see ad on page 350
Hudson Tool & Die Co., Inc., 118 S. 14th St., Newark, N.J., 75, 77
For details see ad on page 30
Hudson Wire Co., Winsted Div., 981 Main St., Winsted, Conn., 71
Huggins Laboratories, 700 Hamilton Ave., Menlo Park, Calif., 45, 73, 80
Hughes Aircraft Co., Florence Ave. & Teale St., Culver City, Calif., 50
For details see ad on page 68
Hughey & Phillips, 4075 Beverly Blvd., Los Angeles 4, Calif., 12, 16, 25, 26, 43, 48
Hunt Corp., 453 Lincoln St., Carlisle 2, Pa., 37
For details see ad on page 163
Hutcheson, Guy C., Box 32, Arlington, Texas, 73
Hycon Mfg. Co., 2961 E. Colorado St., Pasadena 8, Calif., 18, 23, 65, 67, 68, 69, 70, 93, 95 96
Hycor Co., Inc., 11423 Van Owen St., North Hollywood, Calif., 4, 33, 49, 54, 61, 90
Hy-Lite Antennae, Inc., 242 E. 137 St., New York 51, N.Y., 19, 26, 67

I E Manufacturing, 325 N. Hoyne Ave., Chicago 25, Ill., 26, 32, 71, 72, 73, 75, 77
I-T-E Circuit Breaker Co., 1924 Hamilton St., Philadelphia 30, Pa., 33, 49, 67, 75
For details see ad on page 146
Ideal Industries, Inc., Park & Borden, Sycamore, Ill., 39, 77, 82
Ideco Div., Dresser-Stacey Co., 875 Michigan Ave., Columbus 8, Ohio, 12
Illinois Condenser Co., 1616 N. Throop St., Chicago 22, Ill., 30
For details see ad on page 70
Illinois Transformer Co., 412 S. Green St., Chicago 7, Ill., 53, 61
Illustrated Technical Products Corp., 320 Broadway, New York 7, N.Y., 97, 98
Imperial Electric Co., 9 Park Pl., New York 7, N.Y., 43
Imperial Radar & Wire Corp., 818-820 E. 233 St., New York 66, N.Y., 26, 67, 70, 71, 84
Indiana Electronic & Television Corp., 312 E. Washington St., Indianapolis 4, Ind., 73, 75, 80
Indiana Steel Products Co., Valparaiso, Ind., 41
For details see ad on page 171
Induction Heating Corp., 181 Wythe Ave., Brooklyn 11, N.Y., 62
Induction Motors Corp., 570 Main St., Westbury, L.I., N.Y., 28, 43, 65
For details see ad on page 180
Inductograph Products, Inc., 83-56 Victor Ave., Elmhurst 73, N.Y., 45
Industrial Chromium Corp., 109 Lyman St., Holyoke, Mass., 60
Industrial Condenser Corp., 3243 N. California Ave., Chicago 18, Ill., 30, 38
Industrial Control Co., Straight Path Rd., Wyandanch, L.I., N.Y., 1, 40, 60, 61, 63, 65, 90
Industrial Devices, Inc., 22 State Rd., Edgewater, N.J., 44, 75, 77, 78, 80, 84
Industrial Electrical Works, 1509 Chicago St., Omaha 2, Neb., 82
Industrial Electronic Engineers, 5326 Sunset Blvd., Hollywood 27, Calif., 59, 60, 62, 65, 66, 73
Industrial Electronics, Inc., 8060 Wheeler, Detroit 10, Mich., 60, 80
Industrial Electronics of Canada, Ltd., 15 Cordova Ave., Islington, Toronto 18, Ont., Canada, 45, 47, 60, 62, 63, 80
Industrial Hardware Mfg. Co., Inc., 109 Prince St., New York 12, N.Y., 51, 75, 77
For details see ad on page 205
Industrial Instrument, Inc., 89 Commerce Rd., Cedar Grove, N.J., 60, 90
Industrial Laboratories Publishing Co., 201 N. Wells St., Chicago 6, Ill., 98
Industrial Nucleonics Corp., 1205 Chesapeake Ave., Columbus 12, Ohio, 60
Industrial Products Co., P.O. Box 148, Danbury, Conn., 6, 24, 34, 48, 52, 70
Industrial Radio Labs., 178 E. 77 St., New York 21, N.Y., 73, 80
Industrial Rectifier Co., 120 Cedar St., New York 6, N.Y., 45
Industrial Research Labs., Hilltop & Frederick Rds., Baltimore 28, Md., 18, 80
Industrial Scientific Co., 34 W. 33 St., New York 1, N.Y., 65
Industrial Specialties Corp., 323 Atlantic Ave., Brooklyn 2, N.Y., 3, 33, 41, 48, 53, 80
Industrial Tape Corp., U.S. Highway 1, New Brunswick, N.J., 77, 79
Industrial Television, Inc., 369 Lexington Ave., Clifton, N.J., 13, 14, 16, 33, 45, 75, 77, 80, 84, 90, 95, 96
Industrial Test Equipment Co., 55 E. 11 St., New York 3, N.Y., 88, 96
For details see ad on page 307
Industrial Timer Corp., 115 Edison Pl., Newark 5, N.J., 42, 48, 52
Industrial Transformer Corp., Goulds-boro, Pa., 90
Inet, Inc., 8655 S. Main St., Los Angeles 3, Calif., 45, 47
Insl-X Co., Inc., Broadway & Water St., Ossining, N.Y., 81
Institute of Radio Engineers, 1 E. 79th St., New York 21, N.Y., 98
For details see ad on pages 360, 396, 416, 448-449
Instrument Corporation of America, Blacksburg, Va., 34, 75
For details see ad on page 72
Instrument Development Labs., Inc., 163 Highland Ave., Needham Heights 94, Mass., 60, 80
Instrument Electronics Corp., 90 Main St., Pt. Washington, N.Y., 42, 88, 90
Instrument Laboratories, 315 W. Walton Pl., Chicago 10, Ill., 73, 80, 90
Instrument Laboratories, 367 First Ave., New York 10, N.Y., 80, 95
Instrument Resistors Co., 1036 Commerce Ave., Union, N.J., 49
(Continued on page 51)

MINIATURE IN SIZE - GIGANTIC IN PERFORMANCE

FUSITE GLASS-TO-METAL HERMETIC TERMINALS

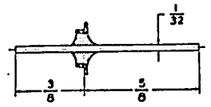
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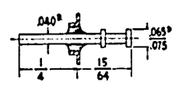


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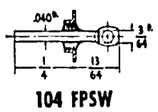
104 SW



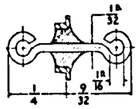
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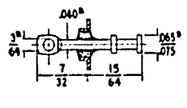
104 FPSW



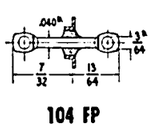
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104 THFP



104 FP



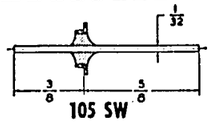
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1500 V Flange Diameter .250 Mounting Hole 3/16"

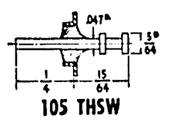


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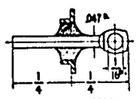
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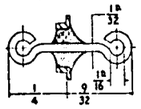
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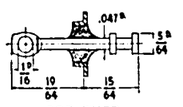
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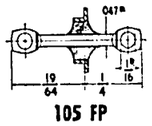
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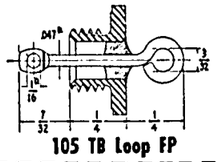
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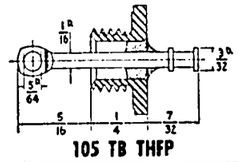
105 FP



105 TB Loop FP



105 TB THFP



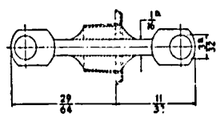
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1500 V Flange Diameter 1⅛" Mounting Hole 3/16"



Illustrated #106 FP

106 FP



GENERAL SPECIFICATIONS

MATERIALS—C. R. Steel disc and steel electrodes. Interfused with glass.

PRESSURE TEST—12 pounds gauge.

INSULATION TEST—10,000 megohms after salt water immersion.

SUDDEN THERMAL SHOCK TEST—dry ice to boiling water.

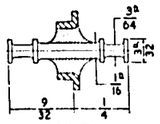
2000 V Flange Diameter 3/4" Mounting Hole 13/64"



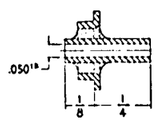
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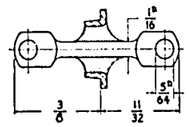
107 TH



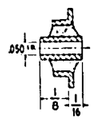
107 HT



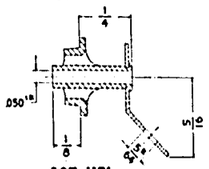
107 FP



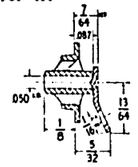
107 HT (Short)



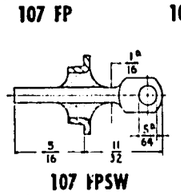
107 HTL



107 BLHT



107 FPSW



107 SERIES

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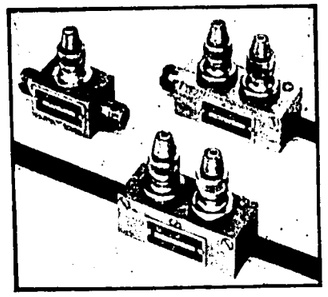
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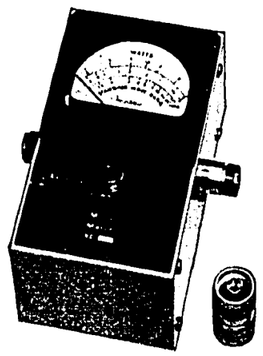
Instrument Specialties Co., Inc., 224 Bergen Blvd., Little Falls, N.J., 77
For details see ad on page 271
Instrument Wire Co., 150 Church St., Guilford, Conn., 71
Insulation Products Co., 504 N. Richland St., Pittsburgh 8, Pa., 51, 75, 84
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 6, 7, 9, 10, 19, 24, 26, 29, 32, 33, 34, 37, 38, 39, 51, 52, 67, 71, 72, 73, 75, 77, 79, 84
For details see ad on page 134
Interelectronics Corp., 2432 Grand Concourse, New York 58, N.Y., 1, 16, 27, 32, 63, 81
For details see ad on page 51
International Electronics Corp., 137 Hudson St., New York 13, N.Y., 55, 56, 57, 82, 95, 96
International Instruments, Inc., P.O. Box 2954, New Haven 15, Conn., 42, 90
For details see ad on page 171
International Nickel Co., Inc., 67 Wall St., New York 5, N.Y., 83
International Pump & Machine Works, 11-13 Governor St., Newark 2, N.J., 82
For details see ad on page 293
International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif. 47, 50, 60
For details see ad on page 188
International Resistance Co., 401 N. Broad St., Philadelphia 3, Pa., 26, 30, 33, 46, 47, 49, 78
International Sound Eng. Co., 821 S. Orange Ave., East Orange, N.J., 1
International Television Corp., 238 William St., New York 38, N.Y., 1, 14, 15, 96
Interstate Mfg. Corp., 26 Sterling St., East Orange, N.J., 71, 84
Investment Casting Co., 319 Chestnut St., Newark 5, N.J., 77
Ippolito & Co., Inc., James, 401 Concord Ave., New York 54, N.Y., 75, 77, 87
For details see ad on page 300
Irvington Varnish and Insulator, 6 Argyle Terr., Irvington 11, N.J., 74, 79, 81, 85
Isolantite Manufacturing Corp., Warren Ave., Stirling, N.J., 24, 26, 37, 72, 77, 78, 84, 87
Ivanhoe Electronic Labs., 14238 S. La Salle St., Chicago 27, Ill., 15, 73

J-B-T Instruments, Inc., 441 Chapel St., New Haven 8, Conn., 42, 52
JFD Mfg. Co., Inc., 6101 16 Ave., Brooklyn 4, N.Y., 4, 6, 26, 31, 39, 52, 67, 71, 77
For details see ad on pp. 140, 242
Jackson Electrical Instrument Co., 18 S. Patterson Blvd., Dayton 2, Ohio, 88, 90, 95, 96
Jackson Industries, Inc., 500 E. 40 St., Chicago 15, Ill., 1, 14, 29
Jacksonville Metal & Plastics Co., 575 Dora St., Jacksonville, Fla., 29, 32
Jaco Products, 6408 Euclid Ave., Cleveland 3, Ohio, 75, 77, 82
Jacobs, Charles F., P.O. Box 408, Church St. Station, New York 18, N.Y., 26
Jacobs Instrument Co., Bethesda 14, Md., 54, 59, 70, 80
James Vibrapowr Co., 4036 N. Rockwell St., Chicago 18, Ill., 1, 35
Janette Electric Mfg. Co., Lehigh at Main, Morton Grove, Ill., 35, 43
Jarvis Electronics Corp., 6058 W. Fullerton Ave., Chicago 39, Ill., 18, 49, 73
Jeffers Electronics Div., Speer Carbon Co., DuBois, Pa., 30, 33
Jefferson Electric Co., 25th and Madison, Bellwood, Ill., 53
Jefferson, Inc., Ray, 40 E. Merrick Rd., Freeport, L.I., N.Y., 23, 24
Jennings Radio Mfg. Co., 970 McLaughlin Ave., P.O. Box 1278, San Jose 8, Calif., 30, 31, 43, 52
For details see ad on pages 390-392
Jensen Industries, Inc., 329 S. Wood St., Chicago 12, Ill., 9, 10
Jensen Manufacturing Co., 6601 S. Laramie Ave., Chicago 38, Ill., 2, 7, 29, 54
Jerrell Electronic, 1970 Neva Dr., Dayton, Ohio, 5, 33, 41, 45, 80, 93
Jersey City Technical Lab., 880 Bergen Ave., Jersey City 6, N.J., 1, 11, 45, 90
Jet Electronics, Inc., 93 Massachusetts Ave., Boston, Mass., 49
Jiffy Clip Mfg. Co., 128 Clinton, Huntington, L.I., N.Y., 77
Johanson Manufacturing Corp., P.O. Box 327, Boonton, N.J., 31
Johns-Manville, 22 E. 40 St., New York 16, N.Y., 81
Johnson Co., E. F., Waseca, Minn., 6, 12, 19, 24, 26, 31, 33, 34, 38, 44, 48, 51, 53, 72, 77
For details see ad on page 183

(Continued on page 53)

VSWR and RF WATTMETER





MM 700 SERIES

MM 570 SERIES

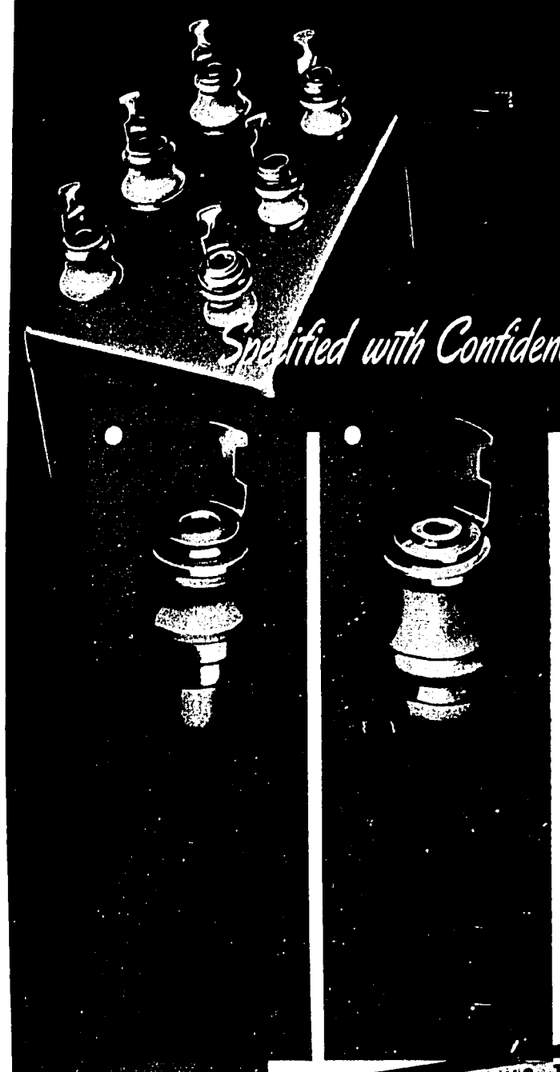
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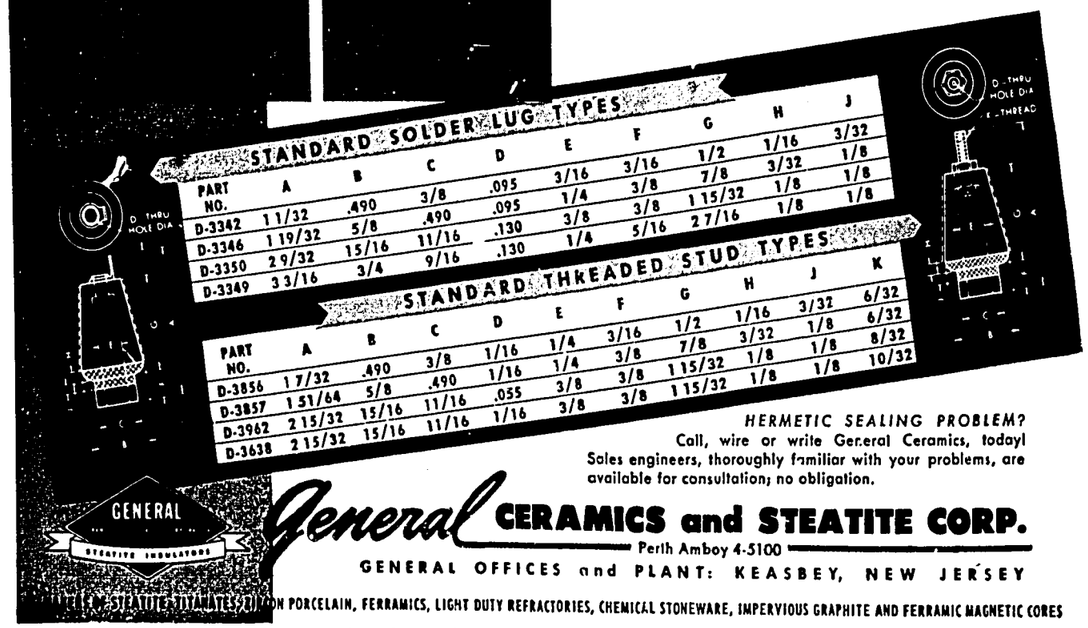
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Solder-seal Terminals by General Ceramics — engineered for severe service and extra dependability — effect a permanent, positive hermetic seal practically immune to mechanical and thermal shock. There are no plastic or rubber gaskets to age or deteriorate in these reliable terminals. Soft-soldering to closures is accomplished easily and quickly. General Ceramics Solder-Seal Terminals are available in a wide range of sizes and shapes to meet almost every requirement.



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PART NO.	A	B	C	D	E	F	G	H	J
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D-3346	1 19/32	5/8	.490	.095	1/4	3/8	7/8	3/32	1/8
D-3350	2 9/32	15/16	11/16	.130	3/8	3/8	1 15/32	1/8	1/8
D-3349	3 3/16	3/4	9/16	.130	1/4	5/16	2 7/16	1/8	1/8

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PART NO.	A	B	C	D	E	F	G	H	J	K
D-3856	1 7/32	.490	3/8	1/16	1/4	3/16	1/2	1/16	3/32	6/32
D-3857	1 51/64	5/8	.490	1/16	1/4	3/8	7/8	3/32	1/8	6/32
D-3962	2 15/32	15/16	11/16	.055	3/8	3/8	1 15/32	1/8	1/8	8/32
D-3638	2 15/32	15/16	11/16	1/16	3/8	3/8	1 15/32	1/8	1/8	10/32

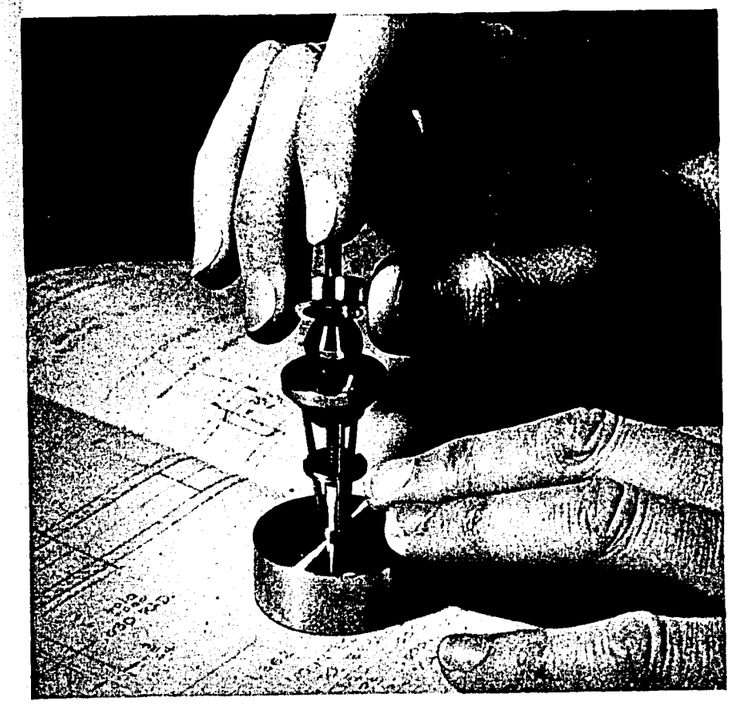
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See complete list of local sales representatives on page 349.



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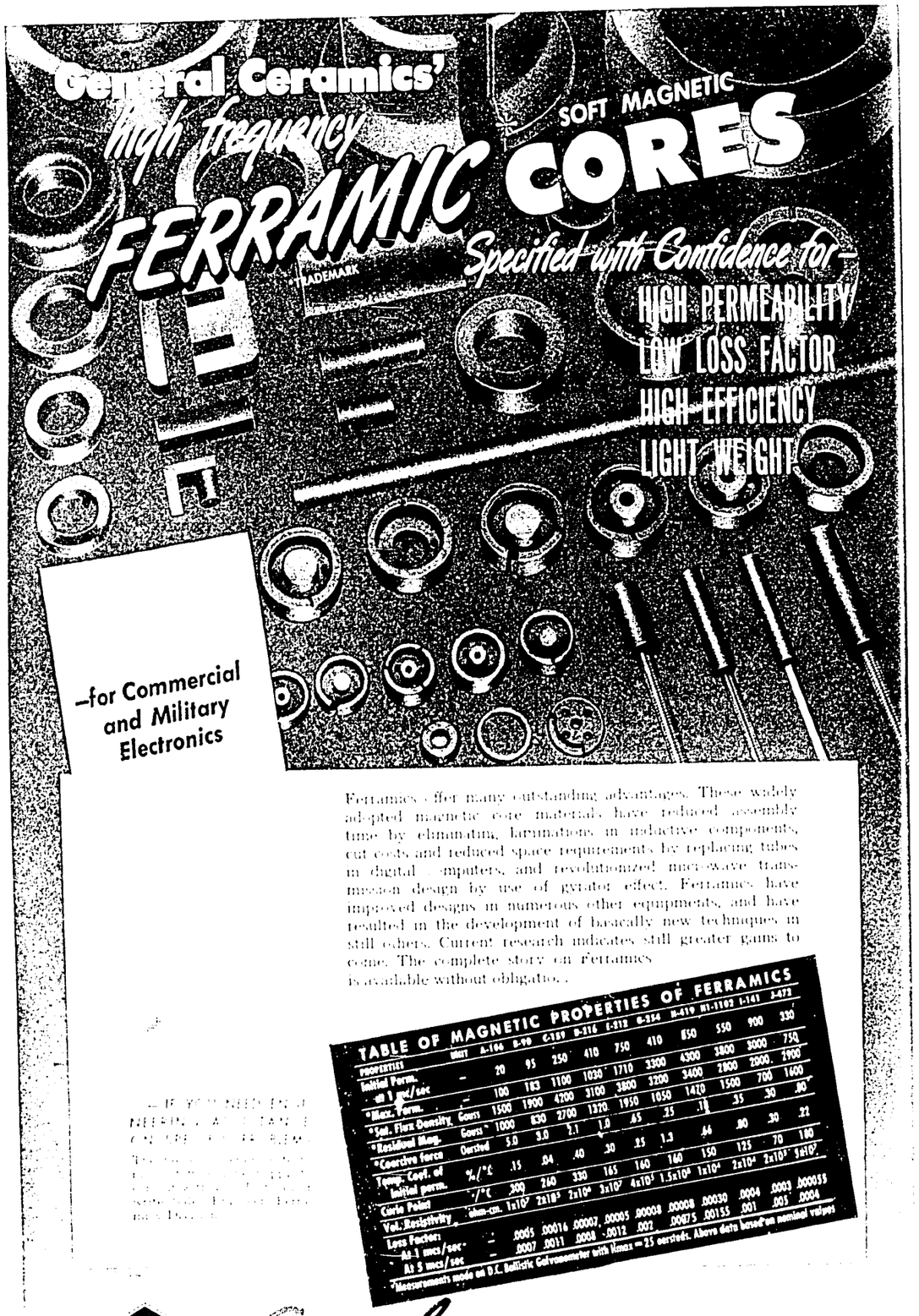
Alphabetical Directory

(Continued from page 51)

Johnson & Hoffman Mfg. Co., 31 E. 2 St., Mineola, L.I., N.Y., 75, 77, 87
For details see ad on pages 397-400
Johnson, J. Kelly, 511 5 Ave., New York 17, N.Y., 73
Johnston Foil Mfg. Co., 6106 S. Broadway, St. Louis 11, Mo., 79, 83, 86
Jones Electronics Co., Inc., M. C., 96 N. Main St., Bristol, Conn., 13, 26, 96
For details see ad on page 51
Jones Div., Howard B., Cinch Mfg. Corp., 1026 S. Homan Ave., Chicago 24, Ill., 6, 34, 39, 51, 77
For details see ad on pages 384-385
Joy Mfg. Co., Electrical Connector Div., 4235 Clayton Ave., St. Louis 10, Mo., 6, 34, 71
Joyner Corp., The, S. Buffalo St., Warsaw, Ind., 33, 54

K-F Development Co., 2606 Spring St., Redwood City, Calif., 20, 49
K. V. Transformer Corp., 20 E. Franklin St., Danbury, Conn., 29, 33, 54
Kaar Engineering Corp., 2995 Middlefield Rd., Palo Alto, Calif., 21, 23, 24, 25, 37
Kabar Mfg. Corp., 1907 White Plains Rd., New York 60, N.Y. 62
Kahle Engineering Co., 1307 7th St., North Bergen, N.J., 82
For details see ad on page 290
Kahn, Leonard R., 22 Pine St., Freeport, L.I., N.Y., 73
For details see ad on page 257
Kahn & Co., Inc., 541 Windsor St., Hartford 1, Conn., 13, 21, 23, 24, 45, 60, 73, 75, 90
Kahn Research Labs., 22 Pine St., Freeport, L.I., N.Y., 14, 18, 24, 25, 80
Kalbfell Laboratories, Inc., 1090 Morena Blvd., San Diego 10, Calif., 1, 2, 4, 45, 46, 65, 73, 90
For details see ad on page 257
Kallmann, Heinz E., 417 Riverside Dr., New York 25, N.Y., 73, 80
Karlson Associates, 1379 E. 15 St., Brooklyn 30, N.Y., 29
Karp Metal Products Co., Div. H & B American Machine Co., 211 63 St., Brooklyn 20, N.Y., 29, 32
Kartron, P.O. Box 472, Huntington Beach, Calif., 90
Kaupp Co., C. B., 32 Newark Way, Maplewood, N.J., 75, 77
For details see ad on page 74
Kay Electric Co., 14 Maple Ave., Pine Brook, N.J., 90, 93, 96
For details see ad on page 314
Kaye-Halbert Corp., 3555 Hayden Ave., Culver City, Calif., 14
Kay-Woff Products Co., Overton, Neb., 71, 77, 84
Kean, Walter F., 1 Riverside Rd., Riverside, Ill., 73
Kearfott Co., Inc., 1150 McBride Ave., Little Falls, N.J., 40 43, 50, 59, 65, 67, 72, 73, 77
For details see ad on page 53
Keim, Llewellyn Bates, 11 Riverside Dr., New York 23, N.Y., 73
Keithley Instruments, 3868 Carnegie Ave., Cleveland 15, Ohio, 1, 90

(Continued on page 55)



Ferramics offer many outstanding advantages. These widely adopted magnetic core materials have reduced assembly time by elimination, laminations in inductive components, cut costs and reduced space requirements by replacing tubes in digital computers, and revolutionized microwave transmission design by use of gyrator effect. Ferramics have improved designs in numerous other equipments, and have resulted in the development of basically new techniques in still others. Current research indicates still greater gains to come. The complete story on ferramics is available without obligation.

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Initial Perm. at 1 mc/sec	—	20	95	250	410	750	410	850	550	900	350
*Max. Perm.	—	100	183	1100	1030	1710	3300	4300	3800	3000	750
*Sat. Flux Density, Gauss	Gauss	1500	1900	4200	3100	3800	3200	3400	2800	2900	2900
*Residual Mag.	Gauss	1000	830	2700	1320	1950	1050	1420	1500	700	1600
*Coercive Force	Oersted	5.0	9.0	2.1	1.0	.45	.25	.11	.35	.30	.90
Temp. Coef. of Initial perm.	%/°C	.15	.04	.40	.30	.85	1.3	.46	.80	.30	.22
Curie Point	°/°C	300	240	330	165	160	160	150	125	70	180
Vol. Resistivity	ohm-cm.	$1x10^7$	$2x10^5$	$2x10^4$	$3x10^5$	$4x10^5$	$1.5x10^6$	$1x10^6$	$2x10^6$	$2x10^5$	$5x10^5$
Loss Factor: At 1 mcs/sec	—	.0005	.00016	.00007	.00005	.00008	.00008	.00030	.0004	.0003	.000055
At 5 mcs/sec	—	.0007	.0011	.0008	.0012	.002	.0025	.00155	.001	.001	.0004

*Measurements made on D.C. Ballistic Galvanometer with Hmax = 25 oersteds. Above data based on nominal values

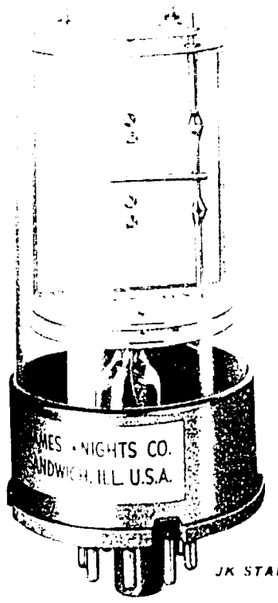
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GENERAL OFFICES and PLANT: KEASBEY, NEW JERSEY
MAKERS OF STEATITE, TITANATES, ZIRCON PORCELAIN, FERRAMICS, LIGHT DUTY REFRACTORIES, CHEMICAL STONEWARE, IMPERVIOUS GRAPHITE AND FERRAMIC MAGNETIC CORES

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JK PRODUCTS

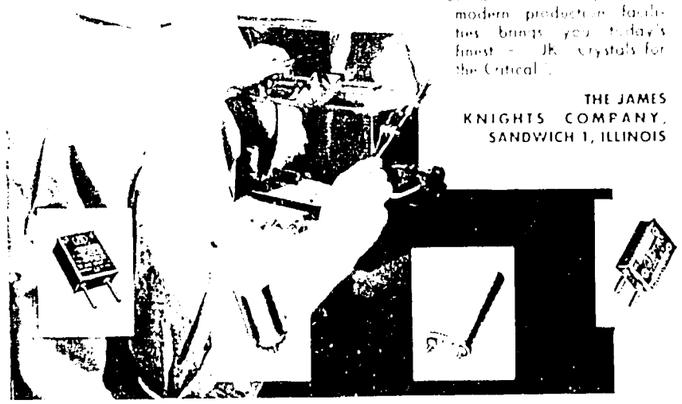
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JK STABILIZED G-12 CRYSTAL

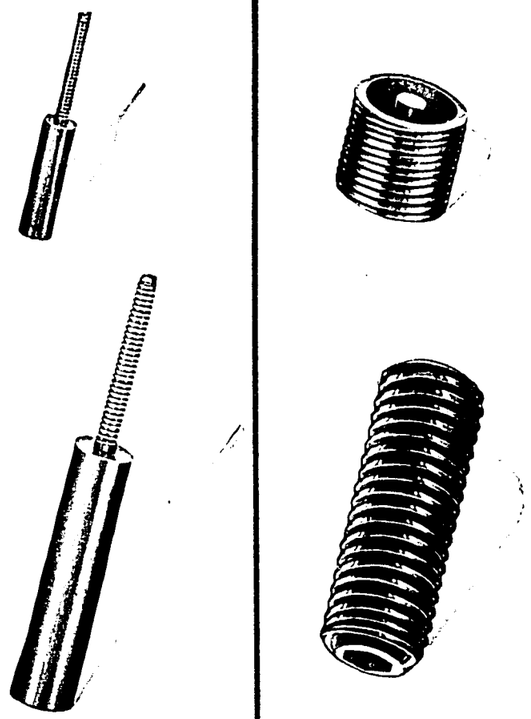
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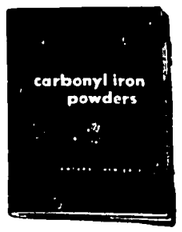
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(Continued from page 55)

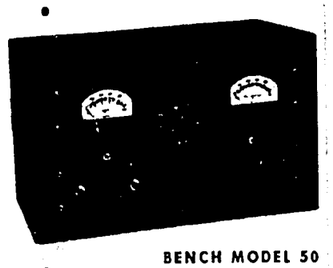
Kinney Mfg. Co., 3529 Washington St., Boston 30, Mass., 82
For details see ad on page 292
Kip Electronics Corp., 155 Waverly Place, New York 14, N.Y., 55, 56, 80
Kirchberger & Co., Inc., M., 1425 37 St., Brooklyn 18, N.Y., 72, 75, 87
For details see ad on page 255
Kleinberger, Richard C., 1 E. Post Road, White Plains, N.Y., 73
Kliegl Bros. Universal Electric Stage Lighting Co., Inc., 321 W. 50 St., New York 19, N.Y., 16
Kling Metal Spinning Co., 174 Centre St., New York 13, N.Y., 75, 77
Klipsch & Associates, Box 64, Hope, Ark., 7
Klise Mfg. Co., 50 Cottage Grove St. S.W., Grand Rapids 2, Mich., 75, 77
Knapp Radio Specialties, Inc., 30 Taylor St., Springfield 3, Mass., 26, 30, 31, 33, 49, 51, 52, 77
Knights Co., James, 101 E. Church St., Sandwich, Ill., 13, 37
For details see ad on page 55
Koehler Mfg. Co., 395 Lincoln St., Marlboro, Mass., 27, 75
Kollmorgen Optical Corp., 30 Church St., New York 7, N.Y., 89
Kollsman Instrument Corp., 80-08 45 Ave., Elmhurst, L.I., N.Y., 43, 65
For details see ad on page 43
Kolton Electric Mfg. Co., 123 N. J. R. R. Ave., Newark 5, N.J., 29, 32, 39, 75, 77
Koppers Co., Inc., Koppers Bldg., Pittsburgh 19, Pa., 85
Korb Eng. & Mfg. Co., 30 Ottawa Ave., Grandville, Mich., 1, 3, 10, 11, 68, 69
Korrol Products Corp., 350 Greenwich St., New York 13, N.Y., 29, 32, 75
Kotron Rectifier Corp., 54 Clark St., Newark 3, N.J., 47
Kramer, Ambrose W., 422 Washington Bldg., Washington 5, D.C., 73, 80
Kriser Corp., 154 11 Ave., New York 11, N.Y., 52, 75
Krohn-Hite Instrument Co., 580 Massachusetts Ave., Cambridge 39, Mass., 1, 4, 45, 88
Kulka Electric Mfg. Co., Inc., 633 S. Fulton Ave., Mt. Vernon, N.Y., 39, 44, 51, 52, 70, 77
Kupfrian Mfg. Co., 395 State St., Binghamton, N.Y., 71, 77, 89
Kurman Electric Co., Inc., 35-18 37 St., Long Island City 1, N.Y., 35, 48
Kurz-Kasch, Inc., Dayton 1, Ohio, 84
Kuthe Laboratories, Inc., 730 S. 13 St., Newark 3, N.J., 56
Kwikheat Mfg. Co., 3732 San Fernando Road, Glendale 4, Calif., 82

L. A. B. Corp., 31 Union Pl., Summit, N.J., 82, 90
Laboratory for Electronics, Inc., 75 Pitts St., Boston 14, Mass., 18, 45, 59, 68, 69, 80, 93, 95
For details see ad on pages 432-433
Labscope, Inc., 50 Patterson Ave., East Rutherford, N.J., 95
Lafayette Labs., Inc., 236 Lafayette St., New York 12, N.Y., 7, 75, 77, 80, 82
Lake Manufacturing Co., 2323 Chestnut St., Oakland 7, Calif., 1
Lako Company, 506-520 East Townsend St., Milwaukee 12, Wis., 54, 75, 80, 96

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Regulation (line): . . . . < 0.15%
Regulation (load): . . . . < 0.5%
Internal Impedance: . . < 2 ohms
Ripple and Noise: . . < 8 mv rms
Polarity: + or − may be grounded
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• 6.3 VAC, 5A . . . . . unregulated

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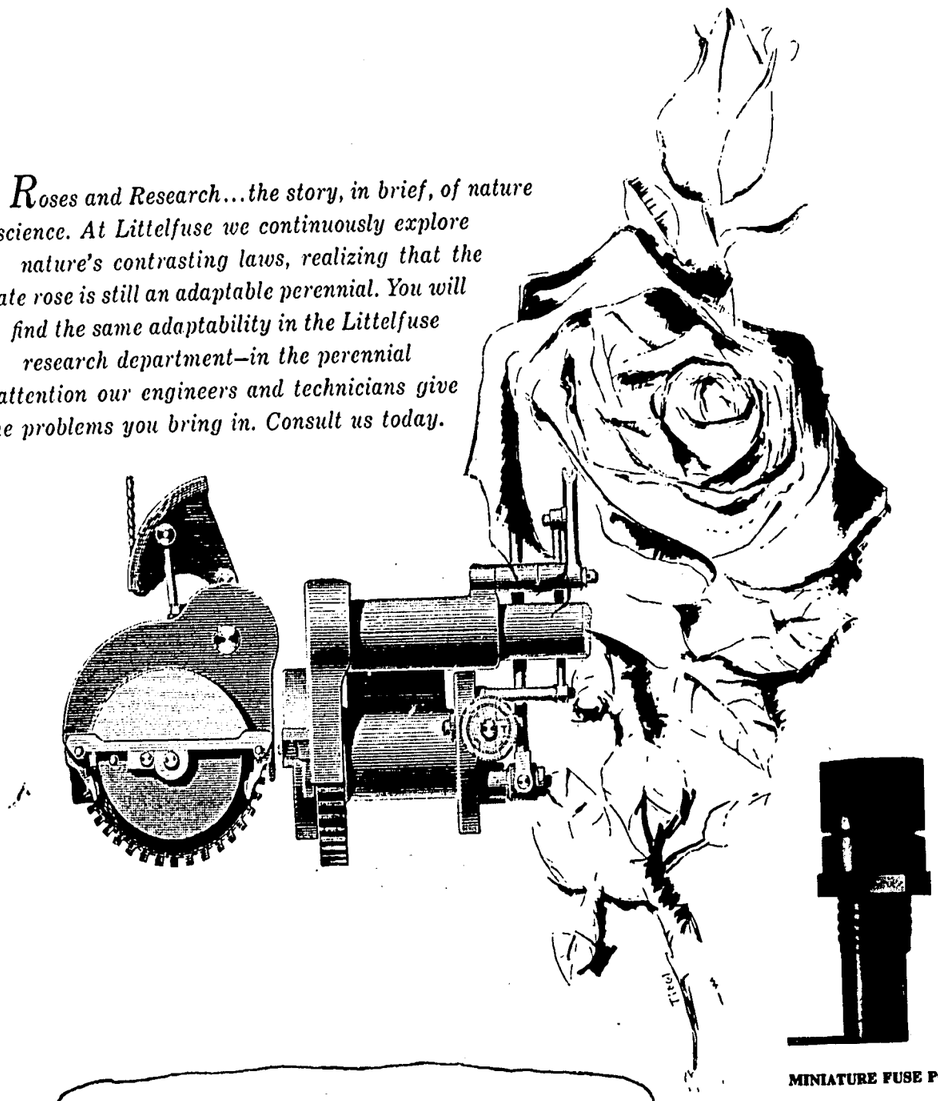
**For complete specifications on these and other models write for catalog G-50-D.*

Alphabetical Directory

Lamagna Mfg. Co., Inc., 51 Clinton Pl., East Rutherford, N.J., 8, 32, 45, 62, 67, 75
Lambda Electronics Corp., 103-02 Northern Blvd., Corona 68, L.I., N.Y., 45
For details see ad on page 57
Lamoree, C. D., 1325 San Julian, Los Angeles 15, Calif., 46, 75, 77, 79, 81, 85
Lampkin Laboratories, Inc., Bradenton, Fla., 96
Landis & Gyr, Inc., 45 W. 45 St., New York 36, N.Y., 59
Lamson & Sessions Co., 1971 W. 85 St., Cleveland 2, Ohio, 77
Langevin Manufacturing Corp., 37 W. 65 St., New York 23, N.Y., 1, 16, 29, 32, 33, 45, 54
For details see ad on page 218
Lansdale Tube Co., Church St., Lansdale, Pa., 50, 55
Lansing Sound, Inc., James B., 2439 Fletcher Drive, Los Angeles 39, Calif., 7, 29
LaPointe Electronics, Inc., 155 West Main St., Rockville, Conn., 14, 25, 26
Lapp Insulator Co., Inc., 20 Sumner St., Le Roy, N.Y., 26, 30, 31, 72
La Rose & Associates, Inc., W. T., P.O. Box 55, Troy, N.Y., 29, 30, 54, 62
LAS-Lab., 316 W. Saratoga St., Baltimore 1, Md., 80
Lavoie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N.J., 18, 31, 67, 70, 80, 92, 93, 95, 96
For details see ad on page 328
Lawn Electronics Co., E. Freehold Road, Freehold, N.J., 45
Lawton Products Co., Inc., 624 Madison Ave., New York 22, N.Y., 59, 80
Leach Relay Co., 5915 Avalon Blvd., Los Angeles 3, Calif., 48
Leader Electronics, Inc., 5713 Euclid Ave., Cleveland 3, Ohio, 48, 52
Lear, Inc., 11916 Pico Blvd., Los Angeles 34, Calif., 14, 18, 21, 23, 24, 33, 35, 38, 40, 43, 58, 60, 65, 73, 75, 80, 82, 96
Lectro-Max, Inc., 15 S. First St., Geneva, Ill., 56, 80
Lectrohm, Inc., 5560 Northwest Hwy., Chicago 30, Ill., 33, 49, 86
Lectroman, Inc., 66-63 69th St., Middle Village 79, N.Y., 54, 60, 80
Lee Electric & Mfg. Co., 2806 Clearwater St., Los Angeles 39, Calif., 40, 45, 47
Lee Electronic Labs., Inc., 233 Dudley St., Boston 19, Mass., 2, 80, 90
Lee Laboratories, P.O. Box 200, Genesee, Pa., 67, 68, 69, 70, 75, 80
For details see ad on page 284
Lee Spring Co., Inc., 30 Main St., Brooklyn 1, N.Y., 33, 75, 77
Lehigh Structural Steel Co., 17 Battery Pl., New York 4, N.Y., 12, 25
Lehigh Valley Electronics Engineering & Mfg. Co., 215 S. 3rd St., Allentown, Pa., 14, 21, 24, 25, 32, 33, 54, 73, 80, 90
Lektra Laboratories, Inc., 154 11th Ave., New York 11, N.Y., 48, 60, 63, 90
Leland Electric Co., Div. A.M.F., 1501 Webster St., Dayton 1, Ohio, 43, 45
Leland, Inc., G. H., 123 Webster, Dayton 2, Ohio, 48, 52
Lenk Mfg. Co., 30-48 Cummington St., Boston 15, Mass., 82, 86

(Continued on page 59)

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Lenkurt Electric Co., Inc., San Carlos, Calif., 3, 4, 20, 33, 36

Lenz Electric Manufacturing Co., 1751 N. Western Ave., Chicago 47, Ill., 71
For details see ad on page 250

Leonard Electric Products Co., 67 34 St., Brooklyn 32, N.Y., 1, 14, 25, 33, 46, 49, 54, 68, 69

Lepel High Frequency Labs., Inc., 54-18 37th Ave., Woodside 77, L.I., N.Y., 62

Lepore's Laboratory, 732 Manton Ave., Providence 9, R.I., 73, 75, 80, 82

Lerner Instrument & Electronics Mfg. Corp., 66 Bergen St., Brooklyn 1, N.Y., 26, 67, 70, 93

Lesa S. P. A., Via Bergamo 21, Milano, Italy, 1, 2, 4, 8, 9, 14, 16, 20, 24, 32, 33, 35, 43, 49, 52, 54

Letting Radio Mfg. Co., 62 Berkley St., Valley Stream, L.I., N.Y., 19, 24, 25, 96

Leupold and Stevens Instruments, Inc., 4445 N.E. Glisan St., Portland 13, Ore., 42, 59, 66, 91

Lewis and Kaufman, Ltd., 17320 El Rancho Ave., Los Gatos, Calif., 56, 57

Libbey-Owens-Ford Glass Co., Nicholas Bldg., Toledo, Ohio, 81, 85

Liebel-Flarsheim Co., 111 E. Amity Road, Cincinnati 15, Ohio, 63

Lincoln Engineering Co., 5701 Natural Bridge, St. Louis 20, Mo., 9

Lindberg Engineering Co., 2450 W. Hubbard St., Chicago 12, Ill., 54

Lindberg Instrument Co., Inc., Alamo Downs, Culebra Road, San Antonio, Route 4, Tex., 9

Linde Air Products Co., Div. U.C.C., 30 E. 42nd St., New York 17, N.Y., 76, 82,

Lindgren & Associates, Erik A., 4515 N. Ravenswood Ave., Chicago 40, Ill., 89
For details see ad on page 311

Linear Equipment Labs., 295 W. Shore Drive, Massapequa, L.I., N.Y., 73, 80, 89, 95, 96
For details see ad on page 333

Linell Engineering Corp., Charles S., 447 South Blvd., Oak Park, Ill., 33

Linemaster Switch Corp., Woodstock, Conn., 52
For details see ad on page 211

Lingo & Son, Inc., John E., 2814 Buren Ave., Camden 5, N.J., 12, 24, 25

Linick Chemical Co., 59 E. Madison St., Chicago 3, Ill., 86

Link Aviation, Inc., Hillcrest, Binghamton, N.Y., 59, 65

Link Radio Corp., 125 W. 17 St., New York 11, N.Y., 24

Lion Fasteners, Honeoye Falls, N.Y., 77

Lipps, Edwin A., 5485 W. Washington Blvd., Los Angeles 16, Calif., 9, 10, 61

Liston-Becker Instrument Co., Inc., 649 Hope St., Springdale, Conn., 1

Littelfuse, Inc., 1865 Miner St., Des Plaines, Ill., 39, 52, 71, 77
For details see ad on page 58

Little, Inc., Arthur D., 30 Memorial Drive, Cambridge 42, Mass., 41, 59, 66, 73, 76, 80

Little Falls Alloys, Inc., 189 Caldwell Ave., Paterson 1, N.J., 71
For details see ad on page 251

Litton Engineering Labs., 1049 Brittan Ave., San Carlos, Calif., 70, 78, 82, 93

Litton Industries, 1025 Brittan Ave., San Carlos, Calif., 41, 57

Livingston Electronic Corp., Livingston, N.J., 1, 9, 90

Loge Sound Engineers, J. M., 2171 W. Washington Blvd., Los Angeles 18, Calif., 1, 5, 52

Logistics Research, Inc., 141 S. Pacific Ave., Redondo Beach, Calif., 42, 59

London Chemical Co., 325 W. 32 St., Chicago 16 Ill., 82, 86

Long Engineering Co., Inc., 31-33 Burke St., Winston Salem, N.C., 80

Lorain Products Corp., 1122 F St., Lorain, Ohio, 45

Loral Electronics Corp., 794 E. 140 St., New York 54, N.Y., 18, 40, 45, 65, 68, 70, 95

Lorain County Radio Corp., 203 Ninth St., Lorain, Ohio, 23, 80

Lord Manufacturing Co., 1635 W. 12 St., Erie 6, Pa., 77

Lord-Taber Co., Inc., 40 Ontario St., Canadaigua, N.Y., 60

Louthan Mfg. Co., 2000 Harvey Ave., East Liverpool, Ohio, 72

Lowell Manufacturing Co., 3030 Laclede Station, St. Louis 17, Mo., 29, 32

Lowenthal Co., T.R., 1205 W. Sherwin Ave., Chicago 26, Ill., 26
For details see ad on page 352

Lubcke, Harry R., 2443 Creston Way, Hollywood 28, Calif., 73, 80
For details see ad on page 258

Lucian Laboratories, 202 Darby Rd., Llanerch, Havertown, Pa., 73, 80

Luckenbach & Co., Inc., Paul, 312 W. 231 St., New York 63, N.Y., 63

Lumenite Electronic Co., 407 S. Dearborn St., Chicago 5, Ill., 48, 49, 60

Luhrs & Co., C. H., 297 Hudson St., Hackensack, N.J., 70

Luma Electric Equip. Co., P.O. Box 132, Toledo 1, Ohio, 82

Lundey Associates, 694 Main St., Waltham 54, Mass., 78

Lyman Electronic Corp., 12 Cass St., Springfield 4, Mass., 80, 82

Lynch Carrier Systems, 96 Jessie St., San Francisco 5, Calif., 4, 20, 33, 66

Lynn Electronic Research Co., 9 W. Magnolia Blvd., Burbank, Calif., 77
For details see ad on page 59

Lysco Mfg. Co., Inc., 1401 Clinton St., Hoboken, N.J., 19, 21, 23, 24, 48, 75, 80

Lytle Engineering & Mfg. Co., 4721 N. Kedzie Ave., Chicago 25, Ill., 1, 4, 14, 17, 18, 19, 24, 25, 33, 38, 43, 46, 48, 54, 65, 68, 70, 73, 75, 80, 96

M B Manufacturing Co., Inc., 1060 State St., New Haven 11, Conn., 77, 82, 90

M P Engineering Co., Fairfield 3, Conn., 1, 5, 14

MacDonald Co., W. S., 33 University Rd., Cambridge 38, Mass., 42, 59, 64

Machlett Laboratories, Inc., 1063 Hope St., Springdale, Conn., 56, 57
For details see ad on page 222

Mackay, Inc., A. D., 198 Broadway, New York 38, N.Y., 74, 76, 83, 87, 89

Mackay Radio & Telegraph Co., 345 Hudson St., New York, N.Y., 7, 23

MacKenzie Products Co., 141 Brewery St., New Haven 11, Conn., 69, 70, 80

MacKinnon, Keith A., P.O. Box 542, Ottawa, Canada, 73

MacLeod & Hanopol, Inc., 10 Roland St., Charlestown 29, Mass., 45, 71, 80, 90

Macmillan Co., 60 Fifth Ave., New York 11, N.Y., 98
For details see ad on page 340

MacNabb Co., Inc., Vernon C., 909 E. Westfield Blvd., Indianapolis 20, Ind., 24

MacRae's Blue Book, 18 E. Huron St., Chicago 11, Ill., 98

Magnatran, Inc., 248 Schuyler Ave., Kearny, N.J., 45, 54

Magnavox Co., The, 2131 Bueter Rd., Fort Wayne 4, Ind., 1, 4, 7, 9, 14, 27, 30, 54
For details see ad on page 138

Magnecord, Inc., 225 W. Ohio St., Chicago 10, Ill., 3, 10, 11

Magnecraft Electric Co., 1450 W. Van Buren, Chicago 7, Ill., 48

Magne-Pulse Corp., 116 Nassau St., New York, N.Y., 3, 10, 11, 58, 59, 66, 73, 80

Magnecessories, Box 6960, Washington 20, D.C., 10

Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N.Y., 1, 33, 40, 45, 54, 58, 60, 61, 65, 66, 80, 90
For details see ad on page 167

Magnetic Core Corp., 2 Croton Ave., Ossining, N.Y., 36, 41, 74

Magnetic Devices, Inc., 712 East St., Frederick, Md., 41, 48

Magnetic Metals Co., Hayes Ave. at 21 St., Camden 1, N.J., 36, 54, 74

(Continued on page 61)

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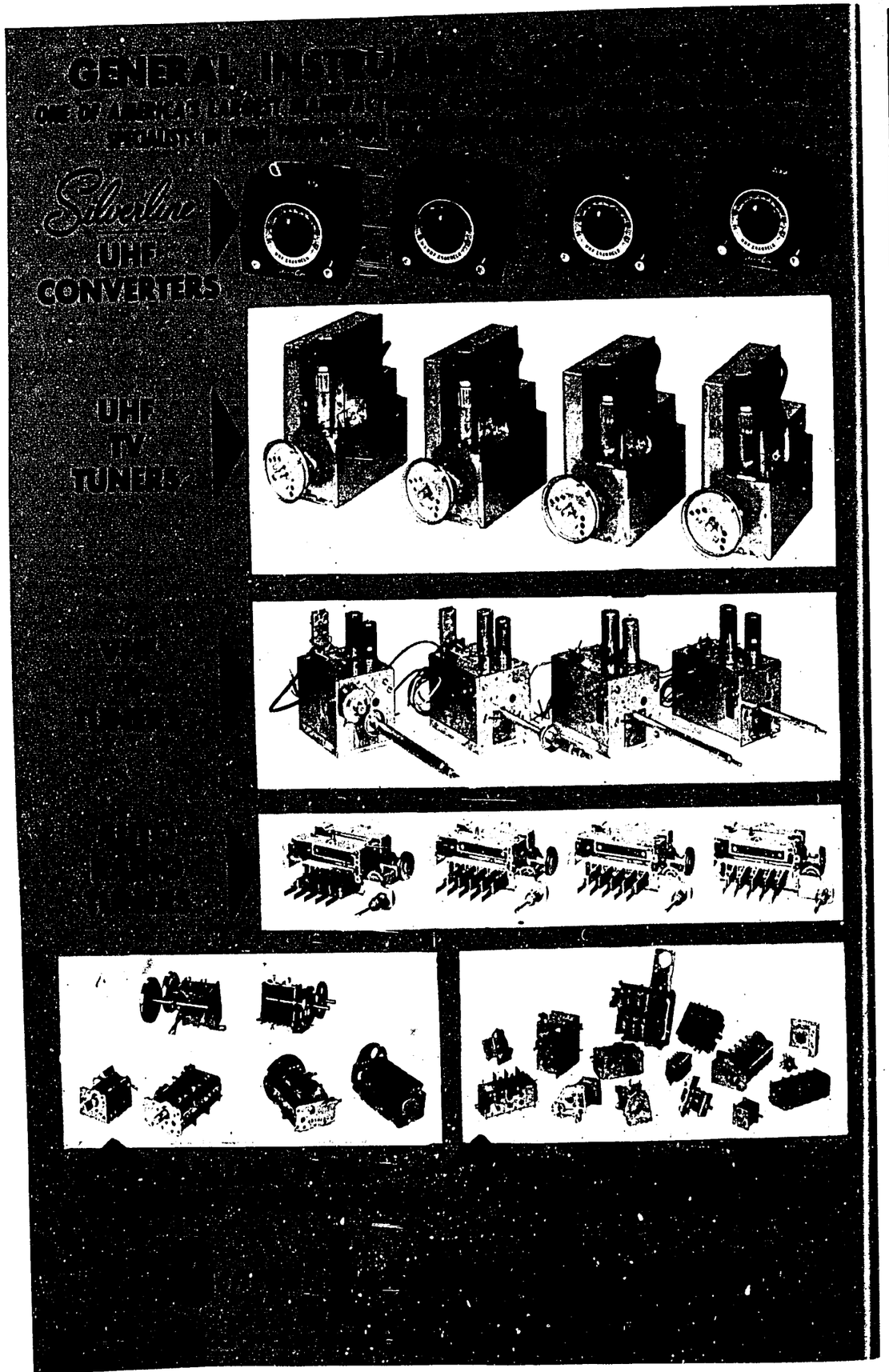
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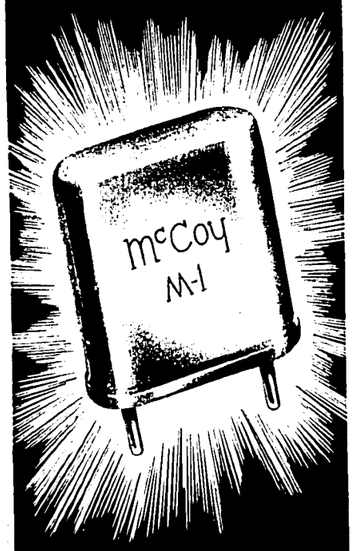
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(Continued from page 59)

Magnetic Recording Industries, 30 Broad St., New York 4, N.Y., 1, 10, 11
Magnetic Research Corp., 318 Kansas St., El Segundo, Calif., 33, 45, 54, 65
Magnetic Winding Div., Essex Wire Corp., Easton, Pa., 54
Magnetics, Inc., Box 230, Butler, Pa., 33, 36, 40, 65
For details see ad on page 160
Magnetics Research Co., 142 King St., Chappaqua, N.Y., 4, 40, 54, 59, 80
Magnex Corp., 90-28 Van Wyck Expressway, Jamaica 18, N.Y., 1, 4, 21, 23, 24, 33, 45, 46, 54, 61, 64, 67, 68, 73, 75, 80, 93, 94, 95
Maico Co., Inc., 21 N. 3rd St., Minneapolis 1, Minn., 1, 10, 88
Maida Development Co., Phoebus, Va., 30, 31
Maigne Co., O. J., 321 Pearl St., New York 38, N.Y., 75, 77, 79, 84, 85, 87
Makepeace Co., D. E., Dunham & Pine Sts., Attleboro, Mass., 34, 67, 70, 71, 75, 83, 85
For details see ad on page 80
Malco Tool & Mfg. Co., 4023 W. Lake St., Chicago 24, Ill., 51, 75, 77
For details see ad on page 272
Mallory & Co., Inc., P. R., 3029 E. Washington St., Indianapolis 6, Ind., 6, 14, 27, 30, 31, 33, 35, 38, 45, 47, 49, 52, 77, 83 85, 90
Management Engineering Publications, Cheltenham, Pa., 98
Manhattan Research Labs., 342 E. 82 St., New York 28, N.Y., 56, 64, 73, 80, 86, 92, 94
Mansol Ceramics, 13 Valley St., Belleville, N.J., 75, 84, 85
For details see ad on page 296
Manson Laboratories, 207 Greenwich Ave., Stamford, Conn., 45, 69, 80, 93
Manufacturers Engineering & Equipment Corp., York & Mill Roads, Hatboro, Pa., 64, 96
Marchand Electronic Labs., 85 Railroad Ave., Greenwich, Conn., 80
Marco Industries Co., 207 S. Helena St., Anaheim, Calif., 71
Marconi Instruments, Ltd., 23-25 Beaver St., New York 4, N.Y., 13, 15, 42, 63, 66, 88, 90, 92, 93, 96
Marconi's Wireless Telegraph Co., Ltd., Marconi House, Chelmsford, Essex, England, 1, 12, 13, 16, 17, 18, 20, 21, 23, 24, 25, 26, 37, 55, 56, 57
Marine Electric Corp., 600 Fourth Ave., Brooklyn 15, N.Y., 4, 16, 23, 24, 29, 32, 45, 73, 80
Marion Electrical Instrument Co., 400 Canal St., Manchester, N.H., 42, 62, 90
For details see ad on page 234
Mark Electronics, Inc., 86 Shipman St., Newark 2, N.J., 54
Mark Products Co., 3549 Montrose, Chicago 18, Ill., 19, 24, 25, 26, 67, 70, 73, 75, 79, 80, 85, 93
Markel Electric Products, Inc., 129-149 Seneca St., Buffalo 3, N.Y., 9
Markem Machine Co., 150 Congress St., Keene, N.H., 82
Markite Co., 155 Waverly Pl., New York 14, N.Y., 49
Marma Electronic Co., 703 Willow St., Chicago 14, Ill., 90
Marsh-Theiss, Inc., 184 New York Ave., Huntington, L.I., N.Y., 5, 20, 23, 45, 60, 65, 73, 80, 89
Martin & Co., H. S., 1910 Greenleaf St., Evanston, Ill., 1, 55, 56, 75, 78, 80, 82, 87
Maryland Electronic Mfg. Corp., 5009 Calvert Rd., College Park, Md., 18
Maspeth Telephone & Radio Corp., 30 Prince St., Brooklyn 1, N.Y., 2, 6, 20, 21, 48
Massa Laboratories, Inc., 5 Fottler Rd., Hingham, Mass., 82
Massachusetts Institute of Technology, Instrument Lab., (Rm 7-303) Cambridge, Mass., 80
Massachusetts Trades Shops School, 100 Massachusetts Ave., Boston, Mass., 97
Master Appliances, Inc., 1600 Factory Ave., Marion, Ind., 41, 63, 90
Master Mobile Mounts, Inc., 1300 Bond St., Los Angeles 15, Calif., 12, 19, 24, 26, 67
Maxson Corp., The W. L., 460 West 34th St., New York 1, N.Y., 1, 18, 39, 43, 45, 48, 58, 59, 60, 65, 67, 68, 69, 73, 80
For details see ad on page 122
Maxson Corp., The W. L., Unimax Switch Div., 460 W. 34 St., New York 1, N.Y., 52
May, Donald M., 6055 Lankershim, N. Hollywood, Calif., 33, 52, 54, 70, 73
Mayer Co., A. W., 895 Boylston St., Boston 15, Mass., 99
For details see ad on page 353
McCarter Radio & TV Co., 1625 W. 3 Ave., Vancouver 9, B.C., Canada, 19, 23, 24, 25, 26, 67
McColpin-Christie Corp., 3410 W. 67 St., Los Angeles 43, Calif., 45, 82
McCoy Electronics Co., Mt. Holly Springs, Pa., 37
For details see ad on page 61
McCurdy Radio Industries, Ltd., 74 York St., Toronto 1, Ont., Canada, 1, 3, 16
McDonnell Aircraft Corp., Lambert Field, Box 516, St. Louis 1, Mo., 80
McElroy Manufacturing Corp., Newtown Road, Littleton, Mass., 11, 21
McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N.Y., 98
For details see ad on page 340
McIntosh Laboratory, Inc., 320 Water St., Binghamton, N.Y., 1
McLaughlin, J. L. A., P.O. Box 529, La Jolla, Calif., 14
McNary, James C., 906 National Press Bldg., Washington 4, D.C., 73
McNeal, J. D., 794 Quinnipiac Ave., New Haven 13, Conn., 45, 48, 60, 62, 71, 73, 75, 80, 82
McPhar Engineering Co. of Canada, Ltd., 36 Cranfield Rd., Toronto, Ont., Canada, 61, 64, 73
Measurements Corp., Intervale Road, Boonton, N.J., 2, 30, 31, 33, 36, 42, 54, 73, 88, 90, 93, 96
For details see ad on pages 284 & 422-423
Mechanical Industries Production Co., 217 Ash, Akron 3, Ohio, 53X
Medcraft Electronic Corp., 41-41 24th St., Long Island City 1, N.Y., 63
Medico Physical Laboratories, St. Bruno, Co. Chambly, Quebec, Canada, 73, 80

(Continued on page 63)

Numbers after address refer to product listings in which firm appears.

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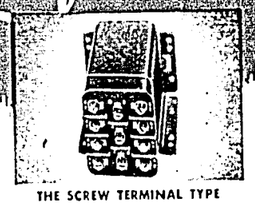
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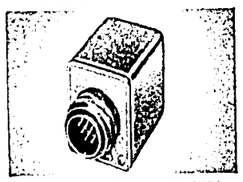
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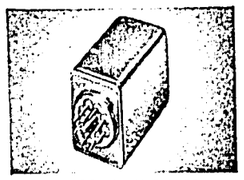
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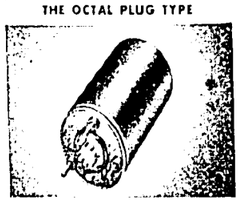
THE SCREW TERMINAL TYPE



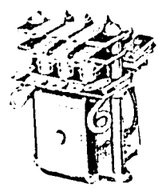
THE A. N. CONNECTOR TYPE



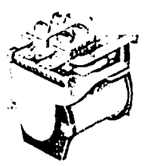
THE OCTAL PLUG TYPE



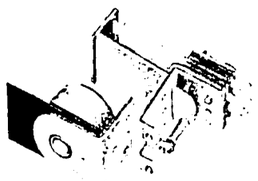
THE LUG HEADER TYPE



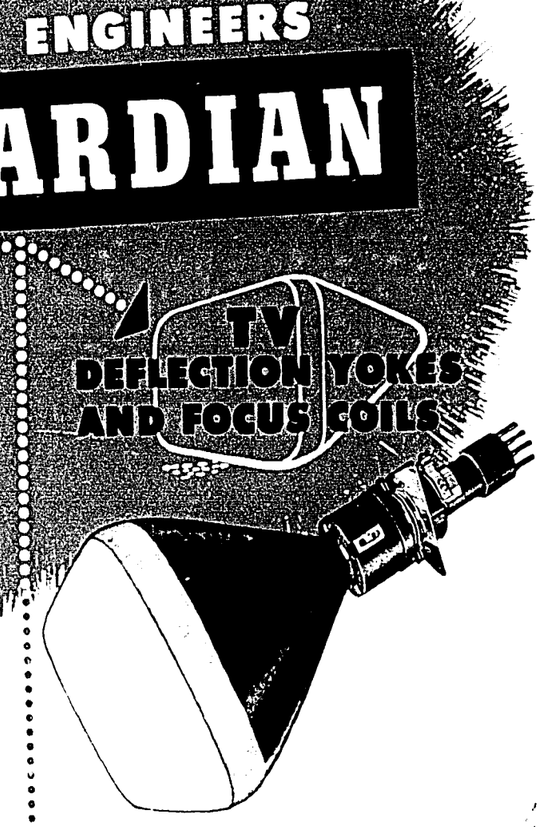
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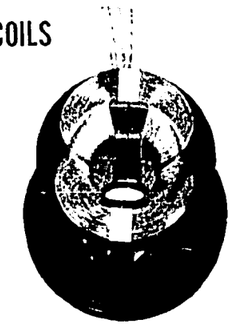
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Melody Master Mfg. Co., 2109 Berwyn Ave., Chicago 25, Ill., 1

Melpar, Inc., 452 Swann Ave., Alexandria, Va., 9, 18, 25, 33, 36, 46, 54, 59, 66, 67, 68, 69, 81

Mendelsohn Speedgun Co., Inc., 457 Bloomfield Ave., Bloomfield, N.J., 54
For details see ad on page 155

Menlo Research Laboratory, Menlo Park, Calif., 54, 89, 94

Mepco, Inc., 35 Abbett Ave., Morristown, N.J., 33, 49
For details see ad on pages 388-382

Mepco Labs., Inc., 37 Abbett Ave., Morristown, N.J., 89

Mercoid Corp., 4201 Belmont Ave., Chicago 41, Ill., 52, 53X

Meredith & Co., Ltd., C. C., Streetsville, Ont., Canada, 49

Mercury Electronic Co., Red Bank, N.J., 1, 14, 18, 26, 45, 88, 90, 96

Mercury Electronic Labs., Inc., 622 W. Kinzie St., Chicago 10, Ill., 1, 8, 33, 54, 75

Merit Coil & Transformer Corp., 4427 N. Clark St., Chicago 30, Ill., 4, 33, 54

Merit Plating Co., 218 E. 141st St., New York 51, N.Y., 75

Metal Fabricators Corp., 73 Pond St., Waltham 54, Mass., 29, 32, 70, 73, 75
For details see ad on page 141

Metal Hydrides, Inc., 12-24 Congress St., Beverly, Mass., 88

Metal Products Co., Craighead St., P.O. 188, Nashville 4, Tenn., 12, 16, 17, 29, 32, 45, 73, 75, 80, 92

Metal Textile Corp., 647 E. 1st Ave., Roselle, N.J., 71, 77, 79, 89
For details see ad on page 279

Metallic Arts of New England, Inc., 150 Broadway, Cambridge 42, Mass., 29, 32, 87

Metallic Corp., Electronics Div., 2101 Grand Concourse, New York 53, N.Y., 29, 75

Metals & Controls Corp., General Plate Div., 34 Forest St., Attleboro, Mass., 34, 75, 85, 87

Metaloid Inc., 111-35 Xenty Ave., East 8-8, 55, N.Y., 29, 63

Meters, Inc., 3353 N. Keystone Ave., Indianapolis 20, Ind., 42, 88, 90

Methode Manufacturing Corp., 2021 W. Churchill St., Chicago 47, Ill., 6, 34, 46, 51
For details see ad on page 208

Metropolitan Electronics & Instrument Co., New York 11, N.Y., 42, 90, 96

Metropolitan Overseas Supply Corp., 1133 Broadway, New York 10, N.Y., 99
For details see ad on page 353

Metrotape Corp., 525 W. 79th St., Chicago 20, Ill., 59, 66

Meyers, James G., 1050 Sheridan Ave., New York 56, N.Y., 1, 75, 80

Mica Fabricating Co., Rochelle Park, N.J., 30, 37, 72, 74, 75, 77, 79, 85

Mica Fabricators Association, 420 Lexington Ave., New York 17, N.Y., 26, 30, 79
For details see ad on page 270

Mica & Mineral Co., 121-125 S. Hamilton St., High Point, N.C., 75, 79

Mica Insulator Co., Schenectady 1, N.Y., 75, 77, 79, 85, 87

Micamold Radio Corp., 1087 Flushing Ave., Brooklyn 37, N.Y., 4, 30, 38, 40

Micarta Fabricators, Inc., 5324 N. Ravenswood, Chicago 40, Ill., 30, 39, 44, 46, 75, 77, 85

Michel Manufacturing Co., 227 N. Water St., Milwaukee 2, Wis., 1, 29, 33, 46, 54, 75, 80

Michigan Electronics, Inc., 854 N. Rockwell St., Chicago 22, Ill., 11, 64, 89

Mico Instrument Co., 80 Trowbridge St., Cambridge 38, Mass., 33, 82, 86, 93, 96
For details see ad on page 63

Micro, Div. M-H Regulator Co., 11 W. Spring St., Freeport, Ill., 52, 70

Micro Balancing, Inc., 191 Herricks Rd., Garden City Park, L.I., N.Y., 90

Micro-Circuits Co., New Buffalo, Mich., 46, 49, 81, 89
For details see ad on page 287

Micro Engineering Lab., 1195 Lawrence Ave. W., Toronto, Ont., Canada, 9, 11

Microlab, 301 S. Ridgewood Rd., South Orange, N.J., 2, 4, 29, 38, 67, 68, 69, 80, 93, 96

Micromax Co., 1964 Utica Ave., Brooklyn 34, N.Y., 49

Microtran Co., Div. Crest Labs., Inc., 84-11 Rockaway Blvd., Rockaway Beach 93, N.Y., 33, 54, 61, 75

Microwave Associates, Inc., 22 Cummington St., Boston 15, Mass., 50, 56, 57, 93

Microwave Consultants, G.P.O. Box 544, Brooklyn 1, N.Y., 73
For details see ad on page 258

Microwave Development Labs., Inc., 220 Grove St., Waltham 54, Mass., 67, 70, 80, 93, 96
For details see ad on page 284

Microwave Services, Inc., 45 Rockefeller Plaza, New York 20, N.Y., 73
For details see ad on page 258

Midland Mfg. Co., Inc., 3155 Fiberglas Rd., Kansas City 15, Kan., 37
For details see ad on page 82

Mid-West Coil & Transformer Co., 1642 Halsted St., Chicago 14, Ill., 33, 54

Midwest Radio and Television Corp., 909 So. State, Cincinnati 2, Ohio, 13, 29

Midwest Research Institute, 4049 Pennsylvania, Kansas City 2, Mo., 89

Millbrook Geophysical Laboratory, 24 Lowell Harvard, Inc., Ohio, 42, 63, 65, 90

Miles Reproducer Co., 812 Broadway, New York 3, N.Y., 30, 31

Mills Corp., Elmer E., 2950 N. Ashland Ave., Chicago 13, Ill., 84, 85

Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass., 19, 31, 33, 45, 51, 54, 70, 72, 77, 84, 95, 96
For details see ad on page 334

Miller Co., J. W., 5917 S. Main St., Los Angeles 3, Calif., 4, 33, 35, 54

Miller Mfg. Co., M. V., 405 S. Church St., Libertyville, Ill., 9, 29

Miller Instrument, Inc., William, 515 N. Halstead Ave., Pasadena 6, Calif., 1, 59, 61, 92, 95

Millivac Instrument Corp., 344 Saratoga St., Schenectady 5, N.Y., 1, 35, 59

Milwaukee Gas Specialty Co., 730 N. Jackson St., Milwaukee 1, Wis., 48

Milwaukee Resistor Co., 700 W. Virginia St., Milwaukee 4, Wis., 29

Milwaukee Stamping Co., 3400 S. 72nd St., Milwaukee 14, Wis., 9, 75, 77, 83

Minerals & Insulation Co., Rockefeller Park, N.J., 26, 30, 37, 72, 74, 75, 77, 79, 84, 85

Miniature Precision Bearings, 511 Cantor St., Keene, N.H., 77

Minneapolis Honeywell Regulator Co., 2753 Fourth Ave. S., Minneapolis 8, Minn., 52

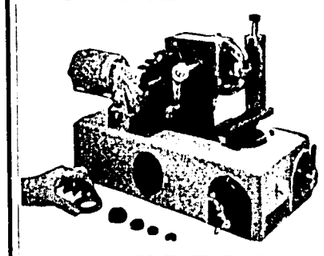
Minneapolis Honeywell Regulator Co., Industrial Div., Wayne & Windrim Aves., Philadelphia 44, Pa., 1, 35, 42, 43, 65, 91

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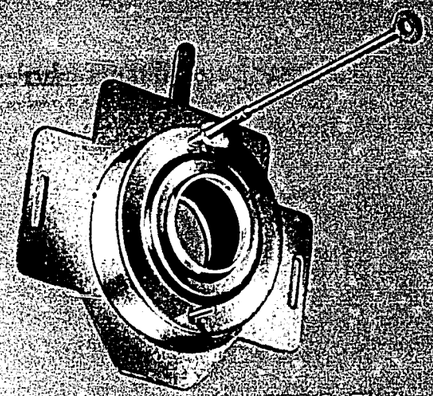


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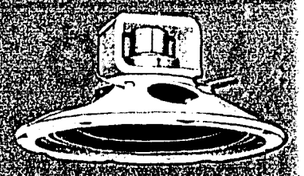
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Missouri Research Labs., Inc., 1815 N. Lynn St., Suite 1, Arlington 1, Va., 75

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Model Electronic Products, 540 W. Washington Blvd., Chicago 6, Ill., 29

Model Engr. & Mfg., Inc., Industrial Products, 2400 N. Milwaukee Ave., Chicago 39, Ill., 29

Model Rectifier Corp., 557 Rogers Avenue, Brooklyn 25, N.Y., 45, 47

For details see ad on page 191

Modelectric Products Corp., 1501 Essex Avenue, Morris Park, N.J., 38, 71

Modernfold Door Corp., 835 E. Price St., Philadelphia 44, Pa., 5, 7, 9, 11, 15, 25, 31, 34, 36, 48, 52, 53, 54, 57, 75, 77, 79, 80, 84

Molding Specialties, Inc., 52 Elm St., Yonkers 2, N.Y., 75, 77, 84

Mole Richardson Co., 937 N. Sycamore Ave., Hollywood 38, Calif., 5, 15

Molectron Electronic Co., 5906 Butler Rd., St. Louis 24, Mo., 36, 84

Monitor Products Co., 4545 Huntington Ave., Pasadena, Calif., 15, 17

Monitor Controller Co., Plasma Div., [illegible], Mass., 45, 85

Monitor Equip., 909 N. Michigan Ave., [illegible], Ill., [illegible] Hotel, 29

Monitor Products Co., Inc., 1845 Belle Plaine, Chicago 13, Ill., [illegible], 29, 52, 75, 85

Monitor Products Co., Inc., 2525 N. Lapham [illegible] Ave., Milwaukee 12, Wis., 29

Monitor Products Mfg. Co., [illegible] St., Cincinnati 14, Ohio, 29

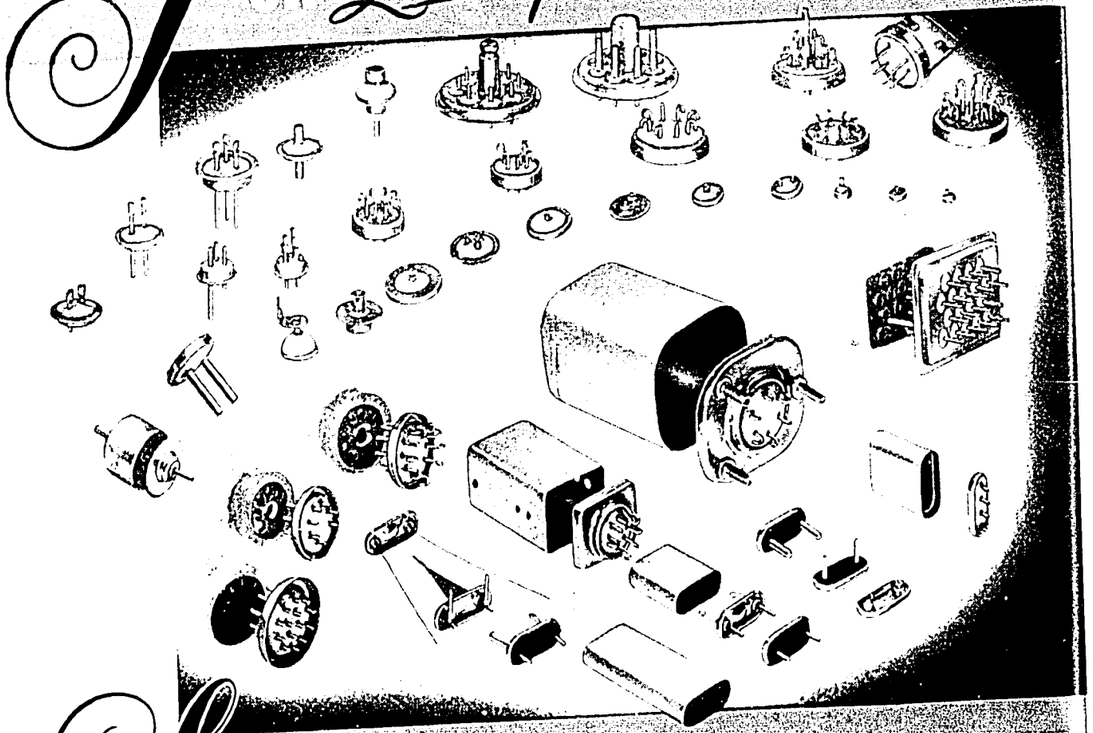
Monitor Products Mfg. Co., [illegible] Ave., Chicago 39, Ill.,

National Electric Controller Co., 5307 Ravenswood Ave., Chicago 40, Ill., 49
National Electric Machine Shops, 909 Jump Blair Drive, Silver Spring, Md., 9, 14, 34, 53, 75, 86, 87, 94, 96
National Electric Products Corp., Box 897, Parkersburg 30, W. Va., 12, 26, 67, 71
National Electronic Mfg. Corp., 42-08 Vernon Blvd., Long Island City 1, N.Y., 26, 37, 38, 39
National Electronics, Inc., 628 North St., Geneva, Ill., 56
National Electronics Labs., Inc., 1711 Kalorama Rd. NW., Washington 9, D.C., 18, 24, 73, 80
National Inter-Communicating Systems, Inc., 1130 N. Milwaukee Ave., Chicago 22, Ill., 5, 24, 52
National Hollywood, 1475 El Miradero Dr., Pasadena 3, Calif., 9, 10
National Lead Co., 111 Broadway, New York 6, N.Y., 83, 86
National Mobbie Co., 140 Clermont St., Hillside 5, N.J., 86, 74, 83
National Radiator Co., 1-5 Bridge St., Johnstown, Pa., 74, 88
National Radio Institute, 16th & U Sts. NW., Washington 9, D.C., 97
National Research Corp., Equipment Div., 70 Memorial Drive, Cambridge 42, Mass., 82
National Radio Research Labs., 74 W. 8 St., New York, N.Y., 2, Pa., 75, 85
National Tel-Tronics Corp., 35 St. Quentin, Yonkers, N.Y., 36, 44, 75, 77
National Union Radio Corp., 237 Jacksonville Road, Hatboro, Pa., 50, 55, 56, 57, 80, 90
For details see ad on page 46
National Vulcan Corp., 430 W. 47th St., Chicago 32, Ill., 55, 57
Nemarico, Inc., 9610 Bellanca Ave., Los Angeles 45, Calif., 48
Neo-Tec Corp., 26 Cornelison, Jersey City 4, N.J., 27, 38, 56, 77, 78, 81, 84
Neptune Electronics Co., 433 Broadway, New York 13, N.Y., 1, 3, 5, 15, 36, 38, 49, 52, 53X
Nesor Alloy Products Co., 282 Halsey St., Newark 2, N.J., 71
For details see ad on page 258
Nesor-Sil Manufacturing Co., 223-30 56th St., Bayonne, N.J., 28, 52
Neutronic Associates, 83-56 Vietor Ave., Elmhurst 73, N.Y., 45
For details see ad on page 184
New England Enclosure & Plating Co., Spring St., Holyoke, Mass., 46, 77
New Hampshire Ball Bearings, Inc., 20 Grove St., Peterborough, N.H., 77
New Hermes Eng. Mach. Corp., 1-15 University Pl., New York 3, N.Y., 52
New London Instrument Co., P.O. Box 158, New London, Conn., 24, 55, 96
New Rochelle Tool Corp., 320 Main St., New Rochelle, N.Y., 62
New York Electric Labs., Inc., 80 Washington St., New York 6, N.Y., 80
New York Transformer Co., Inc., 33rd Ave., Alpha, N.J., 33, 34
Newmont Products Co., 1324 Lexington Ave., Pittsburgh 6, Pa., 1, 5, 9, 14, 29, 52
Newport Aircraft, 248 Coster St., New York 59, N.Y., 75, 93, 96
Newton Schmitt, 1 Crystal Pond St., Newton 58, Mass., 9, 14, 90, 94
Ney Co., The J. M., 71 Elm St., Hartford 1, Conn., 34, 52, 75, 77, 83, 86
For details see ad on page 269
Nilsson Electrical Labs., Inc., 13 Laconia St., New York 13, N.Y., 80
Nine Mile Co., Inc., 55 Washington Ave., New York 55, N.Y., 56, 58
Norcross Pin Locker Co., Inc., 725 E. 136 St., New York 54, N.Y., 77
Norcross Manufacturing Co., 36-42 St., Hoboken, Mass., 71
Norman Laboratories, Ernst, Williams Bay, Wis., 92
For details see ad on page 67
North American Philips Co., Inc., Box F, 42 St., New York 17, N.Y., 45, 55, 71, 74, 75, 85, 86
North American Philips Co., Inc., Research & Control Instruments, 750 S. Fulton Ave., Mt. Vernon, N.Y., 59, 89
North Electric Manufacturing Co., 501 S. Market St., Galion, Ohio, 6, 32, 45, 46, 58, 71, 77
North Hills Electric Co., Inc., 240-32 38th Ave., Douglaston 62, N.Y., 38, 58
Northern Electric Co., Ltd., Belleville, Ont., Canada, 1, 2, 3, 5, 6, 7, 8, 11, 13, 14, 15, 18, 20, 29, 32, 45, 48, 50, 54, 58, 62, 65, 69, 70, 71, 75, 79
Northern Electronic & Vacuum Industries, St. Sauveur De Monts, P.Q., Box 305, Ottawa, Canada, 37, 55, 58, 60, 62, 64, 73, 78, 80, 82, 83, 90, 94, 96
Northern Radio Co., Inc., 145 West 22 St., New York 11, N.Y., 25, 96
For details see ad on pages 410-412
Northern Zaliski Limited, Pratt Oval, Glen Cove, L.I., N.Y., 90
Northshore Nameplate Co., Glenwood Landing, L.I., N.Y., 77
For details see ad on page 272
Nothelfer Winding Labs., 111 Albemarle Ave., Trenton 8, N.J., 33, 54, 90
Nuclear Development Laboratory, P.O. Box 7084, Kansas City, Mo., 58, 64, 94
Nuclear Instrument & Chemical Corp., 223 W. Erie St., Chicago 10, Ill., 45, 58, 59, 64, 88, 89, 94, 94
Nuclear Research Corp., 2563 Grays Ferry Ave., Philadelphia 46, Pa., 64, 94
Nuclear Research & Development, Inc., 1004 Sutter, St. Louis 5, Mo., 64, 94
Nucleonic Co. of America, 497 Union St., Brooklyn 31, N.Y., 45, 58, 64, 94
Nukem Products Corp., 111 Colgate Ave., Buffalo 20, N.Y., 79
Numbertall Stamp & Tool Co., Hunnewell Park, Staten Island 12, N.Y., 82

Oak Electronics Co., 141-143 Oak St., Buffalo 3, N.Y., 14, 47, 90
Oak Mfg. Co., 1260 Clybourn Ave., Chicago 10, Ill., 14, 35, 45, 46, 48, 52
Oak Ridge Products, 37-01 Vernon Blvd., Long Island City 1, N.Y., 42, 90, 92, 96
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(Continued on page 68)

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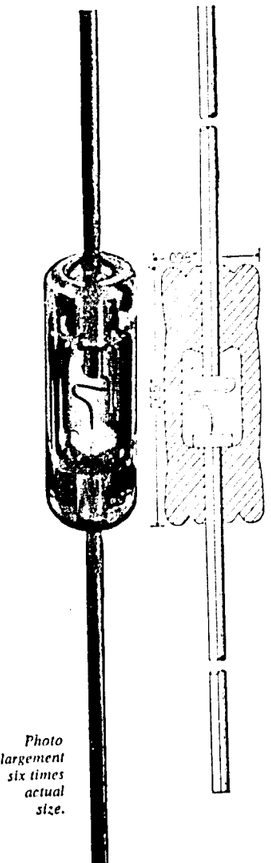


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	1N99	100	80	10.0	0.005 @ −5 v; 0.050 @ −50 v
	1N100	100	80	20.0	0.005 @ −5 v; 0.050 @ −50 v
High Back Resistance	1N89	100	80	3.5	0.008 @ −5 v; 0.100 @ −50 v
	1N97	100	80	10.0	0.008 @ −5 v; 0.100 @ −50 v
	1N98	100	80	20.0	0.008 @ −5 v; 0.100 @ −50 v
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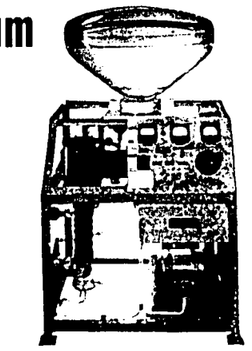
(Continued from page 67)

Offner Electronics, Inc., 5320 N. Kedzie, Chicago 25, Ill., 1, 63, 91, 95
Ohio Carbon Co., 12508 Berea Rd., Cleveland 11, Ohio, 49
Ohmart Corp., 2347 Ferguson Road, Cincinnati 38, Ohio, 1, 64, 94
Ohmite Manufacturing Co., 4835 W. Flournoy St., Chicago 44, Ill., 2, 26, 33, 49, 52, 90
Ohmweve Co., 43 Darcy St., West Hartford 6, Conn., 49
Okonite Co., The, Passaic, N.J., 71
Olin Industries, Inc., Electrical Div., 275 Winchester Ave., New Haven 4, Conn., 27, 82
Oliver Electronics Co., 1324 N.W. 23rd St., Oklahoma City 6, Okla., 80
Olson & Lipps, 5485 W. Washington Blvd., Los Angeles 19, Calif., 9, 16
Olympic Metal Products Co., Inc., P.O. Box 71, Phillipsburgh, N.J., 29, 77
Olympic Radio & Television, 34-01 38 Ave., Long Island City 1, N.Y., 14
Omega Mfg., Inc., 40 Hudson St., New York 13, N.Y., 9, 33, 45, 48, 54, 58
Onondaga Pottery Co., Electronics Dept., 1858 W. Fayette St., Syracuse 1, N.Y., 30, 31, 46
Ontario Industries, Inc., 513 Clinton Ave., South Rochester 18, N.Y., 33, 54
Opad-Green Co., 71 Warren St., New York 7, N.Y., 45, 47, 60
Openheimer Corp., 578 Exchange St., Buffalo 10, N.Y., 79, 85
Optical Film Engineering Co., 2737 N. 6 St., Philadelphia 33, Pa., 82, 89
For details see ad on page 69
Optronic Research, 1374 Massachusetts Ave., Cambridge 38, Mass., 63, 80
Oregon Electronic Mfg. Co., 2232 E. Burnside St., Portland 15, Ore., 45, 75, 80, 96
Ortho Filter Corp., 196 Albion Ave., Paterson 2, N.J., 3, 4, 33, 38, 40, 45, 54, 61, 63, 65
For details see ad on page 101
Orthon Corp., The, 196 Albion Ave., Patterson 2, N.J., 2, 4, 14, 33, 38, 61
For details see ad on page 117
Orradio Industries, Inc., T 120 Maryvn Road, Opelika, Ala., 10
Osborne Transformer Corp., 948 E. Lafayette Ave., Detroit 7, Mich., 54
Oster Manufacturing Co., John, 1 Main St., Racine, Wis., 28, 43, 65
For details see ad on page 181
Osterland Co., Edmund, Mountain Lakes, N.J., 88, 90
Ostlund, Evert M., Andover, N.J., 73
For details see ad on page 258
Owen Laboratories, 412 Woodward Blvd., Pasadena 10, Calif., 45, 90
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PSC Applied Research Ltd., 1450 O'Connor Dr., Toronto, 13, Ont., Canada, 48, 61, 65, 68, 69, 75, 80
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Packard Bell Co., 12333 W. Olympic Blvd., Los Angeles 64, Calif., 9, 11, 14
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Paisley Products, Inc., 1770 Canalport Ave., Chicago 16, Ill., 81
Palo Alto Physicists, P.O. Box 1059, Palo Alto, Calif., 73
Palmut Co., 61 Cordier St., Irvington 11, N.J., 77
Panoramic Radio Products, Inc., 10 S. Second Ave., Mount Vernon, N.Y., 13, 88, 90, 95, 96
For details see ad on page 115
Pantek Co., 208 42 St., Manhattan Beach, Calif., 60, 90
Paragon-Revolute Corp., 77 South Ave., Rochester 4, N.Y., 82
Paramount Paper Tube Corp., 614 S. Lafayette St., Fort Wayne 2, Ind., 36
For details see ad on page 157
Par-o-ken, Inc., 2059 E. 4th St., Cleveland 15, Ohio, 63
Parker, Inc., G. L., 1 Waterman Ave., East Providence 14, R.I., 62, 63
Par-Metal Products Corp., 32-62 49 St., Long Island City 3, N.Y., 29, 32
For details see ad on page 141
Parts Producing Corp., The, 186 J 2 Ave., New York 28, N.Y., 21, 31, 48, 75
Partridge Transformers, Ltd., Tolworth, Surrey, England, 4, 33, 40, 45, 54, 58
Patent Button Co., Patwin Instruments Div., 41 Brown St., Waterbury 20, Conn., 99
Patrick's Industries, 1507 W. Saratoga, Ferndale 20, Mich., 80
Patten-MacGuyer Co., 17 Virginia Ave., Providence 5, R.I., 75, 77
Peay & Associates, L. W., P.O. Box 8983, Southmore Sta., Houston, Texas, 73, 80
Pedersen Electronics, P.O. Box 572, Lafayette, Calif., 1
Peerco Corp., 2700 Whittier Blvd., Los Angeles 23, Calif., 62
Peerless Electrical Products, Div. Altec-Lansing Corp., 9356 Santa Monica Blvd., Beverly Hills, Calif., 33, 54
Peerless Products Ind., 812 N. Pulaski Rd., Chicago 51, Ill., 26, 67, 75, 84
Penn, Wm. Donaldson, 4323 Westway, Dallas, 4, Texas, 73
Penn Technical Institute, 5440 Penn Ave., Pittsburgh 6, Pa., 97
Pennsylvania Testing Lab., Doylestown, Pa., 40, 45, 89, 90, 96
Penntronics, 130 W. Hortter st., Phila. 19, Pa., 1, 45, 60, 63, 80, 88, 90, 95
Penta Laboratories, Inc., 216 N. Milpas St., Santa Barbara, Calif., 30, 31, 52, 56, 57
Penton Corp., 221 E. Cullerton St., Chicago 16, Ill., 1, 3, 9, 10, 11, 14, 29, 40, 45, 73, 80
Perfection Electric Co., 2635 S. Wabash Ave., Chicago 16, Ill., 7, 41

(Continued on page 71)

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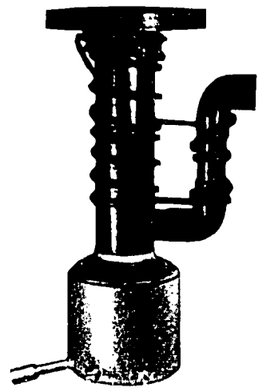


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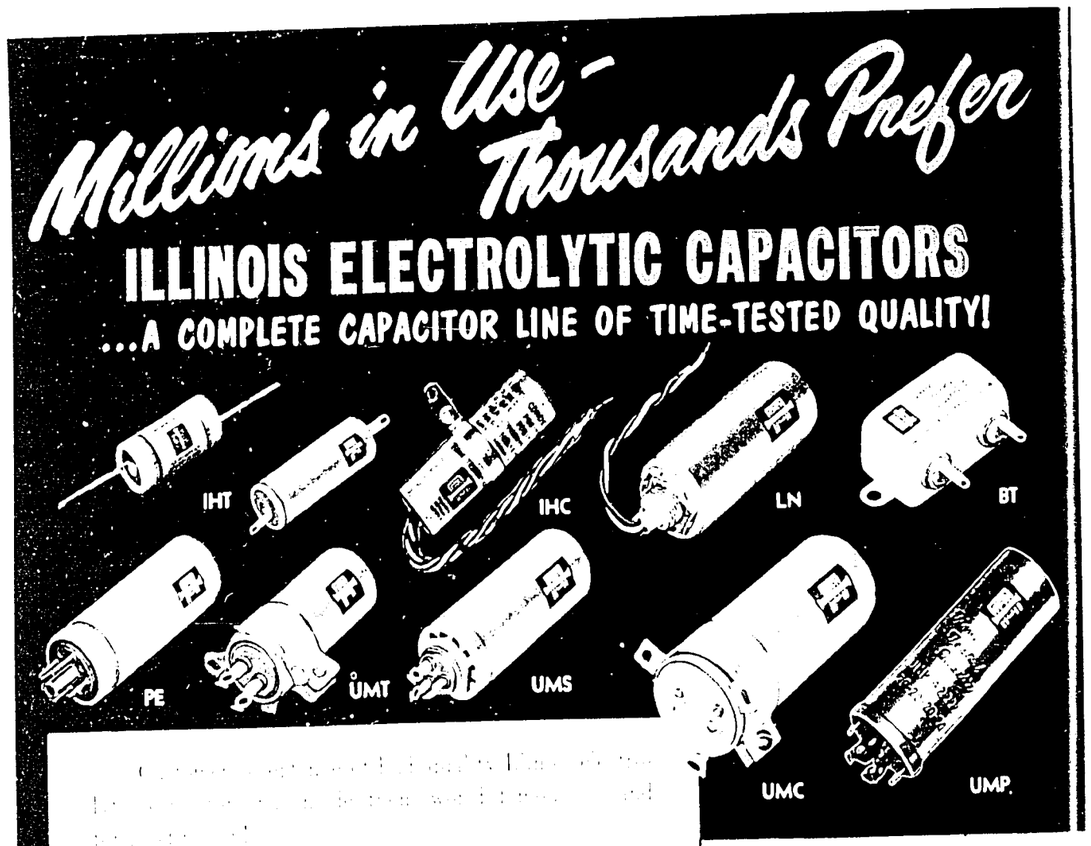
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(Continued from page 71)

Polytronics Co., 582 Bathurst St., Toronto 4, Ont., Canada, 49, 54, 58, 60, 80, 90

Ponn Machine Cutting Co., 25 Curve St., Boston 11, Mass., 77, 79

Porcelain Products, Inc., P.O. Box 300, Findlay, Ohio, 26, 72

Porter Manufacturing Co., 350 N. Lockwood, Chicago 44, Ill., 26, 30, 31, 33, 34, 54, 71

Potter & Brumfield, Princeton, Ind., 48
For details see ad on page 192

Potter Instr. Co., 115 Cutter Mill Rd., Great Neck, L.I., N.Y., 59, 60, 64, 66

Powell Co., Harold H., 2102 Market St., Philadelphia 3, Pa., 30, 32, 34, 47, 49, 52, 54, 71, 78

Power Equipment Co., 5740 Nevada East, Detroit 34, Mich., 45, 56

Power Transformer Co., Inc., 532 Mulberry St., Newark, N.J., 33, 40, 54, 73

Precise Development Corp., 909 Long Beach Rd., Oceanside, L.I., N.Y., 42, 88, 90, 93, 95, 96

Precise Measurements Co., 942 Kings Highway, Brooklyn 23, N.Y., 42, 45, 80, 82, 90, 91
For details see ad on page 294

Precision Apparatus Co., Inc., 92-27 Horace Harding Blvd., Elmhurst, L.I., N.Y., 42, 90, 95, 96
For details see ad on page 330

Precision Associates, Inc., 354 Cumberland St., Brooklyn 38, N.Y., 45, 71, 75, 80, 88, 90

Precision Electronics, Inc., 643-641 Milwaukee Ave., Chicago 22, Ill., 1, 90

Precision Film Laboratories, Inc., 21 W. 46 St., New York 36, N.Y., 15

Precision, Inc., 730 N. Lyndale, Minneapolis 11, Minn., 49

Precision Metal Products Co., 41 Elm St., Stoneham, Mass., 77

Precision Paper Tube Co., 2035 W. Charleston St., Chicago 47, Ill., 77
For details see ad on page 273

Precision Piezo Service, 427 Mayflower St., Baton Rouge 10, La., 37

Precision Radiation Instruments, Inc., 2235 S. La Brea, Los Angeles 16, Calif., 61, 64, 94

Precision Resistor Co., Inc., 334 Badger Ave., Newark 8, N.J., 49

Precision Tube Co., Inc., Wissahickon Ave. & Church Rd., North Wales, Pa., 71, 83

Preis Engraving Mach. Co., H. P., 154 Industrial Branch, Hillside 5, N.J., 82
For details see ad on page 73

Preisman & Biser, 3304 14 St. N.W., Washington 10, D.C., 73, 97

Premax Products Div., Chisholm-Ryder Co., Inc., Highland & College Aves., Niagara Falls, N.Y., 19, 24, 25, 26

Premier Instrument Corp., 52 W. Houston St., New York 12, N.Y., 70, 80

Premier Metal Etching Co., 21-03 44 Ave., Long Island City 1, N.Y., 49, 77

Premier Metal Products Co., 3160 Webster Ave., New York 67, N.Y., 29, 32
For details see ad on page 133

Premier Research Laboratories, Inc., 79 Seventh Ave., New York 11, N.Y., 37

Presto Electric Co., Inc., 600 Fulton St., Elizabeth, N.J., 54, 60

Presto Recording Corp., P.O. Box 500, Paramus, N.J., 1, 3, 4, 9, 10, 11, 16, 18, 40, 92
For details see ad on page 110

Prestoseal Mfg. Corp., 37-27 33 St., Long Island City 4, N.Y., 10

Price Electric Corp., E. Church & Second Sts., Frederick, Md., 48

Printloid, Inc., 93 Mercer St., New York 12, N.Y., 75, 77, 79, 85

Process & Instruments, 60 Greenpoint Ave., Brooklyn 22, N.Y., 1, 63, 73, 80

Prodelin, Inc., 307 Bergen Ave., Kearny, N.J., 12, 25, 26, 67, 70, 71

Product Engineering Labs. Co., Inc., 314 Adams St., Newark 5, N.J., 75, 84

Production Control Units, Inc., 901 Shroyer Rd., Dayton 9, Ohio, 82, 89

Production Engineering Corp., 173 Sargeant Ave., Clifton, N.J., 81

Production Research Corp., Thornwood, N.Y., 80
For details see ad on page 285

Production Tool & Fixture Co., 37 W. Main St., Oyster Bay, L.I., N.Y., 6, 82
For details see ad on page 295

Professional Electronics Co., 180 E. California St., Pasadena 1, Calif., 1, 3, 4, 56, 60, 63, 64, 66, 88, 90, 91, 94

Progressive Electronics Co., Inc., 130 8 St., Passaic, N.J., 62

Protectoseal Co., 1920 S. Western Ave., Chicago 8, Ill., 29, 75, 77

Publishers Authorized Binding Service, 308 W. Randolph St., Chicago 6, Ill., 98

Pulse Techniques, Inc., 1411 Palisade Ave., West Englewood, N.J., 45, 73, 80, 88

Pyle National Co., 1334 N. Kostner Ave., Chicago 51, Ill., 6, 34

Pyramid Electric Co., 1445 Hudson Blvd., North Bergen, N.J., 30

Pyramid Instrument Corp., 630 Merrick Rd., Lynbrook, L.I., N.Y., 42

Pyroferric Co., Inc., 621 E. 216 St., New York 67, N.Y., 36
For details see ad on page 158

Q. L. C. Corp., 10 Aubrey St., Summit, N.J., 33, 54

Q-O-S Corp., 39 W. 60 St., New York 23, N.Y., 45, 60

Quality Components, Inc., St. Marys, Pa., 36, 75, 84

Quam-Nichols Co., 33 Pl. & Cottage Grove Ave., Chicago 16, Ill., 7, 33, 54

Qutronic Transformer Corp., 2 East Broadway, New York 2, N.Y., 4, 33, 40, 54, 58, 61

R-B-M Div., Essex Wire Corp., Logansport, Ind., 48
For details see ad on page 86

R. C. Scientific Instrument Co., 307 Culver Blvd., Playa Del Rey, Calif., 64, 94

R. C. L. Manufacturing Co., P.O. Box 25, Riverside, N.J., 49

R. E. F. Mfg. Corp., 393 Jericho Turnpike, Mineola, L.I., N.Y., 29, 32, 75

RFI Shielded Enclosures Corp., 3634 N. Lawrence St., Philadelphia 40, Pa., 89

R. K. Manufacturing Co., P.O. Box 112, Marion, Ill., 4, 54

R. L. Audio Products, 164 Duane St., New York 13, N.Y., 29

R. M. S. Associates, Inc., 112 W. Boston Post Rd., Mamaroneck, N.Y., 1, 45, 73, 75, 80

Racker Co., Joseph, 140 Nassau St., New York 38, N.Y., 59, 73, 80, 98

Racon Electric Co., Inc., 52 E. 19 St., New York 3, N.Y., 4, 7, 8

Radar Electronics, Inc., 229 W. 28 St., New York 1, N.Y., 1, 14, 18, 68, 69, 80

Radelco Manufacturing Co., 7580 Garfield Blvd., Cleveland 25, Ohio, 24, 26, 34

Radell Corp., 7900 Pendleton Pike, Indianapolis 26, Ind., 49
For details see ad on page 38

Radex Corp., 2070 Elston Ave., Chicago 14, Ill., 88, 90

Radiant Lamp Corp., 300 Jelliff Ave., Newark 8, N.J., 44

Radiart Corp., 3455 Vega Ave., Cleveland 13, Ohio, 14, 26, 35

Radiation, Inc., Box Q, Melbourne, Fla., 66, 91

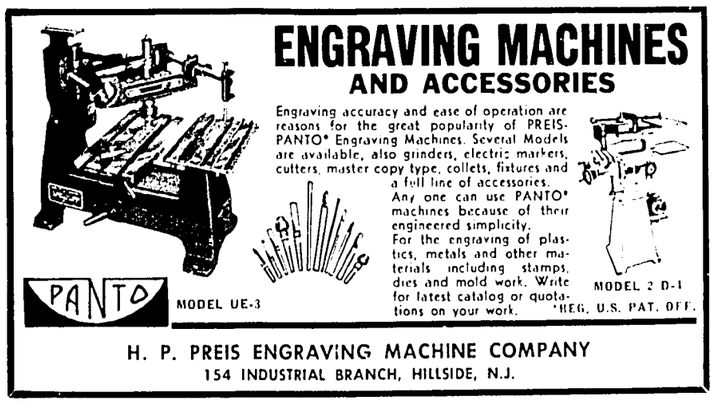
Radiation Counter Labs., Inc., 5122 W. Grove St., Skokie, Ill., 56, 59, 64, 76, 78, 93, 94

Radiation Research Corp., 526 S. Northwood Rd., West Palm Beach, Fla., 27, 80

Radio Apparatus Corp., 55 N. New Jersey St., Indianapolis 4, Ind., 18, 24

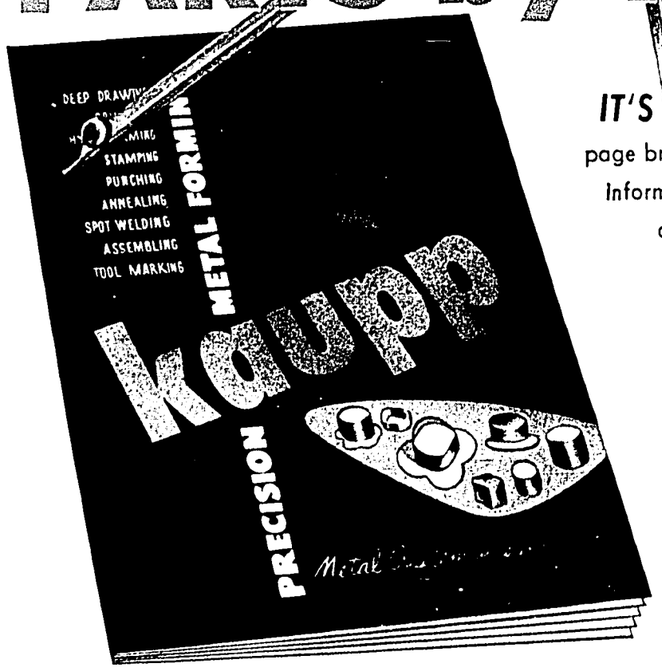
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(Continued on page 75)



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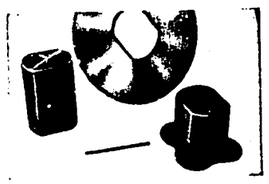
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For details see ad on page 161

Radio Corp. of America, Engineering Products Div., Camden, N.J., 1, 2, 4, 5, 7, 8, 10, 11, 12, 13, 16, 17, 21, 24, 37, 67, 68, 69
For details see ad on pages 88, 440-441

Radio Corp. of America, RCA Victor Div., Camden, N.J., 23, 25, 45, 59
For details see ad on pages 88 & 440-441

R. C. A. Specialized Employment Div., Personnel Dept., Building 2-2, Camden, N.J.
For details see ad on page 413

R. C. A. Victor Division, Tube Dept., 415 S. Fifth St., Harrison, N.J., 7, 9, 26, 27, 33, 42, 46, 50, 54, 55, 56, 57, 82, 87, 90, 95, 96
For details see ad on pages 88 & 440-441

R. C. A. Institutes, Inc., 350 W. 4 St., New York 7, N.Y., 97

R. C. A. Review, R. C. A. Laboratories Div., Princeton, N.J., 98

Radio Components, Ltd., 560 King St. W., Toronto, Ont., Canada, 11, 49, 52, 54, 70, 77, 81

Radio Craftsmen, Inc., 4401 N. Ravenswood Ave., Chicago 40, Ill., 1, 14

Radio Development & Research Corp., 26 Cornelison Ave., Jersey City 4, N.J., 50, 58, 83

Radio Development & Sales, 323 Atlantic Ave., Brooklyn 1, N.Y., 33, 48, 54

Radio-Electronic Engineering, 366 Madison Ave., New York 17, N.Y., 98

Radio & Electronic Jobber News, 848 Leader Bldg., Cleveland 14, Ohio, 98

Radio-Electronics, 25 West Broadway, New York 25, N.Y., 98

Radio Engineering Co., 8 State St., New York 4, N.Y., 73, 75, 80

Radio Engineering Labs., Inc., 36-40 37 St., Long Island City 1, N.Y., 17, 25, 29, 67, 68, 69, 73, 77, 90

Radio Engineering & Maintenance Corp., 208 W. Third St., Lexington, Ky., 73

Radio Engineering Products, Ltd., 4305 Iberville St., Montreal 34, Que., Canada, 2, 3, 4, 6, 17, 18, 20, 21, 22, 24, 25, 32, 33, 45, 48, 54, 58, 66, 73, 80

Radio Industries Corp., 1 E. 57 St., New York 22, N.Y., 12, 17, 69, 80

Radio Industries, Inc., 5225 N. Ravenswood Ave., Chicago 25, Ill., 30, 33, 46, 54, 70

Radio Industries, Inc., 1307 Central Ave., Kansas City 2, Kan., 71, 75, 80

Radio Instrument Labs., 12-05 Summer Pl., Fair Lawn, N.J., 73, 80

Radio Kits, Inc., 120 Cedar St., New York, N.Y., 1, 14, 26, 42, 90

Radio Laboratories, Inc., 1846 Westlake North, Seattle 9, Wash., 5, 18, 19, 20, 21, 23, 24, 25

Radio Magazines, Inc., 204 Front St., Mineola, L.I., N.Y., 98

Radio Manufacturing Engineers, 300-306 First Ave., Peoria 6, Ill., 14, 18, 19, 24, 25

Radio Materials Corp., 3325 N. California Ave., Chicago 18, Ill., 30
For details see ad on pages 436-437

Radio Receptor Co., Inc., 251 W. 19 St., New York 11, N.Y., 14, 25, 47, 50, 51, 62
For details see ad on pages 190 & 202

Radio Recorders Equipment Co., 7007 Melrose Ave., Los Angeles 38, Calif., 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 16, 80

Radio Sonic Corp., 186 Union Ave., New Rochelle, N.Y., 45, 54, 73, 75, 80, 89, 90, 96

Radio Specialty Mfg. Co., 2023 S.E. 6 Ave., Portland 14, Ore., 24, 25, 37

Radio & Television News, 366 Madison Ave., New York 17, N.Y., 98

Radio Transceiver Laboratories, 116-23 Jamaica Ave., Richmond Hill 18, N.Y., 19, 21, 24

Radio Valve Co. of Canada, Ltd., 189 Dufferin St., Toronto 3, Ont., Canada, 55, 56

Radio Wire Manufacturing Corp., Box 387, New Augusta, Ind., 71

Radioactive Products, Inc., 443 W. Congress, Detroit 26, Mich., 64

Radiocom, Inc., P.O. Box 600, Great Barrington, Mass., 98

Radiomarine Corp of America, 75 Varick St., New York 13, N.Y., 23, 67, 68, 69, 80

Rahm Instruments, Inc., 12 W. Broadway, New York 7, N.Y., 61, 63, 91

Ram Electronics, Inc., S. Buckhout St., Irvington-on-Hudson, N.Y., 33, 54

Randall, Inc., Douglas, 102 High St., Westerly, R.I., 33, 54

Rangertone, Inc., 73 Winthrop St., Newark 4, N.J., 1, 10, 11

Rapid Electroplating Process, Inc., 1414 S. Wabash Ave., Chicago 5, Ill., 82

Rapid Specialties Co., 327 W. Huron St., Chicago 10, Ill., 41, 81

Rattray & Co., George, 92-32 Union Hall St., Jamaica, L.I., N.Y., 49

Rauland Corp., 4245 N. Knox Ave., Chicago 41, Ill., 55, 56

Rawson Electrical Instrument Co., 110 Potter St., Cambridge 42, Mass., 42, 88, 90

Ray-O-Vac Co., 212 E. Washington Ave., Madison 10, Wis., 27

Raybestos-Manhattan, Inc., Manheim, Pa., 75, 79, 85

Raymond Engineering Laboratory, Inc., Smith St., Middletown, Conn., 82

Raymond Mfg. Co., 226 S. Center St., Corry, Pa., 75, 77

Raypar, Inc., 7800 W. Addison St., Chicago 34, Ill., 26, 33, 54
For details see ad on page 220

Raytheon Mfg. Co., Equipment Sales Div., 138 River St., Waltham 54, Mass., 33, 40, 45, 54, 58, 60, 68, 69, 84
For details see ad on page 228

Raytheon Mfg. Co., Power Tube Div., Waltham, Mass., 57, 63
For details see ad on page 228

Raytheon Mfg. Co., Receiving Tube Div., 55 Chapel St., Newton 58, Mass., 50, 55, 56
For details see ad on page 228

Raytronic Laboratory, Inc., 9701 Reading Rd., Cincinnati 15, Ohio, 80

Razdow, Adolph, Dr., 593 Riverside Dr., New York 31, N.Y., 73

Rea Magnet Wire Co., Inc., E. Pontiac St., Fort Wayne 4, Ind., 71

Reading Batteries, Inc., P.O. Box 916, Reading, Pa., 27

Ready Power Co., 11231 Freud Ave., Detroit 14, Mich., 45

Recoton Corp., 147 W. 22 St., New York 11, N.Y., 9, 10

Rediffon, Ltd., Broomhill Rd., London, S.W. 18, England, 1, 5, 12, 16, 17, 18, 23, 24, 25, 37, 62

Redman Electronics Corp., 92 Prospect St., Thompsonville, Conn., 33, 54

Reed & Prince Mfg. Co., 1 Duncan Ave., Worcester 1, Mass., 77

Reed Research, Inc., 1048 Potomac St., Washington 7, D.C., 73, 80

Reeve Electronics, Inc., 601 Lake St., Chicago 6, Ill., 40, 62, 73, 82

Reeves-Hoffman Corp., 145 Cherry St., Carlisle, Pa., 37
For details see ad on page 164

Reeves Instrument Corp., 215 E. 91 St., New York 28, N.Y., 43, 59, 65, 68, 69, 90

Reeves Soundcraft Corp., 10 E. 52 St., New York 22, N.Y., 9, 10

Reeves-Sound Co., Inc., 35-54 36 St., Long Island City 1, N.Y., 1, 3, 11, 16, 73

Reflectone Corp., Post Rd., Stamford, Conn., 32, 54, 65, 80

Regulator Equipment Corp., 50 California Ave., Paterson 3, N.J., 40, 45, 58, 65

Reiner Electronics Co., Inc., 152 W. 25 St., New York 1, N.Y., 29, 32, 42, 88, 90, 95, 96

Rek-O-Kut Co., 38-01 Queens Blvd., Long Island City 1, N.Y., 9, 29, 43

Relay Sales, 833 W. Chicago Ave., Chicago 22, Ill., 34, 48

Relays, Inc., 162 W. 83 St., New York 24, N.Y., 48

Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, Ohio, 60

Reliable Spring & Wire Forms, 3167 Fulton Rd., Cleveland 9, Ohio, 33, 77

Remington Rand, Inc., Eckert-Mauchly Div., 2300 W. Allegheny Ave., Philadelphia 29, Pa., 59

Remler Co., Ltd., 2101 Bryant St., San Francisco 10, Calif., 7, 23, 29, 34, 51, 75, 77, 84, 87

Reon Resistor Corp., 117 Stanley Ave., Yonkers 2, N.Y., 49, 90
For details see ad on page 200

Repath Co., Paul R., 641 E. 61 St., Los Angeles 1, Calif., 52, 74, 77

Republic Foil & Metal Mills, Inc., 55 Triangle St., Danbury, Conn., 83

Republic Steel Corp., Youngstown 1, Ohio, 12, 25

Resdel Engineering, 2351 Riverside Dr., Los Angeles 39, Calif., 4, 18, 38, 40, 45, 60, 61, 62, 63, 64, 68, 69, 88, 90, 93, 94, 95, 96

Research Electronics, Roslyn, Pa., 45, 60, 73, 80, 90

Research, Inc., Sexton Bldg., Minneapolis 15, Minn., 45, 48, 82

(Continued on page 77)

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Research Instrument Co., 233 Broadway, New York 7, N.Y., 29, 30, 31, 32, 33, 46, 65, 73, 74, 75, 77, 80, 82, 84
Resinite Corp., Div. Precision Paper Tube, 2035 G4 W. Charleston St., Chicago 47, Ill., 85
For details see ad on page 298
Resistance Products Co., 714 Race St., Harrisburg, Pa., 49
For details see ad on page 196
Resistoflex Corp., Belleville 9, N.J., 26, 75, 79, 84, 85
For details see ad on page 281
Resistors, Inc., 5226 W. 26 St., Chicago 50, Ill., 49
Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N.Y., 75, 83
Rex Corporation, The, Hayward Rd., West Acton, Mass., 71, 79, 85
For details see ad on page 280
Rex Rheostat Co., 3 Foxhurst Rd., Baldwin, L.I., N.Y., 49
Reynolds Electric Co., 3000 River Rd., River Grove, Ill., 43, 48, 52

Code Numbers TELL YOU

what each company does or makes. The number after each address refers you to the 99 Product Listings, in which detailed product or service information on the firm will be found.

	Page
PINK SECTION gives guide to Products Index by products in the 10 Product Directories.	I-viii
PART 2—Alphabetical List of Firms	3-96
PART 3—Product Directory in 10 Sections	97-360
1. Audio Equipment	97
2. Broadcasting	113
3. Communications	121
4. Components	129
5. Electronic Applications	227
6. Radar-Microwave	241
7. Services, Materials and Consultants	249
8. Test Equipment	305
9. Educational	339
10. Distribution	343
PART 4 Complete Data Spreads	361-455
CATALOGS	456
Ad Index:	Cover 3

Rhode Island Insulated Wire Co., 50 Burnham Ave., Cranston, R.I., 71
Rhodes, Inc., M. H., 30 Bartholomew Ave., Hartford 6, Conn., 43, 48, 92
Rifet Desfardins, 13 rue Perier, Montrouge, France, I, 14, 18, 66, 88, 90, 95
Rich Electronics, Inc., 212 N.W. 8 Ave., Miami 36, Fla., 19, 23, 24, 45, 48, 54, 60, 61, 62, 73, 75, 80
Rich Roch Laboratories, 673 Connecticut Blvd., East Hartford, 8, Conn., 59, 60, 73, 80
Richardson Co., The, 2885 Lake St., Melrose Park, Ill., 29, 46, 74, 75, 79, 84, 85
Richardson Labs., Kenneth, 254 Vincent Ave., Lynbrook, L.I., N.Y., 4, 33, 41, 62, 63
Richardson, William E., 1935 S.W. Moss St., Portland 19, Ore., 72
Rider Publisher, Inc., John F., 480 Canal St., New York 13, N.Y., 98
Riester & Thesmacher Co., The, 1526 W. 25 St., Cleveland 13, Ohio, 29, 32
Rinehart Books, Inc., 232 Madison Ave., New York 16, N.Y., 98
Ripley Co., Inc., Middletown, Conn., 18, 28, 48, 60
For details see ad on page 131
River Edge Industries, 5 River Edge Rd., River Edge, N.J., 29
Roanwell Corp., 662 Pacific St., Brooklyn 17, N.Y., 7, 8
Robberson Marine Radio, 44 Sintsink Dr., East, Port Washington, L.I., N.Y., 23, 24
Robertshaw Thermostat Div., Robertshaw Fulton Controls Co., Youngswood, Pa., 53X
Robinette Co., W. C., 802 Fairoaks Ave., South Pasadena, Calif., 60, 65, 67, 73, 80
Robinson Aviation, Inc., Teterboro, N.J., 32, 73, 77
For details see ad on page 90
Robinson, Inc., Edward E., 95 Park Ave., Nutley 10, N.J., 82
Robinson Recording Laboratories, 35 S. 9 St., Philadelphia 7, Pa., 9, 11, 16
Rochester Electronics Co., Inc., P.O. Box 227, Pittsford, N.Y., 90
Rockbar Corp., 211 E. 37 St., New York 16, N.Y., 9, 30, 49
For details see ad on page 77
Rockbestos Products Corp., Nicoll & Cannon St., New Haven 4, Conn., 71
Rockwell Engineering Co., 4003 N. New Jersey St., Indianapolis 5, Ind., 1, 58, 60, 65, 88, 90
Rogan Brothers, 5031 N. Monticello, Skokie, Ill., 29, 75, 84
Rogers Corp., Goodyear, Conn., 33, 77, 79
Rogers Majestic Electronics, Ltd., 11-19 Brentcliffe Rd., Leaside, Ont., Canada, 20, 29, 21, 23, 24, 25, 66, 68, 69
Rohde Manufacturing Co., 4739 W. Montrose, Chicago 41, Ill., 75, 84
Rohm & Haas Co., Washington Square, Philadelphia 5, Pa., 85

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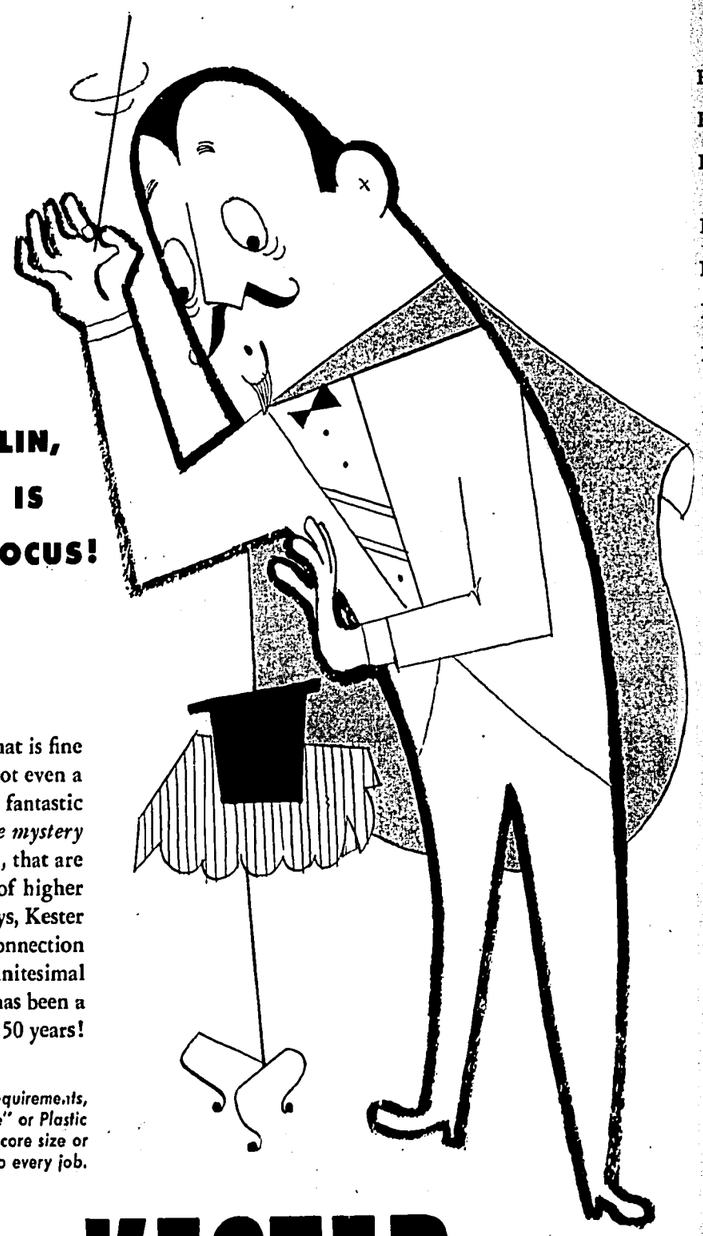
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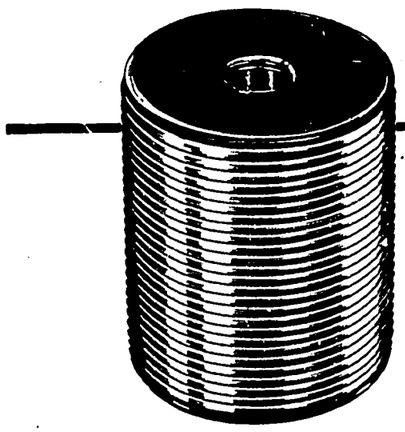
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(Continued from page 77)

Rohn Mfg. Co., 116 Linestone, Bellevue, Peoria, Ill., 12, 25, 26
Rola Company, Inc., 2530 Superior Ave., Cleveland 14, Ohio, 7, 33, 54
Rolab Studios, Rolab Photo-Science Labs., Walnuttree Hill, Sand Hook, Conn., 16, 73, 80, 89
Roller-Smith Corp., 1000 N. 8 Ave., Bethlehem. Pa., 42, 52, 75, 77
Rollin Co., 2010 N. Lincoln Ave., Pasadena 3, Calif., 70, 93, 96
Rollins Corp., P.O. Box 213, Lewes, Del., 33, 54
Rosen Engineering Products Inc., Raymond, 32 & Walnut Sts., Philadelphia 4, Pa., 1, 5, 24, 25, 66, 68, 69
Rosenberg Associates, Paul, 100 Stevens Ave., Mount Vernon, N.Y., 73, 80
For details see ad on page 258
Ross Manufacturing Co., 2405 Armitage Ave., Chicago 47, Ill., 33, 54
Rostan Corp., 383 Kent Ave., Brooklyn 11, N.Y., 12, 26
Rotron Mfg. Co., Inc., Schoonmaker Lane, Woodstock, N.Y., 28, 43
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio, 4, 7, 9, 23, 24, 29, 32, 45, 60, 61, 71, 73, 75
Royalcall, Inc., 11462 Euclid Ave., Cleveland, Ohio, 1, 5, 21, 24, 25, 73
Rubicon Co., 3751 Ridge Ave., Philadelphia 32, Pa., 42, 49, 52, 90
Ruby Chemical Co., The, 68-70 McDowell St., Columbus 8, Ohio, 86
Ruckelshaus Laboratories, John G., 110 Pomeroy Rd., Madison, N.J., 49, 80
Runzel Cord & Wire Co., 4727 W. Montrose Ave., Chicago 41, Ill., 6, 71
Rupps Assembling & Mfg. Works, 2341 N. Seminary Ave., Chicago 14, Ill., 52, 71
Rutherford Electronics Co., 3707 S. Robertson Blvd., Culver City, Calif., 59, 80, 88, 90, 92, 93, 95
Rutishauser Corp., 490 S. Fair Oaks Ave., Pasadena 1, Calif., 1, 80

S. N. C. Manufacturing Co., Inc., P.O. Box 277, Oshkosh, Wis., 33, 54
St. Marys Carbon Co., State St., St. Marys, Pa., 77
St. Regis Paper Co., Panelyte Div., 230 Park Ave., New York 17, N.Y., 75, 79, 85
Saf-T-Flux Co., Box 64, Collegeville, Pa., 86
Sag Harbor Industries, Inc., Sag Harbor, N.Y., 33, 41
Sams & Co., Inc., Howard W., 2201 E. 46 St., Indianapolis 5, Ind., 73, 80, 98
Samuel & Co., Inc., J. A., 220 Broadway, New York 38, N.Y., 71, 83
Sanborn Co., 39 Osborn St., Cambridge 39, Mass., 1, 42, 61, 63, 65, 91, 95
For details see ad on page 320
Sanders Associates, Inc., 137 Canal St., Nashua, N.H., 46, 57, 65, 67, 68, 69, 80
For details see ad on page 42
Sandvik Steel, Inc., 145 Hudson St., New York 13, N.Y., 77
Sangamo Electric Co., Marion, Ill., 30
Sanial Laboratories, 168-14 32 Ave., Flushing 58, N.Y., 73
Santay Corp., 351 N. Crawford, Chicago 24, Ill., 84
Sargent-Rayment Co., 1401 Middle Harbor Rd., Oakland 20, Calif., 1, 14
Sauereisen Cements Co., 1045 N. Canal St., Pittsburgh 15, Pa., 81
Saville RaTeleNics Labs., 1125 Russell St., Covington, Ky., 80
Saxonburg Potteries, Saxonburg, Pa., 72
Scala Radio Co., 2814 19 St., San Francisco, Calif., 90, 96
For details see ad on page 337
Schauer Manufacturing Corp., 4500 Alpine Ave., Cincinnati 36, Ohio, 45, 47, 90
Schott Co., Walter D., 3225 Exposition Pl., Los Angeles 18, Calif., 6, 26, 52, 67, 77, 81, 82
Schottland, Frederic D., 104-18 Metro Ave., Forest Hills 75, N.Y., 60, 73, 75, 80
Schuttig and Co., Inc., 9 & Kearny Sts., N.E., Washington 17, D.C., 18, 24
Schwartz, Bernard, 1200 Sherwin Ave., Chicago 22, Ill., 73
Schweber Electronics, 122 Herricks Rd., Mineola, L.I., N.Y., 34, 70, 71, 99
See complete catalog in last section
Scientific Electric, 111 Monroe St., Garfield, N.J., 45, 62, 82
Scientific Electronic Lab., 866 Bergen St., Newark 8, N.J., 78, 87
Scientific Instrument Labs., 3336 Hull Ave., New York 67, N.Y., 45, 73, 80
Scientific Radio Products, Inc., 215 S. 11 St., Omaha 8, Neb., 37
Scientific Radio Service, 4301 Sheridan St., University Park, Md., 37

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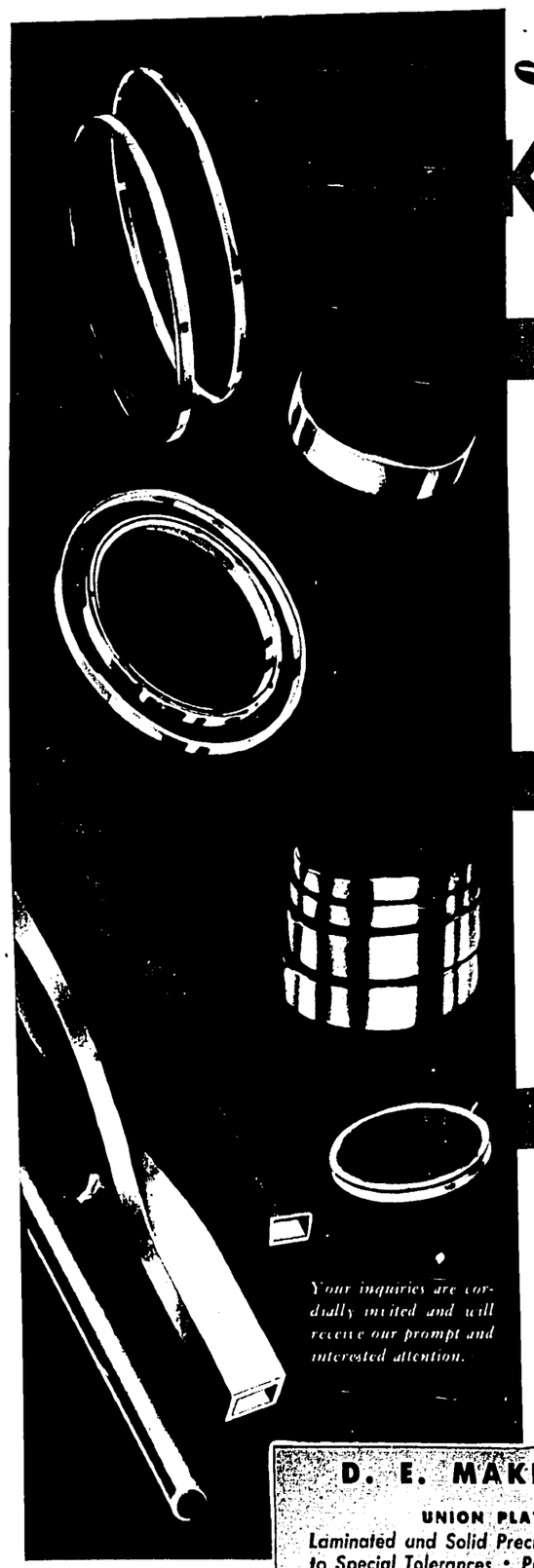
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Scientific Wood Cabinet Co., 80-86 Holmes St., Belleville 9, N.J., 29
Scott, Inc., H. H., 385 Putnam Ave., Cambridge 39, Mass., 1, 4, 45, 60, 88, 90
Scott's Television, 2404 Columbia Pike, Arlington, Va., 14, 15
Scovill Mfg. Co., 99 Mill St., Waterbury 20, Conn., 10, 32, 75, 77, 83, 87
Screw Corporation of America, 103 Park Ave., New York 17, N.Y., 77
Seaboard Electric Co., 417 Canal St., New York 13, N.Y., 73, 80
Sealtron Co., The, 9701 Reading Rd., Cincinnati 15, Ohio, 78
Sears Co., M. J., 52 Clark St., Brooklyn 2, N.Y., 6, 7, 8, 73
Secon Metals Corp., 228 E. 45 St., New York 17, N.Y., 49, 71, 75, 83, 87
For details see ad on page 296
Segel Co., Inc., Henry P., 143 Newbury St., Boston 16, Mass., 99
For details see ad on pages 79 & 356
Seismograph Service Corp., P.O. Box 1590, Tulsa 1, Okla., 23, 61
Selectronics, Inc., 1410 48 Ave., Oakland 1, Calif., 1
Sellers Co., 905½ Main St., Dallas 2, Texas, 15
Sel-Rex Precious Metals, Inc., 229 Main St., Belleville, N.J., 75, 83
For details see ad on page 296
Semco Electronics Corp., 103 Lafayette St., New York 13, N.Y., 30, 49
Semon Bache & Co., 636 Greenwich St., New York 14, N.Y., 89
Semrow Products Co., Inc., 6120 Northwest Highway, Chicago 31, Ill., 75, 77
Senn Corp., New Augusta, Ind., 33
Sensitive Research Instrument Corp., 9-11 Elm Ave., Mt. Vernon, N.Y., 42, 49, 80, 88, 90
For details see ad on page 307
Sentinel Radio Corp., 2100 Dempster St., Evanston, Ill., 14
Sepmeyer, L. W., 1862 Comstock Ave., Los Angeles 25, Calif., 73
Servo Corporation of America, 20-20 Jericho Turnpike, New Hyde Park, L.I., N.Y., 59, 60, 65, 69, 80, 88, 91, 92, 95, 96
For details see ad on page 438-439
Servomechanisms, Inc., Post and Stewart Aves., Westbury, L.I., N.Y., 43, 59, 60, 61, 65, 66, 80, 91
For details see ad on page 237
Servo-Tek Products Co., Inc., 1086 Goffle Rd., Hawthorne, N.J., 1, 43, 48, 60, 65
Servotrol Co., 114 W. Illinois St., Chicago 10, Ill., 49
Sessions Clock Co., Forestville, Conn., 42, 43, 52
Setchell-Carlson, Inc., 330 Fifth Ave., New Brighton, Minn., 14
Sexton Can Co., Inc., 31 Cross St., Everett 49, Mass., 77
Shakeproof, Inc., Div. Illinois Tool Works, St. Charles Rd., Elgin, Ill., 77
Shallcross Mfg. Co., 524 Pusey Ave., Collingdale, Pa., 1, 2, 42, 49, 52, 72, 73, 75, 80, 90
For details see ad on page 98
(Continued on page 81)



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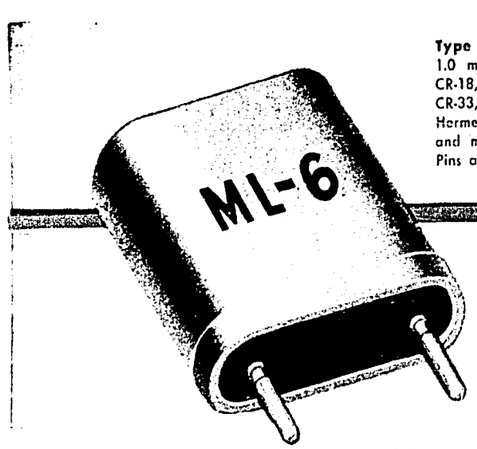
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Alphabetical Directory

(Continued from page 79)

Shaw Insulator Co., 160 Coit St., Irvington 11, N.J., 75
Shaw Television Corp., 195 Front St., Brooklyn 1, N.Y., 14, 29
Shawinigan Products Corp., 350 Fifth Ave., New York 1, N.Y., 79, 85
Sheffco Mfg. Co., Grand & Ruby Aves., Palisades Park, N.J., 71, 75, 77, 85
Sheldon Electric Co., Div. Allied Electric Products, Inc., 69-98 Coit St., Irvington 11, N.J., 48, 55, 56
Shepard Laboratories, 480 Morris Ave., Summit, N.J., 66, 73, 90
Sherron Electronics Corp., 1201 Flushing Ave., Brooklyn 6, N.Y., 1, 29, 32, 45, 90
Sherman Mfg. Co., H. B., Battle Creek, Mich., 77
Sherman Industrial Electronics Co., 505 Washington Ave., Belleville 9, N.J., 38, 42, 52, 62
Sherwin-Williams Co., 101 Prospect Ave. N.W., Cleveland 1, Ohio, 81
Sherwood Co., Robert H., 122 E. 42 St., New York 17, N.Y., 73, 75, 80, 85
Shevers, Inc., Harold, 123 W. 64 St., New York, N.Y., 1, 14
Shielding, Inc., Riverside, N.J., 89
For details see ad on page 313
Shores Laboratories, East Patchogue, L.I., N.Y., 80
Shrader Manufacturing Co., Inc., 2803 M St. N.W., Washington 7, D.C., 1, 5
Shultz and Associates, E. Pat, 180 E. California, Pasadena 1, Calif., 73, 80
Shura-Tone Products, Inc., 440 Adelphi St., Brooklyn 38, N.Y., 1, 9, 29, 75
Shure Brothers, Inc., 225 W. Huron St., Chicago 10, Ill., 8, 9, 10
For details see ad on page 108
Shurite Meters, 61 Hamilton St., New Haven 8, Conn., 42
Skiatron Electronics & TV Corp., 30 E. 10 St., New York 3, N.Y., 1, 9, 11, 13, 56, 59, 63, 65, 80, 90, 91, 92
Sickles Div., F. W., General Instrument Corp., 165 Front St., Chicopee, Mass., 31, 33, 54
For details see ad on page 421
Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif., 20, 25, 26, 54, 69, 80, 88, 90, 96
Sightmaster Corp., 111 Cedar St., New Rochelle, N.Y., 48, 70, 86, 93
Sigma Instruments Inc., 170 Pearl St., South Braintree 85, Mass., 48
Signal Engineering & Mfg. Co., 154 W. 14 St., New York 11, N.Y., 48
For details see ad on page 197
Signalite, Box 357, Neptune, N.J., 44
Simmonds Aerocessories, Inc., Tarrytown, N.Y., 60
Simmons Fastener Corp., North Broadway, Albany 1, N.Y., 77
Simonds Saw and Steel Co., Ohio St., Lockport, N.Y., 41
Simplex Wire & Cable Co., 79 Sidney St., Cambridge 39, Mass., 71
Simpson Electric Co., 5200 W. Kinzie St., Chicago 44, Ill., 42, 95, 96
For details see ad on page 174
Simpson Mfg. Co., Inc., Mark, 32-28 49 St., Long Island City 3, N.Y., 1, 5, 9, 11, 14, 45, 88, 90
Sivers Lab., Kristallvagen 18, Stockholm, Sweden, 70, 73, 80, 93, 96
Slepian & Co., Arthur, 2 Burroughs St., Bridgeport, Conn., 71
Slip Ring Co., of America, 2038 Broadway, Santa Monica, Calif., 34
Small Motors, Inc., 2076 Elston Ave., Chicago 14, Ill., 28, 43
Smallwood Ltd., S. G., 397 King St. East, Kitchener, Ont., Canada, 33
Smeby, Lynne C., 1311 G St. N.W., Washington 5, D.C., 73
Smith, Inc., Herman H., 436 18th St., Brooklyn 15, N.Y., 6, 26, 34, 39, 44, 52, 77
See complete catalog in last section
Smith Mfg. Co., Nathan R., 105 Pasadena Ave., South Pasadena, Calif., 23, 33, 41, 52, 54, 75, 80
Smith & Stone Ltd., Georgetown, Ont., Canada, 26, 39, 52, 63, 72, 75, 84, 85, 95
Snyder Co., V. A., 25 Hyatt St., Staten Island 1, N.Y., 99
For details see ad on page 357
Snyder Mfg. Co., 22 & Ontario, Philadelphia 40, Pa., 8, 24, 26, 67
Societé Des Lampes Fotos Grammont, 160 Route D, Heyrieux, Lyon 7, France, 55, 56, 57
Society of the Plastics Industry, Inc., 67 W. 44 St., New York 36, N.Y., 85
Sola Electric Co., 4633 W. 16 St., Chicago 50, Ill., 45, 54, 58
For details see ad on page 225
Solar Manufacturing Corp., 2660 E. 46 St., Los Angeles 58, Calif., 30, 31, 46
Soledring Specialities, P.O. Box 653, Summit, N.J., 86
Somers Brass Co., Inc., 94 Baldwin Ave., Waterbury 20, Conn., 83
Sonar Radio Corp., 3050 W. 21 St., Brooklyn 24, N.Y., 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 38, 45, 96
Sondyna A. G., Hedwigstrasse 25, Zurich 29, Switzerland, 14, 20, 25, 33, 45, 54, 60, 80, 88, 90, 92, 96
Sonic Recording Products, Inc., 58 Mill Rd., Freeport, L.I., N.Y., 10
Sonotone Corp., Elmsford, N.Y., 1, 7, 8, 9, 27, 55, 87, 88
Soreng Mfg. Corp., 9555 Eden Ave., Schiller Park, Ill., 34, 37, 52
Sorensen & Co., Inc., 375 Fairfield Ave., Stamford, Conn., 45, 58
Sound Apparatus Co., Stirling, N.J., 91
For details see ad on page 319
Sound Devices, Inc., 129 E. 124 St., New York 35, N.Y., 46
Soundscriber Corp., The, 146 Munson St., New Haven 4, Conn., 10, 11
South River Metal Products Co., Inc., 377 Turnpike, South River, N.J., 26, 75
Southern Electric & Transmission Co., 3127 Holmes St., Dallas 15, Texas, 4, 20, 33, 93
Southwest Technical Lab., 416 N. 4 St., Albuquerque, N.M., 67, 89
Sparton of Canada, Ltd., Elm St., London, Ont., Canada, 9, 14, 29, 32, 75, 80
Sparton Radio Television Div., 2400 E. Ganson St., Jackson, Mich., 14
Speak-O-Phone Rec. & Equip. Co., 23 W. 60 St., New York 23, N.Y., 8, 10, 11
Special Instruments Lab., Inc., 1003 Highland Ave., Knoxville, Tenn., 1, 60, 61, 64, 90, 92, 94
Special Products Co., 9115 Brookville Rd., Silver Spring, Md., 1, 8, 96
Specialties, Inc., Skunks Misery Rd., Syosset, L.I., N.Y., 4, 49, 54
Specialty Battery Co., 212 E. Washington Ave., Madison, Wis., 27, 43
Specialty Engineering Div., Specialty Assem. & Packing Co., 79 Clifton Pl., Brooklyn 38, N.Y., 1, 2, 13, 14, 15, 18, 19, 24, 26, 42, 64, 68, 69, 73, 80, 88, 90, 92, 93, 94, 96
Specific Products, 5804 Hollywood Blvd., Hollywood 28, Calif., 14
Speer Carbon Co., Du Bois, Pa., 30, 33
Speer Carbon Co., Speer Resistor Div., St. Marys, Pa., 30, 49
Spellman Television Co., 3029 Webster Ave., New York 67, N.Y., 33, 45, 80, 90
For details see ad on page 185
Spencer-Kennedy Laboratories, Inc., 186 Massachusetts Ave., Cambridge 39, Mass., 4, 14, 73, 80, 88, 93, 95
For details see ad on page 306
Spencer Thermostat Div., Metals & Controls Corp., 105 Forrest, Attleboro, Mass., 53X
Spera Electronics Labs., 37-10 33 St., Long Island City 1, N.Y., 14, 19, 24, 80
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 26, 33, 34, 42, 43, 45, 54, 57, 59, 70, 93, 95, 96
See complete catalog in last section
Sphere Co., Inc., P.O. Box 557B, Short Hills, N.J., 75, 77, 78
For details see ad on page 274
Spilsbury & Tindall, Ltd., 44 Water St., Vancouver 4, B.C., Canada, 1, 18, 23, 24, 25, 37, 58
Sprague Electric Co., North Adams, Mass., 30, 31, 36, 38, 46, 49, 90
Spruce Pine Mica Co., Spruce Pine, N.C., 79
Stainless, Inc., Third St., North Wales, Pa., 12, 26, 75
Square Root Manufacturing Corp., 391 Saw Mill River Rd., Yonkers 2, N.Y., 4, 18, 26, 33, 40, 41, 45, 54, 60, 67, 73, 75, 80
Stackpole Carbon Co., Tannery St., St. Marys, Pa., 30, 36, 49, 52, 87
For details see ad on pages 442-443
Stamford Tool & Die Corp., Customatic Div., 90 Lincoln Ave., Stamford, Conn., 73, 80
Stancil-Hoffman Corp., 921 N. Highland Ave., Hollywood 38, Calif., 1, 10, 11, 16, 43
Standard Condenser Co., 1802 N. Damen Ave., Chicago 47, Ill., 30
Standard Coil Products Co., Inc., 2329 N. Pulaski Rd., Chicago 39, Ill., 33, 46, 54, 65, 70
Standard Crystal Co., 1714 Locust St., Kansas City 8, Mo., 37
Standard Electric Time Co., 73 Logan St., Springfield 2, Mass., 6, 42, 59, 60, 90, 92
For details see ad on page 325
Standard Electrical Products Co., 2240 E. Third St., Dayton 5, Ohio, 33, 36, 40, 41, 45, 48, 54, 58
Standard Electronic Research Corp., 2 East End Ave., New York 21, N.Y., 1, 4, 45, 54, 60, 64, 65, 73, 80
Standard Electronics Corp., 285 Emmet St., Newark 5, N.J., 3, 6, 12, 13, 16, 17, 23, 33, 45, 54, 58, 80

(Continued on page 83)



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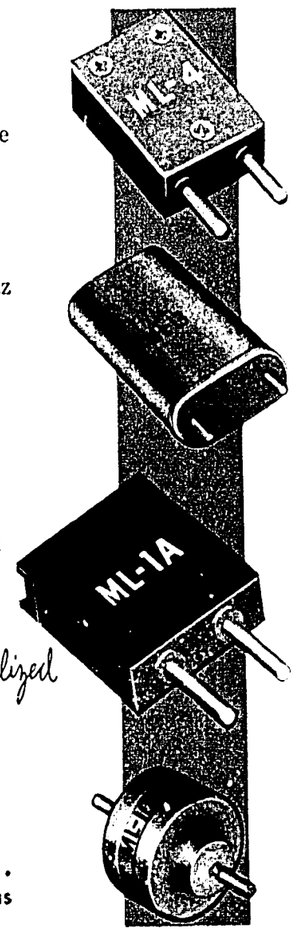
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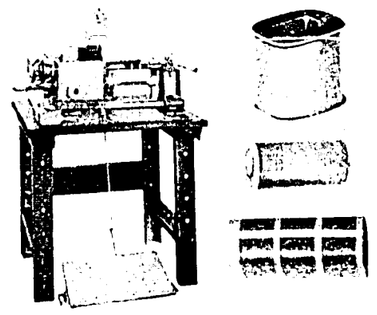
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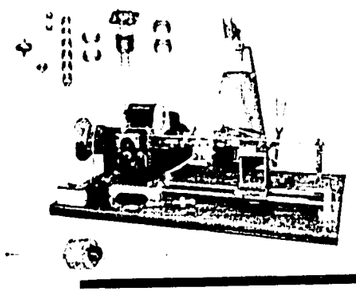
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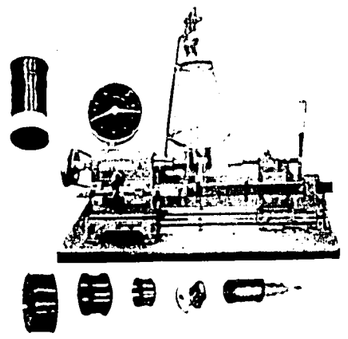
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Chicago 30, Illinois

Alphabetical Directory

(Continued from page 81)

Standard Piezo Co., 265 E. Pomfret St., P.O. Box 278, Carlisle, Pa., 37, 60
For details see ad on page 92

Standard Pressed Steel Co., Jenkintown, Pa., 77, 89

Standard Transformer Corp., 3580 Elston Ave., Chicago 18, Ill., 4, 19, 24, 33, 54

Standard Winding Co., Inc., 44-62 Johnes St., Newburg, N.Y., 33, 54

Standard Wood Products Corp., 43-02 38 St., Long Island City 1, N.Y., 29

Stanley Works, Stanley Tool Div., 111 Elm St., New Britain, Conn., 82

Stanwyck Winding Co., Inc., 137 Walsh Ave., Newburgh, N.Y., 33, 54

Star Expansion Products Co., 147 Cedar St., New York 6, N.Y., 75, 82

Star Fuse Co., Inc., 235 Canal St., New York 13, N.Y., 39, 73

Star-Kimble Motor Div., 200 Bloomfield Ave., Bloomfield, N.J., 43

Stark Electronic Instruments, Ltd., Stark Building, Niax, Ont., Canada, 42, 45, 89, 90, 95, 96

Starrett Television Corp., 601 W. 26 St., New York 1, N.Y., 6, 14, 18, 25, 88, 96

State University of N.Y., Institute of Applied Arts & Sciences, 300 Pearl St., Brooklyn 1, N.Y., 97

State Company, The, 19 New Park Ave., Hartford 6, Conn., 19, 26, 49

Statham Laboratories, Inc., 12401 W. Olympic Blvd., Los Angeles 64, Calif., 90

Staver Company, Inc., 41-51 N. Saxon Ave., Bay Shore, L.I., N.Y., 87
For details see ad on page 302

Stavid Engineering, Inc., 312 Park Ave., Plainfield, N.J., 80

Steelman Phono. & Radio Co., 12-30 Anderson Ave., Mt. Vernon, N.Y., 9, 14

Steiner Ives Company, Springfield Rd., Union, N.J., 82, 89

Stelma, Inc., 389 Ludlow St., Stamford, Conn., 20, 25, 93

Stephens Mfg. Corp., 8538 Warner Dr., Culver City, Calif., 1, 4, 5, 7, 8, 24, 29, 61

Sterling Engineering Co., 90 Mill St., Laconia, N.H., 48

Sterling Manufacturing Co., 7201 Wentworth Ave., Cleveland 2, Ohio, 42

Sterling Transformer Corp., 297 N. 7 St., Brooklyn 11, N.Y., 33, 54, 80

Stern Co., Roger M., 93 Nassau St., New York 38, N.Y., 73, 97, 98
For details see ad on page 39

Stevens-Arnold, Inc., 22 Elkins St., South Boston 27, Mass., 24, 35, 48
For details see ad on page 159

Stevens Manufacturing Co., 69 S. Walnut St., Mansfield, Ohio, 52, 53X
For details see ad on page 213

Stevens Mfg. Co., Inc., Geo., Pulaski Road at Peterson, Chicago 30, Ill., 82
For details see ad on page 83

Stevens Products, Inc., 86 Main St., East Orange, N.J., 7, 75, 84

Steward Mfg. Co., D. M., E. 36 St., & Jerome Ave., Chattanooga 3, Tenn., 26, 72, 74

Stewart Mfg. Corp., F. W., 4311-13 Ravenswood Ave., Chicago 13, Ill., 77
For details see ad on page 273

(Continued on page 85)

Numbers after address refer to product listings in which firm appears.



Stewart-Warner Electric, 1826 W. Diversey Pkwy., Chicago 14, Ill., 14, 24, 68, 69

Stibitz, Ph.D., George R., 393 S. Prospect St., Burlington, Vt., 73

Sticht & Co., Inc., Herman H., 27 Park Pl., New York 7, N.Y., 42, 90, 92
For details see ad on page 173

Still-Man Co., 429-33 E. 164 St., New York 56, N.Y., 53X

Stockman Electronics Research Co., 543 Lexington St., Waltham 54, Mass., 1, 14, 19, 73, 89, 90, 96, 97, 98

Stokes Machine Co., F. J., 5500 Tabor Rd., Philadelphia 20, Pa., 82

Stoddart Aircraft Radio Co., Inc., 6644 Santa Monica Blvd., Hollywood 38, Calif., 70, 90, 93, 96
For details see ad on page 246

Stokes Molded Products, Inc., Taylor St., Trenton 4, N.J., 75, 84

Strain Engineering Service, 1261 Niles Ave. N.W., Atlanta, Ga., 15, 73

Strandberg Engineering Labs., 416 W. Market St., Greensboro, N.C., 10

Streeter-Amet Co., 4101 Ravenswood, Chicago 13, Ill., 59, 64, 66, 80

Stromberg-Carlson Co., 100 Carlson Road, Rochester 3, N.Y., 1, 5, 6, 7, 14, 48, 52, 73, 75, 80

Strong Electric Corp., 87 City Park Ave., Toledo 2, Ohio, 16

Struthers-Dunn, Inc., 150 N. 13 St., Philadelphia 7, Pa., 48

Sun Electric Corp., 6323 Avondale Ave., Chicago 31, Ill., 42

Stupakoff Ceramic & Mfg. Co., Box 390 Hillview Ave., Latrobe, Pa., 26, 30, 31, 37, 46, 72, 78, 83, 87
For details see ad on pages 139, 189, 203, 255, 265, 277, 295, 297, 303, 378-379

Sturtevant Co., P. A., Addison, Ill., 82

Suburban Radio Co., 158 Central Ave., Rochelle Park, N.J., 19, 24, 71, 75

Suckle Electronics Co., 22nd & Hayes Ave., Camden 5, N.J., 29, 32, 62, 70, 75, 80

Suffolk Products Corp., Woodbine & Scudder Aves., Northport, L.I., N.Y., 24, 29, 32, 45, 67, 70

Summers Gyroscope Co., 2328 Broadway, Santa Monica, Calif., 18, 40, 49, 65, 67

Summit Coil Co., 4 Claremont Rd., Bernardsville, N.J., 33, 54

Summit Electronics, Inc., 7 Industrial Pl., Summit, N.J., 1, 5, 26, 45, 63, 71, 73, 80

Sun Dial Corp., Passaic Ave., Caldwell, N.J., 77

Sunvic Controls, Ltd., 10 Essex St., Strand, W.C. 2, England, 48, 52, 53X, 59, 59, 60, 91

Superex Electronics Corp., 23 Atherton St., Yonkers 2, N.Y., 1, 2, 4, 9, 13, 14, 18, 33, 38, 40, 45, 46, 54, 65, 68, 73, 80

Super Flow Solder Co., Inc., 90 State St., Albany, N.Y., 86

Superior Electric Co., 83 Laurel St., Bristol, Conn., 45, 54, 58, 77
See complete catalog in last section

Superior Marine Radio Co., 136 St. George St., St. Augustine, Fla., 14, 17, 23, 25

Superior Porcelain Co., 9312 Market St., Parkersburg, W.Va., 26, 72

Superior Steatite & Ceramic Corp., 32-49 Gale Ave., Long Island City 1, N.Y., 72, 75, 87

Superior Transformer Corp., 2010 N. California, Chicago 47, Ill., 53, 54

Superior Tube Co., P.O. Box 191, 2512 Germantown Ave., Norristown, Pa., 87
For details see ad on pages 444-445

Supreme Inc., Carlton Rd., Greenwood, Miss., 42, 49, 88, 90, 95, 96

Surprenant Mfg. Co., 172 Sterling St., Clinton, Mass., 71, 85
For details see ad on page 252

Swan Television Co., Ltd., Ernie, 512 Bayview Ave., Toronto, Ont., Canada, 26, 73

Swift Industries, Inc., 10 Love Lane, Hartford 1, Conn., 67, 89
For details see ad on page 311

Swiss Jewel Co., Lafayette Bldg., Philadelphia 6, Pa., 77

Switchcraft, Inc., 1340 N. Halsted St., Chicago 22, Ill., 6, 34, 52
For details see ad on page 104

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 6, 14, 37, 39, 42, 44, 46, 47, 49, 50, 51, 55, 56, 57, 71, 73, 74, 75, 77, 78, 80, 82, 83, 84, 87, 90, 95, 96.
For details see ad on pages 417-420

Sylvania Electric Products Inc., Electronics Div., 100 Sylvan Rd., Woburn, Mass., 47, 50, 56, 57, 58
For details see ad on pages 417-420

Sylvania Electric Products Inc., Boston Eng. Lab., 70 Forsyth St., Boston 15, Mass., 59, 68, 69
For details see ad on pages 417-420

Sylvania Electric Products Inc., Radio & Television Div., 254 Rano St., Buffalo 7, N.Y., 88, 89, 90, 95, 96
For details see ad on pages 417-420

Syncor Products Co., Box 51, Malden 48, Mass., 26, 87

Synchromatic Productions, 995 Broadway, Bayonne, N.J., 10

Synco-Start Products, Inc., 8151 N. Rideeway Ave., Skokie, Ill., 60

Syntron Co., 242 Lexington Ave., Homer City, Pa., 47

Syntronic Instruments, Inc., 100 Industrial Rd., Addison, Ill., 33, 45, 54, 68, 93, 95

Syracuse Ornamental Co., Inc., 581 S. Clinton St., Syracuse 2, N.Y., 29, 84

Syracuse University, East Syracuse 4, N.Y., 97

TLC Electric Corp., 31 W. 27 St., New York, N.Y., 90

Taco West Corp., 525 N. Noble St., Chicago 22, Ill., 90

Taffet Radio & Television Co., 2530 Belmont Ave., New York 58, N.Y., 80

Takk Corp., Newark, Ohio, 47, 90

Talk-A-Phone Co., 1512 S. Pulaski Rd., Chicago 23, Ill., 1, 5, 9

Taller & Cooper, 75 Front St., Brooklyn 1, N.Y., 59, 60, 65, 66, 73, 80, 91

Tape Recording Apparatus Co., Box 221, Caldwell, N.J., 9, 10

Tartak-Stolle Electronics, Inc., 39 70 S. Grand Ave., Los Angeles 37, Calif., 14

Tarzian, Inc., Sarkes, 539 S. Walnut St., Bloomington, Ind., 13, 14, 16, 17, 47, 68, 69

Tarzian, Inc., Sarkes, 415 N. College Ave., Bloomington, Ind., 13, 14, 16, 17, 31, 47, 58, 68, 69

Taylor Electrical Instr. Ltd., 419-424 Montrose Ave., Slough, Bucks, England, 83, 88, 90, 93, 95, 96

Taylor Fibre Co., Norristown, Pa., 46, 75, 77, 79, 85

Taylor Tubes, Inc., 2312 W. Wabansia Ave., Chicago 47, Ill., 56, 57

Teca Corp., 139 E. 23 St., New York 10, N.Y., 63, 88

Tech Laboratories, Inc., Bergen & Edsall Blvds., Palisades Park, N.J., 1, 2, 4, 45, 46, 49, 52, 80, 90

Techlit Consultants, Inc., 140 Nassau St., New York 38, N.Y., 97, 98

Tech-Master Products Co., 443 Broadway, New York 13, N.Y., 1, 14

Technical Advertising Associates, Cheltenham, Pa., 98

Technical Advisory Associates, 30 Broad St., New York 4, N.Y., 43, 48, 52, 65

Technical Apparatus Builders, 111 Liberty St., New York 6, N.Y., 1, 4, 7, 19, 89, 95

Technical Appliance Corp., 1 Taco St., Sherburne, N.Y., 19, 24, 25, 26, 97

Technical Development Corp., 4000 Ince Blvd., Culver City, Calif., 80

Technical Materiel Corp., 700 Fenmore Rd., Mamaroneck, N.Y., 5, 4, 12, 14, 17, 21, 24, 25, 73

Technicraft Laboratories, Inc., Thomaston Ave., Thomaston, Conn., 67, 70, 80, 93

Technisonic Studios, 1201 Brentwood Blvd., St. Louis 17, Mo., 1

Technitrol Engineering Co., 2751 N. 4 St., Philadelphia 33, Pa., 54, 59, 70, 93
For details see ad on page 221

Technograph Printed Electronics, Inc., 191 Main St., Tarrytown, N.Y., 46

Technology Instrument Corp., 535 Main St., Acton, Mass., 1, 49, 84, 92, 96
For details see ad on pages 198 & 334

Teiner Co., Inc., Roland, Everett 49, Mass., 75

Tektronix, Inc., P.O. Box 831, Portland 7, Ore., 63, 88, 92, 95, 96

Telechrome, Inc., 88 Merrick Rd., Amityville, L.I., N.Y., 12, 13, 14, 16, 17, 25, 45, 54, 58, 68, 69, 70, 80, 95, 96
For details see ad on pages 120 & 285

Telechron Dept., General Electric Co., 199 Homer Ave., Ashland, Mass., 42

Telecomputing Corp., 133 E. Santa Anita Ave., Burbank, Calif., 59

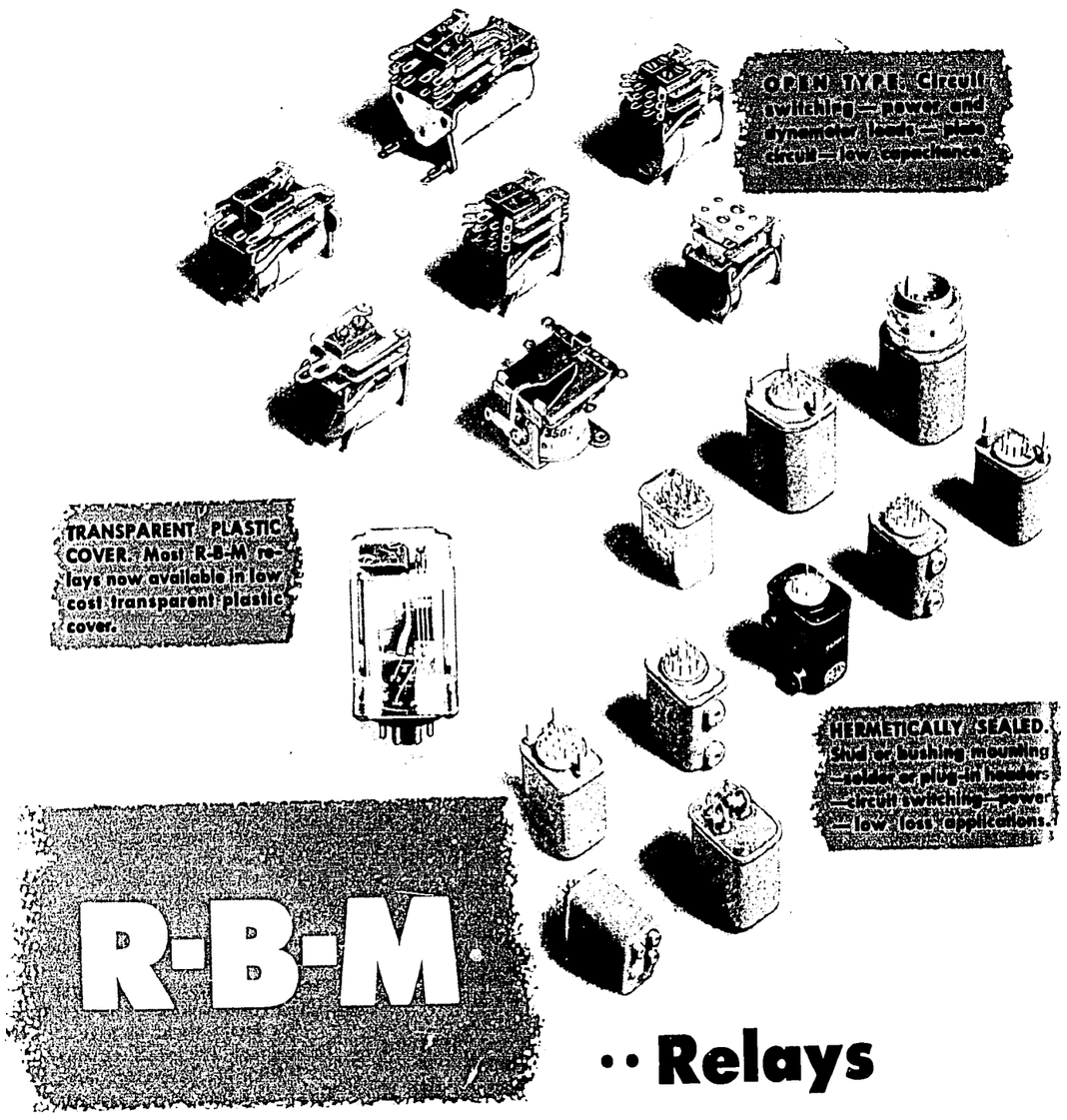
Tele-King Corp., 601 W. 26 St., New York 1, N.Y., 9, 14, 43

Telectro Industries Corp., 35-10 37 St., Long Island City 1, N.Y., 80

Telectron Co., 4019 Prospect Ave., Cleveland 3, Ohio, 33

Telegraph Condenser Co., Ltd., North Acton, London, W. 3, England, 1, 30, 31

Continued on page 87



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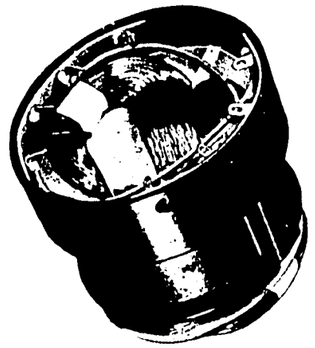
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Telephonics Corp., Park Ave., Huntington, L.I., N.Y., 1, 6, 7, 8, 18, 21
Telephony Publishing Corp., 608 S. Dearborn St., Chicago 5, Ill., 98
Telequip Radio Co., 2559 W. 21 St., Chicago 8, Ill., 14
Teleradio Eng. Corp., 99 Wall St., New York 5, N.Y., 30, 33, 54, 75, 80
Teleregister Corp., 157 Chambers St., New York 7, N.Y., 59, 66, 80
Telescreen Corp., 30 Grove St., New Canaan, Conn., 13, 14, 16, 18 25, 54, 60, 68, 69, 75, 80
Teletronic Laboratories, Inc., 1835 West Rosecrans Ave., Gardena, Calif., 34, 71, 80, 95
Teletronics Laboratory, Inc., 54 Kinkel St., Westbury, L.I., N.Y., 45, 60, 62, 64, 75, 88, 90, 92, 93, 96
Televex Co., 217 Riverdale Ave., Yonkers, N.Y., 9, 89
Television Equipment Corp., 238 William St., New York 38, N.Y., 14, 88, 95
Television Laboratories, Inc., Mill St., Wauconda, Ill., 4, 26, 33, 38, 41, 46, 54
Television Utilities Corp., 1315 Jericho Turnpike, New Hyde Park, L.I., N.Y., 13
Television Zoomar Corp., 500 Fifth Ave., New York 36, N.Y., 89
Televiso Corp., 7466 W. Irving Pk. Rd., Chicago 34, Ill., 15, 23, 28, 58, 43, 45, 60, 65, 73, 80
Telex, Inc., 1033 Eustis St., St. Paul 1, Minn., 1, 7, 14, 30, 33, 46, 61, 72
Tel-Instrument Co., Inc., 50 Paterson Ave., East Rutherford, N.J., 16, 45, 96
For details see ad on page 120
Tel-O-Tube Corp. of America, 180 Van Riper Ave., East Paterson, N.J., 55
Telmusic Service, Inc., 53 Amsterdam Ave., Passaic, N.J., 27
Tel-Rad Mfg. Co., 7 Madison St., Fennimore, Wis., 33
For details see ad on page 87
Telrex, Inc., 26 Neptune Highway, Asbury Park, N.J., 12, 19, 24, 26
For details see ad on page 258
Television Laboratories, Inc., 5045 W. Lake St., Chicago 44, Ill., 4, 26, 33, 46, 49, 54
Tempel Manufacturing Co., 1939 Bryn Mawr Ave., Chicago 26, Ill., 74
Tenney Engineering, Inc., Dept. N, 26 Ave. B, Newark 5, N.J., 89
For details see ad on page 310
Tensitron, Inc., Harvard, Mass., 89, 82, 90
Tensolite Insulated Wire Co., Inc., 198 Main St., Tarrytown, N.Y., 26, 71
For details see ad on page 253
Tensor Electric Dev. Co., 343 Classon Ave., Brooklyn 5, N.Y., 88
Tetrad Co., Inc., 4054 Ocean Park, Los Angeles, Calif., 4, 33, 48, 54
Tetrad Corp., 62 St. Mary St., Yonkers 2, N.Y., 9
Texas Instruments Inc., 6000 Lemmon Ave., Dallas 9, Tex., 50, 61
Thall Plastic Eng. Co., 155 Chambers St., New York 7, N.Y., 75, 85
Thermo Instruments Co., 1166 El Camino Real, Belmont, Calif., 48, 60
Therm-O-Disc, Inc., 127 Crouse, Mansfield, Ohio, 53X
Theatre Equipment Co., 109 Michigan, Toledo 2, Ohio, 1, 5, 7
Thomas Electronics, Inc., 118 Ninth St., Passaic, N.J., 55, 87
Thomas & Sons Co., The R., Lisbon, Ohio, 29, 72
Thomas Clocks, Seth, 135 South St., Thomaston, Conn., 75, 77, 91
Thomas & Skinner Steel Products Co., Inc., 1125 E. 23 St., Indianapolis 7, Ind., 36, 41, 74
For details see ad on page 169
Thompson Co., The H. L., 1733 Cordova St., Los Angeles 7, Calif., 73, 79
Thompson, H. A., 2525 Pennsylvania Ave., Boulder, Colo., 73
Thompson Products, Inc., 2196 Clarkwood Road, Cleveland 3, Ohio, 29, 40, 45, 52, 67, 96
Thor Ceramics, Inc., 225 Belleville Ave., Bloomfield, N.J., 72, 77, 78
For details see ad on page 256
Thordarson & Meissner, 7th & Bellmont, Mt. Carmel, Ill., 1, 3, 4, 14, 31, 33, 40, 54, 61
Thwing-Albert Instr. Co., Penn St. & Pulaski Ave., Philadelphia 44, Pa., 42, 49
Tibbetts Industries, Inc., Colcord Ave., Camden, Me., 8
Times Facsimile Corp., 540 W. 58 St., New York 19, N.Y., 22, 87, 92
For details see ad on page 303
Timmerman Products, Inc., P.O. Box 6088, Cleveland 1, Ohio, 77
Titeflex, Inc., 500 Frelinghuysen Ave., Newark 5, N.J., 34, 67, 70, 93
Todd Electric Co., Inc., 6 Brook St., Yonkers, N.Y., 33, 54
Todd Products Co., Inc., 156 Gramatan Ave., Mt. Vernon, N.Y., 33, 54
Tomore Electric Corp., 131 Gould St., Rochester 10, N.Y., 49
Toeppen Co., P.O. Box 1012, Beverly Hills, Calif., 73
Topflight Tape Co., Ninth Ave. at Queen St., York, Pa., 77
Tork Clock Co., Inc., 1 Grove St., Mt. Vernon, N.Y., 42, 52, 75
Torocoil Co., 1374 Mobile Ct., St. Louis 10, Mo., 33, 36
For details see ad on page 147
Torwico Electronics, Inc., 963 Frelinghuysen Ave., Newark 5, N.J., 4, 33, 54, 77, 78
For details see ad on page 149
Toth, Albert F., 38 Park Row, New York 7, N.Y., 73, 80
Tracerlab, Inc., 130 High St., Boston 10, Mass., 64, 80, 89, 94
Trad Television Corp., 1001 First Ave., Asbury Park, N.J., 2, 14, 18, 23, 45, 88, 93, 95, 96
For details see ad on page 338
Transco Products, Inc., 12210 Nebraska Ave., Los Angeles 25, Calif., 34, 48, 52, 67, 68, 69
Transducer Corp., 1085 Commonwealth Ave., Boston 54, Mass., 18, 59, 60, 65, 75, 80, 91

(Continued on page 89)

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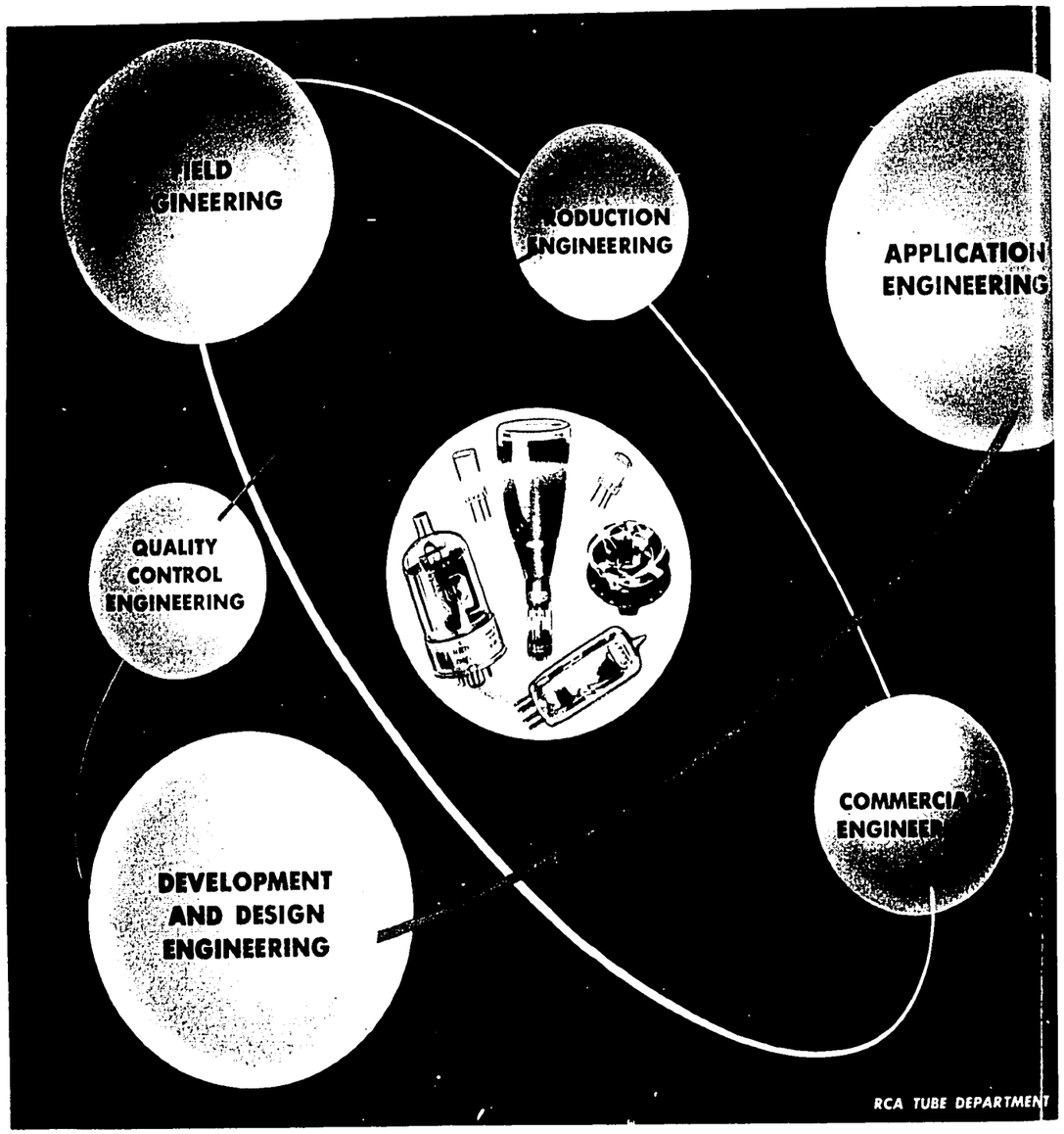
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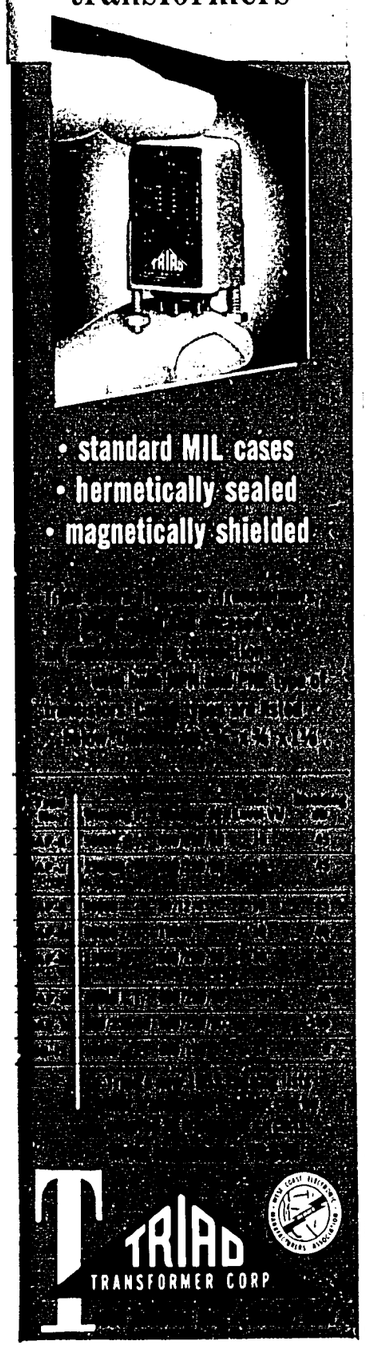
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Tr-Un

(Continued from page 87)

Transelectric Mfg. Co., 50 Hopewell Rd., Oxford, Pa., 5, 8, 48

Trans Electro Products Corp., Bala Cynwyd, Pa., 1, 73, 80

Transformer & Electronic Specialties Co., 3824 Terrace St., Philadelphia 28, Pa., 33, 54
For details see ad on page 221

Transformer Engineers, 161 E. California St., Pasadena 1, Calif., 3, 4, 33, 40, 54, 61

Transformer Metal Products Corp., 343 W. 26 St., New York 1, N.Y., 9, 29, 32, 75, 77

Transformer Specialty Co., Inc., 328 Rockhill Rd., Bala-Cynwyd, Pa., 1, 2, 4, 33, 54, 75
For details see ad on page 219

Transformer Technicians, Inc., 2608 N. Cicero Ave., Chicago 39, Ill., 4, 33, 45, 54, 60, 61

Transformers, Inc., 532 North St., Endicott, N.Y., 54

Trans-Gel Products, P.O. Box 328, Port Washington, L.I., N.Y., 46, 77

Transicoil Corp., 107 Grand St., New York 13, N.Y., 65
For details see ad on page 236

Transistor Products, Inc., Snow and Union Sts., Brighton Station, Boston 35, Mass., 50, 90
For details see ad on page 206

Transitron Electronic Corp., 407 Main St., Melrose 76, Mass., 47, 50

Trans-Lux Corp., 1270 Sixth Ave., New York 20, N.Y., 16

Transmitter Equipment Mfg. Co., 345 Hudson St., New York 14, N.Y., 18, 19, 21, 23, 24, 25, 45, 59, 65, 68, 69

Transradio, Ltd., 138A Cromwell Rd., London, S.W. 7, England, 26, 71, 75, 77, 85

Trans-Sonics, Inc., Bedford Airport, Bedford, Mass., 4, 49, 65, 90

Transvision, Inc., 460 North Ave., New Rochelle, N.Y., 12, 14, 26, 33, 54, 55, 73, 80, 90, 96, 97, 98

Trenton Transformer Corp., 822 E. State St., P.O. Box 568, Trenton 4, N.J., 54

Triad Portable Case Corp., 310 W. Lincoln Ave., Mt. Vernon, N.Y., 29

Triad Transformer Corp., 4055 Redwood Ave., Venice, Calif., 4, 33, 54, 61, 77, 78
For details see ad on page 89

Tri-Dex Electronics, P.O. Box 1207, Lindsay, Calif., 1, 33, 46, 54, 71, 75, 77, 80

Tricraft Products Co., 1535 N. Ashland Ave., Chicago 22, Ill., 26, 67, 75

Trimm, Inc., 400 W. Lake St., Libertyville, Ill., 1, 6, 7, 34, 75
For details see ad on page 107

Triplett Electrical Instrument Co., Harmon Rd., Bluffton, Ohio, 42, 90, 95, 96

Triumph Mfg. Co., 913 W. Van Buren St., Chicago 7, Ill., 45, 88, 90, 95

Truelove & MacLean, Inc., Waterville St., Waterbury 14, Conn., 75, 77, 87

Truscon Steel Div., Republic Steel Corp., Youngstown, Ohio, 12, 25
For details see ad on page 126

Trumbull Electric Dept., General Electric Co., Plainville, Conn., 52

Tube Service Corp., 2 Gaston Ave., Garfield, N.J., 55

Tucker & Co., 545 Fifth Ave., New York 17, N.Y., 73

Tung-Sol Electric, Inc., 95 Eighth Ave., Newark 4, N.J., 44, 50, 55, 55
For details see ad on page 94

Turner Co., 917 17 St. N.E., Cedar Rapids, Iowa, 8, 14

Tydings Co., Div. of Keps Electric Co., 5800 Baum Boulevard, Pittsburgh 6, Pa., 99
For details see ad on page 358

Ucinite Co., Div. of United-Carr Fastener, 459 Watertown St., Newtonville 60, Mass., 34, 44, 51, 77
For details see ad on page 447

Ulanet Co., George, 413 Market St., Newark 5, N.J., 52, 53X
For details see ad on page 211

Ultradyne Engineering Labs., Inc., P.O. Box 8007, Albuquerque, N.M., 73, 80, 97

Ultrasonic Corp., 61 Rogers St., Cambridge 43, Mass., 1, 7, 48, 52, 59, 61, 65, 66, 68, 75, 80

Underwood Corp., Electronic Computer Div., 35-10 36 Ave., Long Island City 1, N.Y., 54, 59, 70, 80

Ungar Electric Tools, Inc., 4101 Redwood Ave., Venice, Calif., 82

Uniform Tubes, Inc., Level Rd., Collegeville 2, Pa., 83

Unimax Switch Div., W. L. Maxson Corp., 460 W. 34 St., New York 1, N.Y., 52

Union Electric & Mfg. Co., 1057 Summit Ave., Jersey City 7, N.J., 32, 33, 54

Union Plate & Wire Co., Dunham & Pine Sts., Attleboro, Mass., 34, 67, 70, 71, 75, 83, 86

Union Spring & Mfg. Co., 1057 Summit Ave., Jersey City 7, N.J., 1, 33, 45, 54

United-Carr Fastener Corp., 31 Ames St., Cambridge 42, Mass., 44, 77, 87
For details see ad on page 446

United Condenser Corp., 337 E. 139 St., New York 54, N.Y., 30

United Electronics Co., 42 Spring St., Newark 4, N.J., 31, 56, 57

United Specialties Co., Mitchell Div., Edmund & Shelmire Sts., Philadelphia 36, Pa., 32, 75

U. S. Components, Inc., 454-462 E. 148th St., New York 55, N.Y., 6, 34, 46, 78
For details see ad on page 96

U. S. Electronic Co., 84 Howard Ave., New Haven 11, Conn., 1

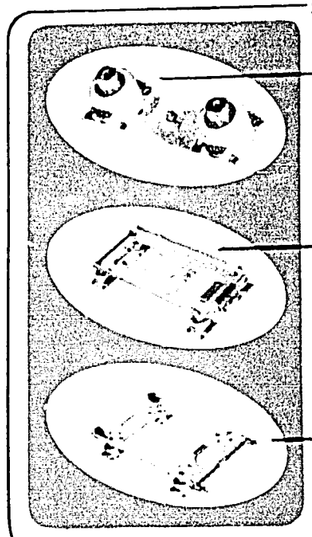
(Continued on page 90)

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ROBINSON MET-L-FLEX all-metal mounts for vibration isolation and shock protection

FOR AIRBORNE ELECTRONIC EQUIPMENTS, INSTRUMENTS AND CONTROLS

SERIES 878 TWIN UNIT MOUNT ASSEMBLY



The assembly consists of two Series 7001 MET-L-FLEX Unit Mounts on a flanged tie-plate for attachment to your own tray or mounting base. S-1 and S-2 standard bases incorporate this assembly. Special widths and load ratings available. See Dwg. 878 B for details.

Robinson Model Number	Load Rating Lbs. Each End
878 1	½ to 1
878 2	¾ to 1¼
878 3	1½ to 3
878 4	2½ to 5½
878 5	5 to 10

SERIES 892 UNIT MOUNTING BASE

Designed and manufactured in conformance with JAN-C-172A and included specifications. "Proof Tested" Construction. Uses two Series 878 MET-L-FLEX Twin Unit Mounts and Bonding Jumpers. See Dwg. 892 B for details.

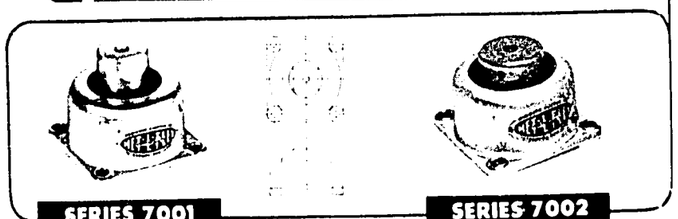
Robinson Model No.	Standard Designation	Load Range in Pounds	Weight in Lbs.
892 1	MT S 1	6 12	1 25
892 2	MT S 2	10 22	1 35

SERIES 831 UNIT MOUNTING BASE

Designed and manufactured in conformance with JAN-C-172A and included specifications. "Proof Tested" Construction. Employs four Series 7002 MET-L-FLEX Unit Mounts and Bonding Jumpers. See Dwg. 831 B for details.

Robinson Model No.	Standard Designation	Load Range in Pounds	Wgt. in Pounds
831 1	MT A1 B	10 24	2 40
831 2	MT A1 C	10 24	2 45
831 3	MT A1 D	10 24	2 50
831 4		18 40	
831 5	MT B1 B	10 24	2 60
831 6		18 40	
831 7	MT B1 2 C	10 24	2 65
831 8		18 40	
831 9	MT B1 2 D1	22 50	2 70
831 13	MT B1 2 D2	40 80	2 70
831 14	MT C1 2 C	40 80	2 80
831 15	MT C1 2 D	40 80	2 85

Mounting Bases to meet your exact dimensional and load requirements are available on special order.



SERIES 7001 SERIES 7002

Model Number	Application Range in Lbs.
7001-H	½ to 1
7001-J	¾ to 1¾
7001-K	1½ to 3
7001-L	2½ to 5½
7001-M	5 to 10

Model Number	Application Range in Lbs.
7002-G	1½ to 2¾
7002-H	2½ to 6
7002-J	4½ to 10
7002-K	5½ to 12½
7002-L	10 to 20
7002-U	15 to 30
7002-M	18 to 40
7002-P	35 to 50
7002-R	45 to 75

Robinson MET-L-FLEX Engineered Mounting Systems, Mounting Bases and Unit Mounts are compact, rugged and effective. They feature an exclusive all-metal resilient element, made of knitted stainless steel wire, fabricated and compressed. This cushion provides wide environmental tolerance with high built-in damping, resulting in "Sea level performance at any altitude". Its non-linear deflection characteristics permit optimum performance under load variations of as much as ±50% of mean ratings. Auxiliary MET-L-FLEX limiter pads afford additional protection against extreme overloads and impacts.

Further "Plus Features" exclusive with all MET-L-FLEX Mounts and Mounting bases are: negligible drift rate; wide temperature tolerance (−90°C to +175°C); and amazingly long service life without maintenance. They completely lack those faults and weaknesses inherent to mountings incorporating organic or plastic materials.

The "Plus Features" of Robinson Mountings, providing performance in excess of current specifications, pay off in maximum protection of the mounted equipment.

For complete performance and construction details, write for Technical Bulletins IRE-700 and IRE-750 and the telephone number of your local representative.

*MET-L-FLEX is the copyrighted designation for the all-metal resilient cushions developed and pioneered by Robinson.

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U. S. Engineering Co., 521 Commercial St., Glendale 3, Calif., 77, 84
For details see ad on page 91

U. S. Gasket Co., 611 N. 10 St., Camden 1, N.J., 26, 34, 36, 46, 51, 75, 77, 79, 84, 85
For details see ad on pages 450-451

U. S. Gauge, Div. American Machine & Metals Co., Sellersville, Pa., 42

U. S. Radium Corp., 535 Pearl St., New York 7, N.Y., 64, 77, 94

U. S. Rubber Co., 1230 Ave., of Americas, New York 20, N.Y., 27, 71, 84

U. S. Steel Corp., 525 Wm. Penn Pl., Pittsburgh 30, Pa., 83

U. S. Testing Co., Inc., 1415 Park Ave., Hoboken, N.J., 75, 80

U. S. Tool Company, Inc., 255 N. 18 St., Amphere, (East Orange), N.J., 82

U. S. Wire & Cable Corp., Progress & Monroe St., Union, N.J., 71

United Technical Laboratories, Morristown, N.J., 38, 75, 77, 80, 81, 96

United Transformer Co., 150 Varick St., New York 13, N.Y., 3, 4, 33, 38, 40, 54, 58, 61
See complete catalog in last section

United Wood Specialty Mfg. Co., 951 Broadway, Fall River, Mass., 29

Universal Aviation Equipment, Inc., 187 Lafayette St., New York 13, N.Y., 44, 74, 77, 90

Universal Electric Co., 300 E. Main St., Owosso, Mich., 43

Universal Electronics Co., 2012 S. Sepulveda Blvd., Los Angeles 25, Calif., 45, 73, 80
For details see ad on page 186

Universal Mfg. Co., Inc., 410 Hillside Ave., Hillside, N.J., 33, 70, 93
For details see ad on pages 149 & 247

Universal Winding Co., P.O. Box 1605, Providence 1, R.I., 82

Universal X-Ray Products, Inc., 1140 N. Western Ave., Chicago 22, Ill., 45, 56, 61, 75, 82

University Loudspeakers, Inc., 80 South Kensico Ave., White Plains, N.Y., 4, 7, 8, 29
For details see ad on page 105

Utah Radio Products Co., Inc., 1123 East Franklin, Huntington, Ind., 7, 29, 54

Utica Drop Forge & Tool Corp., 2415 Whitesboro St., Utica 4, N.Y., 82

V-M Corporation, 4th & Park Sts., Benton Harbor, Mich., 1, 9

Vaco Products Co., 317 E. Ontario, Chicago 11, Ill., 77

Vacuum-Electronic Engineering Co., 756 Third Ave., Brooklyn 32, N.Y., 80, 82, 89, 90
For details see ad on pages 294, 311

Vacuum Metals Corp., 70 Memorial Dr., Cambridge 42, Mass., 83

Vactum Tube Products, 506 S. Cleveland St., Oceanside, Calif., 30, 31, 55, 56, 57, 82

Vallorbs Jewel Co., Lancaster, Bird-in-Hand, Pa., 9, 75, 77

Valpey Crystal Corp., 1274 Highland St., Holliston 1, Mass., 37

Valverde Laboratories, 252 Lafayette St., New York 12, N.Y., 53X

Van Deventer, Inc., H. R., 342 Madison Ave., New York 17, N.Y., 80

Varflex Corp., 305 N. Jay St., Rome, N.Y., 79, 85

Varian Associates, 661 Hansen Way, Palo Alto, Calif., 41, 45, 57, 80, 87
For details see ad on pages 454-455

Vari-L Company, Inc., P.O. Box 1433, Stamford, Conn., 33

Varo Mfg. Co., Inc., 1801 Walnut St., Garland, Tex., 43, 45, 48, 54, 58, 92

Vector Electronic Co., 3352 San Fernando Rd., Los Angeles 65, Calif., 6, 29, 45, 51, 77
For details see ad on page 205

Vectron, Inc., 400 Main St., Waltham 54, Mass., 4, 37, 45, 49, 59, 65, 66, 73, 75, 80, 88, 92, 93, 95, 96
For details see ad on page 308

Vega Co., 155 Columbus Ave., Boston 16, Mass., 1, 9, 29, 73, 75, 92

Vesto Co., Inc., 1916 Clay St., North Kansas City 16, Mo., 26

Vibraloc Corp., 425 Bush St., San Francisco 8, Calif., 29

Vibration Research Laboratories, Inc., 42 Oak Ave., Tuckahoe, N.Y., 35
For details see ad on pages 157 & 285

Vibroflex Co., Inc., 833 Broadway, New York 3, N.Y., 53

Vickers Electric Div., 1815 Locust St., St. Louis 3, Mo., 40, 45, 47, 58

Victoreen Instrument Co., 3800 Perkins Ave., Cleveland 14, Ohio, 33, 35, 45, 48, 49, 55, 56, 64, 94

Victory Engineering Corp., Springfield Rd., Union, N.J., 49, 50, 56, 63, 70
For details see ad on page 203

Victorlite Industries, Inc., 5350 Second Ave., Los Angeles 43, Calif., 16

Vidaire Electronics Mfg. Co., 576 W. Merrick Rd., Lynbrook, L.I., N.Y., 1, 14, 26, 38, 54, 90

Video Corp. of America, 229 W. 28 St., New York 1, N.Y., 14, 45, 68, 69

Video Industries Co., 42-46 Palmer Pl., Port Chester, N.Y., 26

Video Products Corp., 42 West St., Red Bank, N.J., 14, 45

Virginia Electronics Co., River Road, and B&O R.R., Washington 7, D.C., 6, 23, 45, 60, 67, 71, 73, 75, 77, 78, 80

Vitavox Ltd., Westmoreland Rd., London, N.W. 9, England, 4, 7, 8

Vitramon, Inc., Box 544, Bridgeport 1, Conn., 30

Vitroseal Corp., 6325 Guilford Ave., Indianapolis 20, Ind., 78

Vorac Co., 147 Meadow Rd., Rutherford, N.J., 81

Vocaline Co. of America, Inc., Coulter St., Old Saybrook, Conn., 1, 20, 23, 38, 43, 48

Vokar Corp., Dexter, Mich., 4, 33, 35, 38, 45, 46, 49, 52, 71

Volkert Metal Stampings, Inc., John, 222-43 96 Ave., Queens Village, 8, L.I., N.Y., 75, 87

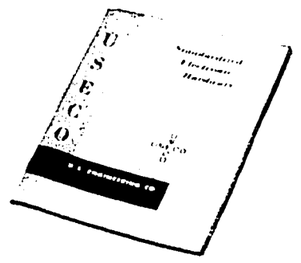
Vulcan Electric Co., 88 Holten St., Danvers, Mass., 49, 53X, 82, 86

(Continued on page 93)

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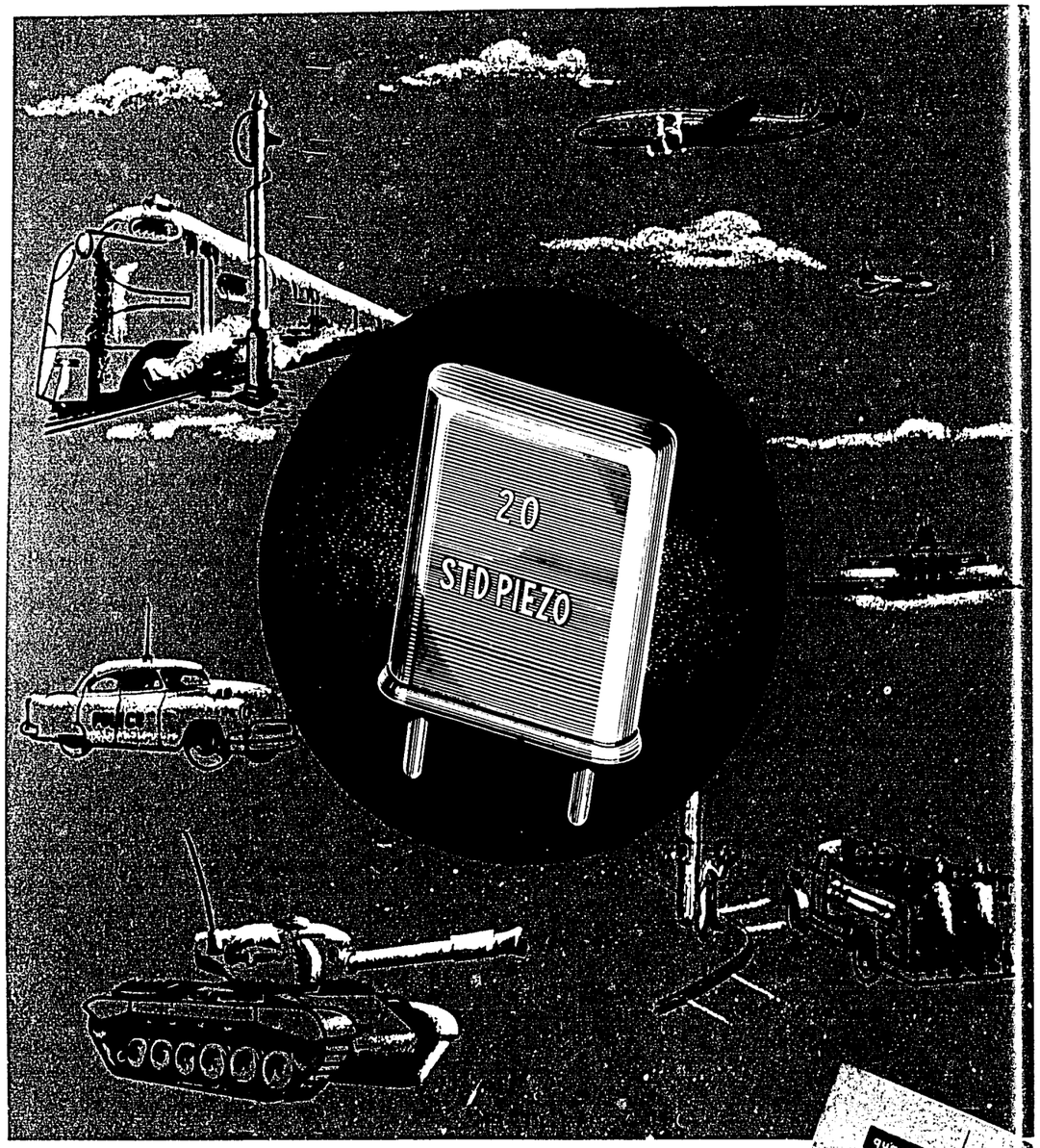


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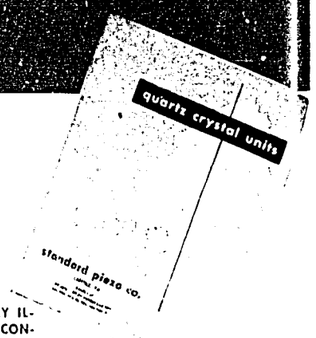
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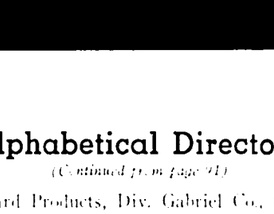


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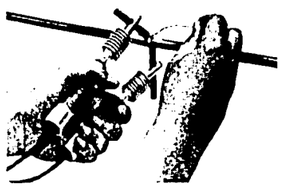
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Wakefield Industries, Inc., 5108 W. Grove St., Skokie, Ill., 37, 70, 78, 89
Waldes Kohinoor, Inc., 47-16 Austel Pl., Long Island City 1, N.Y., 77
Walker Co., George, 188 Amsterdam Ave., Passaic, N.J., 77
For details see ad on page 274
Walker Electric Co., B., 132 Nassau St., New York 7, N.Y., 73, 80
Walker-Turner Div., Kearney & Trecker Corp., Plainfield, N.J., 77
Walkirt Co., 145 W. Hazel St., Inglewood 3, Calif., 13, 42, 46, 59, 64, 75, 80, 88, 92
Wall Mfg. Co., P., Erie St., Grove City, Pa., 62, 75, 77, 82, 86
Wallind-Pierce Corp., 1928 Pacific Coast Hwy., Lomita, Calif., 40, 59, 73, 80
Walsh Press & Die Co., 4709 W. Kinzie St., Chicago 44, Ill., 82
Waltham Horological Corp., 899 Main St., Waltham 54, Mass., 6, 34
Wang Laboratories, 296 Columbus Ave., Boston 16, Mass., 59, 64, 66, 73, 80, 93, 95
For details see ad on page 230
Wappler, Inc., 27 W. 24 St., New York 10, N.Y., 63
Ward Leonard Electric Co., 115 Mac-Questen Pky. S., Mt. Vernon, N.Y., 48, 49
Ward Products, Div. Gabriel Co., 1523 E. 45 St., Cleveland 3, Ohio, 19, 24, 25, 26, 67
Warren Wire Co., Pownal Vt., 26, 71
Warwick Manufacturing Corp., 4640-50 W. Harrison St., Chicago 44, Ill., 14, 75
Washington Technological Associates, 3000 Connecticut Ave. N.W., Washington 8, D.C., 73
Wasserlein Mfg. Co., 126 W. Cass St., Joliet, Ill., 75, 82
For details see ad on page 93
Waterbury Companies, Inc., P.O. Box 1052, Waterbury 20, Conn., 29, 84
Waterman Products Co., Inc., 2445-63 Emerald St., Philadelphia 25, Pa., 55, 95
For details see ad on pages 385-387
Waters Conley Co., Rochester, Minn., 9, 63
Waters Manufacturing, Inc., 4 Gordon St., Waltham, Mass., 49, 60
Waters, Inc., Robert A., 4 Gordon St., Waltham 54, Mass., 49, 60
Waveforms, Inc., 333 6 Ave., New York 14, N.Y., 1, 3, 4, 7, 42, 73, 80, 88, 90, 92, 96
Waveline, Inc., P.O. Box 470, Caldwell, N.J., 67, 70, 93, 96
For details see ad on page 242
Wayne-Kerr Laboratories, Ltd., Sycamore Grove, New Malden, Surrey, England, 42, 45, 49, 64, 70, 88, 90, 93, 94, 95, 96
For details see ad on page 316
Weber Co., 1220 Buttonwood St., Philadelphia 23, Pa., 82
Webster Electric Co., 1900 Clark St., Racine, Wis., 1, 9, 11
Weckesser Co., 5269 N. Avondale Ave., Chicago 30, Ill., 26, 77
For details see ad on page 275
Weiss, Samuel, 2310 Holland Ave., New York 67, N.Y., 81
Weinschel Engineering Co., Inc., 10511 Metropolitan Ave., Kensington, Md., 2, 88, 93
Welch Mfg. Co., W. M., 1515 Sedgwick St., Chicago 10, Ill., 42, 43, 49, 82, 89, 90, 92
Weller Electric Corp., 808 Packer St., Easton, Pa., 82
Wells-Gardner & Co., 2701 N. Kildare, Chicago 39, Ill., 14, 18
Weltronic Co., 19500 W. 8 Mile Rd., Detroit 19, Mich., 29, 32, 56, 58, 60, 62
West Coast Electronics Co., 5873 W. Jefferson Blvd., Los Angeles 16, Calif., 11, 13, 24, 25, 33, 54, 70
Westchester Research & Development Labs., 28 Windermere Dr., Yonkers, N.Y., 80
Western Coil Products Co., Inc., 2993 Middlefield Rd., Palo Alto, Calif., 33, 38, 54, 73, 80
Western Electronic Enterprises, P.O. Box 1110, Gardena, Calif., 24, 34, 49, 52, 70, 71
Western Gold & Platinum Works, 589 Bryant St., San Francisco 7, Calif., 26, 71, 72, 83, 86, 87
Western Lithograph Co., 600 E. 2nd St., Los Angeles 54, Calif., 77
Western Sound & Electronic Labs., Inc., 805 S. 5 St., Milwaukee 4, Wis., 1, 5, 11, 16, 45, 58, 60, 80, 88, 90, 95
Western Union Telegraph Co., 60 Hudson St., New York 13, N.Y., 22
Westfield Chemical Corp., 221 Union St., Westfield, Mass., 81
Continued on page 93

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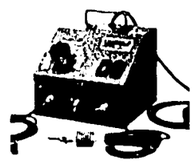


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Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N.J.
42, 47, 48, 54, 55, 76, 96
For details see ad on page 37.
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Wheeler Laboratories, Inc., 122 Cutter Mill Rd., Great Neck, L.I., N.Y., 62
68, 70, 73, 80, 93, 99
For details see ad on page [illegible]
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87

Wiley & Sons, Inc., John, 440 Fourth Ave., New York 16, N.Y., 96
For details see ad on page 84.
Wilkerson Industries, 66 Murray St., New York 7, N.Y., 8, 66
For details see ad on page 84.
Wilkor Div., Arrowsox Corp., 650 Dutton Ave., Cleveland 14, Ohio, See Arrowsox ad on page [illegible]
Wilmad Glass Co., Inc., Franklin & Fifteen St., Buena, N.J., 72, 87
For details see ad on page [illegible]

Wm. Bosert Electronics, Inc., 238 Crescent St., Granite City, Ill., 6, 46, 50, 58, 77, 84
For details see ad on page 59
Wind Turbine Co., 248 E. Market St., West Chester, Pa., 16, 18, 58, 76, 87
For details see ad on page 60
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For details see ad on page [illegible]

Yaxley Electric Corp., 111 Chambers St., New York 7, N.Y., 37
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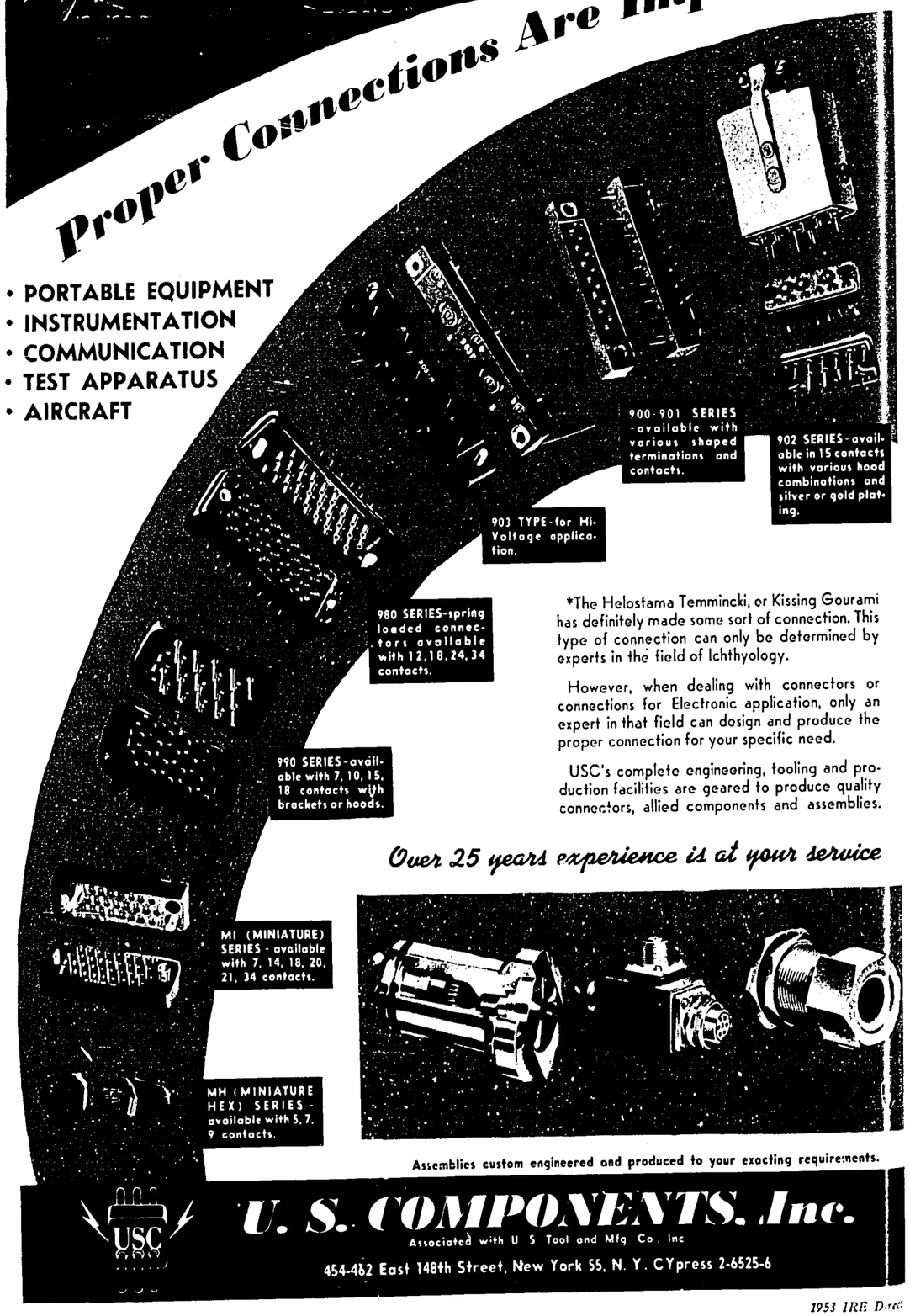
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USC's complete engineering, tooling and production facilities are geared to produce quality connectors, allied components and assemblies.

Over 25 years experience is at your service

Assemblies custom engineered and produced to your exacting requirements.

U. S. COMPONENTS, Inc.

Associated with U. S. Tool and Mfg. Co., Inc.

454-462 East 148th Street, New York 55, N. Y. CYpress 2-6525-6

The first few times you use this

EDGE INDEX

follow the "How to use" instructions slowly—ONE STEP AT A TIME.

After that you will be able to open easily and almost instantly to the section or letter that you seek.

HOW TO USE

1. With the directory open on the desk, place the four fingers of your right hand on the back cover and your right thumb near the middle of the edge of this page.
2. Raise your right hand (about 2 inches) and move it to the left until the pages are bent almost double.
3. From the 1 or 2 line symbol adjacent to the section or product you seek, run your eye across the page edges until you reach the horizontally corresponding symbol.
4. OPEN THERE

IT IS EASIER IF YOU "FAN" OR "RIFFLE" THE LAST FEW PAGES WITH YOUR RIGHT THUMB. THE EDGE INDEX COVERING THE OTHER 7 DIRECTORIES WILL BE FOUND OPPOSITE PAGE 128.



Product No.		Page No.
1	Amplifiers	97
2	Attenuators	100
3	Equalizers	100
4	Filters	101
5	Industrial Sound Systems	102
6	Jacks & Plugs	103
7	Loudspeakers & Head Phones	105
8	Microphones & Stands	107
9	Phonographs & Accessories	107
10	Recording Accessories	109
11	Recording Equipment	111
12	Antennas & Accessories	113
13	Monitor Equipment	114
14	Receivers	115
15	Services for the Broadcaster	117
16	Studio Equipment	119
17	Transmitters	120
18	Aircraft and Airport Equipment	121
19	Amateur Equipment	123
20	Carrier Current Equipment	124
21	Emergency Communications	124
22	Facsimile Equipment	124
23	Marine Equipment	125
24	Mobile Equipment	125
25	Point to Point Equipment	127

Classifications with a System!

THE IRE Directory Product Classifications have both a pattern and a purpose. They differ widely from most product indexes, deliberately. They aim to organize the hundreds of products and services of a complex technical industry according to the way engineers think. To this end, the product grouping follows the pattern of the IRE Professional Groups, broadly. The result is a division of all products and services into ten fundamental indexes into which 100 basic classifications have been organized.

You will note that we here differ from most directory compilers, for we do not mix meters with motors simply for alphabetical reasons. Products used in "Audio" whether components or complete apparatus form the first fundamental group. Yet, the same manufacturer and product may also appear in the "Component Parts" section. This system gives subject grouping for speed and convenience. A directory should aid a man who has forgotten some detail, or product name. Ours helps by grouping products as one would *think*.

1. **Audio Frequency Equipment** (Products 1 to 11)
2. **Broadcasting Equipment** (Products 12 to 17)
3. **Communications Equipment** (Products 18 to 25)
4. **Component Parts** (Products 26 to 58)
5. **Applications of Electronics** (Products 59 to 66)
6. **Radar, Microwave, UHF** (Products 67 to 70)
7. **Services and Materials** (Groups 71 to 87)

   Here we separate the consultant, the fabricating firm, the machine for radio manufacturing, and basic materials from being lost in an alphabetical maze of component and test equipment names.
8. **Test & Measuring Equipment** (Products 88 to 96)
9. **Education & Publishing** (Groups 97 & 98)
10. **Distribution Functions** (Service 99)

For detailed identification, these 100 products and and services, grouped in the 10 indexes, are further defined into nearly 500 named products. We have tried to avoid oversimplification, and a tremendous amount of information is given by our product number system. But, the basic indexing adds speed. Purely alphabetical directories are as slow and cumbersome as a telephone book. IRE engineers have liked our system better!

For safety, an alphabetical "terminology" index is given, preceding the product system in the pink pages introducing the company index. You will note also that after each firm, its products are listed by number code in the alphabetical list, and that sub-classifications shown by number code in the product indexes give much detail. Just a little study of the system will help you get great good from this book.

The IRE DIRECTORY is 10 Indexes in one book.

A Directory of

1. Audio Frequency Equipment



11 Major Groups

63 Products

Organized by functions for Engineers!

01 Amplifiers.
02 Attenuators.
03 Equalizers.
04 Filters.
05 Industrial Sound Systems.
06 Jacks, Jack Fields & Plugs.
07 Loudspeakers & Headphones.
08 Microphones & Stands.
09 Phonographs, Pick-ups, Record Changers, etc.
10 Recording Accessories & Supplies.
11 Recording Equipment.

The products and services of the Radio-Electronics industry have been organized into ten basic directories following closely the organization of the IRE Professional Groups. But 100 major product groups are numbered consecutively throughout.

Always consult the pink pages at the start of the Directory of firms, for a terminology cross-index, or to find products by name. The pink pages list more than 500 products by name, as well as under the product groups. Page numbers are given for speed.

01. Amplifiers.

5. Decade amplifiers
10. DC amplifiers
15. Dynamic noise suppressors
20. Hearing aid
25. High fidelity
30. Inter-coms
35. Phonograph pre-amplifiers
40. Power amplifiers —recording
45. Public address

A.R.F. Products, Inc., Ill., 10, 25, 35
Advance Electronics Co., 451 Highland Ave., Passaic, N.J., 10
For details see ad on page 325
Aero Electronics Co., Ill., 10, 25
Airtronix Development Corp., N.Y., 25, 30, 35, 45
Alcar Instruments, Inc., N.J., 25, 30
Allegany Instrument Co., Md., 10
Alcor Electronics Corp., N.Y., 5, 10
Altec Lansing Corp., Calif., 25, 35, 40, 45
American Electroneering Corp., Calif., 5, 10
American Electronic Labs. Inc. Pa., 10
American Machine & Foundry Co., Mass., 5, 10, 15
Amplifier Corp. of America, N.Y., 10, 25, 30, 40, 45
Ansley Mfg. Co., Arthur, Pa., 25, 35
Applied Electronics Co., Inc., Calif., 45
Approved Electronic Instrument Co., N.Y., 25, 35
Ardente Acoustic Labs., Ltd., England, 20, 25, 30, 40, 45
Atlantic Electronics Corp., N.Y., 25
Audio Instrument Co., Inc., N.Y., Lab Condenser
Audio-Tone Oscillator Co., Conn., 25
Aviation Accessories, Inc., Tex., 10
Avion Instrument Corp., N.J.. 10
Ballantine Laboratories, Inc., Boonton, N.J., 5
For details see ad on page 304
Barber & Howard, R.I., 25, 35
Bardwell & McAlister, Calif., 25
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 5, 10, 25, 35
For details see ad on page 408
Bell Sound Systems, Inc., Ohio, 25, 30, 35, 40, 45
Bendix Aviation Corp., Calif., 10
Belock Instrument Corp., N.Y., 10
Berndt-Bach, Inc., Calif., 25, 40
Berkshire Laboratories, 584 Beaver Pond Rd., Lincoln, Mass., 10
For details see ad on page 315
Berlant Associates, Calif., 25
Biophysical Instruments, Inc., Pa., 10
Birmingham Sound Reproducers, Ltd., England, 45
Bliss-Warren Electronic Corp., N.J., 45
Bogen Co., Inc., David, N.Y., 25, 30, 45
Boom Electric & Amplifier Co., Ill., 45
Bremer Electronics, N.J., 45
Brociner Electronics Laboratory, N.Y., 25, 35, 40
Brook Electronics, Inc., N.J., 25, 35, 40
Brush Electronics Co., Ohio, 10
Budelman Radio Corp., Conn., 45
Canadian General Electric Co., Canada, 45
Canadian Marconi Co., Canada, 30, 45
Canadian Research Institute, Canada, 5, 25, 30, 40, 45
Canadian Westinghouse Co., Ltd., Canada, 10
Central Rediffusion Services, England, 40, 45
Centralab, Div. Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis., 20
See complete catalog in last section
Century Projector Corp., N.Y., 25, 45
Champion Electric Corp., England, 35
Chisholm Industries, Ltd., Canada, 35, 45
Cole Instrument Co., Calif., 5, 10
Colortone Television Co., Inc., N.Y., 30
Commercial Radio Sound Corp., N.Y., 30, 45
Communicating Systems, Inc., N.Y., 25, 45
Communication Equip. & Engineering, Ill., 45
Components Supply Co., N.Y., 35
Computer Corporation of America, N.Y., 10
Connecticut Telephone & Electric Corp., Conn., 30, 45
Cook Laboratories, Conn., 35
Cooper Electronic Products Co., Pa., 30
Cossor (Canada) Ltd., Canada, 25, 40
Crown Engineering, N.M., 30
Decade Instrument Corp., P.O. Box 153, Caldwell, N.J., 5
For details see ad on page 321
Denrad Mfg. Co., Inc., Tex., 25, 30, 35, 40, 45

(Continued on page 99)

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

SHALLCROSS

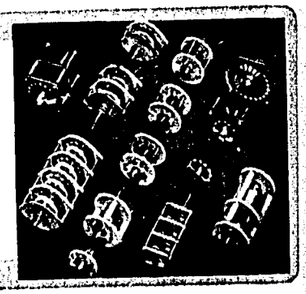


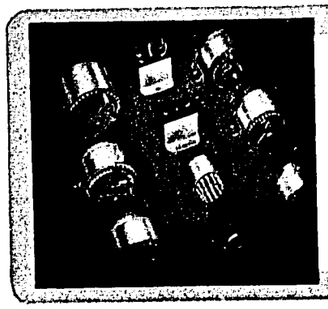
AKRA-OHM PRECISION RESISTORS

Not only are Shallcross Akra-Ohm precision wire wound resistors made to extremely close tolerances; equally important, they are physically protected to maintain their accuracy under difficult operating conditions. Types, shapes, sizes, and mounting styles for JAN, MIL, and other exacting needs. Guaranteed tolerances to 0.01% and stabilities as low as 0.003% where required. Matched pairs and sets available. Write for Shallcross Resistor Bulletin R-3C.

MULTI-POSITION SELECTOR SWITCHES

Shallcross regularly manufactures a wide variety of single or multi-deck selector switches having up to 180 positions and designed for dependable performance up to 250 volts 10 amperes, or 2500 volts 1 ampere A.C. Contact resistance ranges from as low as 0.0005 ohm to a maximum of 0.005 ohm depending upon the size and material of the contacts. Outline your requirements on Specification Sheet No. 6 for recommendation. Write for Data Bulletin L-13.





PRECISION AUDIO ATTENUATORS

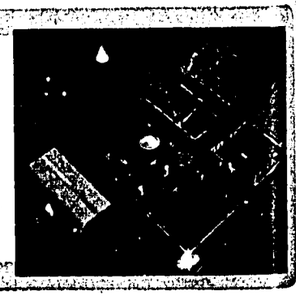
Improved materials and production techniques and careful quality control for Shallcross Attenuators have resulted in a line that sets higher standards of attenuation performance for practically every audio and communications use. Included are single and dual potentiometers, variable impedance matching networks, V. U. meter multipliers, cueing attenuators, fixed pads, pre-emphasis and de-emphasis networks, attenuation boxes, ladder and balanced ladder controls, bridged T, straight T, bridged H, and straight H attenuators. Write for Attenuator Bulletin 4-A.

PRECISE MEASURING INSTRUMENTS

As long-time specialists in standard and special electrical measuring instruments, Shallcross welcomes your inquiry for any desired types. Standard instruments include:

Resistance Standards • Decade Potentiometers • Decade Resistance Boxes • Wheatstone Bridges Combined Kelvin-Wheatstone Bridges • Wheatstone-Megohm Bridges • Wheatstone-Limit Bridges • Percent-Limit Bridges • Capacitor Analyzers • Decibel Meters • Tone Generators Telephone Test Equipment • Low-Resistance Test Sets • High-Voltage Test and Measuring Equipment.

Write for Shallcross Bulletin DC





TUBULAR MULTIPLIER RESISTORS

Shallcross Types MFA and MFB are special resistance elements hermetically sealed in ceramic tubes with ferrule terminals. Designed to Jan-R-29 specifications, they are available with ratings from 1 to 6 watts and for potentials from 1 to 6 KV.



HIGH-RANGE KILOVOLTMETER MULTIPLIERS

Whether for direct high-voltage measurements or for use as standards, Shallcross KV meter multipliers combine close accuracy with safety and dependability. Various types are available for voltages up to 200,000 volts or higher if required. Write for Bulletin L-7.

HERMETICALLY-SEALED NETWORKS

Resistance, capacitance, bridge and inductance types available to meet critical electrical specifications and space requirements. Outline details of your requirements for recommendation by Shallcross Engineers.



CUSTOM-BUILT SPECIALTIES AND ENGINEERING SERVICE

Sealed networks, high voltage measuring equipment, special test sets, thermally controlled networks, precise decades and networks for computer devices, high resistance standards, and critical coil assemblies are designed by Shallcross Engineers and built to meet your requirements. Forward your specifications for further information.



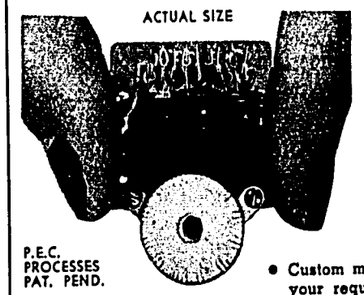
SHALLCROSS MANUFACTURING CO., 524 Pusey Ave., Collingdale, Pa.

Representatives in principal U.S. cities, Toronto and Vancouver.

De Wald Radio Mfg. Corp., N.Y., 30
Dictograph Products, Inc., N.Y., 20, 30, 40, 45
Doelcam Corp., Mass., 10
Dominion Electrohome Ind., Ltd., Canada, 25
Douglas Labs., Inc., 373 Fourth Ave., New York 10, N.Y., 40
For details see ad on page 401
Edin Co., Inc., Mass., 10, 40
Electro-Voice, Inc., Mich., 45
Electrodyne Co., Mass., 5, 10
Electronic Control Corp., Mich., 10
Electronic Industries, Inc., Minn., 15, 25, 30, 35, 40, 45
Electronic Instruments, Ltd., England, 10
Electronic Tube Corp., Pa., 10
Electronics Devices Co., N.Y., 20
El-Tronics, Inc., Pa., 5, 10, 25, 40
Endevco Corp., Calif., 5
Engineering Research & Development Corp., Ill., 10
Espey Manufacturing Co., Inc., N.Y., 25
Executone, Inc., N.Y., 30, 45
Fairchild Recording Equipment Corp., N.Y., 25, 35, 40
Farmers Engineering & Mfg. Co., Pa., 30, 45
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 10
For details see ad on pages 368-373
Feldman & Co., Henry, Calif., 5, 15, 25
Fidelity Hearing Aid Co., N.J., 20
Fisher Radio Corp., N.Y., 25, 35, 40
Five Star TV & Radio Co., Mass., 35, 40, 45
Fluke Engineering Co., John, Wash., 40
Franklin Electronics, Inc., Pa., 10
Freed Electronics & Controls Corp., N.Y., 25
Freed Transformer Co., Inc., 1718-36 Weirfield St., Brooklyn 27, N.Y., 5
See complete catalog in last section
Furst Electronics, Ill., 5, 10
Galbraith & Son Electric Corp., C. C., 450 Ave. of Americas, New York 11, N.Y., 25, 30, 35, 45
For details see ad on page 104
Gately Development Laboratory, N.J., 25, 35
Gates Radio Co., Ill., 25, 35, 40, 45
General Communications, Wis., Broadcast Audio Amplifiers
General Hermetic Sealing Corp., 99 E. Hawthorne Ave., Valley Stream, L.I., N.Y., 30
For details see ad on page 275
Geotechnical Corp., Tex., 10
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 10, 25
For details see ad on pages 380-381, Cover IV
Godfrey Manufacturing Co., Ill., 30
Grason-Stadler Co., Mass., 10, 20
Gulton Mfg. Corp., N.J., 5
Hallicrafters Co., Ill., 25
Harman-Kardon, Inc., N.Y., 25, 40, 45
Harmon Electronics Co., Mo., 10, 30
Hartley Co., Ltd., H. A., England, 15, 35
Hathaway Instrument Co., Colo., 10
Heath Co., 305 Territorial Rd., Benton Harbor, Mich., 25, 35, 45
For details see ad on page 331
Hi-Video, Inc., N.Y., 25, 30, 35, 45
Holl Audio, Inc., Calif., 25, 40, 45
Hose-McCann Telephone Co., Inc., N.Y., 30, 45
Industrial Control Co., N.Y., 10
Instrument Laboratories, N.Y., 10
Interelectronics Corp., 2432 Grand Concourse, New York 58, N.Y., 25, 35, 40, 45
For details see ad on page 51
International Sound Eng. Co., N.J., 25, 35, 45
International Television Corp., N.Y., 30
Jackson Industries, Inc., Ill., 25, 40
James Vibrapowr Co., Ill., 10
Jersey City Technical Lab., N.J., 10, 20, 30
Kalbfell Laboratories, Inc., 1090 Morena Blvd., San Diego 10, Calif., 5, 10
For details see ad on page 257
Keithley Instruments, Ohio, 5, 10
Kellogg Switchboard & Supply Co., Dept. 69, 79 W. Monroe St., Chicago 3, Ill., 30
For details see ad on page 106
Key Electronics Corp., N.Y., 20, 25, 30, 35, 40, 45
Korb Engineering & Mfg. Co., Mich., 40
Krohn-Hite Instrument Co., Mass., 25, 40
Lake Manufacturing Co., Calif., 30, 45
Langevin Manufacturing Corp., 37 W. 65 St., New York 23, N.Y., 35, 40, 45
For details see ad on page 218
Leonard Elec. Products Co., N.Y., 40, 45
Lesa, S. P. A., Italy, 25, 35, 40
Liston-Becker Instrument Co., Inc., Conn., 10
Livingston Electronic Corp., N.J., 25
Loge Sound Engineers, J. M., Calif., 25, 30, 35, 40, 45
Lytle Engineering & Mfg. Co., Ill., 10, 35
MP Engineering Co., Conn., 20, 25, 35, 45
Magnavox Co., 2131 Bueter Rd., Ft. Wayne 4, Ind., 10, 15, 25, 30, 35, 40
For details see ad on page 138
Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N.Y., Magnetic Transistor
For details see ad on page 167
Magnetic Recording Industries, N.Y., 25, 35, 40
Magnex Corp., N.Y., 10
Maico Co., Inc., Minn., 20
Marconi's Wireless Telegraph Co., Ltd., England, 45
Martin & Co., H. S., Ill., 25
Maxson Corp., W. L., 460 W. 34 St., New York 1, N.Y., 10
For details see ad on page 122
McCurdy Radio Industries Ltd., Canada, 25, 35, 40
McIntosh Lab., Inc., N.Y., 25, 35, 40, 45
Melody Master Mfg. Co., Ill., 20, 25, 45
Mercury Electronic Co., N.J., 10, 40
Mercury Electronic Labs., Inc., Ill., 30
Meyers, James G., N.Y., 25, 35
Michel Mfg. Co., Wis., 25, 35, 45
Miller Instruments, Inc., Wm., Calif., 10
Millivac Instrument Corp., N.Y., 10
Minneapolis-Honeywell Regulator Corp., Pa., 10
Moulic Specialties Co., Ill., 10
Mullard Overseas Ltd., England, 45
National Inter Communicating Systems, Ill., 30, 35, 45
National Radio Research Labs., N.Y., 25, 40
Neptune Electronics Co., N.Y., 30, 35, 45
Newcomb Audio Prod., Calif., 25, 40, 45
Newton Scientific Co., Mass., 25, 35
Northern Electric Co., Ltd., Canada, 25, 30, 35, 45
Oberline, Ltd., Calif., 25, 30, 35, 40, 45
Offner Electronics, Inc., Ill., 10
Ohmart Corp., Ohio, 10
Photron Instrument Co., Ohio, 10
Pickard & Burns, Inc., 240 Highland Ave., Needham, Mass., 5
For details see ad on pages 113, 284
Pilot Radio Corp., N.Y., 25, 35
Pedersen Electronics, Calif., 25, 35
Pemtronics, Pa., 25
Pentron Corp., Ill., 40
Perkin-Elmer Corp., Conn., 10
Petty Laboratories, Inc., Tex., 10
Pfanstiehl Chemical Co., Ill., 35
Phebco, Inc., Md., 10, 25
Philmore Mfg. Co., Inc., N.Y., 25
Phonograph Corp. of America, N.Y., 35
Pickering & Co., Inc., 308 Woods Ave., Oceanside, L.I., N.Y., 35
For details see ad on pages 109, 210
Plastics & Electronics Corp., P.O. Box 38, Station J, Buffalo 8, N.Y., 20, Transistor
For details see ad on page 99
Precision Electronics, Inc., Ill., 25, 35, 40, 45
Presto Recording Corp., P.O. Box 500, Paramus, N.J., 25, 35, 40
For details see ad on page 110

(Continued on page 100)

ACTUAL SIZE



P.E.C. PROCESSES PAT. PEND.

TRANSISTOR Amplifiers

AVAILABLE FROM STOCK!

- 3 stage printed resistance or transformer coupled circuits on non-breakable bases.
- Operates on 1.25 V. to 6 V. D.C.
- Resistance coupled model illustrated has volume control with switch. Ideal for ultra small hearing aids, pocket radios and portable equipment.
- Custom made printed electronic circuits developed to your requirements. Prompt delivery.

WRITE FOR BULLETINS ON YOUR COMPANY LETTERHEAD

PLASTICS & ELECTRONICS CORPORATION
P.O. BOX 38, STATION J, BUFFALO 8, NEW YORK

Amplifiers

Process & Instruments, N.Y., 10
Professional Electronics Co., Calif., 10, 25, 40
R.M.S. Associates, Inc., N.Y., 10
Radar Electronics, Inc., N.Y., 25, 30, 35, 45
Radio Corp. of America, Engineering Products Div., Camden, N.J., 25, 30, 35, 40, 45
For details see ad on pages 88, 440-441
Radio Craftsmen, Inc., Ill., 25, 35
Radio Kits, Inc., N.Y., 10, 35, 45
Radio Recorders Equipment Co., Calif., 15, 25, 30, 35, 40, 45
Rangertone, Inc., N.J., 25
Redifon, Ltd., England, 45
Ribet Desjardins, France, 35
Rockwell Engineering Co., Ind., 5
Rosen Engineering Prod., Inc., Raymond, Pa., 30, 45
Royalcall, Inc., Ohio, 30
Rutishauser Corp., Calif., 10
Sanborn Co., 39 Osborn St., Cambridge 39, Mass., 10
For details see ad on page 320
Sargent-Rayment Co., Calif., 25, 35, 40
Scott, Inc., H. H., Mass., 5, 15, 25, 35, 40
Selectronics, Inc., Calif., 45, Mobile
Servo-Tek Products Co., Inc., N.J., 10
Shallcross Mfg. Co., 524 Pusey Ave., Collingdale, Pa., 10
For details see ad on page 98
Sherron Electronics Corp., N.Y., 40, 45
Shevers, Inc., Harold, N.Y., 25
Shrader Manufacturing Co., Inc., D.C., 25
Skiatron Electronics & TV Corp., N.Y., 25, 35
Shura-Tone Products, Inc., N.Y., 35
Simpson Mfg. Co., Inc., Mark, N.Y., 10, 25, 30, 35, 40, 45
Sonotone Corp., N.Y., 20
Special Instruments Lab., Inc., Tenn., 10
Special Products Co., Md., 15, 25, 35, Microphone Mixer
Specialty Assem. & Packing Co., N.Y., 45, Mixer Amplifiers
Spilsbury & Tindall Ltd., Canada, 45
Stancil-Hoffman Corp., Calif., 25
Standard Electronic Research, N.Y., 10, 25
Stephens Manufacturing Corp., Calif., 25
Stockman Electronics Research, Mass., 35
Summit Electronics, Inc., N.J., 25, 40, 45
Superex Electronics Corp., N.Y., 10, 25, 30, 45
Talk-A-Phone Co., Ill., 30, 45
Tech Laboratories, Inc., N.J., 20
Tech Master Products, N.Y., 35
Technical Apparatus Builders, N.Y., 25, 35, 40, 45
Technisonic Studios, Mo., 40
Technology Instrument Corp., 535 Main St., Acton, Mass., 5
For details see ad on pages 198, 334
Telephonics Corp., N.Y., 45
Telex, Inc., Minn., 20
Theatre Equipment Co., Ohio, 25
Trans Electro Products Corp., Pa., 25, 40, 45
Transformer Specialty Co., Inc., 328 Rockhill Rd., Bala-Cynwyd, Pa., 30, 45
For details see ad on page 219
Tri-Dex Electronics, Calif., 35
Trimm, Inc., 400 W. Lake St., Libertyville, Ill., 20
For details see ad on page 107
Ultrasonic Corp., Mass., 10, 25
Union Spring & Mfg. Co., N.J., 25, 30, 35, 40, 45
U. S. Electronic Co., Conn., Wide Band
V-M Corp., Mich., 35, 45
Vega Company, Mass., 25, 45
Vidaire Electronics Mfg. Co., N.Y., 25, 35
Vocaline Company of America, Inc., Conn., 30, 45
Waveforms, Inc., N.Y., 10, 25, 35, 40, 45
Webster Electric Co., Wis., 30, 45
Western Sound & Elec. Labs., Inc., Wis., 5, 20, 25, 30, 35, 40, 45
White Industries, Inc., N.Y., 25
Worner Electronic Devices, Ill., 30

02. Attenuators.

5. Decade
10. Impedance matching
15. Volume controlling

A.R.F. Products, Inc., Ill., 5, 10
Airplane & Marine Instruments, Inc., Pa., 15
Airphone Co., Inc., Fla., 15
American Machine & Foundry Co., Mass., 5, 10
Blonder-Tongue Laboratories, Inc., N.J., Bogart Mfg. Co., N.Y., 10
Brown Electro-Measurement Corp., Ore. 5
C.G.S. Laboratories, Inc., Conn., 15
Centralab, Div. Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis., 15
See complete catalog in last section
Clarostat Mfg. Co., Inc., Washington St., Dover, N.H., 10, 15
For details see ad on pages 394-395
Cole Instrument Co., Calif., 5
Cutler-Hammer, Inc., Wis., 15
Daven Co., N.J., 5, 10, 15, RF
Dawe Instruments, England, 5
Electron-Radar Products, Ill., Coax
Elk Electronic Laboratories, 333 W. 52 St., New York 19, N.Y., 5
For details see ad on page 257
El-Mec Laboratories, Inc., N.J., Capacitive Variable
Empire Devices, Inc., N.Y., UHF
Fretco Inc., Pa. 10
Furzehill Laboratories, Ltd., England, 5
G. W. Associates, Calif., 10
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 5
For details see ad on pages 380-381, Cover IV
Harnett Electric Corp., 138 Haven Ave., Port Washington, L.I., N.Y., 5
For details see ad on page 264
Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif., 5
See complete catalog in last section
Jensen Manufacturing Co., Ill., 15
Kalbfell Laboratories, Inc., 1090 Morena Blvd., San Diego 10, Calif., Logarithmic
For details see ad on page 257

Attenuators

Kellogg Switchboard & Supply Co., Dept. 69, 79 W. Monroe St., Chicago 3, Ill., 15
For details see ad on page 106
Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 5, 10, 15
For details see ad on pages 414-415
Lee Electronic Labs., Inc., Mass., 5
Lesa, S.P.A., Italy, 5, 15
Maspeth Telephone & Radio Corp., N.Y., 5, 10, 15
Measurements Corp., Intervale Rd., Boonton, N.J., 10
For details see ad on pages 284, 422-423
Microlab, N.J., 5, 10, 15
Muirhead & Co., Ltd., England, 5
Northern Electric Co., Ltd., Canada, 10, 15
Ohmite Manufacturing Co., Ill., 15
Orthon Corp., 196 Albion Ave., Paterson 2, N.J., 10
For details see ad on page 117
PCA Electronics, Inc., Calif., 10
Painton and Co. Ltd., England, 5, 10, 15
Radio Corp. of America, Engineering Products Div., Camden, N.J., 15
For details see ad on pages 88, 440-441
Radio Engineering Products, Canada, 5, 10, 15
Radio Recorders Equipment Co., Calif., 15
Shallcross Mfg. Co., 524 Pusey Ave., Collingdale, Pa., 5, 10, 15
For details see ad on page 98
Specialty Assem. & Packing Co., N.Y., 10
Superex Electronics Corp., N.Y., 10
Tech Laboratories, Inc., N.J., 5, 10, 15
Trad Television Corp., 1001 First Ave., Asbury Park, N.J., 10
For details see ad on page 338
Transformer Specialty Co., Inc., 328 Rockbill Rd., Bala-Cynwyd, Pa., 10
For details see ad on page 219
Weinschel Engineering Co., Inc., Md., Coaxial, Microwave, Fixed, and Step

03. Equalizers.

5. Dialogue equalizers
10. Line equalizers
15. Magnetic recording
20. Recording diameter equalizers
25. Sound effect equalizers

Alcor Electronics Corp., N.Y., 10
American Machine & Foundry Co., Mass., 3, 15
Berlant Associates, Calif., 15
Brush Development Co., Ohio, 15
Burnell & Co., 45 Warburton Ave., Yonkers 2, N.Y., 10
For details see ad on page 16
C.G.S. Laboratories, Inc., Conn., 25
Central Transformer Co., Ill., 10, 25
Collins Radio Co., 855 35th St. N.E., Cedar Rapids, Iowa, 10
For details see ad on pages 428-429
Communication Accessories Co., 110th St. & Hillcrest Rd., Hickman Mills, Mo., 10
For details see ad on page 144

(Continued on page 101)

Equalizers

Connecticut Telephone & Elect. Corp., Conn., 15
Crown Engineering, N.M., 10
Daven Co., N.J., 10
De Coursey Eng. Laboratory, Calif., 5, 10, 15, 20, 25
Electronic Transformer Co., 207 W. 25 St., New York 1, N.Y., 5, 10, 15, 20, 25
For details see ad on page 214
Fairchild Recording Equipment Corp., N.Y., 5, 10
Freed Transformer Co., Inc., 1718-36 Weirfield St., Brooklyn 27, N.Y., 10
See complete catalog in last section
Gates Radio Co., Ill., 10, 15, 20, 25
Gray Research & Development Co., Inc., Hilliard St., Manchester, Conn., 15
For details see ad on page 118
Industrial Specialties Corp., N.Y., 15
Korb Engineering & Mfg. Co., Mich., 15
Lenkurt Electronic Co., Inc., Calif., 10
Magnecord, Inc., Ill., 15
Magne Pulse Corp., N.Y., 15
McCurdy Radio Industries Ltd., Canada, 15
Northern Electric Co., Ltd., Canada, 10
Ortho Filter Corp., 196 Albion Ave., Paterson 2, N.J., 10
For details see ad on page 101
Pacific Transducer Corp., Calif., 10
Pentron Corp., Ill., 15
Presto Recording Corp., P.O. Box 500, Paramus, N.J., 10, 15, 25
For details see ad on page 110
Professional Electronics Co., Calif., 5, 10, 15, 25
Radio Recorders Equipment Co., Calif., 5, 10, 15, 20, 25
Reevesound Co., Inc., N.Y., 15
Technical Materiel Corp., N.Y., 10
Transformer Engineers, Calif., 5, 10
United Transformer Co., 150 Varick St., New York 13, N.Y., 5, 10, 15, 20, 25
See complete catalog in last section
Waveforms, Inc., N.Y., 10

04. Filters.

5. Band pass & band rejection
10. Loudspeaker dividing networks
15. Variable Band Pass

Acro Transformer & Mfg. Corp., N.Y., 5, 10
Acro Instrument Co., Calif., 5
Aerovox Corp., 740 Belleville Ave., New Bedford, Mass., 5, 10
For details see ad on pages 362-363
Airpax Products Co., Md., 5
Alcor Electronics Corp., N.Y., 5
Altec Lansing Corp., Calif., 10
American Machine & Foundry Co., Mass., 5
Amplifier Corp. of America, N.Y., 5
Audio Development Co., Minn., 5
Balco Research Laboratories, N.J., 5
Bardwell & McAlister, Calif., 5
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 5, 10, 15
For details see ad on page 408
Berkshire Laboratories, 584 Beaver Pond Rd., Lincoln, Mass., 5
For details see ad on page 315
Borg Equip. Div., Geo. W. Borg Corp., Wis., 5
Brociner Electronics Laboratory, N.Y., 10
Burnell & Co., 45 Warburton Ave., Yonkers 2, N.Y., 5, 15
For details see ad on page 16
Central Transformer Co., Ill., 5, 10
Chicago Electronic Eng. Co., Ill., 5
Chicago Transformer Division, Essex Wire Corp., 3580 N. Elston Ave., Chicago 18, Ill., 5
For details see ad on page 212
Communication Accessories Co., 110 St. & Hillcrest Rd., Hickman Mills, Mo., 5
For details see ad on page 144
Communication Equip. & Eng., Ill., 5
Communication Parts, Ill., 5
Control Corp., Minn., 5
Copper Wire Products, Ltd., Canada, 10
Cornell-Dubilier Electric Corp., 333 Hamilton Blvd., S. Plainfield, N.J., 5, 15
For details see ad on page 6
Crown Engineering, N.M., 5
DX Radio Products Co., Inc., Ill., 5
Danbury Transformer Corp., Conn., 5
De Coursey Eng. Laboratory, Calif., 5, 10
Deutschmann Corp., Tobe, Mass., 5
Dietz Design & Mfg. Co., Grandview, Mo., 5
For details see ad on page 27
Eldico of New York, Inc., 44-31 Douglaston Parkway, L.I., N.Y., 5
For details see ad on page 257
Electro-Voice, Inc., Mich., 10
Electronic Systems Co., N.Y., 5
Electronic Transformer Co., 207 W. 25 St., New York 1, N.Y., 5, 10
For details see ad on page 214
Elk Electronic Laboratories, Inc., 333 West 52 St., New York 19, N.Y., 5
For details see ad on page 257
Elm Laboratories, N.Y., 5
Empire State Laboratories, N.Y., 5
Epco Products, Inc., 2500 Atlantic Ave., Brooklyn 7, N.Y., 5
For details see ad on page 217
Espey Manufacturing Co., Inc., N.Y., 5, 15
Federal Electric Mfg. Co., Ltd., Canada, 5
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5
For details see ad on pages 368-373
Feldman & Co., Henry, Calif., 5, 15
Ferranti Electric, Inc., N.Y., 5
Filtron Co., Inc., N.Y., 5
Franklin Electronics, Inc., Pa., 5
Freed Transformer Co., Inc., 1718-36 Weirfield St., Brooklyn 27, N.Y., 5
See complete catalog in last section
Gates Radio Co., Ill., 5, 15
General Precision Lab., Inc., 63 Bedford Rd., Pleasantville, N.J., 5
For details see ad on page 116
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 5
For details see ad on pages 380-381, Cover IV
Geotechnical Corp., Tex., 5
Gertsch Products, Inc., Calif., 5
Glenco Corp., 212 Durham Ave., Metuchen, N.J., 5
For details see ad on page 137
Gramer Transformer Corp., Ill., 5, 10

(Continued on page 102)

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Filters

(Continued from page 101)

Gudeman Co., 340 W. Huron St., Chicago 10, Ill., 5
For details see ad on page 22
Gulton Mfg. Corp., N.J., 5
Harmon Electronics Co., Mo., 5
Harnett Electric Corp., 138 Haven Ave., Port Washington, N.Y., 5
For details see ad on page 264
Hartley Co., Inc., H. A., N.Y., 5
Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif., 5
See complete catalog in last section
Hill Electronic Engineering & Mfg. Co., New Kingstown, Pa., 5
For details see ad on page 160
Hogan Laboratories, Inc., 155 Perry St., New York 14, N.Y., 5
For details see ad on page 283
Hycor Co., Inc., Calif., 5, 15
JFD Mfg. Co., Inc., 6101 16 Ave., Brooklyn 4, N.Y., 5
For details see ad on pages 140, 242
Kalbfell Laboratories, Inc., 1090 Morena Blvd., San Diego 10, Calif., 5
For details see ad on page 257
Kellogg Switchboard & Supply Co., Dept. 69, 79 W. Monroe St., Chicago 3, Ill., 5
For details see ad on page 106
Kenyon Transformer Co., Inc., 840 Barry St., New York 59, N.Y., 5, 10
For details see ad on pages 406-407
Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 15
For details see ad on pages 414-415
Krohn-Hite Instrument Co., Mass., 5, 15
Lenkurt Electric Co., Inc., Calif., 5
Lesa, S. P. A., Italy, 5, 10
Lynch Carrier Systems, Inc., Calif., 5
Lytle Engineering & Mfg. Co., Ill., 5
Magnetics Research Co., N.Y., 5
Magnex Corp., N.Y., 5
Marine Electric Corp., N.Y., 5
Melco Products, Inc., Minn., 5
Micamold Radio Corp., N.Y., 5
Microlab, N.J., 5
Miller Co., J. W., Calif., 5
Neptune Electronics Co., N.Y., 5
Ortho Filter Corp., 196 Albion Ave., Paterson 2, N.J., 5, 10
For details see ad on page 101
Orthon Corp., 196 Albion Ave., Paterson 2, N.J., 5, 10
For details see ad on page 117
PCA Electronics Inc., Calif., 5
Partridge Transformers, Ltd., England, 10
Phebco, Inc., Md., 5
Polyphase Instrument Co., Pa., 5
Presto Recording Corp., P.O. Box 500, Paramus, N.J., 15
For details see ad on page 110
Professional Electronics Co., Calif., 5, 10
Qutronic Transformer Corp., N.Y., 5
R. K. Manufacturing Co., Ill., 5
Racon Electric Co., Inc., N.Y., 10
Radio Corp. of America, Engineering Products Div., Camden, N.J., 5, 10
For details see ad on pages 88, 440-441
Radio Engineering Products, Canada, 5 15
Radio Recorders Equipment Co., Calif., 10
Resdel Engineering, Calif., 5, 15
Richardson Labs., Kenneth, N.Y., 5
Rowe Industries, Ohio, 10
Scott, Inc., H. H., Mass., 5, 15
Southern Elec. & Transmission Co., Tex., 5
Specialties, Inc., N.Y., 5
Spencer-Kennedy Laboratories, Inc., 186 Massachusetts Ave., Cambridge 39, Mass., 5, 15
For details see ad on page 306
Square Root Manufacturing Corp., N.Y., 5, 10
Standard Electronic Research, N.Y., 5
Standard Transformer Corp., Ill., 5
Stephens Manufacturing Corp., Calif., 10
Superex Electronics Corp., 5
Tech Laboratories, Inc., N.J., 5
Technical Apparatus Builders, N.Y., 10
Technical Materiel Corp., N.Y., 5
Telvision Laboratories, Inc., Ill., 5
Tetrad Co., Inc., Calif., 5
Torwico Electronics, Inc., 961 Frelinghuysen Ave., Newark 5, N.J., 5
For details see ad on page 149
Transformer Engineers, Calif., 5
Transformer Specialty Co., Inc., 328 Rockhill Rd., Bala-Cynwyd, Pa., 5, 10, 15
For details see ad on page 219
Trans-Sonics, Inc., Mass., 5
Triad Transformer Corp., 4055 Redwood Ave., Venice, Calif., 5
For details see ad on page 89
United Transformer Co., 150 Varick St., New York 13, N.Y., 5, 10, 15
See complete catalog in last section
University Loudspeakers, Inc., 80 S. Kensico Ave., White Plains, N.Y., 10
For details see ad on page 105
Vectron, Inc., 400 Main St., Waltham 54, Mass., 5
For details see ad on page 308
Vitavox Ltd., England, 10
Vokar Corp., Mich., 5, 10, 15
Waveforms, Inc., N.Y., 5, 15
White Industries, Inc., N.Y., 5

05. Industrial Sound Systems.

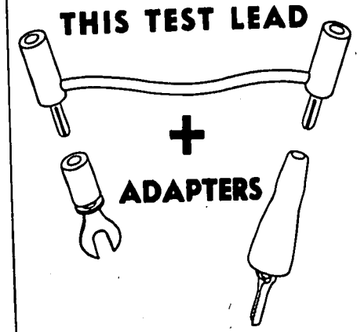
5. Complete systems 10. Installation & rental contractors

Altec Lansing Corp., Calif., 5
Ardente Acoustic Labs., Ltd., England, 5
Audio-Tone Oscillator Co., Conn., 5
Bell Sound Systems, Inc., Ohio, 5
Bogen Co., Inc., David, N.Y., 5
Boom Electric & Amplifier Co., Ill., 5, 10
Budelman Radio Corp., Conn., 5
Canadian General Electric Co., Canada, 5
Canadian Marconi Co., Canada, 5
Central Rediffusion Services, England, 5, 10
Communicating Systems, Inc., N.Y., 5
Communication Equip. & Eng., Ill., 5
Computing Devices of Canada, Ltd., Canada, 5, 10
Connecticut Telephone & Elect. Corp., Conn., 5
Cossor (Canada) Ltd., Canada, 5
Denrad Mfg. Co., Inc., Tex., 5
Dictograph Products, Inc., N.Y., 5
Dormitzer Electric & Mfg. Co., Inc., Mass., 5

Industrial Sound Systems

Edmar Communication Co., Pa., 5, 10
Electronic Industries, Inc., Minn., 10
Executone, Inc., N.Y., 5
Farmers Engnrng. & Mfg. Co., Pa., 10, 15
Galbraith & Son Electric Corp., C. C., 450 Ave. Of Americas, New York 11, N.Y., 5
For details see ad on page 104
Gates Radio Co., Ill., 5
Hi-Video, Inc., N.Y., 5, 10
Hose-McCann Telephone Co., Inc., N.Y., 5, 10
International Television Corp., N.Y., 5
Kihchel Communications, Pa., 5, 10
Loge Sound Engineers, J. M., Calif., 5
MP Engineering Co., Conn., 5
Marsh-Theiss, Inc., N.Y., 5
Mullard Overseas, Ltd., England, 5
National Inter-Communicating Systems, Ill., 5
Northern Electric Co., Ltd., Canada, 5
Oberline, Ltd., Calif., 5, 10
Radio Corp. of America, Engineering Products Div., Camden, N.J., 5
For details see ad on pages 88, 440-441
Radio Laboratories, Inc., Wash., 5, 10
Radio Recorders Equipment Co., Calif., 5, 10
Redifon, Ltd., England, 5, 10
Rosen Engineering Prod., Inc., Raymond, Pa., 5
Royalcall, Inc., Ohio, 5

(Continued on page 103)



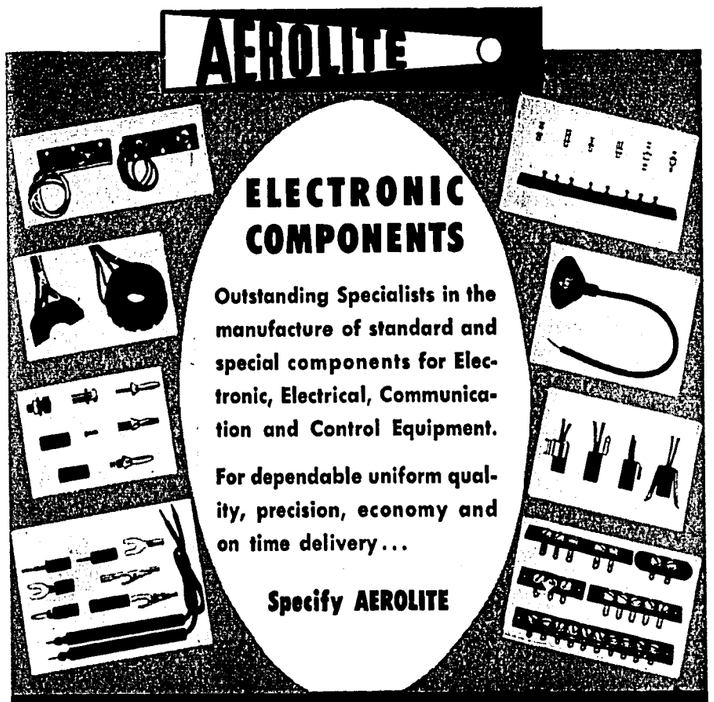
A test lead that is safe, economical, convenient and rapidly tailor made for each application.

The end of each plug is a socket to receive another plug, thus providing for multiple connections.

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Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

Industrial Sound Systems

(Continued from page 102)

Shrader Manufacturing Co., Inc., D.C., 5, 10
Simpson Mfg. Co., Inc., Mark, N.Y., 5, 10
Stephens Manufacturing Corp., Calif., 5
Summit Electronics, Inc., N.J., 5
Talk-A-Phone Co., Ill., 5
Theatre Equipment Co., Ohio, 5, 10
Transelectric Mfg. Co., Pa., 5
Western Sound & Elec. Labs., Inc., Wis., 5, 10

06. Jacks, Jack Fields & Plugs.

5. Jacks 15. Patch cords
10. Jack fields 20. Plugs

Adler Communications Labs., N.Y., 10, 15
Aerolite Electronics Corp., 507 26 St., Union City, N.J., 5, 20
For details see ad on page 103
Alden Products Co., 117 N. Main St., Brockton 64, Mass., 5, 15, 20
For details see ad on pages 150-151
American Phenolic Corp., 1830 S. 54 Ave., Chicago 50, Ill., 5, 20
For details see ad on page 2
American Radio Hardware Co., N.Y., 5, 10, 20
Arey Machine Co., N.J., 5, 10, 15, 20
Audio Development Co., Minn., 5, 15, 20
Automatic Electric Co., Ill., 5, 10, 15, 20
Birnbach Radio Co., Inc., 145 Hudson St., New York 13, N.Y., 5, 20
For details see ad on pages 103, 248
Brach Mfg. Corp., N.J., 20
Brilhart Plastics Sales Corp., N.Y., 5
Bud Radio, Inc., 2118 E. 55 St., Cleveland 3, Ohio, 5, 20
For details see ad on pages 267, 346
Buggie and Co., H. H., 726 Stanton St., Toledo 1, Ohio, 5, 15, 20
For details see ad on page 153
Cannon Electric Co., 3209 Humboldt St., Los Angeles 31, Calif., 15, 20
For details see ad on page 148
Carter Parts Co., Ill., 5, 20
Cinch Mfg. Corp., 1026 S. Homan Ave., Chicago 24, Ill., 5, 20
For details see ad on pages 384-385
Circuit Controls Co., Ill., 5
Citation Products Co., 233 E. 146 St., New York 51, N.Y., 5, 20
For details see ad on page 269
Clarke Instr. Div., National Electric Machine Shops, Md., 5, 15, 20
Coaxial Connector Co., 35 N. 2nd Ave., Mt. Vernon, N.Y., 5, 15, 20
For details see ad on page 155
Coles Electronic Corp., Pa., 5, 20
DeJur-Amsco Corp., 45-01 Northern Blvd., Long Island City 1, N.Y., 20
For details see ad on pages 152, 168
Eby, Inc., Hugh H., 4700 Stenton Ave., Philadelphia 44, Pa., 5, 20
For details see ad on page 207
Elco Corp., Pa., 20

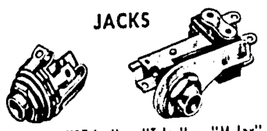
(Continued on page 104)

SWITCHCRAFT® INC.

COMPONENT PARTS

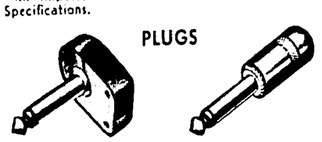
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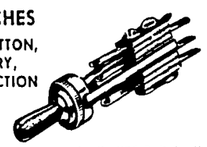
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"Littel-Plugs"—"Standard Plugs"—"Flat-Plugs"—"Lug-Plugs." Two and three conductor types, new and different designs. Plastic and metal shells. Also JAN types.

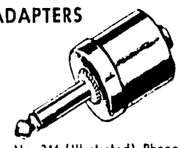
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"Littel-Switches"—"FF-Switches"—"RS-Switches"—"Lev-R-Switches"—Telever Switches." Numerous designs, simple, yet rugged construction. All popular circuits.

ADAPTERS

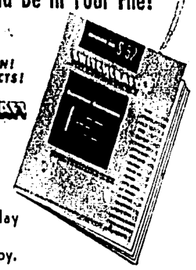


Seven different "Adapters" provide convenient interchange of equipment between various connector devices. No. 344 (Illustrated) Phono Jack Connector Input to Phone Plug Output. (See catalog for complete line).

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Canadian Representative: Atlas Radio Corp. Ltd., 560 King St., W. Toronto 28, Canada.

Jacks, Jack Fields & Plugs

(Continued from page 103)

Federal Electric Mfg. Co., Ltd., Canada, 5, 10

Federal Screw Products, Inc., 224 W. Huron St., Chicago 10, Ill., 5, 20
For details see ad on page 270

Flexilab Products Co., 2229 Bellaire St., Denver 7, Colo., 5, 20
For details see ad on page 102

Gates Radio Co., Ill., 10, 15

Gee-Lar Mfg. Co., Ill., 5, 20

General Cement Mfg. Co., Ill., 5, 20

General Radio Co., 275 Massachusetts. Ave., Cambridge 39, Mass., 5, 15, 20
For details see ad on pages 380-381, Cover IV

Gombos Co., Inc., John, 103-109 Montgomery Ave., Irvington 11, N.J., 5, 20
For details see ad on page 154

Gremar Manufacturing Co., Inc., Mass., 5, 20

Industrial Products Co., Conn., 5

Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 5, 15, 20
For details see ad on page 134

JFD Mfg. Co., Inc., 6101 16 Ave., Brooklyn 4, N.Y., 5, 20
For details see ad on pages 140, 242

Johnson Co., E. F., Waseca, Minn., 5, 20
For details see ad on page 183

Joy Mfg. Co., Mo., 20

Kellogg Switchboard & Supply Co., Dept. 69, 79 W. Monroe St., Chicago 3, Ill., 5, 10, 15, 20
For details see ad on page 106

Keystone Electronics Corp., N.Y., 5, 20

Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 5, 10, 15, 20
For details see ad on pages 414-415

Mallory & Co., Inc., P. R., Ind., 5, 20

Maspeth Telegraph & Radio Corp., N.Y., 5, 10, 15, 20

Methode Manufacturing Corp., 2021 W. Churchill St., Chicago 47, Ill., 20
For details see ad on page 208

Molded Insulation Co., Pa., 5, 20

Morse Co., Frank W., Mass., 20

National Co., Inc., 61 Sherman St., Malden 48, Mass., 5, 20
For details see ad on pages 434-435

National Teletronics Corp., N.Y., 5, 20

Neptune Electronics Co., N.Y., 5, 15, 20

North Electric Manufacturing Co., Ohio, 5

Northern Electronic Co., Ltd., Canada, 10, 5

Painton and Co., Ltd., England, 20

Philmore Mfg. Co., Inc., N.Y., 5, 20

Production Tool & Fixture Co., 37 W. Main St., Oyster Bay, L.I., N.Y., 20
For details see ad on page 295

Pyle National Co., Ill., 20

Radio Engineering Products, Canada, 5, 10

Radio Recorders Equipment Co., Calif., 5, 10, 15, 20

Runzel Cord & Wire Co., Ill., 15

Schott Co., Walter D., Calif., 5, 20

Sears Co., M. J., N.Y., 15

Smith, Inc., Herman H., 436 18 St., Brooklyn 15, N.Y., 5, 15, 20
See complete catalog in last section

Standard Electric Time Co., 73 Logan St., Springfield 2, Mass., 5, 15, 20
For details see ad on page 325

Starrett Television Corp., N.Y., 15

Switchcraft, Inc., 1340 N. Halsted St., Chicago 22, Ill., 5, 20
For details see ad on page 104

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 5, 20
For details see ad on pages 417-420

Telephonics Corp., N.Y., 5

Trimm, Inc., 400 W. Lake St., Libertyville, Ill., 5, 10, 15, 20
For details see ad on page 107

U. S. Components, Inc., 454 E. 148 St., New York 55, N.Y., 5, 20
For details see ad on page 96

Vector Electronic Co., 3352 San Fernando Rd., Los Angeles 65, Calif., 20
For details see ad on page 205

Virginia Electronics Co., D.C., 10

Waltham Horological Corp., Mass., 5, 20

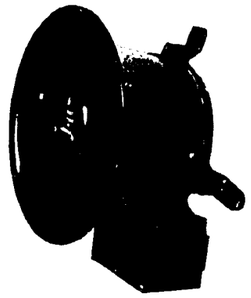
Whitso, Inc., Ill., 5

Winchester Electronics, Inc., 15 Crescent St., Glenbrook, Conn., Hermetically Sealed Plugs
For details see ad on page 156

Audio Frequency Test Equipment Manufacturers are listed on page 305

Weatherproof Audio Equipment

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Medium Power Speaker—10" horn dia. —Heavy Aluminum Alodized.

High Power Speakers—15" horn dia.—All Bronze Construction.

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TRUMPETS Model 7102 exemplifies the rugged construction and progressive engineering behind every University product. Model 7102 is the *only* loudspeaker ever approved by Underwriters' Labs for Class II Groups E, F, & G hazardous area duty. Features include re-entrant trumpet (pioneered by University) for compactness and greater efficiency, heavy duty 25 watt driver unit with exclusive University "W" shaped Alnico V magnet, and *built-in* line matching transformer with impedances of 16, 45, 500, 1000, 1500, and 2000 ohms. See general catalog for trumpets of all sizes.

BREAKDOWN-PROOF DRIVER UNITS Model PA-30 embodies features developed by University and never successfully imitated. Ratings are conservative, and construction is to well known University standards which have made our drivers famous for their dependable performance. PA-30 is rated at 30 watts, with response 80-10,000 cps, and is the first to have a multi-tap built-in line matching transformer. Exclusive "rim centering" construction of mechanism and use of University "W" shaped Alnico V magnet insures high conversion efficiency, permanent voice coil alignment regardless of shock or vibrations. Weatherproof throughout.



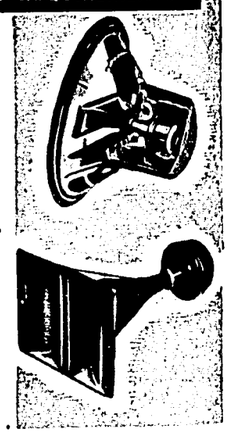
PAGING AND INTER COM SPEAKERS These feature reflex air columns with hermetically sealed driver units. They are widely used for intercommunication and paging of all types. Efficiency is high and reproduction exceptional at any volume level. Directional, radial, or bi-directional types available. Weather-proof finishes permit use anywhere. Typical of University pace-setting design is the Cobra-12 illustrated, which provides optimum area coverage with minimum power input. Power rating is 12 watts, frequency response 250-10,000 cps, dispersion angle 60° x 120°. Swivel mounting bracket provides full flexibility.



SUBMERGENCE-PROOF SPEAKERS These types are designed for use where extreme ruggedness and immunity to spray, gases, live steam or dust are essential. Function even under water, drain automatically, operate continuously regardless of exposure. Models available for directional or radial projection, wall or bulkhead mounting, swivel mount and with or without built-in line matching transformer and attenuator. Design is ideal for railroad use, shipboard, industries, docks, rough mobile work, etc. Model MM-2, illustrated, is rated at 15 watts continuous IPM, frequency 300-6000 cps, impedance 16 ohms.

FOR ALL HIGH FIDELITY REPRODUCTION REQUIREMENTS

WIDE RANGE CONE SPEAKERS Model 6201 comprises a superb 12" cone speaker with a driver type tweeter mounted coaxially. The cone speaker features a 24 oz. "W" shaped Alnico magnet and edged treated cone for distortion-free low frequency response. Tweeter has wide angle horn. A built-in LC crossover network and external high frequency attenuator are included. Capacity is 25 watts, response 45-15,000 cps, impedance 8 ohms. Other cone speakers for high fidelity, as well as submergence-proof or blastproof service for commercial and military applications.



HI-FREQUENCY TWEETERS University offers a complete line of single and double tweeter units for both 2000 and 600 cycle crossover. Exclusive University "reciprocating flare" horn construction assures uniform wide angle dispersion. A complete line of accessories are included—crossover networks, adapter for mounting tweeter on a standard cone speaker, etc. These tweeters may be added to any standard amplifier and speaker to provide the finest in high fidelity reproduction—and at a very low cost.

WRITE DEPT. I TODAY FOR YOUR FREE COPY OF THE NEW 28-PAGE UNIVERSITY TECHNILOGUE—A COMBINED TECHNICAL MANUAL AND CATALOG—INVALUABLE FOR YOUR FILES.

University LOUDSPEAKERS INCORPORATED
80 SOUTH KENSICO AVE., WHITE PLAINS, NEW YORK

07. Loudspeakers & Headphones.

5. Commercial grade loudspeakers
10. Headphones
15. High-frequency loudspeakers

Airphone Co., Inc., Fla., 10

Altec Lansing Corp., Calif., 15, 20, 25

Ardente Acoustic Labs., Ltd., England, 5, 10, 15

Atlas Sound Corp., N.Y., 5, 15

Audicraft, Inc., N.Y., 5

Audio Equipment Co., Inc., N.Y., Electronic Megaphone

Barker Sound Reproducers, England, 15, 20, 25

Bartlett, Frederick P., Ill., 5

Becker Electronics Mfg. Corp., N.Y., 5

Best Mfg. Co., Inc., N.J., 5, 10

Besteraft Products Co., Inc., N.Y., Grille Cloth

Bozak Co., The R. T., Conn., 15, 20, 25

Brociner Electronics Laboratory, N.Y., 15, 25

Brush Development Co., Ohio, 10

Brush Electronics Co., Ohio, 10

Campbell Mfg. Co., Ltd., Canada, 5, 10, 25

Cannon Co., C. F., N.Y., 10

Carbonneau Industries, Mich., 5

Cinaudagraph Speakers, Ill., 5, 10, 15, 20, 25

Cleveland Electronics, Inc., Ohio, 5, 15, 20, 25

Collins Radio Company, 855-35 St. N.E., Cedar Rapids, Iowa, 5
For details see ad on pages 428-429

Computing Devices of Canada, Ltd., Canada, 5, 15, 20

Connecticut Telephone & Elect. Conn., 10, 25

Consolidated Radio Products Co., Ill., 5, 10, 15, 20, 25

Copper Wire Products, Ltd., Canada, 5

Crescent Industries, Inc., Ill., 5, 15, 20

DX Radio Products, Company, Inc., Ill., 5

Duotone Co., Inc., N.J., 15

Dyna Labs., Inc., N.Y., 10

Electro-Voice, Inc., Mich., 5, 15, 20, 25

Galbraith & Son Electric Corp., C. C., 450 Ave. of Americas, New York 11, N.Y., 5
For details see ad on page 104

Glaser-Steers Corp., N.J., 5

Hartley Co., Ltd., H. A., England, 15

Hawley Products Co., 333 N. 6 St., St. Charles, Ill., Diaphragms & Dust Covers
For details see ad on page 132

Heppner Mfg. Co., Box 1207, Round Lake, Ill., 5
For details see ad on page 64

Holl Audio, Inc., Calif., 5, 15, 20, 25

Horton Machine Products Co., N.Y., 5

Insuline Corp. of America, 36-02 35th Ave., Long Island City 1, N.Y., 10
For details see ad on page 134

Jensen Manufacturing Co., Ill., 5, 15, 20, 25

Klipsch & Associates, Ark., 15, 20, 25

Lafayette Laboratories, Inc., N.Y., Lathe Work

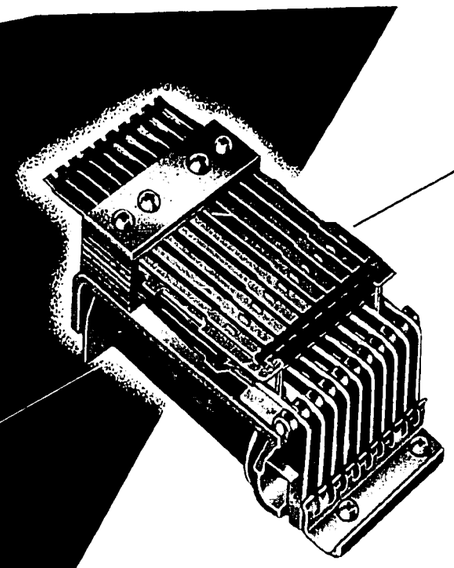
Lansing Sound, Inc., James B., Calif., 15, 20, 25

MacKay Radio & Telegraph Co., N.Y., 10

(Continued on page 107)

KELLOGG

Magnetic Impulse Counter



Check these features

- ☐ The long life and dependability characteristic of relay equipment.
- ☐ Occupies space of only two telephone relays.
- ☐ Operates over a wide range of pulse ratio and frequency.
- ☐ Replaces a chain of well designed relays at small fraction of cost.

It's new — but already Industry is pouring in orders for Kellogg's unique *Magnetic Impulse Counter!* . . . Why? Because it is simple, it saves space and it has a wide application in many fields. Actuated by electrical impulses, the Kellogg Magnetic Impulse Counter performs the counting and marking function of a chain of from 10 to 20 relays — or of a two-magnet ten-point stepping switch. It does this in less space and with assured reliability! It has many uses — from industrial control, to any system where trains of impulses, such as generated by a telephone dial, are to be counted. Get the facts. Get them now! Find out how the Kellogg Magnetic Impulse Counter can save you money. A request on your letterhead will bring particulars.

KELLOGG

Midget Condenser Microphone



- Uniform Dependable Response
- Exceptional Calibration Stability
- Laboratory and Industry-Proved Performance

Here's the device you need for precision sound measurements and high quality recording! . . . It's the Kellogg Midget Condenser Microphone. Of rugged, long-lasting construction; humidity-proof and exceptionally reliable, it satisfies the exacting requirements of government laboratories, universities, audio development laboratories, sound studios and others manufacturing sound equipment. Write for complete information.

MICROWAVE

Check with Kellogg whenever you have requirements for telephone terminating equipment for Microwave Systems — Ringdown and dial Selective Calling Equipment — Signalling Oscillators —Hybrid Terminations — Strap Attenuators — Line and Patching Jacks — Jack Fields.

KELLOGG

An Associate of International Telephone and Telegraph Corporation

KELLOGG SWITCHBOARD AND SUPPLY COMPANY, Dept. 69 • General Sales Offices: 79 W. Monroe Street, Chicago 3, I

Loudspeakers & Headphones

(Continued from page 105)

Magnavox Co., 2131 Beuter Rd., Ft. Wayne 4, Ind., 5, 15, 20, 25
For details see ad on page 138
Molded Insulation Co., Pa., 5
Northern Electric Co., Ltd., Canada, 10
Oxford Electric Corp., Ill., 5, 15, 20, 25
Perfection Electric Co., Ill., 5
Permoflux Corp., Ill., 5, 10, 15, 20
Philmore Mfg. Co., Inc., N.Y., 10
Quam-Nichols Co., Ill., 5
Racon Electric Co., Inc., N.Y., 5, 15, Driver Units
Radio Corp. of America, Camden, N.J., 5, 15, 20, 25
For details see ad on pages 88, 440-441
RCA Victor Division, Tube Dept., 415 S. 5 St., Harrison, N.J., 5
For details see ad on pages 88, 440-441
Radio Recorders Equipment Co., Calif., 5, 10, 15, 20, 25
Remler Co., Ltd., Calif., Marine
Roanwell Corp., N.Y., 5
Rola Company, Inc., Ohio, 5
Rowe Industries, Ohio, 5
Sears Company, M. J., N.Y., 10
Sonotone Corp., N.Y., 10
Stevens Prod., Inc., N.J., Diaphragms, Cones, Suspensions
Technical Apparatus Builders, N.Y., 15, 20
Telephonics Corp., N.Y., 10
Telex, Inc., Minn., 10
Theatre Equipment Co., Ohio, 5
Trimm, Inc., 400 W. Lake St., Libertyville, Ill., 10, Handsets
For details see ad on page 107
Ultrasonic Corp., Mass., 25
University Loudspeakers, Inc., 80 S. Kensico Ave., White Plains, N.Y., 5, 15, 20, 25
For details see ad on page 105
Vitavox, Ltd., England, 5, 15, 20, 25
Waveforms, Inc., N.Y., 25
Wheeler Insulated Wire Co., Conn., Handsets
Winslow Company, Inc., N.J., 10
Wright, Inc., Minn., 5, Grilles & Baffles
Wright-Zimmerman, Inc., Minn., 5, Hospital Pillow Speakers

TRIMM

electronic components

- Headsets
- Handsets
- Phone Plugs
- Patch Cords
- Jacks
- Jack Panels
- Cord Assemblies
- Control Boxes
- Group Hearing Aid Components

TRIMM INC.

Libertyville Illinois

08. Microphones & Stands.

5. Carbon
10. Condenser
15. Crystal
20. Dynamic
25. Velocity
30. Microphone stands

Altec Lansing Corp., Calif., 10, 20, 30
American Microphone Co., Calif., 5, 15, 20, 25, 30
Ardente Acoustic Labs., Ltd., England, 20, 30
Astatic Corp., Ohio, 5, 15, 20, 30
Atlas Sound Corp., N.Y., 30
Audio Instrument Co., Inc., N.Y., 10
Automatic Electric Co., Ill., 5
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 10
For details see ad on page 408
Brociner Electronics Laboratory, N.Y., 25
Brush Electronics Co., Ohio, 10, 15
Campbell Mfg. Co., Ltd., Canada, 5
Capps & Co., Frank L., N.Y., 10
Century Lighting, Inc., N.Y., 30
Computing Devices of Canada, Ltd., Canada, 15
Connecticut Telephone & Elect. Corp., Conn., 5, 20
Cook Laboratories, Conn., 10
Dazor Manufacturing Corp., Mo., 30
Dyna Labs., Inc., N.Y., 15
Eastern Mike Stand Co., N.Y., 30
Ectro, Inc., Ohio, 5, 15, 20
Electro-Voice, Inc., Mich., 5, 10, 15, 20, 25, 30
Greibach Res. & Development Labs., N.Y., 20
Gulton Mfg. Corp., N.J., 15
Harmon Electronics Co., Mo., 5
Kellogg Switchboard & Supply Co., Dept. 69, 79 W. Monroe St., Chicago 3, Ill., 5, 10
For details see ad on page 106
LaMagna Mfg. Co., Inc., N.J., 5
Lesa, S. P. A., Italy, 15, 20
Mercury Electronic Labs, Inc., Ill., 10
Mole-Richardson Co., Calif., Microphone Booms
Mullard Overseas, Ltd., England, 20, 30
Northern Electric Co., Ltd., Canada, 20
Philmore Mfg. Co., Inc., N.Y., 5
Racon Electric Co., Inc., N.Y., 30
Radio Corp. of America, Engineering Products Div., Camden, N.J., 15, 20, 25, 30
For details see ad on pages 88, 440-441
Radio Recorders Equipment Co., Calif., 10, 15, 20, 25, 30
Roanwell Corp., N.Y., 5
Sears Co., M. J., N.Y., 5, 20
Shure Brothers, Inc., 225 W. Huron St., Chicago 10, Ill., 5, 15, 20, 25, 30
For details see ad on page 108
Snyder Mfg. Co., Pa., 30
Sonotone Corp., N.Y., 15
Speak-O-Phone Rec. & Equip. Co., N.Y., 5, 15, 30
Special Products Company, Md., 30
Stephens Manufacturing Corp., Calif., 15, 20, 25
Stephens Manufacturing Corp., Calif., 10
Telephonics Corporation, N.Y., 5, 20
Tibbetts Industries, Inc., Me., 15
Transelectric Mfg. Co., Pa., 5
Turner Co., The, Iowa, 5, 15, 20, 25, 30
University Loudspeakers, Inc., 80 S. Kensico Ave., White Plains, N.Y., 5
For details see ad on page 105
Vitavox, Ltd., England, 20, 30

09. Phonographs, Pick-ups, Record Changers, etc.

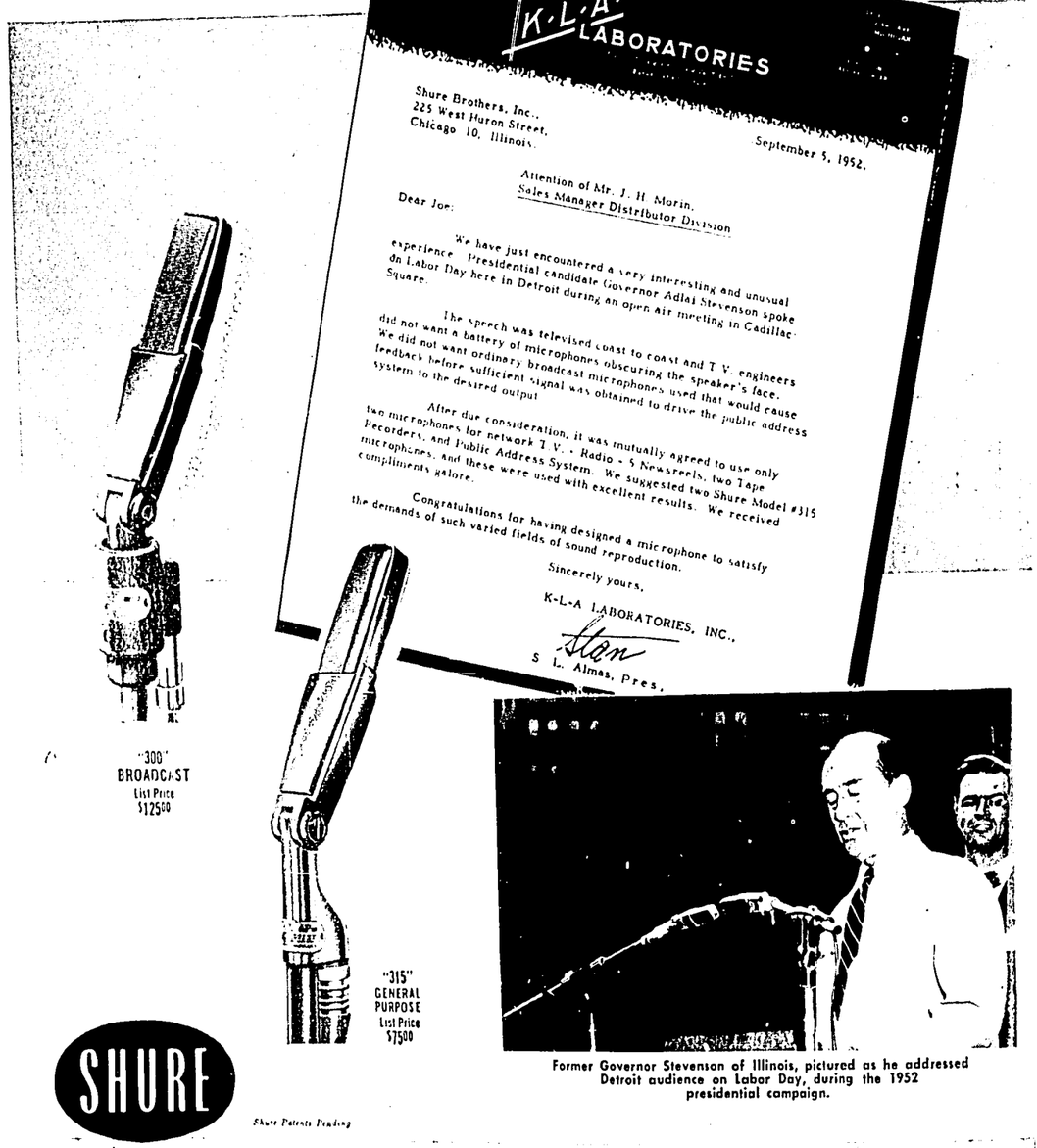
5. Phonograph motors
10. Pick-ups—crystal
15. Pick-ups—dynamic
20. Pick-ups—magnetic
25. Pick-ups—reluctance
30. Playback arms
35. Record changers
40. Record players
45. Styli-diamond
50. Styli-metallic
55. Styli-sapphire
60. Tape phonographs & playback equipment

Airtronix Development Corp., N.Y., 40
Alliance Manufacturing Co., Ohio, 5
Alliance Tool & Motor Co., Ltd., Canada, 5, 40
American Microphone Co., Calif., 10, 30
Amplifier Corp. of America, N.Y., 60
Ansley Mfg. Co., Arthur, Pa., 40
Ardente Acoustic Labs., Ltd., England, 40
Armstrong Co., A. T. R., Canada, 45, 50, 55
Astatic Corp., Ohio, 10, 45, 50, 55
Audio Industries, Inc., Ind., 35, 40
Audio Master Corp., N.Y., 5, 35, 40, 60
Berndt-Bach, Inc., Calif., 40
Berlant Associates, Calif., 60
Birmingham Sound Reproducers, Ltd., England, 5, 35, 40
Bogen Co., Inc., David, N.Y., 40
Califone Corp., Calif., 30, 40
Campbell Mfg. Co., Ltd., Canada, 60
Capps & Co., Frank L., N.Y., 55
Cinaudagraph Speakers, Ill., 35
Consolidated Engineering Corp., Calif., Vibration & Pressure Pick Ups
Consolidated Radio Products Co., Ill., 35
Dietz Co., H. G., N.Y., 60
Crescent Ind., Inc., Ill., 35, 40, 60
Cycle Electronic Labs., N.J., 5
De Wald Radio Mfg. Corp., N.Y., 40
Diamond Tool Engineering Co., Mass., 45, 55
Duotone Company, Inc., N.J., 35, 45, 50, 55
Electro-Voice, Inc., Mich., 10, 15, 20, 25
Electronic Industries, Inc., Minn., 35, 40
Elso Mfg. Co., Inc., Pa., 35, 40, 60
Feldman & Co., Henry, Calif., 30, 45, 50
Fairchild Recording Equipment Corp., N.Y., 15, 30
Ferranti Electric, Inc., N.Y., 15
Fidelity Amplifier Co., Ill., 40
Garod Radio Corp., N.Y., 60

(Continued on page 109)

PROOF of PERFORMANCE

Shure slender Gradient[1] Microphones solve difficult acoustic problem



Former Governor Stevenson of Illinois, pictured as he addressed Detroit audience on Labor Day, during the 1952 presidential campaign.

SHURE

Shure Patents Pending

SHURE BROTHERS, Inc. ★ Microphones and Acoustic Devices

225 West Huron Street, Chicago 10, Illinois • Cable Address: SHUREMICRO

(Continued from page 107)

Garrard Sales Corp., N.Y., 35, 40
Gates Radio Company, Ill., 40, 60
General Instrument Corp., 829 Newark Ave., Elizabeth 3, N.J., 35
For details see ad on page 60
Gleason-Avery, Inc., N.Y., 5
Gray Research & Development Co., Inc., Hilliard St., Manchester, Conn., 30
For details see ad on page 118
Gulton Mfg. Corp., N.J., 10
Hartley Co., Ltd., H. A., England, 5, 15, 20, 35, 40
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 20
For details see ad on page 134
Jensen Industries, Inc., Ill., 45, 50, 55
Key Electronics Corp., N.Y., 40, 60
Lesa, S.P.A., Italy, 5, 10, 15, 20, 30, 35, 60
Lincoln Engineering Co., Mo., 35, 40
Lindberg Instrument Co., Inc., Tex., Resistance Pick-Up
Lipps, Edwin A., Calif., 45, 55
Livingston Electronic Corp., N.J., 30
Magnavox Co., 2131 Bueter Rd., Ft. Wayne 4, Ind., 10, 35, 40
For details see ad on page 138
Markel Electric Prod., Inc., N.Y., 35
Melpar, Inc., Va., 20
Micro Engineering Lab., Canada, 5, 30
Miller Mfg. Co., M. A., Ill., 45, 50, 55
Milwaukee Stamping Co., Wis., 35, 40
Molded Insulation Co., Pa., 60
National Hollywood, Calif., 55
Newcomb Audio Products, Calif., 40
Olson & Lipps, Calif., 45, 50, 55
Omega Manufacturing, Inc., N.Y., 35
Pacific Transducer Corp., Calif., 20, 25, 30, 45, 55
Packard Bell Co., Calif., 35, 40
Pentron Corp., Ill., 60
Permo Inc., Ill., 35, 45, 50, 55
Pfanstiehl Chemical Co., Ill., 25, 30, 45, 50, 55
Phonograph Corp. of America, N.Y., 35, 40
Pickering & Co., Inc., 308 Wood Ave., Oceanside, L.I., N.Y., 20, 30
For details see ad on pages 109, 210
Presto Recording Corp., P.O. Box 500, Paramus, N.J., 20, 30, 60
For details see ad on page 110
RCA Victor Division, Tube Dept., 415 S. 5th St., Harrison, N.J., 55
For details see ad on pages 88, 440-441
Radio Recorders Equipment Co., Calif., 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60
Recoton Corp., N.Y., 20, 45, 50, 55, 60
Reeves Soundcraft Corp., N.Y., 45, 50, 55
Rek-O-Kut Co., N.Y., 5, 40
Robinson Recording Labs., Pa., 30
Rockbar Corp., 211 E. 37 St., New York 16, N.Y., 10, 25, 35, 40
For details see ad on page 77
Row Industries, Ohio, 20
Shura Tone Products, Inc., N.Y., 60
Shure Brothers, Inc., 225 W. Huron St., Chicago 10, Ill., 10, 55
For details see ad on page 108
Simpson Mfg. Co., Inc., Mark, N.Y., 5, 40, 60
Skiatron Electronics & TV Corp., N.Y., 60
Sonotone Corp., N.Y., Pick-Ups, Ceramic
Sparton of Canada, Ltd., Canada, 40
Steelman Phonograph & Radio Co., N.Y., 40
Superex Electronics Corp., N.Y., 45
Talk-A-Phone Co., Ill., 35, 40
Tape Recording Apparatus Co., N.J., 60
Tele King Corp., N.Y., 35, 40
Televex Co., N.Y., 45
Tetrad Corp., N.Y., 30, 45
Transformer Metal Products Corp., N.Y., 30
V-M Corp., Mich., 30, 35, 40, 60
Vallorbs Jewel Co., Pa., 55
Vega Company, Mass., 20
Webster Electric Co., Wis., 10, 30
Waters-Conley Co., Minn., 40
Wilcox-Gay Corp., Mich., 60

PICKERING PICK-UP CARTRIDGES

- For the utmost in record playing pleasure
- For the greatest length of satisfactory service
- For those who want and demand the highest quality record reproduction, with all of the original modulation, realism and brilliance
- For minimum record wear
- For minimum extraneous and annoying sounds

120 SERIES	for transcriptions and lacquer discs
MODEL R-150	for phonograph records
140 SERIES	for microgroove records

All Pickering Pick-up Cartridges are available with either a Diamond or Sapphire Stylus. . . . Diamond Styli are good for thousands of playings whereas Sapphire Styli require replacement after a few hundred [illegible].

Pickering also manufactures Pick-Up Arms, Preamplifiers, Equalizer-Amplifiers and Equalizers.

PICKERING & COMPANY
Oceanside, New York

10. Recording Accessories & Supplies.

5. Blank disks
10. Cutting heads
15. Cutting styli
20. Magnetic recording, playback & erase heads
25. Magnetic recording tape-acetate base
30. Magnetic recording tape-paper base
35. Magnetic recording wire
40. Stylus resharpening
45. Suction pumps & equipment
50. Tape splicing equipment

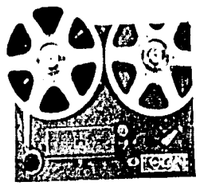
Advance Recording Products Co., N.Y., 5
Astatic Corp., Ohio, 10
Audio Devices, Inc., N.Y., 5, 15, 25, 30, 40
Audio Industries, Inc., Ind., 15
Audio Master Corp., N.Y., 25
Avion Instrument Corp., N.J., 20
Berlant Associates, Calif., 30
Brush Electronics, Inc., Ohio, 10, 20, 25, 35
Caltron Products Co., Calif., 5
Capps & Co., Frank L., N.Y., 15, 40
Connecticut Telephone & Elect. Corp., Conn., 20, 25
Daystrom Electric Corp., N.Y., 20
Devol Research Co., Conn., 20
Duotone Co., Inc., N.J., 5, 10, 15, 25, 40, 45
Fairchild Recording Equipment Corp., N.Y., 10, 15
Fidelitone, Inc., Ill., 25, 30, 35
Garod Radio Corp., N.Y., 5, 25
General Cement Mfg. Co., Ill., 25, 30, 35
Home Recording Prod. Corp., N.Y., 5
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 5
For details see ad on page 134
Interelectronics Corp., N.Y., 25
Jensen Industries, Inc., Ill., 15, 25, 30
Korb Engineering & Mfg. Co., Mich., 35
Lipps, Edwin A., Calif., 10, 15, 20, 40
Magnecord, Inc., Ill., 20
Magne Pulse Corp., N.Y., 20
Magnecessories, D.C., 50
Magnetic Recording Industries, N.Y., 5, 30
Maico Co., Inc., Minn., 20
Miles Reproducer Co., N.Y., 10, 15
Miller Mfg. Co., M. A., Ill., 15
Monson Corp., Ill., 25
National Hollywood, Calif., 5, 15, 25, 40
Olson & Lipps, Calif., 10, 15, 20, 40

(Continued on page 111)

PRESTO SHOWCASE

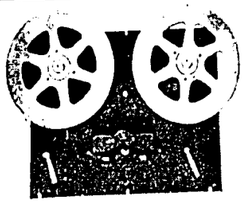
of the world's finest recording equipment

TAPE EQUIPMENT



NEWEST PRESTO TAPE RECORDER RC-11

Radical new "unitized" construction with self-contained capstan drive unit. Reel size up to 10½ inches; three enclosed heads; push button operation; heavy ribbed aluminum panel. PRESTO'S most advanced tape recording mechanism.



LONG-PLAYING TAPE REPRODUCER PB-17

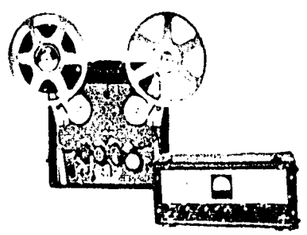
Designed especially for background music in industrial plants, entertainment locations, ships and trains. Eight hour tape cycle at 3¾"/sec.; dual track; 4800 ft. reel capacity; frequency resp. is 50 to 8,000 cps. (±2db)



TURNTABLE-DRIVEN TAPE REPRODUCER TL-10

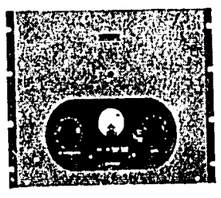
Most amazing development to hit the recording field in years. Makes any standard 16" turntable quickly adaptable to tape. Turntable acts as motor; speeds of 7½"/sec. and 15"/sec. Plugs into standard studio speech input equipment; no preamplifier required.

RECORDING AMPLIFIERS



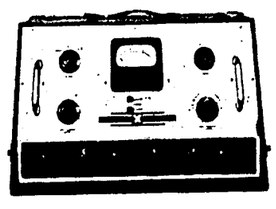
PRESTO PORTABLE PT-920

This popular portable tape machine is shown here with the new RA-1 reel adapters which increase its reel size to 10½ inches. Three motor drive without friction clutch or friction brakes, 15,000 cps. frequency response and excellent dynamic range.



PRESTO 92-B

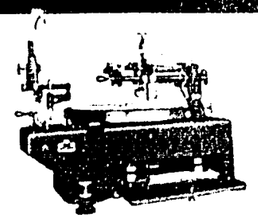
PRESTO'S famous 60 watt recording amplifier for rack mounting. Removable front panel makes maintenance easy. Selector switch and one meter indicate output level and tube plate currents. Push-button selector for recording characteristics. Response: 20 to 17,000 cps.



PRESTO PORTABLE 90-B

Qualities of high fidelity studio console b portable, with complete facilities for remo operation. Distortion of less than 1.5% maximum output. Equalizers for flat, NA 33⅓ rpm, phono, NAB playback and au matic. Three-microphone input with mix and master gain control.

DISC EQUIPMENT



PRESTO STUDIO CONSOLE 8 D-G

Designed to cut the finest instantaneous and master recordings. Has radial cantilevered overhead requiring no turntable contact. 1-D cutting head. Direct gear drive and twin motors. Eight different feed pitches in each direction, including 250 lpi. microgroove.



PRESTO TRANSCRIPTION TURNTABLE 10-B

Here is an improved model of the famous PRESTO 10-A which has been the preferred turntable in hundreds of broadcast stations. The 10-B is a rim-driven table of exceptional accuracy with 3-speed mechanism. Offered as chassis only or in console cabinet.



PRESTO PORTABLE RECORDER 6-

World favorite! Unusual reliability un all recording conditions. Low mechani noise level. Speed accuracy excellent at and 33⅓ rpm. Equipped with 1-D cutt head. Microgroove attachment availble extra cost.

PRESTO RECORDING CORPORATION • Paramus, New Jersey

Export Division: 25 Warren Street, New York 7, N. Y. • Canadian Division: Walter P. Downs, Ltd., Dominion Square Bldg., Montreal

WORLD'S LARGEST MANUFACTURER OF PRECISION RECORDING EQUIPMENT AND DI

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Institute of Radio Engineers
1 East 79th Street
New York 21, N.Y.

Recording Accessories & Supplies

(Continued from page 109)

Orradio Industries, Inc., Ala., 25
Pentron Corp., Ill., 20, 25, 30
Permo, Inc., Ill., 25, 30, 35
Presto Recording Corp., P.O. Box 500, Paramus, N.J., 5, 10, 15, 20, 40
For details see ad on page 110
Prestoseal Mfg. Corp., N.Y., 50
Radio Corp. of America, Engineering Products Div., Camden, N.J., 20, 25, 30
For details see ad on pages 88, 440-441
Radio Recorders Equipment Co., Calif., 5, 10, 15, 20, 25, 30, 35, 40, 45, 50
Rangertone, Inc., N.J., 20
Recoton Corp., 5, 15, 25, 40
Reeves Soundcraft Corp., N.Y., 5, 15, 25, 30, 40
Scovill Mfg. Co., Conn., 5
Shure Brothers, Inc., 225 W. Huron St., Chicago 54, Ill., 20
For details see ad on page 108
Sonic Recording Products, Inc., N.Y., 5
Sound Scriber Corp., Conn., 5
Speak-O-Phone Recording & Equip. Co., N.Y., 5, 15, 25, 30
Stancil-Hoffman Corp., Calif., 20
Strandberg Engineering Labs., N.C., 40
Synchromatic Productions, N.J., Recorder Projector Synchronizer
Tape Recording Apparatus Co., N.J., 20
Wilcox-Gay Corp., Mich., 5, 25

11. Recording Equipment.

5. Disk recorders
10. Embossing types of recorders
15. Magnetic tape recorders
20. Magnetic wire recorders

American Machine & Foundry Co., Mass., 10, 15, 20
Ampex Electric Corp., 934 Charter St., Redwood City, Calif., 15
For details see ad on pages 364-365
Amplifier Corp. of America, N.Y., 15
Audio Industries, Inc., Ind., 5
Audio Master Corp., N.Y., 15
Bell Sound Systems, Inc., Ohio, 5, 15
Broadcast Equipment Specialties, N.Y., 15
Brush Development Co., Ohio, 15, 20
Brush Electronics, Inc., Ohio, 15
Califone Corp., Calif., 15
Camera Equipment Co., 1600 Broadway, New York 19, N.Y., 15
For details see ad on page 119
Campbell Mfg. Co., Ltd., Canada, 15
Cook Laboratories, Conn., 5
Crescent Ind., Inc., Ill., 15, 20
Curtiss-Wright Corp., N.J., 20
Daystrom Electric Corp., N.Y., 10, 15
Dictaphone Corp., Conn., 5, 15
Ectro, Inc., Ohio, 15
Electro Craft Industries, Inc., Conn., 15
Electronics Devices Co., N.Y., 20
Elso Mfg. Co., Inc., Pa., 15
Engineering Research Associates, Minn., 15
Fairchild Recording Equip. Corp., N.Y., 5, 15
Federal Mfg. & Engineering Corp., N.Y., 15
Gallant Engineering Co., D.C., 5, 15, 20
Garod Radio Corp., N.Y., 5, 15
Gates Radio Co., Ill., 5

Recording Equipment

Jersey City Technical Lab., N.J., 15
Korb Engineering & Mfg. Co., Mich., 15, 20
Magnecord, Inc., Ill., 15
Magne Pulse Corp., N.Y., 15
Magnetic Recording Industries, N.Y., 15
McElroy Manufacturing Corp., Mass., Ink Tape
Michigan Electronics, Inc., Ill., 15, 20
Micro Engineering Lab., Canada, 5, 15
Miles Reproducer Co., N.Y., 10
Minnesota Electronics Corp., Minn., 15
Molded Insulation Co., Pa., 15, 20
Monson Corp., Ill., 5, 15
Northern Electronic Co., Ltd., Canada, 10
Packard Bell Co., Calif., 5
Pentron Corp., Ill., 15
Presto Recording Corp., P.O. Box 500, Paramus N.J., 5, 15
For details see ad on page 110
Radio Corp. of America, Engineering Products Div., Camden, N.J., 5, 15
For details see ad on pages 88, 440-441
Radio Components, Ltd., Canada, 15
Radio Recorders Equipment Co., Calif., 5, 15, 20
Rangertone, Inc., N.J., 15
Reevesound Co., Inc., N.Y., 15, Film
Robinson Recording Laboratories, Pa., 5
Skiatron Electronics & TV Corp., N.Y., 15
Simpson Mfg. Co., Inc., Mark, N.Y., 5, 15
Sound Scriber Corp., Conn., 5, 10, 15
Speak-O-Phone Rec. & Equip. Co., N.Y., 5, 15
Stancil Hoffman Corporation, Calif., 15
Wagner Research Co., N.J., 5, 10
Webster Electric Co., Wis., 15
West Coast Electronics Co., Calif., 15
Western Sound & Elec. Labs., Inc., Wis., 5, 15
Wilcox-Gay Corp., Mich., 5, 15
Wireway Corp. of America, Ill., 15, 20

Visit the
Audio Section
of the
Radio Engineering Show
March 22-25
1954
Kingsbridge Armory
New York City

ANTENNA MANUFACTURERS FOR THE ELECTRONIC INDUSTRY

MICROWAVE ANTENNAS

Workshop antennas are widely used in microwave communications. Railroads, pipelines, utilities, television relay, and overseas networks have found Workshop precise engineering and rugged construction to fully meet their requirements. Workshop was first with a complete microwave antenna line, and continuing development by the Gabriel Laboratories maintains that leadership.

940 mc—For the 940 mc band a center-fed parabolic antenna is available in diameters of four or six feet. Both models terminate with a weatherproof type "N" connector for use with RG-8/U cable.

2000 mc—A new Offset Feed Antenna has been designed to cover the entire 2000 mc band requiring only one feed. The offset design removes the horn feed from the radiated field of greatest intensity, resulting in less energy being reflected into the horn feed. Measurements of 1.2 maximum VSWR can be maintained over the 1700 to 1990 mc band with this six-foot antenna.

7000 mc—After years of development and research, the engineers of the Gabriel Laboratories have produced a sensational antenna feed with outstanding electrical characteristics. This new antenna feed design maintains a VSWR of less than 1.13 over a 300 mc band for each of nine models covering a range of 5900 to 7425 mc. Available in 4-, 6-, and 8-foot diameters.

Accessories—Heavy-duty Workshop mounting clamps, model CP-4/6, provide a tilting range up to 3 3/4° and attach to pipe diameters of 2 1/2" to 4". Specifically designed for the harshest weather conditions, the Workshop heater permits continuous antenna operation in sleet, hail, ice, or snow.

UHF TELEVISION TRANSMITTING ANTENNAS

To meet the broadest requirements of isolated communities as well as large metropolitan areas, the Gabriel Laboratories has designed a high-gain UHF television antenna for Workshop which combines simplicity, ruggedness, and reliability.

With 25 and 14 power gain models in production, this new antenna is already rated as one of the best by electronic engineers. Its radiation pattern is the closest approach to a cosecant curve of any antenna now available. Efficient electrical design provides excellent impedance characteristics and makes possible null fill-in and adjustable beam tilt, if desired.

A standard input flange for 3 1/8" coaxial line makes the antenna readily adaptable to the use of waveguide. In addition, provisions for mounting a 300 mm beacon are incorporated in the antenna top.

Simple mechanical design results in a relatively low-cost antenna which has no insulator except for gas seal, no de-icing problems, and no field repair problems. The plastic weatherizing windows which protect the radiating structure are dyed "international orange," according to the latest F.C.C. regulations, so that the antenna never requires painting. Galvanized, welded steel construction assures excellent rigidity, corrosion resistance, and long life.

COMMUNICATION ANTENNAS

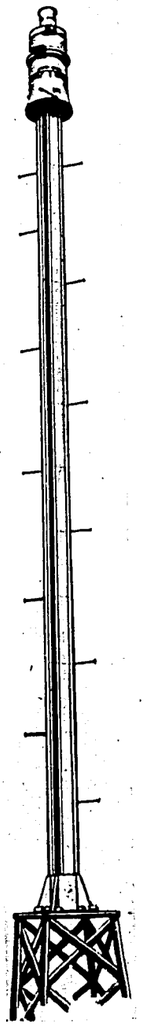
Directional—Workshop Directional Antennas are expressly designed for commercial point-to-point communications. Six-element arrays, consisting of two bays of reflector, dipole, and director provide unparalleled performance. A model for each frequency band assures constant impedance and a low VSWR for maximum efficiency. Models cover the 29 to 50 mc, 72 to 76 mc, and 140 to 174 mc bands.

Beacon—For omni-directional coverage Workshop High-Gain Beacon Antennas give you performance that is outstanding and dependable. These antennas are "series fed" to insure that the power is equally divided between the radiating dipoles for concentration of energy on the horizon. All radiating elements are completely weatherproofed. Models are available for the 144 to 162 mc and 450 to 470 mc bands.

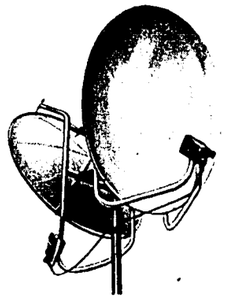
ENGINEERING AND CONTRACT SERVICE

Workshop handles scores of special government and commercial antenna problems every year from design through production. New acquisitions of $300,000 in machine tools provide one of the most complete antenna production facilities in the world, available for the design, manufacture and test, to your specifications, of complete antenna assemblies. These new facilities are supplemented by the Gabriel Laboratories in Needham, Mass., which has long enjoyed a reputation as one of the leading antenna laboratories.

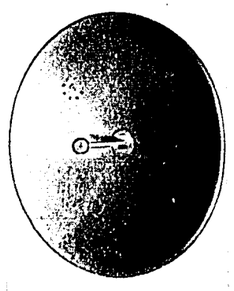
If your product or service requires antennas or waveguide components—research, design, test or production—get in touch with Workshop. Write or phone Norwood 7-3300.



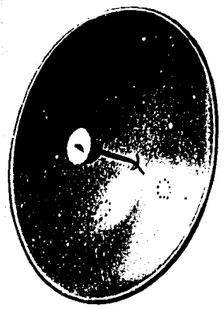
UHF transmitting antenna for television—featuring null fill-in, a Workshop exclusive.



Model 2K6T, six-foot offset feed antenna, covers entire 2000 mc band.



Model 7K4B2, four-foot parabolic antenna, for 7000 mc band.



Model 9406, six-foot diameter antenna, covers the 920-960 mc band.

WORKSHOP ASSOCIATES DIVISION
THE GABRIEL COMPANY
ENDICOTT STREET · NORWOOD, MASS.

A Directory of

2. Broadcasting Equipment

Both Aural & Visual; Receivers, Transmitters & Associated Equipment

Broadcasting Equipment Directory

6 Major Groups

30 Products

Organized by functions for Engineers.

12 Antennas & Accessories.
- 05 AM broadcast transmitting
- 10 FM broadcast transmitting
- 15 TV broadcast transmitting
- 20 Supporting towers
- 25 Tower lighting equipment
- 30 Tower erection & maintenance service

13 Monitor Equipment.
- 05 Frequency
- 10 Modulation
- 15 Remote control monitors
- 20 Video monitors

14 Receivers.
- 05 AM Broadcast
- 10 AM Shortwave
- 15 FM Broadcast
- 20 TV Broadcast
- 25 TV Boosters
- 30 TV Color adapters
- 35 TV Tuners

15 Services for the Broadcaster.
- 05 Frequency measurement
- 10 Packaged program services
- 15 Transcription libraries

16 Studio Equipment.
- 05 Consoles & speech input equipment
- 10 TV Cameras
- 15 TV Camera control equipment
- 20 TV Film projectors
- 25 TV Studio lighting equipment
- 30 Turntables

17 Transmitters.
- 05 AM Broadcast
- 10 FM Broadcast
- 15 TV Broadcast
- 20 Relay broadcast & STL equipment

The products and services of the Radio-Electronics industry have been organized into ten basic directories following closely the organization of the IRE Professional Groups. But 100 major product groups are numbered consecutively throughout.

Always consult the pink pages at the start of the Directory of firms, for a terminology cross-index, or to find products by name. The pink pages list more than 500 products by name, as well as under the product groups. Page numbers are given for speed.

ELECTRONICS unlimited?

Well — almost. After you have discussed your problem with us we think you will agree that the solution of problems by electronics is almost *unlimited*. Pickard and Burns offers a completely integrated service for consultation, research, development, instrumentation, and custom manufacturing, in the various phases of electronics and radio.

The staff includes experienced specialists in electronics, physics, mathematics, navigation, geophysics, statistics and technical economics.

Facilities include a well equipped electronic laboratory, model shop, antenna laboratory and range, as well as manufacturing facilities for custom built apparatus.

RESEARCH AND DEVELOPMENT
- Radio and Microwave Communications
- Antennas
- Radar Systems
- Loran
- Instrumentation
- Automatic Recorders

MEASUREMENT AND TEST EQUIPMENT



BOLOMETER AMPLIFIER, Model 100. A high-precision instrument to aid in measuring RF field strengths of antenna systems and RF networks.

BOLOMETER AMPLIFIER, Model 60. A highly accurate instrument not requiring the special features of Model 100.

LOG-LINEAR CONVERTER, Model 86. Will convert any 50 kc. signal to logarithmic form up to 100 db. for direct meter reading or to operate any conventional linear recorders.

PICKARD & BURNS
INCORPORATED
240 Highland Avenue,
Needham 94, Mass.

12. Antennas & Accessories.

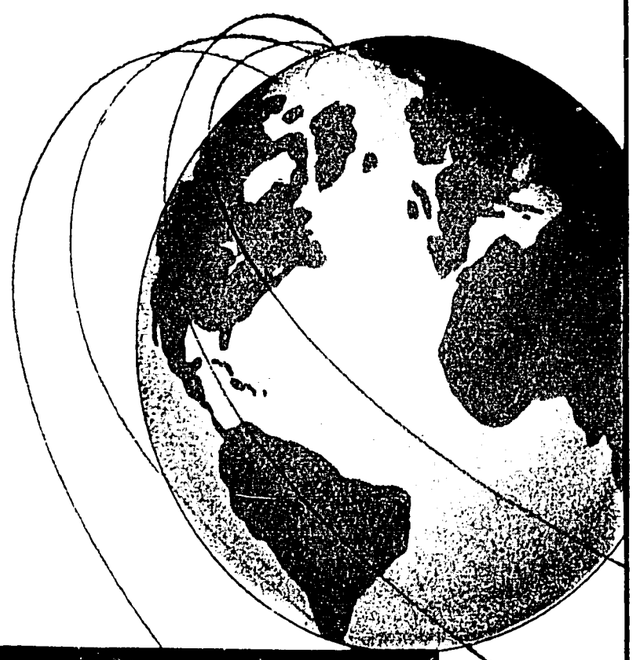
5. AM broadcast transmitting
10. FM broadcast transmitting
15. TV broadcast transmitting
20. Supporting towers
25. Tower lighting equipment
30. Tower erection & maintenance service

American Phenolic Corp., 1830 S. 54 Ave., Chicago 50, Ill., 5, 10, 15
For details see ad on page 2
Andrew Corp., Ill., 5, 10, 25
Blaw-Knox Co., Pa., 5, 10, 15, 20, 30
Bud Radio, Inc., 2118 E. 55 St., Cleveland 3, Ohio, 20
For details see ad on pages 267, 346
Burton-Rogers Co., Mass., 5
Canadian General Electric Co., Canada, 5, 10, 15, 20, 25, 30
Collins Radio Co., 855-35th St. N.E., Cedar Rapids, Iowa, 25
For details see ad on pages 428-429
Continental Electronics Mfg. Co., Tex., Directional Antenna Equip.
Cossor (Canada) Limited, Canada, 10
DuMont Labs., Inc., Allen B., TV Transmitter Div., 1500 Main Ave., Clifton, N.J., 15
For details see ad on page 29
Electrical Tower Service, Inc., Ill., 30
Elizabeth Iron Works Inc., N.J., 20, 30
Federal Electric Mfg. Co., Ltd., Canada, 10, 15
Federal Telecommunication Labs., Inc., N.J., 15
Freteo, Inc., Pa., 20
Gates Radio Co., Ill., 10
Gee-Lar Mfg. Co., Ill., 15
(Continued on page 114)

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

CROSBY

Sets a new standard of performance in radio communications.



Single-Sideband and Exalted Carrier Receivers.

Multiplex Transmitting and Receiving Equipment.

Broadcast and Communications Apparatus.

CROSBY LABORATORIES, Inc., is an engineering, development, and production firm with a background of successful, progressive experience in the fields of radio communication and applied electronics.

The products of the Laboratories are now in use in Governmental and commercial radio services in many parts of the world.

Behind these products is an able staff of electronic engineers, and a modern laboratory with extensive facilities for research and development, equipped with production tools of the latest design.

Send for our descriptive booklets

CROSBY LABORATORIES, Inc.
ROBBINS LANE, BOX 233, HICKSVILLE, N. Y.
Telephone Hicksville 3-3191

Antennas & Accessories

(Continued from page 113)

Hartenstine-Zane Co., Inc., N.Y., 5, 10, 15, 20, 25, 30
Hughey & Phillips, Calif., 25
Dresser-Stacey Co., Ohio, 20
Johnson Co., E. F., Waseca, Minn., 5, 10, 25
For details see ad on page 183
Lehigh Structural Steel Co., N.Y., 20
Lingo & Son, Inc., John E., N.J., 5, 10, 15, 20
Marconi's Wireless Telegraph Co., Ltd., England, 5, 10, 15, 20, 25, 30
Master Mobile Mounts, Inc., Calif., 5, 10
Metal Products Co., Tenn., 20
National Electric Products Corp., Pa., 15
Pickard & Burns, Inc., 240 Highland Ave., Needham 94, Mass., 10, 15
For details see ad on pages 113, 284
Philson Mfg. Co., Inc., N.Y., 10, 15
Prodelin, Inc., N.J., 15
Product Development Co., Inc., N.J., 5, 10, 15, 20, 25, 30
Radio Corp. of America, Engineering Products Div., Camden, N.J., 5, 10, 15, 20, 25
For details see ad on pages 88, 440-441
Radio Eng. & Maintenance, Ky., 30
Radio Industries Corp., N.Y., 5
Redifon, Ltd., England, 5, 20
Republic Steel Corp., Ohio, 5, 20, 25
Rich Electronics, Inc., Fla., 10
Rostan Corp., N.Y., 20
Stainless, Inc., Pa., 5, 10, 20, 25, 30
Technical Material Corp, N.Y., 20
Telechrome, Inc., 88 Merrick Rd., Amityville, L.I., N.Y., 15
For details see ad on pages 120, 285
Telrex, Inc., 26 Neptune Highway, Asbury Park, N.J., 5, 10, 15
For details see ad on page 258
Transvision, Inc., N.Y., 30
Westinghouse Electric Corp., Pa., 5, 10
Wincharger Corp., Iowa, 5, 20, 25
Workshop Associates Div., Gabriel Co. Endicott St., Norwood, Mass., 15
For details see ad on page 112

13. Monitor Equipment.

5. Frequency
10. Modulation
15. Remote Control Monitors
20. Video monitors

A.R. F. Products, Inc., Ill., 10
Adler Communications Labs., N.Y., 20
Arc Equipment Co., N.J., 20
Bassett, Inc., Rex, Fla., 5
Berkeley, Division Beckman Instruments, Inc., 2200 Wright Ave., Richmond, Calif., 5
For details see ad on page 8
Browning Laboratories, Inc., 750 Main St., Winchester, Mass., 5, 10
For details see ad on page 326
Canadian General Electric Co., Canada, 5, 10, 15, 20
Conrac, Inc., Calif., 20
Dage Electronics Corp., Ind., 20

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

Monitor Equipment

DuMont Labs., Inc., Allen B., TV Transmitter Div., 1500 Main Ave., Clifton, N.J., 5, 10, 20
For details see ad on page 29
Federal Electronic Mfg. Co., Ltd., Canada, 20
Federal Telecommunication Labs., Inc., N.J., 5, 10, 20
Gates Radio Co., Ill., 5, 10, 15, 20
General Communications, Wis., 15, 20
General Precision Lab., Inc., 63 Bedford Rd., Pleasantville, N.Y., 20
For details see ad on page 116
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 5, 10
For details see ad on pages 380-381, Cover IV
Hewlett-Packard Co., 395 Page Mill Road, Palo Alto, Calif., 5, 10, 20
See complete catalog in last section
Industrial Television, Inc., N.J., 20
Jones Electronics Co., Inc., M. C., 96 N. Main St., Bristol, Conn., RF Power Output
For details see ad on page 51
Kahn & Co., Inc., Conn., 10
Marconi Instruments, Ltd., N.Y., 5, 10, 15, 20
Marconi's Wireless Telegraph Co., Ltd., England, 20
Motorola, Inc., Ill., 5, 10
National Co., Inc., 6 Sherman St., Malden 48, Mass., 5, 10
For details see ad on pages 434-435
Neptune Electronics Co., N.Y., 15
Northern Electric Co., Ltd., Canada, 15
Panoramic Radio Products, Inc. 10 S. Second Ave., Mount Vernon, N.Y., 10
For details see ad on page 115
Polarad Electronics Corp., N.Y., 20
Radio Corp. of America, Engineering Products Div., Camden, N.J., 5, 10, 20
For details see ad on pages 88, 440-441
Skiatron Electronics & TV Corp., N.Y., 20
Specialty Assem. & Packing Co., N.Y., 5, 10
Superex Electronics Corp., N.Y., 20
Tarzian, Inc., Sarkes, Ind., 20
Telechrome, Inc., 88 Merrick Road, Amityville, L.I., N.Y., 10, 20
For details see ad on pages 120, 285
Telescreen Corp., Conn., 15, 20
Television Utilities Corp., N.Y., 15, 20
Walkirt Co., Calif., 5
West Coast Electronics Co., Calif., 5, 10

14. Receivers.

5. AM Broadcast
10. AM Shortwave
15. FM Broadcast
20. TV Broadcast
25. TV Boosters
30. TV Color adapters
35. TV Tuners

A.R.F. Products, Inc., Ill., 5, 10, 15, 20
Admiral Corp., Ill., 5, 15, 20, 30
Airtronix Development Corp., N.Y., 5, 25
Alliance Manufacturing Co., Ohio, 25
Alliance Tool & Motor Co., Ltd., Canada, 25

PANORAMIC
RADIO PRODUCTS, INC.

THERE'S A PANORAMIC INSTRUMENT SPECIALLY DESIGNED FOR YOUR NEEDS IN SPECTRUM AND WAVEFORM ANALYSIS AND MONITORING

40 cps to 20 KC	FOR AUDIO WAVE ANALYSIS IN 1 SECOND Panoramic Sonic Analyzer, Model AP-1 INCREASED HARMONIC RESOLUTION OF AUDIO FREQUENCIES Panoramic Sonic Analyzer, Model LP-1 ACCURATE FREQUENCY RESPONSE MEASUREMENT Panoramic Sonic Response Indicator G-2
2 KC to 300 KC	FOR HIGH SPEED ULTRASONIC SPECTRUM ANALYSIS Panoramic Ultrasonic Analyzer, Model SB-7 ACCURATE FREQUENCY RESPONSE MEASUREMENT Panoramic Ultrasonic Response Indicator, G-3
RF to Microwaves	FOR GENERAL RF SPECTRUM ANALYSIS Panadaptor SA-3 • Panalyzor SB-3 RF SPECTRUM ANALYSIS WITH GREATER RESOLUTION Panadaptor SA-8a • Panalyzor SB-8a RF SPECTRUM ANALYSIS REQUIRING UTMOST RESOLUTION Panalyzor SB-12, Type T-100

Write Today for Complete Specifications and Prices

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10 South Second Avenue, Mount Vernon, N.Y.
Mount Vernon 4-3970

Receivers 12-14

American Radio & Television, Inc., Ark., UHF Converters
Amy, Aceves & King, Inc., N.Y., 25
Andrea Radio Corp., N.Y., 5, 10, 15, 20
Ansley Mfg. Co., Arthur, Pa., 5, 15
Approved Electronic Instrument Co., N.Y., 5, 15, 25
Ardente Acoustic Labs., Ltd., England, 5, 10
Armstrong Co., A. T. R., Canada, 25, 35
Arvin Industries, Inc., Ind., 5, 15, 20
Astatic Corp., Ohio, 25
Audio Industries, Inc., Ind., 5
Bace Television Corp., N.J., 20
Barber & Howard, R.I., 15
Bassett, Inc., Rex, Fla., 10
Bell Television, Inc., N.Y., 20
Bendix Aviation Corp., Research Lab., Fisher Bldg., Detroit 2, Mich., 5, 10, 15, 20, 25, 30
For details see ad on pages 176, 366-367
Blonder-Tongue Laboratories, Inc., N.J., 25, UHF Converters
Bogen Co., Inc., David, N.Y., 25, 35, AM, FM Tuners
Browning Laboratories, Inc., 750 Main St., Winchester, Mass., FM Tuners
For details see ad on page 326
Calbest Engineering & Electronics, Calif., 5, 15, 20
Canadian Westinghouse Co., Ltd., Canada, 5, 10, 15, 20
Capehart-Farnsworth Corp., Ind., 5, 10, 15, 20
Certified Radio Laboratories, N.Y., 20
Champion Electric Corp., England, 5, 10, 15, 20
Chisholm Industries, Ltd., Canada, 5, 10, 15, 20
Clarke Instr. Div., National Elec. Mach. Shops, Md., 15
Collins Radio Co., 855-35th St. N.E., Cedar Rapids, Iowa, 10
For details see ad on pages 428-429
Colortone Television Co., Inc., N.Y., 5, 20, 30
Communication Equip. & Eng., Ill., 15
Connecticut Telephone & Electric Corp., Conn., 35
Conrac, Inc., Calif., 20, 35
Crest Laboratories, Inc., N.Y., 25
Crosby Laboratories, Inc., Robbins Lane, Hicksville, L.I., N.Y., Single Sideband
For details see ad on pages 114, 282
Custom Electronics Corp., N.J., Studio Cue
Dage Electronics Corp., Ind., 25, Closed Circuit
Decimeter, Inc., Colo., 25
De Wald Radio Mfg. Corp., N.Y., 5, 10, 15, 20
DuMont Labs., Inc., Allen B., TV Receiver Div., 35 Market St., East Paterson, N.J., 20
For details see ad on page 29
Eckstein Radio & TV Co., Minn., 5
Electro-Voice, Inc., Mich., 25, 35
Elm Laboratories, N.Y., 5
Emerson Radio and Phonograph, N.Y., 5, 15, 20
Erco Radio Labs., Inc., N.Y., 10
Esquire Radio Corp., N.Y., 5, 10, 15
Fada Radio & Electric Co., Inc., N.J., 5, 10, 15, 20

(Continued on page 117)

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

Only One Source gives you Double Duty TV!

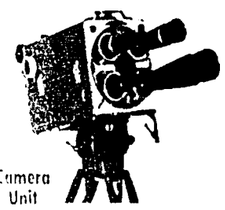
When you invest in GPL TV *studio* equipment, you're buying *field* equipment as well. Every GPL unit provides unparalleled flexibility, light weight, easy handling, precise control. Let GPL engineer *your* station, from camera to antenna. Have *The Industry's Leading Line*—in *quality*, in *design*.

Highest Quality Studio Programming Resources—plus

GENERAL PRECISION LABORATORY INCORPORATED

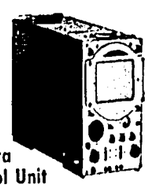
Portable Packaging for Maximum Studio-Field Flexibility!

Camera Chain Model PA 600



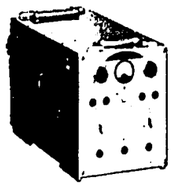
Camera Unit

...built, lightweight, ...handling. Push-button ... iris control, ... and range se... Easy to service.



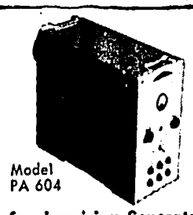
Camera Control Unit

Touch-identified controls. 8½" monitor tube. Split or single headphone intercom system. CRO views horizontal, vertical, and vertical sync block. Iris control.



Camera Power Unit

Rugged, dependable, compact. Matched to other units in GPL chain. Standard relay panels swing out for maintenance.

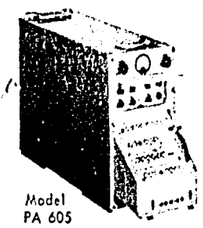


Model PA 604

Synchronizing Generator

Affords maximum circuit reliability without operator adjustment. Binary counters and delay lines, stable master oscillator. Built-in power supply.

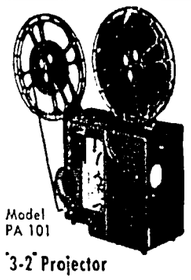
Complete TV Station Installations from Camera to Antenna



Model PA 605

Video Switcher

Full studio flexibility anywhere. Control can view, preview, fade, dissolve, etc. Views any of 5 inputs, 2 remotes, outgoing line. Twin fade levers.



Model PA 101

"3-2" Projector

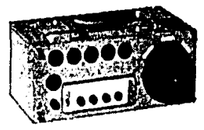
Portable sync unit. No need for special phasing facilities. Projects rear-screen or "direct in." Ideal for remote origination of film. Relieves load on Telecine.



Model PA 100 A

Professional TV Projector

Highest quality 16-mm projector, designed specifically for TV. Delivers 100 foot-candles to tube. Sharp, steady pictures from 4000-foot film magazine.



Model PA 607

Remote Control Box

Provides revolutionary remote control of camera focus, lens change. Styled to match other components in the GPL TV line.

WRITE WIRE OR PHONE FOR DETAILS

GENERAL PRECISION LABORATORY INCORPORATED

General Precision Laboratory

INCORPORATED

PLEASANTVILLE NEW YORK

TV Camera Chains • TV Film Chains • TV Field and Studio Equipment • Theatre TV Equipment

(Continued from page 115)

Federal Electric Mfg. Co., Ltd., Canada, 5, 10, 15, 20
Federal Mfg. & Engineering Corp., N.Y., 10
Feldman & Co., Henry, Calif., 5, 15
Fisher Radio Corp., N.Y., 5, 15
Fisher Research Lab., Inc., Calif., 5, 10
Five Star TV & Radio Co., Mass., 5, 20
Freed Electronics & Controls Corp., N.Y., 5, 10, 15, 20
Garod Radio Corp., N.Y., 5, 10, 15, 20
General Instrument Corp., 829 Newark Ave., Elizabeth 3, N.J., 35
For details see ad on page 60
General Precision Lab., Inc., 63 Bedford Rd., Pleasantville, N.Y., 20
For details see ad on page 116
Grigsby-Allison Company, Inc., Ill., 35
Hallicrafters Co., Ill., 5, 10, 15
Hartley Co., H. A., N.Y., 5, 15
Harvey-Wells Electronics, Inc., Mass., 10, 35
Heath Co., 305 Territorial Rd., Benton Harbor, Mich., 5, 10, 15, Kits
For details see ad on page 331
Hi-Video, Inc., N.Y., 25, 30
Hoffman Radio Corp., Calif., 5, 15, 20
Hose-McCann Telephone Co., Inc., N.Y., 10
Industrial Television Inc., N.J., 25
International Television Corp., N.Y., 20, 30
Jackson Industries, Inc., Ill., 5, 10, 15
Kahn Research Labs., N.Y., Single Sideband
Kaye-Halbert Corp., Calif., 20
Key Electronics Corp., N.Y., 5, 15, 25
LaPointe Electronics Inc., Conn., 20
Lear, Inc., Calif., 5, 10
Lehigh Valley Electr. Engr. & Mfg., Pa., 10
Leonard Electric Products Co., N.Y., 35
Lesa, S.P.A., Italy, 5
Lytle Engineering & Mfg. Co., Ill., 5, 10, 15, 20, 25, 30, 35
MP Engineering Co., Conn., 20
Magnavox Co., 2131 Bueter Rd., Ft. Wayne 4, Ind., 5, 10, 15, 20, 35
For details see ad on page 138
Mallory & Co., Inc., P. R., Ind., 35 UHF Converter
McLaughlin, J. L. A., Calif., Signal Splitter
Mercury Electronic Co., N.J., 25
Midwest Radio and Television, Ohio, 5, 10, 15, 20, 25
Mitchell Industries, Inc., Tex., 10
Morrow Radio Mfg. Co., Ore., 10
Mullard Overseas, Ltd., England, 5, 10, 20
Muntz TV, Inc., Ill., 20
National Company, Inc., 61 Sherman St., Malden 48, Mass., 5, 10
For details see ad on pages 434-435
Newcomb Audio Products, Calif., 5
Newton Scientific Co., Mass., 5, 15
Northern Electric Co., Ltd., Canada, 5, 10
Oak Electronics Co., N.Y., 25
Oak Mfg. Co., Ill., 35 & UHF
Olympic Radio & Television, Inc., N.Y., 5, 10, 15, 20
Orthon Corp., 196 Albion Ave., Paterson 2, N.J., 5, 10, 15, 25
For details see ad on page 117
Packard-Bell Co., Calif., 5, 20
Pilot Radio Corp., N.Y., 5, 10, 15, 20
Pentron Corp., Ill., 5
Philips Industries, Ltd., Canada, 5, 10, 15, 20
Phonograph Corp. of America, N.Y., 5
Plastics & Electronics Corp., P.O. Box 38, Station J, Buffalo 8, N.Y., 5
For details see ad on page 99
Radar Electronics, Inc., N.Y., 5, 10, 20
Radiart Corp., Ohio, 25
Radio Corp. of America, Camden, N.J., 5, 10, 15, 20, 35
For details see ad on pages 88, 440-441
Radio Craftsmen, Inc., Ill., 5, 15, 20
Radio Kits, Inc., N.Y., 5, 10, 20
Radio Manufacturing Engineers, Ill., 35, UHF Converters
Radio Receptor Co., Inc., 251 W. 19th St., New York 11, N.Y., 35, UHF Tuners & Converters
For details see ad on pages 190, 202
Radio Recorders Equipment Co., Calif., 5, 10, 15, 20
Ribet Desjardins, France, 5, 20
Sargent-Rayment Co., Calif., 5, AM FM Tuners
Scotts Television, Va., 20
Sentinel Radio Corp., Ill., 5, 10, 15, 20
Setchell-Carlson, Inc., Minn., 5, 20
Shaw Television Corp., N.Y., 5, 15, 20, 30
Shevers, Inc., Harold, N.Y., 5, 15, 20
Simpson Mfg. Co., Inc., Mark, N.Y., 15, UHF Converters & Boosters
Sonar Radio Corp., N.Y., 5, 10, 15
Sondyna, A. G., Switzerland, 5, 10, 15, 20
Sparton of Canada, Ltd., Canada, 5, 10, 15, 20
Sparton Radio Television Div., Mich., 5, 10, 15, 20
Specialty Assem. & Packing Co., N.Y., 35
Specific Products, Calif., Fixed Frequency
Spencer-Kennedy Laboratories, Inc., 186 Massachusetts Ave., Cambridge 39, Mass., 25
For details see ad on page 306
Spera Electronics Labs., N.Y., 10
Starrett Television Corp., N.Y., 20, 30
Steelman Phonograph & Radio Co., N.Y., 5, 15
Stewart-Warner Electric, Ill., 5, 10, 15, 20, 30
Stockman Electronics Research, Mass., 5
Superex Electronics Corp., N.Y., 5, 15, 25, 30
Superior Marine Radio Co., Fla., 10
Tartak-Stolle Electronics, Inc., Calif., 20
Tarzian, Inc., Sarkes, Ind., 35
Tech Master Products, N.Y., 5, 20, Kits
Technical Materiel Corp., N.Y., 10
Telechrome, Inc., 88 Merrick Road, Amityville, L.I., N.Y., 20, 30, Special
For details see ad on pages 120, 285
Tele-King Corp., N.Y., 5, 20
Telequin Radio Co., Ill., 20
Telescreen Corp., Conn., 30, Industrial Color TV
Television Equipment Corp., N.Y., 20, 25
Telex, Inc., Minn., 10, 15
Trad Television Corp., 1001 First Ave., Asbury Park, N.J., 20
For details see ad on page 338
Transvision, Inc., N.Y., 20, 25
Turner Co., Iowa, 25, UHF Converter
Vidaire Electronics Mfg. Co., N.Y., 25, 30
Video Corp. of America, N.Y., 20
Video Products Corp., N.J., 15, 20
Wells-Gardner & Co., Ill., 5, 10, 15, 20
Warwick Manufacturing Corp., Ill., 5, 10, 15, 20
Westinghouse Electric Corp., Pa., 5, 15, 20
Wilcox Electric Co., Inc., Mo., 10
Wilcox-Gay Corp., Mich., 5, 10, 15, 20
Yonkers Industries, Inc., N.Y., 25, UHF Converters

●MIL-SPEC
●SUB-CONTRACT
●COMMERCIAL

Radio Receivers
Tuners
Test Equipment
Timers
Power Supplies

SPECIALISTS IN ELECTRO-MECHANICAL ASSEMBLIES

Complete Facility Report Available on Request!

For complete information and details on any electronics problem, write direct to . . .

THE ORTHON CORPORATION
196 ALBION AVENUE PATERSON, N. J.
MUlberry 4-5858

15. Services for the Broadcaster.

5. Frequency measurement
10. Packaged program
15. Transcription libraries
services

Aero Instrument Co., Calif., 5
Apple Frequency Measuring Svce., H. L., N.C., 5
Associated Electronics Co., N.Y., 10

(Continued on page 119)

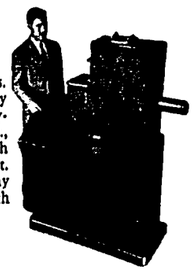
Gray RESEARCH

Networks and independent stations everywhere recommend and approve Gray professional equipment for broadcast station use. Such broad acceptance is not unwarranted. The products here mentioned are designed and engineered by audio and video specialists . . . incorporate highest quality and serviceability . . . are rightfully leaders in the industry.

. . . for the finest equipment for AM-FM-TV station use

Gray TELOP I (TELevision Optical Projector)

Make PROFITS GROW for TV Stations. The Gray Telop projects low-cost, easily produced TV 'commercials'. Without keystoning, any two photos, titles, slides, etc., or small objects may be broadcast with superimposition, lap dissolve or fade-out. Four optical openings. Strip material may be used horizontally or vertically with Drives shown below.





Gray TELOP II

With the versatile Gray TELOP II you can produce an amazing variety of professional-quality commercials at low cost. TELOP II presents selling messages with opaque cards, photographs and transparencies. You can get the effect of superimposition, lap dissolve and fade-out. Only limitation is your imagination. One operator does it all!

Gray 3A TELOJECTOR

Compact, portable unit for automatic, remote control projection of standard 2 x 2 slides in uninterrupted sequence . . . with studio effects of fading, lapping and superimposition. Projection alternates between two lens systems, with slide turrets changeable in seconds.





Gray 55A FILM CAMERA TURRET

Enables a single camera to serve up to 8 projectors. Centered on a rugged 'square' pedestal, requires a minimum of space. Heavy duty ball bearings. Rotates 360°.

Gray 11A VERTICAL SCROLL DRIVE

Attaches to any optical openings of the Telop. Accommodates roll stock *vertically* to televise commentary or the commercial in the same way movie introductions are projected.





Gray 60A FOUR-WAY FILM MULTIPLEXER

A precision arrangement of mirrors for operation of pairs of projectors simultaneously into a single TV camera or individually into two separate cameras. *Enables a greater number of projectors to be used with fewer highly expensive TV cameras.*

Gray 13A LIGHT BOX

Provides back lighting of transparencies for Telop use.

Gray 12A HORIZONTAL TAPE DRIVE

Attaches to optical openings of the Telop. News ticker tape fed from 8-mm reels is projected on any part of the screen, top to bottom, horizontally. May be used with test pattern or other commercial.





Gray 15R REVERSE CLOCK

For use where reversal is required. Designed to permit superimposing of the commercial or other copy.

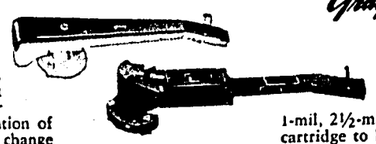


Gray EQUALIZERS

MODEL 602B EQUALIZER has been specially engineered to provide constant velocity frequency response for both conventional and LP records. Four steps — flat, transcriptions, good records, poor records. Gray Equalizers used as standard professional equipment by broadcast stations.
MODEL 603 — Has 5 control positions. For both GE and Pickering cartridges.

Gray 108B VISCOUS DAMPED TONE ARM

For all records — 33⅓, 45 and 78 r.p.m. Radically new suspension development on the viscous damping principle *for perfect tracking* of records and elimination of tone arm resonances. Instant cartridge change with automatic correct stylus pressure. Solves all transcription problems. IDEAL FOR LP RECORDS. For Pickering and GE cartridges.



Gray 106SP TRANSCRIPTION ARM

Designed to meet strictest requirements of modern highly compliant pickup cartridges. Three cartridge slides furnished enable GE 1-mil, 2½-mil or 3-mil cartridges or Pickering cartridge to be slipped into position in a jiffy. No tools or solder! Superb reproduction of 33⅓, 45 or 78 r.p.m. records. Low vertical inertia, precisely adjustable stylus pressure.

Please write Dept. RB for bulletins describing the above equipment.

GRAY RESEARCH

and Development Co., Inc., Hilliard St., Manchester, Conn.

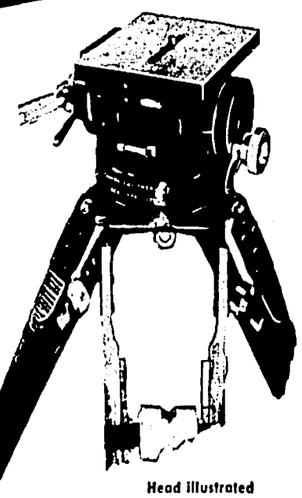
Division of the GRAY MANUFACTURING COMPANY—Originators of the Gray Telephone Pay Station and the Gray Audograph

Services for the Broadcaster

(Continued from page 117)

Berkeley, Div. Beckman Instruments, Inc., 2200 Wright Ave., Richmond, Calif., 5
For details see ad on page 8
Burnett Radio Laboratory, Wm. W. L., Calif., 5
Central Rediffusion Services, England, 10, 15
De Wald Radio Mfg. Corp., N.Y., 5
Eichwald & Co., Inc., B., N.Y., Operate Radio Stations
Federal Telecommunication Labs., Inc., N.J., 5
Gillett & Bergquist, D.C., AM TV Allocation
Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif., 5
See complete catalog in last section
Ivanhoe Electronic Labs., Ill., 5
Marconi Instruments, Ltd., N.Y., 5
Monitor Products Co., Calif., 5
Oberline, Ltd., Calif., 10
Phelps Precision Laboratory, Minn., 5
Precision Film Laboratories, Inc., N.Y., Film Processing
Scotts Television, Va., 5
Sellers Co., Tex., Recording Studio
Specialty Assem. & Packing Co., N.Y., 5
Strain Engineering Service, Ga., 5
Televiso Corp., Ill., 5

From Station Break to Feature... the NEW "BALANCED" TV Tripod is doing a whale of a job every day!



WE THREW THE book away and engineered a brand new "BALANCED" Tripod for every photographic and video need. The result—a revelation in effortless operation, super-smooth tilt and 360° pan action.

PERFECT BALANCE prevents mishap if the lock lever is not applied. Quick release pan handle locks into desired position. Mechanism is enclosed, rustproof, needs no lubrication. Tension adjustment for Camera Man's preference. Built-in spirit level. Telescoping extension pan handle. We defy you to get anything but the smoothest, most efficient operation out of this tripod beauty.



Head illustrated contains adjustable camera tie-down screw for locating center of gravity. This feature is optional.

"BALANCED" TV TRIPOD mounted on 3-wheel portable collapsible dolly.

If you work with film... **for Studio, Newsreel, Commercials, Business, Industrial or Home Movies—it will pay you to get to know us. The country's foremost professionals depend upon our portable, versatile, adaptable equipment.**

CAMERA EQUIPMENT CO.

We Rent and Service Cameras • Moviolas • Dollies
Complete line of 35mm and 16mm equipment available for rental
MITCHELL: Standard, Hi-Speed, BNC, NC, 16mm
BELL & HOWELL: Standard, Shiftover, Eyemos
MAURER: 16mm Cameras
MOVIOLA: Editing machines, Synchronizers

We Design and manufacture Lens Mounts and camera equipment for 16mm — 35mm and TV cameras.

We Calibrate Lenses **Precision "T" STOP CALIBRATION of all type lenses, any focal length. Our method is approved by Motion Picture Industry and Standard Committee of SMPTE. For proper exposure density, it is important that you have your lens "T" stop calibrated. Lenses coated for photography. Special TV coating. Rapid service.**

16. Studio Equipment.

5. Consoles & speech input equip.
10. TV cameras
15. TV camera control equipment
20. TV film projectors
25. TV studio lighting equipment
30. Turntables

Adler Communications Labs., N.Y., 5
Altec-Lansing Corp., Calif., 5
Bardwell & McAlister, Calif., 25
Berndt-Bach, Inc., Calif., 10
Camera Equipment Co., 1600 Broadway, New York 19, N.Y., 25
For details see ad on page 119
Canadian General Electric Co., Canada, 5, 10, 15, 20, 25, 30
Canadian Research Institute, Canada, 5
Cardwell Mfg. Corp., Allen D., Conn., Color TV Studio Equip.
Century Lighting, Inc., N.Y., 25
Century Projector Corp., N.Y., 20
Collins Radio Co., 855 35th St. N.E., Cedar Rapids, Iowa, 5
For details see ad on pages 428-429
Dage Electronics Corp., Ind., 10, 15
DuMont Labs., Inc., Allen B., TV Transmitter Div., 1500 Main Ave., Clifton, N.J., 10, 15, 20, 25, 30
For details see ad on page 29
Eastman Kodak Co., N.Y., 20
Edmar Communication Co., Pa., 5
Equipment and Service Co., Tex., 25
Fairchild Recording Equipment Corp., N.Y., 30
Federal Telecommunication Labs., Inc., N.J., 5, 10, 15, 20
Gates Radio Co., Ill., 5, 15, 30
General Communications, Wis., 5, 25
General Precision Lab., Inc., 63 Bedford Rd., Pleasantville, N.Y., 10, 15, 20
For details see ad on page 116
Gray Research & Development Co., Inc., Hilliard St., Manchester, Conn., 20
For details see ad on page 118
Hughey & Phillips, Calif., 25
Industrial Television, Inc., N.J., 5
Interelectronics Corp., 2432 Grand Concourse, New York 58, N.Y., 5
For details see ad on page 51
Kliegl Bros. Universal Elec. Stage Lighting Co., N.Y., 25
Langevin Manufacturing Corp., 37 W. 65 St., New York 23, N.Y., 5
For details see ad on page 218
Lesa, S.P.A. Italy, 30
Marconi's Wireless Telegraph Co., Ltd., England, 5, 10, 15, 20, 25, 30
Marine Electric Corp., N.Y., 5
McCurdy Radio Ind., Ltd., Canada, 5
Metal Products Co., Tenn., 5, 10, 15
Molded Insulation Co., Pa., 10
Mole-Richardson Co., Calif., 25
National Cine Equipment, Inc., N.Y., Booms, Dollies
National Radio Research Labs., N.Y., 5
Northern Electric Co., Ltd., Canada, 5
Oberline, Ltd., Calif., 5
Presto Recording Corp., P.O. Box 500, Paramus, N.J., 5, 30
For details see ad on page 110
Radio Corp. of America, Engineering Products Div., Camden, N.J., 5, 10, 15, 20, 30
For details see ad on pages 88, 440-441

(Continued on page 120)

A Complete Line of

TV PRODUCTION TEST EQUIPMENT

AND

INSTRUMENTS

- Synchronizing Signal Generators
- Monoscope Cameras
- R.F. Sweep Generators
- I.F. Sweep Generators
- I.F. Distribution Amplifiers
- Video Distribution Amplifiers
- Range Calibrators
- Multi-Frequency Crystal Generator
- Bar-Dot Generator
- Delay Lines

WRITE FOR COMPLETE CATALOG.

Tel Instrument Co., Inc.

50 PATERSON AVE.

EAST RUTHERFORD, N. J.

Studio Equipment

(Continued from page 119)

Radio Recorders Equipment Co., Calif., 5
Redifon, Ltd., England, 5
Reevesound Co., Inc., N.Y., 5, 15
Robinson Recording Laboratories, Pa., 30
Rolab Studios, Conn., 15
Stancil-Hoffman Corp., Calif., 5
Strong Electric Corp., Ohio, 25
T. L. G. Electro Corp., N.Y., 5
Tarzian, Inc., Sarkes, Ind., 10, 15, 20
Telechrome, Inc., 88 Merrick Rd., Amityville, L.I., N.Y., 5, 10, 15
For details see ad on pages 120, 285
Telescreen Corp., Conn., 10, 15
Tel Instrument Co., 50 Paterson Ave., East Rutherford, N.J., 10, Monoscope
For details see ad on page 120
Trans Lux Corp., N.Y., 20, Rear Screen
Victorlite Ind., Inc., Calif., Background Projector
Western Sound & Elec. Labs., Inc., Wis., 5

17. Transmitters.

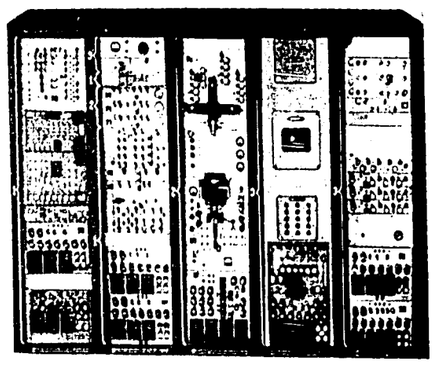
5. AM Broadcast
10. FM Broadcast
15. TV Broadcast
20. Relay broadcast & STL equip.

Alcor Electronics Corp., N.Y., 20
Budelman Radio Corp., Conn., 20
Canadian General Electric Co., Canada, 5, 10, 15, 20

Transmitters

Canadian Westinghouse Co., Canada, 5, 10
Central Rediffusion Services, England, 5
Century Electronics, Div. Century Metalcraft Corp., 14808 Oxnard St., Van Nuys, Calif., 20
For details see ad on page 329
Chisholm Industries, Ltd., Canada, 5, 10, 20
Collins Radio Co., 855 35th St. N.E., Cedar Rapids, Iowa, 5
For details see ad on pages 428-429
Communication Devices Co., Inc., N.Y., 5, 10, 20
Continental Electronics Mfg. Co., Tex., 5
Custom Electronics Corp., N.J., Studio Cue
DuMont Labs., Inc., Allen B., TV Transmitter Div., 1500 Main Ave., Clifton, N.J., 15, 20
For details see ad on page 29
Eicor, Inc., Ill., 15
Electro Craft Industries, Inc., Conn., 20
Erco Radio Labs., Inc., N.Y., Beacon & Teletype
Federal Electric Mfg. Co., Ltd., Canada, 5, 10, 15, 20
Federal Telecommunication Labs., Inc., N.J., 15, 20
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 15, 20
For details see ad on pages 368-373
Fisher Research Lab., Inc., Calif., 5
Gallay, Harris, N.J., 20
Gates Radio Co., Ill., 5, 10, 15, 20
Hallicrafters Co., Ill., 10, Hand Carried
Hose-McCann Telephone Co., Inc., N.Y., 5
Lytle Engineering & Mfg. Co., Ill., 10
Marconi's Wireless Telegraph Co., Ltd., England, 5, 10, 15
Metal Products Co., Tenn., 20, TV Relay
Motorola, Inc., Ill., 20
Mullard Overseas Ltd., England, 5
Philco Corp., Pa., 20
Radio Corp. of America, Engineering Products Div., Camden, N.J., 5, 10, 15, 20
For details see ad on pages 88, 440-441
Radio Engineering Labs., Inc., N.Y., 10, 20
Radio Engineering Products, Canada, 20
Radio Industries Corp., N.Y., 20
Redifon, Ltd., England, 5
Sonar Radio Corp., N.Y., 5, 10
Superior Marine Radio Co., Fla., 20
Tarzian, Inc., Sarkes, Ind., 15, 20
Technical Materiel Corp., N.Y., 20
Telechrome, Inc., 88 Merrick Rd., Amityville, L.I., N.Y., 15, 20
For details see ad on pages 120, 285
Westinghouse Electric Corp., Pa., 5, 10

NTSC



COLOR TV

TELECHROME'S NTSC "COLOSSUS"

Based upon solving many color TV problems we have evolved the NTSC Colossus — a unit specifically designed to enable the Industry to embark promptly on color programs by acquiring color equipment as required.

America's leading Radio—TV organizations are now using Telechrome equipment.

Write or phone for information—and delivery

GROUP 1 — Minimum Equipment consists of encoders, color bar, burst, sub-carrier, sync generators, phase equalizer, and incidental power supplies.

GROUP 2 — Additional Equipment includes flying spot picture generator and gamma amplifiers; permits encoding of 35 mm color slides.

GROUP 3 — Complete Equipment contains complete decoding and tri-color display, video amplifiers and sync separator, picture and sound transmitter.

COLOR TV TELE

THROUGH ADVANCED RESEARCH & DEVELOPMENT

84 MERRICK ROAD, AMITYVILLE, N.Y.

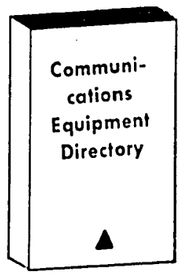
TELEPHONE AMITYVILLE 4-4444

Complete alphabetical list of products located in pink section preceding alphabetical directory.

A Directory of

3. Communications Equipment

All non-broadcast forms of communication; Amateur, Emergency, Facsimile, Mobile, Etc.



8 Major Groups

29 Products

Organized by functions for Engineers



18 Aircraft & Airport Equipment.
05 Airborne receivers
10 Airborne transmitters
15 Airport receivers
20 Airport transmitters
25 GCA Equipment, etc.

19 Amateur Equipment.
05 Antennas & antenna accessories, rotators, etc.
10 Receiving equipment
15 Transmitters

20 Carrier Current Equipment.
05 Complete terminal equipment
10 Installation & maintenance
15 Repeat & relay equipment

21 Emergency Communications Equipment.
05 Despatching equipment
10 Walkie-talkies

22 Facsimile Equipment.
05 Receiving equipment
10 Sensitized paper
15 Transmitting equipment

23 Marine Equipment.
05 Contract installers
10 Pleasure craft radiotelephones
15 Shipborne communications equipment

24 Mobile Equipment.
05 Antennas
10 Central Station receivers
15 Central Station transmitters
20 Citizen Radio
25 Mobile receivers
30 Mobile transmitters
35 Selective Calling equipment

25 Point-to-Point Equipment.
05 Antennas & towers
10 Receivers
15 Transmitters

The products and services of the Radio-Electronics industry have been organized into ten basic directories following closely the organization of the IRE Professional Groups. But 100 major product groups are numbered consecutively throughout.

Always consult the pink pages at the start of the Directory of firms, for a terminology cross-index, or to find products by name. The pink pages list more than 500 products by name, as well as under the product groups. Page numbers are given for speed.

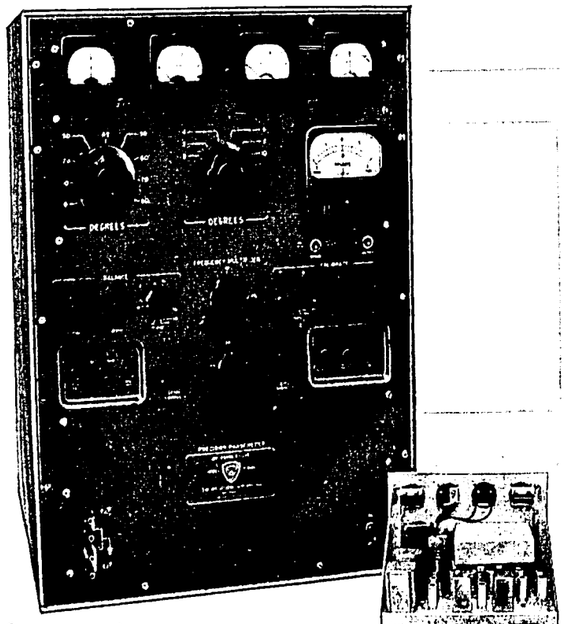
18. Aircraft & Airport Equipment.

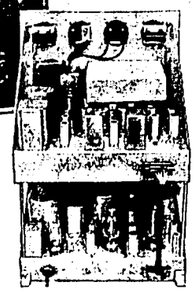
5. Airborne receivers
10. Airborne transmitters
15. Airport receivers
20. Airport transmitters
25. GCA equipment, etc.

Aero Materials Co., N.Y., 5, 10, 15, 20, 25
Aeronautical Communications Equip., Inc., Fla., 5, 10, 20
Air Associates, Inc., N.J., 15, 20
Aircraft Radio Corp., Boonton, N.J., 5, 10
For details see ad on page 123
Airplane & Marine Instruments, Pa., 5, 10
American Electroneering Corp., Calif., 5, 10, 15, 20
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25
Aviation Accessories, Inc., Tex., 5, 15, 20
Bassett Inc., Rex, Fla., 15, 20
Bendix Aviation Corp., Bendix Radio Div., Baltimore 4, Md., 5, 10, 25
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Research Lab., Fisher Bldg., Detroit 2, Mich., 5, 10, 15, 20, 25
For details see ad on pages 176, 366-367
Canadian General Electric Co., Canada, 5, 10, 15, 20, 25
Canadian Westinghouse Co., Ltd., Canada, 5, 10, 15, 20
Central Rediffusion Services, England, 15, 20
Champion Electric Corp., England, 5
Coles Electronic Corp., Pa., 10
Collins Radio Co., 855 35th St., N.E., Cedar Rapids, Iowa, 5, 10, 15, 20, 25
For details see ad on pages 428-429
Communicating Systems, Inc., N.Y., 5, 10, 15, 20
Communication Devices Co., Inc., N.Y., 5, 10, 15, 20
Communications Co., Inc., Fla., 15, 20
Crown Engineering, N.M., 10
Cubic Corp., Scott & Canon Sts., San Diego 6, Calif., 5, 10
For details see ad on page 327
De Wald Radio Mfg. Corp., N.Y., 5
Eldico of New York, Inc., 44-31 Douglaston Pkwy., Douglaston, L.I., N.Y., 5, 10, 15, 20
For details see ad on page 257
Electronic Specialty Co., Calif., 5, 10
El-Tronics, Inc., Pa., 15, 20
Emerson Radio and Phonograph, N.Y., 5, 10, 25
Erco Radio Labs., Inc., N.Y., 15, 20
Federal Electric Mfg. Co., Ltd., Canada, 5, 10, 15, 20, 25
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5, 10, 15, 20, 25
For details see ad on pages 368-373
Freed Electronics & Controls Corp., N.Y., 5
Garod Radio Corp., N.Y., 5
Gates Radio Co., Ill., 20
Gertsch Products, Inc., Calif., 5
Gilfillan Bros., Inc., Calif., 25
Hallicrafters Co., Ill., 15
Hammarlund Mfg. Co., 460 W. 34 St., New York 1, N.Y., 15
For details see ad on pages 424-427
Hastings Instrument Co., Inc., Va., 5, 10
Hycon Mfg. Co., Calif., 5, 10
Industrial Research Labs., Md., 10
Jarvis Electronics Corp., Ill., 5, 10, 25
Kahn Research Labs., N.Y., 20
Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 5, 10, 15, 20, 25
For details see ad on pages 414-415
Kingston Prod. Corp., Ind., 10
Laboratory for Electronics, 75 Pitts St., Boston 14, Mass., 25
For details see ad on pages 432-433
Lavoie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N.J., 20, 25
For details see ad on page 328
Lear, Inc., Calif., 5, 10, 15, 20, 25
Loral Electronics Corp., N.Y., 5
Lytle Engineering & Mfg. Co., Ill., 5, 10, 15
Marconi's Wireless Telegraph Co., Ltd., England, 5, 10, 15, 20, 25
Maryland Electronic Mfg. Corp., Md., 15, 20, 25
Maxson Corp., W. L., 460 W. 34 St., New York 1, N.Y., 25
For details see ad on page 122
Melpar, Inc., Va., 5, 10
Mercury Electronic Co., N.J., 5, 10
Mitchell Industries, Inc., Tex., 5, 10, 15, 20
Molded Insulation Co., Pa., 15
Mullard Overseas Ltd., England, 5, 10
Munston Mfg. & Service, Inc., N.Y., 15, 20

(Continued on page 123)

MAXSON
PRECISION PHASE METER





for precise measurement of phase difference at audio frequencies

THE MODEL P-1060 PHASE METER is invaluable wherever precise knowledge of phase relationships in the audio-frequency range must be obtained. It has found increasing acceptance in the design of reactive components or of equipment using them, and in such analytical applications as measurement of residual inductance in "non-inductive" resistors, measurement of stray capacitance across resistors, and investigation of phase relationships in navigational and data-transmission systems.

Employing the phase-comparison method, the instrument exhibits a high degree of accuracy and incremental discrimination. The calibration may be checked with auxiliary equipment available in most laboratories. Even-order harmonic distortion is cancelled and odd-order distortion up to 1% will not affect accuracy of reading.

SPECIFICATIONS

Equipment, when removed from cabinet, is suitable for mounting in standard 19" relay rack.

WRITE TODAY for descriptive bulletin No. IR-53.

Frequency range	30 to 20,000 cps
Phase range	0 to 360 degrees
Accuracy	0.1 degree
Incremental discrimination	0.01 degree
Signal level	0.5 to 10 volts rms
Input impedance	10 megohms shunted by 25 $\mu\mu f$
Display	Decade null system
Output jack	Can be provided for operating external recorder
Power requirements	200 watts at 105-125 volts, 60 cycles
Size	19½" wide, 16¼" deep, 25" high
Weight	110 pounds
Cabinet	Internally shielded walnut cabinet.

MAXSON

THE W. L. MAXSON CORPORATION
460 West 34th Street New York 1, N. Y.
Plants at Long Island City, N. Y. and Old Forge, Pennsylvania

MAXSON

ENGINEERING

Can Help YOU

in

- **RESEARCH**
- **DEVELOPMENT**
- **MANUFACTURE**

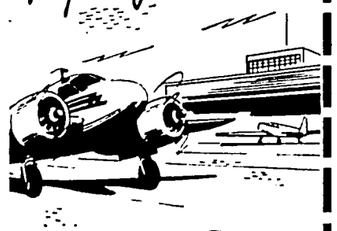
of

Wide-band UHF power oscillators
Radar mapping systems
Navigation computers
Ammunition feeders
Fire-control computers
Mechanical turret drives
Gun-data computers
Bomb racks
Phasemeters
Line-of-position computers
Electronic flowmeters
Electronic countermeasures systems
Magnetic-amplifier control systems
Mine laying systems
Fire-control radar
Ammunition-feeding systems
Servo amplifiers
Fire-control system components
Doppler radar systems
Missile launchers
Machine-gun pods
Mechanical turret drives
Reflex sights
Mobile bomb lifts
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Stabilized aircraft-turret drive and control systems
Gyroscopes
Rocket launchers

FACILITIES BROCHURE ON REQUEST

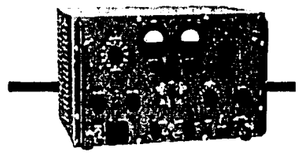
CHECK ACCURATELY...

Fly Confidently!



A.R.C. SIGNAL GENERATOR

Gives a Quick, Accurate Check of VHF Airborne Navigation Equipment



TYPE H-14
108-132 Megacycles

■ Favorite, dependable instrument for quick, accurate check of VHF airborne omnirange and localizer receivers in aircraft or on the bench. It checks up to 24 omni courses, omni course sensitivity, to-from and flag-alarm operation, left-center-right on 90/150 cycle localizers. Widely used for all quantitative bench tests. For ramp check, RF output 1 volt into 52 ohm line; for bench checks, 0-10,000 microvolts. AF output available for bench maintenance and trouble shooting.

Price $942.00 net, f.o.b. Boonton, N.J.

Ask for literature on new A.R.C. Type H-16 Standard Course Checker—a simple, precise instrument for checking the phase-accuracy of the modulation on VOR (omnirange) signal generators. For laboratory or field use.



Price $398.00 f.o.b. Boonton, N.J.

ARC

Dependable Airborne Electronic Equipment Since 1928

Aircraft Radio Corporation
BOONTON NEW JERSEY

Aircraft & Airport Equip.

(Continued from page 121)

National Aeronautical Corp., Pa., 5, 10, 15, 20
National Co., Inc., 61 Sherman St., Malden 48, Mass., 5, 15, 20
For details see ad on pages 434-435
National Electronics Labs., Inc., D.C., 15, 20
Northern Electric Co., Ltd., Canada, 5, 15
Phebco, Inc., Md., 5, 10
Philco Corp., Pa., 5, 20
Polarad Electronics Corp., N.Y., 5
Presto Recording Corp., P.O. Box 500, Paramus, N.J., 5
For details see ad on page 110
Radar Electronics, Inc., N.Y., 5
Radio Apparatus Corp., Ind., 15
Radio Engineering Products, Canada, 5, 10, 15, 20, 25
Radio Laboratories, Inc., Wash., 15, 20
Radio Manufacturing Engineers, Ill., 15
Redifon, Ltd., England, 15, 20
Resdel Engineering, Calif., 5, 10, 15, 20, 25
Ribet Desjardins, France, 25
Rich Electronics, Inc., Fla., 10
Ripley Co., Inc., Middletown, Conn., 5, 10
For details see ad on page 131
Schuttig and Co., Inc., D.C., 15, 20
Sonar Radio Corp., N.Y., 5, 10, 15, 20, 25
Specialty Assem. & Packing Co., N.Y., 10
Spilsbury & Tindall Ltd., Canada, 15, 20
Square Root Manufacturing Corp., N.Y., 5, 10, 25
Starrett Television Corp., N.Y., 20
Summers Gyroscope Co., Calif., 5
Superex Electronics Corp., N.Y., 5, 10
T. L. G. Electric Corp., N.Y., 5, 10, 15, 20
Telephonics Corp., N.Y., Aircraft Intercom
Telescreen Corp., Conn., 5, 10
Trad Television Corp., 1001 First Ave., Asbury Park, N.J., 5
For details see ad on page 338
Transducer Corp., Mass., 25
Transmitter Equipment Mfg. Co., N.Y., 5, 10, 15, 20
Wells-Gardner & Co., Ill., 5, 10
White Industries, Inc., N.Y., 10
Wilcox Electric Co., Inc., Mo., 5, 10, 15, 20, 25
Wilcox-Gay Corp., Mich., 5

19. Amateur Equipment.

5. Antennas & antenna accessories, rotators, etc. **10.** Receiving equipment **15.** Transmitters

Alliance Manufacturing Co., Ohio, 5
American Phenolic Corp., 1830 S. 54 Ave., Chicago 50, Ill., 5
For details see ad on page 2
Amy, Aceves & King, Inc., N.Y., 5
Antenna Specialists Co., Ohio, 5
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 5, 15
For details see ad on page 408
Bassett Inc., Rex, Fla., 5, 10, 15
Birnbach Radio Co., Inc., 145 Hudson St., New York 13, N.Y., 5
For details see ad on pages 103, 248

Amateur Equipment

Brach Mfg. Corp., N.J., 5
Bremer Electronics, N.J., 10, 15
C and H Sales Co., Calif., 10, 15
Cardwell Mfg. Corp., Aller D., Conn., 10
Champion Electric Corp., England, 10
Chisholm-Ryder Co., Inc., N.Y., 5
Coles Electronic Corp., Pa., 15
Collins Radio Co., 855 35th St., N.E., Cedar Rapids, Iowa, 5, 10, 15
For details see ad on pages 428-429
Consolidated Wire & Assoc. Cos., Ill., 5
Cornell-Dubilier Electric Corp., 333 Hamilton Blvd., South Plainfield, N.J., 5
For details see ad on page 6
Davis Electronics, Calif., 5
Decimeter, Inc., Colo., 10
Denrad Mfg. Co., Inc., Tex., 15
Douglas Radio Labs., Mass., 15
Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio, 5
For details see ad on page 165
Eldico of New York, Inc., 44-31 Douglaston Pkwy., Douglaston, L.I., N.Y., 5, 10, 15
For details see ad on page 257
Freteo Inc., Pa., 5
Gates Radio Co., Ill., 15
Hallicrafters Co., Ill., 10, 15
Hammarlund Mfg. Co., Inc., 460 W. 34 St., New York 1, N.Y., 10
For details see ad on pages 424-427
Harvey-Wells Electronics, Inc., Mass., 10, 15
Heath Co., Mich., 10, 15
Hy-Lite Antennae, Inc., N.Y., 5
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 5
For details see ad on page 134
Johnson Co., E. F., Waseca, Minn., 5, 15
For details see ad on page 183
Letting Radio Mfg. Co., N.Y., 15
Lysco Mfg. Co., Inc., N.J., 5, 15
Lytle Engineering & Mfg. Co., Ill., 10
Mark Products Co., Ill., 5
Master Mobile Mounts, Inc., Calif., 5, 10, 15
McCarter Radio & TV Co., Canada, 5
Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass., 15
For details see ad on page 334
Morrow Radio Mfg. Co., Ore., 10, 15
Motorola, Inc., Ill., 5, 10, 15
National Company, Inc., 61 Sherman St., Malden 48, Mass., 10
For details see ad on pages 434-435
Philmore Mfg. Co., Inc., N.Y., 5, 15
Radio Laboratories, Inc., Wash., 15
Radio Manufacturing Engineers, Ill., 10, 15
Radio Transceiver Laboratories, N.Y., 10, 15
Rich Electronics, Inc., Fla., 15
Rogers Majestic Electronics, Ltd., Canada, 10
Sonar Radio Corp., N.Y., 10, 15
Specialty Assem. & Packing Co., N.Y., 5
Spera Electronics Labs., N.Y., 10, 15
Standard Transformer Corp., Ill., 15
States Co., Conn., 5
Stockman Electronics Research, Mass., 10
Suburban Radio Co., N.J., 15

(Continued on page 124)

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

Amateur Equipment

(Continued from page 123)

Technical Apparatus Builders, N.Y., 10, 20
Technical Appliance Corp., N.Y., 5
Telrex, Inc., 26 Neptune Hghwy., Asbury Park, N.J., 5
For details see ad on page 258
Transmitter Equip. Mfg. Co., N.Y., 15
Ward Products Div., Gabriel Co., Ohio, 5
Wilcox Electric Co., Inc., Mo., 15
Wind Turbine Co., 248 E. Market St., West Chester, Pa., 5
For details see ad on page 128
Workshop Associates Div., Gabriel Co., Endicott St., Norwood, Mass., 5
For details see ad on page 112
World Radio Laboratories, Iowa, 15

20. Carrier Current Equipment

5. Complete terminal equip. 10. Installation & maintenance 15. Repeat & relay equip.

Alcar Electronics Corp., N.Y., 5, 15
Automatic Electric Co., Ill., 5, 15
Bristol Co., Conn., 15
Budelman Radio Corp., Conn., 5
Canadian General Electric Co., Canada, 5, 10, 15
Canadian Westinghouse Co., Ltd., Canada, 15
Communication Accessories Co., 110th St. & Hillcrest Rd., Hickman Mills, Mo., 5
For details see ad on page 144
Communication Equip. & Engineering, Ill., 5
Control Corporation, Minn., 5
Electronic Industries, Inc., Minn., 10
Farmers Engineering & Mfg. Co., Pa., 5
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5, 15
For details see ad on pages 368-373
General Electric Co., N.Y., 5, 10, 15
Harmon Electronics Co., Mo., 5, 10, 15
K. F. Development Co., Calif., 5, 10
Kellogg Switchboard & Supply Co., Dept. 69, 79 W. Monroe St., Chicago 3, Ill., Telephonic Carrier
For details see ad on page 106
Lenkurt Electric Co., Inc., Calif., 5, 15
Lesa, S. P. A., Italy, 10, 15
Lynch Carrier Systems, Inc., Calif., 5, 15
Marconi's Wireless Telegraph Co., Ltd., England, 5, 10, 15
Marsh-Theiss, Inc., N.Y., 10
Maspeth Telegraph & Radio Corp., N.Y., 5, 10, 15
Motorola, Inc., Ill., 5, 10, 15
Motorola Research Laboratory, Ariz., 5, 15
Mullard Overseas Ltd., England, 5
Northern Electric Co., Ltd., Canada, 5, 15
Northern Radio Co., Inc., 145 W. 22 St., New York 11, N.Y., AM & Frequency Shift Tone Telegraph
For details see ad on pages 410-412

Carrier Current Equipment

PM Industries, Inc., Conn., 15
Radio Engineering Products, Canada, 5, 10, 15
Radio Laboratories, Inc., Wash., 5, 10
Rogers Majestic Electronics Ltd., Canada, 5, 10
Sierra Electronic Corporation, Calif., 10
Sondyna, A. G., Switzerland, 10
Southern Elec. & Transmission Co., Tex., 5, 15
Stelma, Inc., Conn., 5, 15
T. L. G. Electric Corp., N.Y., 5, 15
Vocaline Company of America, Inc., Conn., 15
Westinghouse Electric Corp., Pa., 5, 10, 15

21. Emergency Communications Equipment.

5. Despatching equipment 10. Walkie-talkies

Air Associates, Inc., N.J., 5, 10
American Electroneering Corp., Calif., 10
Bendix Aviation Corp., Bendix Radio Div., Baltimore 4, Md., 10
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Research Lab., Fisher Bldg., Detroit 2, Mich., 5, 10
For details see ad on pages 176, 366-367
Canadian Westinghouse Co., Ltd., Canada, 5
Champion Electric Corp., England, 10
Communication Devices Co., Inc., N.Y., 5, 10
Communication Equip. & Engineering, Ill., 10
Communications Co., Inc., Fla., 5
Computing Devices of Canada, Ltd., Canada, 5
Condor Radio Mfg. Co., Ariz., 10
Dictograph Products, Inc., N.Y., 5
Eldico of New York, Inc., 44-31 Douglaston Pkwy., Douglaston, L.I., N.Y., 5, 10
For details see ad on page 257
Electro Craft Industries, Inc., Conn., 10
Emerson Radio and Phonograph, N.Y., 10
Federal Electric Mfg. Co., Ltd., Canada, 5
Galbraith & Son Electric Co., C. C., 450 Avenue of the Americas, New York 11, N.Y., 5
For details see ad on page 104
Grady Instrument, Mass., 5, 10
Hallicrafters Co., Ill., 10
Interelectronics Corp., N.Y., 10
Kaar Engineering Corp., Calif., 5
Kahn & Co., Inc., Conn., 10
Lear, Inc., Calif., 10
Lehigh Valley Electr. Engr. & Mfg., Pa., 10
Lysco Mfg. Co., Inc., N.J., 5, 10
Magnex Corp., N.Y., 10
Marconi's Wireless Telegraph Co., Ltd., England, 5, 10
Maspeth Telephone & Radio Corp., N.Y., 10

Emergency Communications Equipment

McElroy Manufacturing Corp., Mass., Radio Telegraph
Morrow Radio Mfg. Co., Ore., 5, 10
Motorola, Inc., Ill., 5, 10
Motorola Research Laboratory, Ariz., 5, 10
Parts Producing Corp., N.Y., 5
Phebco, Inc., Md., 10
Radio Corp. of America, Engineering Products Div., Camden, N.J., 5, 10
For details see ad on pages 88, 440-441
Radio Engineering Products, Canada, 5, 10
Radio Laboratories, Inc., Wash., 5
Radio Transceiver Laboratories, N.Y., 10
Rogers Majestic Electronics, Ltd., Canada, 5, 10
Royalcall, Inc., Ohio, 5
Sonar Radio Corp., N.Y., 5, 10
Technical Materiel Corp., N.Y., 10
Telephonics Corp., N.Y., 10
Transmitter Equipment Mfg. Co., N.Y., 5

22. Facsimile Equipment.

5. Receiving equipment 10. Sensitized paper 15. Transmitting equipment

Aerolux Light Corp., N.Y., Light sources
Alden Electronic & Impulse Recording Co., Westboro, Mass., 5, 15
For details see ad on page 125
Alden Systems Co., Box 125, Westboro, Mass., 5, 15
For details see ad on page 125
Alfax Paper & Engineering Co., P. O. Box 125, Westboro, Mass., 10
For details see ad on page 125
American Machine & Foundry Co., Mass., 5, 10, 15
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 15
For details see ad on page 408
Brick Electronic Equipment Co., N.J., 5, 10, 15
Canadian General Electric Co., Canada, 5, 10, 15
Cardwell Mfg. Corp., Allen D., Conn., 5, 15
Espey Manufacturing Co., Inc., N.Y., 15
Faximile, Inc., N.Y., 5, 10, 15
Freed Electronics & Controls Corp., N.Y., 5
Hogan Laboratories, Inc., 155 Perry St., New York 14, N.Y., 5, 10, 15
For details see ad on page 283
Muirhead & Co., Ltd., England, 5, 10, 15
Northern Radio Co., Inc., 145 W. 22 St., New York 11, N.Y., Converters
For details see ad on pages 410-412
Radio Engineering Products, Canada, 15
Sonar Radio Corp., N.Y.,
Times Facsimile Corp., 540 W. 58th St., New York 19, N.Y., 5, 10, 15
For details see ad on page 303
Western Union Telegraph Co., N.Y., 15
Winchester Industries, Inc., N.J., 5, 15

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

ALFAX the NEW Universal Recording Paper
for HELIX, STYLUS, ROLLER or IMPRESSION PRINTING and RECORDING

Now for the first time there is available a universal paper for instrument and facsimile recording applicable to any type of printing or recording means known today.

ELECTRICITY IS THE INK

Marked by current as low as 1 volt, ALFAX now makes possible low-cost recorders of new simple design.
ALFAX is the only paper capable of high speed recording — normal writing speeds up to 300" per second.
ALFAX records faithfully under extreme humidity, and over all temperature ranges from stratospheric to sub-tropical.
ALFAX provides a THIRD DIMENSION thru 14-step tone response.
Find how this new universal paper can serve you to PRODUCE Memories — to RECORD Computer Totals, Radar Signals, Sonar Signals, Infra Red Signals, Telemetered Data — to DISPATCH Business Records and Information — to MONITOR Any Operation, Any Process — to PROVIDE Information for Analysis Studies.

Request Booklet "Recording with Alfax" — describe your problem.

ALFAX PAPER & ENGINEERING CO.
Alden Research Center, Westboro, Mass.
ENGINEERING SERVICE TO RECORDER MANUFACTURERS

Alden Monitoring Recorders

Providing an extremely simple method of getting permanent records of number and time of almost any actions or occurrences — with simple rugged Recorders that can be used under almost any conditions — installed by anybody.
The basic simplicity of these recorders is made possible by the use of Alfax Electro-sensitive Paper in which electricity is the ink. This paper records under climatic extremes of humidity and temperature and making possible simple, rugged recorders without need of delicate mechanisms or complex moving parts.

ALDEN MAGAZINE RECORDER



Records 2 actions plus timing marks. Just plug into AC outlet and run wires to source of on-off actions.

ALDEN MULTI-CHANNEL RECORDER



To record up to 30 separate tests, actions and processes, all on 5" paper.

Facsimile Components Available

It's immensely simple — and inexpensive — to build your own recorders with our unitized facsimile recorder components.

Request Literature

ALDEN ELECTRONIC & IMPULSE RECORDING CO.
Alden Research Center, Westboro, Mass.

23. Marine Equipment.

5. Contract installers 10. Pleasure craft radiotelephones 15. Shipborne communications equip.

Airplane & Marine Instruments Inc., Pa., 15
Applied Electronics Co., Inc., Calif., 10, 15
Ardente Acoustic Labs., Ltd., England, 15
Bassett Inc., Rex, Fla., 10
Bludworth-Marine Division, National Simplex-Bludworth, Inc., N.Y., 10, 15
Burke Electric & X-Ray Co., Ltd., Canada, 5
Canadian General Electric Co., Canada, 10, 15
Canadian Westinghouse Co., Ltd., Canada, 10, 15
Central Rediffusion Services, England, 15
Chisholm Industries, Ltd., Canada, 15
Communication Devices Co., Inc., N.Y., 10, 15
Communications Co., Inc., Fla., 10
Connecticut Marine Instrument, Conn., 5, 10, 15, Antennas
Eldico of New York, Inc., 44-31 Douglaston Pkwy., Douglaston, L.I., N.Y., 10, 15
For details see ad on page 257
Electro Craft Industries, Inc., Conn., 15
Erco Radio Labs., Inc., N.Y., 10, 15
Espey Manufacturing Co., Inc., N.Y., 15
Federal Electric Mfg. Co., Ltd., Canada, 15
Fisher Research Lab., Inc., Calif., 10, 15
G. L. Electronics, Calif., 5, 10, 15
Galbraith & Son Electric Corp., C. C., 450 Ave. of the Americas, New York 11, N.Y., 15
For details see ad on page 104
General Electrosonics, Inc., N.Y., 5
Gray Radio Co., Fla., 10
Hose-McCann Telephone Co., Inc., N.Y., 5, 10, 15
Hycon Mfg. Co., Calif., 15
Jefferson, Inc., Ray, N.Y., 10, 15, Direction Finders
Kaar Engineering Corp., Calif., 10, 15
Kahn & Co., Inc., Conn., 10, 15
Lear, Inc., Calif., 10
Lorain County Radio Corp., Ohio, 5, 15
Lysco Mfg. Co., Inc., N.J., 10
Mackay Radio & Telegraph Co., N.Y., 5, 15
Magnex Corp., N.Y., 15
Marconi's Wireless Telegraph Co., Ltd., England, 15
Marine Electric Corp., N.Y., 5, 15
Marsh-Theiss, Inc., N.Y., 5
McCarter Radio & TV Co., Canada, 15
Motorola, Inc., Ill., 15
Mullard Overseas Ltd., England, 10, 15
Munston Mfg. & Service, Inc., N.Y., 10
National Co., Inc., 61 Sherman St., Malden 48, Mass., 15
For details see ad on pages 434-435
Philco Corp., Pa., Loran
Polarad Electronics Corp., N.Y., 15
Radio Corp. of America, Camden, N.J., 10, 15
For details see ad on pages 88, 440-441
Radio Laboratories, Inc., Wash., 5, 10, 15
Radiomarine Corp. of America, N.Y., 10, 15
Redifon, Ltd., England, 15
Remler Co., Ltd., Calif., Locator Transmitters
Rich Electronics, Inc., Fla., 10, 15
Robberson Marine Radio, N.Y., 5, 10, 15, Antennas
Rogers Majestic Electronics Ltd., Canada, 15
Rowe Industries, Ohio, 10
Seismograph Service Corp., Okla., Navigation Equip.
Smith Mfg. Co., Nathan R., Calif., 5, 10
Sonar Radio Corp., N.Y., 10, 15
Spilsbury & Tindall Ltd., Canada, 5, 10, 15
Starrett Television Corp., N.Y., 10
Superior Marine Radio Co., Fla., 5, 10, 15
Televiso Corp., Ill., 5
Trad Television Corp., 1001 First Ave., Asbury Park, N.J., 10
For details see ad on page 338
Transmitter Equipment Mfg. Co., N.Y., 15
Virginia Electronics Co., D.C., 15
Vocaline Co. of America, Inc., Conn., 15
Winters, T. Starling, N.J., Automatic Pilots

24. Mobile Equipment.

5. Antennas 10. Central Station receivers 15. Central Station transmitters 20. Citizen Radio 25. Mobile receivers 30. Mobile transmitters 35. Selective Calling equipment

ABC Radio Laboratories, Ind., FM Police Converters
A. R. F. Products, Inc., Ill., 25, 30
Adler Communications Labs., N.Y., 25, 30
Air Associates, Inc., N.J., 25, 30
Aircraft Radio Corp., Boonton, N.J., 25, 30
For details see ad on page 123
American Electroneering Corp., Calif., 5, 10, 15, 25, 30
American Phenolic Corp., 1830 S. 54 Ave., Chicago 50, Ill., 5
For details see ad on page 2
Andrew Corp., Ill., 5
Antenna Specialists Co., Ohio, 5
Applied Electronics Co., Inc., Calif., 5, 25, 30
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 10, 15, 25, 30
For details see ad on page 408
(Continued on page 127)

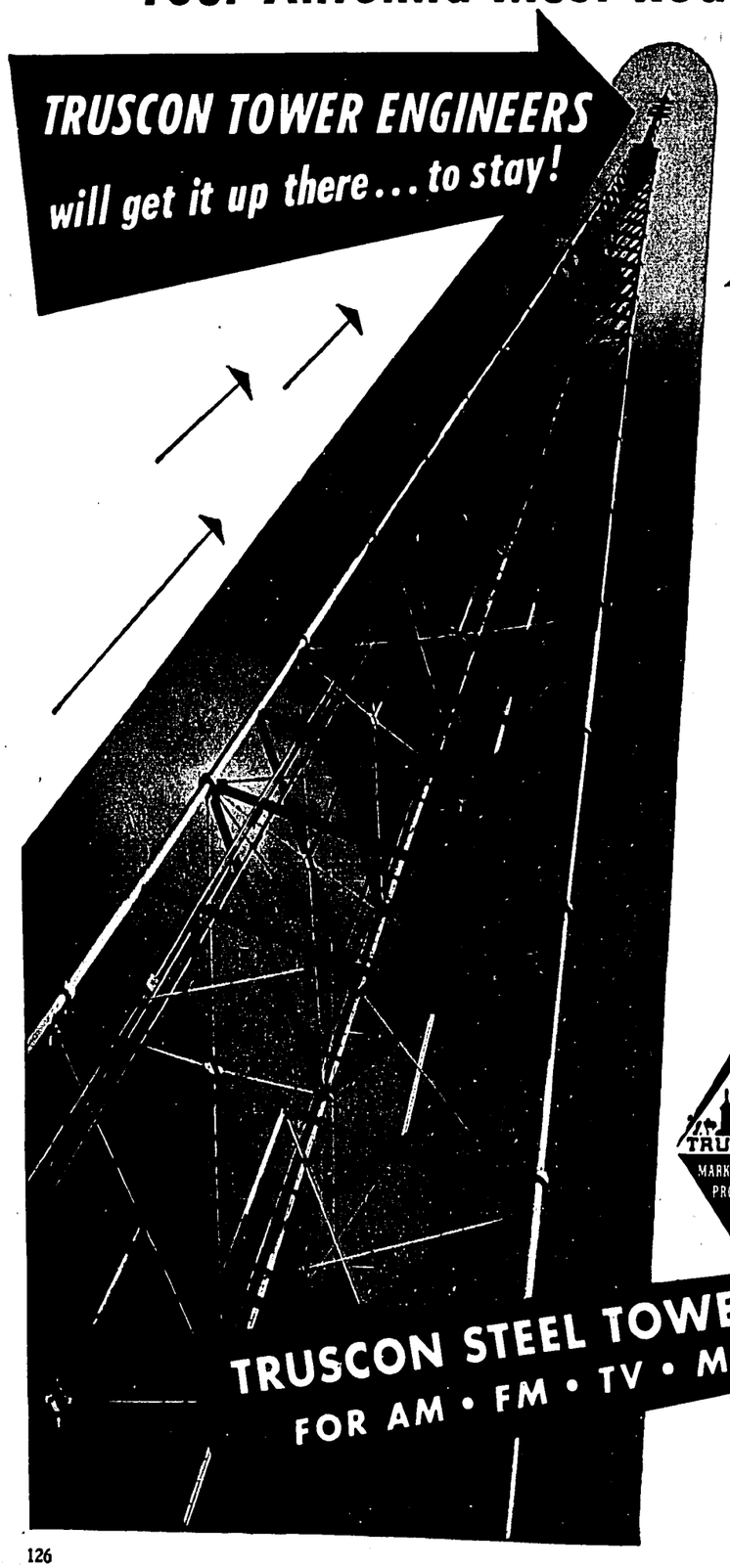
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For example—

See Barker & Williamson, Inc., ad on page 408

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

You Name The Height Your Antenna Must Reach...



● Whether your needs call for a medium-sized 300 foot tower, a lofty 1200-plus foot giant, or any size in between, Truscon engineers have the answer . . . or can get it to you fast. Truscon has designed and built many hundreds of radio towers now serving in all kinds of climate and all types of topography. Truscon builds 'em for you tall or small . . . guyed or self-supporting . . . tapered or uniform in cross-section . . . for AM, FM, TV, and Microwave transmission. You just name the height your antenna must reach; then write, wire or 'phone your nearest Truscon district office or "tower headquarters" in Youngstown to get your tower program going as soon as defense requirements permit.

TRUSCON STEEL DIVISION

REPUBLIC STEEL CORPORATION
1072 ALBERT ST.
YOUNGSTOWN 1, OHIO

TRUSCON
MARK OF MERIT PRODUCTS

TRUSCON®
—a name you can build

Bassett Inc., Rex, Fla., 5, 10, 15, 25, 30
Bendix Aviation Corp., Research Lab., Fisher Bldg., Detroit 2, Mich., 10, 15, 25, 30
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Bendix Radio Div., Baltimore 4, Md., 5, 10, 15, 25, 30
For details see ad on pages 176, 366-367
National Simplex-Bludworth, Inc., N.Y., 25, 30
Bremer Electronics, N.J., 20, 25, 30
Budelman Radio Corp., Conn., 20, 25, 30, 35
Buggie Inc., H. H., 726 Stanton St., Toledo 1, Ohio, 5
For details see ad on page 153
Campbell Mfg. Co., Ltd., Canada, 5
Canadian General Electric Co., Canada, 5, 10, 15, 20, 25, 30, 35
Canadian Marconi Co., Canada, 10, 15, 25, 30
Chisholm Industries, Ltd., Canada, 10, 15, 20, 25, 30, 35
Coaxial Connector Co., 35 N. 2nd Ave., Mt. Vernon, N.Y., 5
For details see ad on page 155
Communicating Systems, Inc., N.Y., 5
Communication Devices Co., N.Y., 25, 30
Communication Equip. & Engineering, Ill., 25, 30, 35
Communications Company, Inc., Fla., 5, 10, 15, 25, 30
Condor Radio Mfg. Co., Ariz., 25, 30
Connecticut Tel. & Elec. Corp., Conn., 20
Cornell-Dubilier Electric Corp., 333 Hamilton Blvd., South Plainfield, N.J., 5
For details see ad on page 6
Craig Machine, Inc., Mass., 5
Eckstein Radio & TV, Co., Minn., 25
Eldico of New York, Inc., 44-31 Douglaston Pkwy., Douglaston, L.I., N.Y., 5, 10, 15, 25, 30
For details see ad on page 257
Electro Craft Industries, Inc., Conn., 5
El-Tronics, Inc., Pa., 25, 30
Emerson Radio and Phonograph, N.Y., 25, 30
Erco Radio Labs., Inc., N.Y., 5, 10, 15, 25, 30
Federal Electric Mfg. Co., Ltd., Canada, 10, 15, 20, 25
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5, 10, 15, 20, 25, 30, 35
For details see ad on pages 368-373
Fisher Research Lab., Inc., Calif., 25, 30
Fretco Inc., Pa., 5
G.L. Electronics, Calif., 25, 30
Gates Radio Co., Ill., 15, 30
Grady Instrument, Mass., 5, 10, 15, 20, 25, 30, 35
Hallicrafters Co., Ill., 25, 30
Harmon Electronics Co., Mo., 35
Hastings Instrument Co., Va., 5, 25, 30
Henry & Miller Industries, Inc., N.Y., 5
Industrial Products Co., Conn., 5
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 5
For details see ad on page 134
Inplantite Manufacturing Corp., N.J., 5
Jefferson, Inc., Ray, N.Y., 5
Johnson Co., E. F., Waseca, Minn., 30
For details see ad on page 183
Kaar Engineering Corp., Calif., 10, 15, 25, 30
Kahn & Co., Inc., Conn., 5, 10, 15, 25, 30
Kahn Research Labs., N.Y., 15
Kent Engineering Co., Inc., Ill., 20
Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 5
For details see ad on pages 414-415
Lear, Inc., Calif., 5, 25, 30
Lehigh Valley Electronic Engineering & Mfg., Pa., 25
Lesa, S. P. A., Italy, 25
Letting Radio Mfg. Co., N.Y., 30
Lingo & Son, Inc., John E., N.J., 5
Link Radio Corp., N.Y., 10, 15, 20, 25
Lysco Mfg. Co., Inc., N.J., 5, 10, 15, 25, 30
Lytle Engineering & Mfg. Co, Ill., 20, 25
MacNabb Co., Inc., Vernon C., Ind., 20
Magnex Corp., N.Y., 20, 25, 30
Marconi's Wireless Telegraph Co., Ltd., England, 5, 10, 15, 20, 25, 30
Marine Electric Corp., N.Y., 35
Mark Products Co., Ill., 5, 20
Master Mobile Mounts, Inc., Calif., 5, 20, 25
McCarter Radio & TV Co., Canada, 5
Morrow Radio Mfg. Co., Ore., 10, 15, 20, 25
Motorola, Inc., Ill., 5, 10, 15, 20, 25, 30, 35
Motorola Research Laboratory, Ariz., 10, 15, 20, 25, 30
Mullard Overseas Ltd., England, 5, 10, 15, 20, 25, 30
National Electronics Labs., Inc., D.C., 25, 30
National Inter-Communications, Ill., 35
Petty Laboratories, Inc., Tex., 25, 30
Phebco, Inc., Md., 25, 30
Philco Corp., Pa., 20
Philmore Mfg. Co., Inc., N.Y., 20
Philson Mfg. Co., Inc., N.Y., 5
Plastics & Electronics Corp., P.O. Box 38, Station J, Buffalo 8, N.Y., 35
For details see ad on page 99
Polarad Electronics Corp., N.Y., 5
Premax Products Div., Chisholm-Ryder Co., Inc., N.Y., 5
Product Development Co., Inc., N.J., 5
Radelco Manufacturing Co., Ohio, 5
Radio Apparatus Corp., Ind., 5, 10, 25, 35
Radio Corp. of America, Engineering Products Div., Camden, N.J., 5, 10, 15, 25, 30, 35
For details see ad on pages 88, 440-441
Radio Engineering Products, Canada, 10, 15, 25, 30, 35
Radio Laboratories, Inc., Wash., 35
Radio Manufacturing Engineers, Ill., 10, 25, 30
Radio Specialty Mfg. Co., Ore., 10, 15, 25, 30
Radio Transceiver Laboratories, N.Y., 20, 25, 30
Redifon, Ltd., England, 10, 15, 25, 30
Rich Electronics, Inc., Fla., 25, 30
Robberson Marine Radio, N.Y., 5
Rogers Majestic Electronics Ltd., Canada, 5, 10, 15, 20, 25
Rosen Engineering Prod., Raymond, Pa., 5, 10, 15, 20, 25, 30, 35
Rowe Industries, Ohio, 5
Royalcall, Inc., Ohio, 15, 35 Industrial UHF Paging Equip.
Schuttig and Co., Inc., D.C., 25, 30
Snyder Mfg. Co., Pa., 5
Sonar Radio Corp., N.Y., 10, 15, 25, 30
Specialty Assem. & Packing Co., N.Y., 5
Spera Electronics Labs., N.Y., 10, 15, 20, 25, 30
Spilsbury & Tindall Ltd., Canada, 5, 10, 15, 25, 30
Standard Transformer Corp., Ill., 30
Stephens Manufacturing Corp., Calif., 30
Stevens-Arnold, Inc., 22 Elkins St., S. Boston 27, Mass., 35
For details see ad on page 159
Stewart-Warner Electric, Ill., 20
Suburban Radio Co., N.J., 30
Suffolk Products Corp., N.Y., 5
Technical Appliance Corp., N.Y., 5
Technical Materiel Corp., N.Y., 25, 30
Telrex, Inc., 26 Neptune Hghwy., Asbury Park, N.J., 5
For details see ad on page 258
Transmitter Equipment Mfg. Co., N.Y., 10, 15, 25, 30, 35
Ward Products Div., Gabriel Co., Ohio, 5
West Coast Electronics Co., Calif., 5, 10, 15, 25, 30
Western Electronic Enterprises, Calif., 5
Westinghouse Electric Corp., Pa., 25, 30
White & Son, James L., N.J., 5
Wind Turbine Co., 248 E. Market St., West Chester, Pa., 5
For details see ad on page 128
Workshop Associates Div., Gabriel Co., Endicott St., Norwood, Mass., 5
For details see ad on page 112

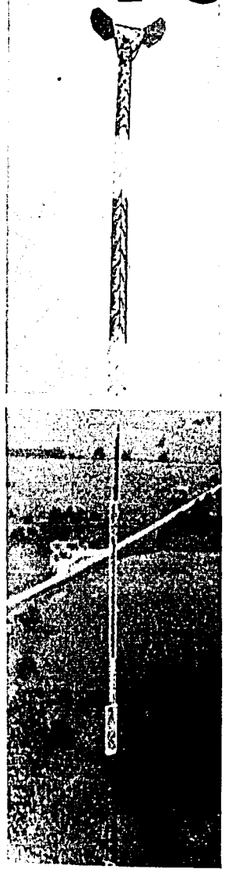
25. Point-to-Point Equipment.

5. Antennas & towers **10. Receivers** **15. Transmitters**

Aeronautical Communications Equip., Inc., Fla., 15
Air Associates, Inc., N.J., 10, 15
Alcor Electronics Corp., N.Y., Repeaters
American Electroneering Corp., Calif., 5, 10, 15
American Machine & Foundry Co., Mass., 5, 10, 15
American Phenolic Corp., 1830 S. 54 Ave., Chicago 50, Ill., 5
For details see ad on page 2
Andrew Corp., Ill., 5
Antenna Specialists Co., Ohio, 5
Applied Electronics Co., Calif., 10, 15
Automatic Electric Co., Ill., 10, 15
Barber Labs., Alfred W., 32-44 Francis Lewis Blvd., Flushing, L.I., N.Y., Frequency Shift Keyers, Single Sideband Adaptors
For details see ad on page 282
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 10, 15
For details see ad on page 408
Bassett, Inc., Rex, Fla., 5, 10, 15
Bendix Aviation Corp., Bendix Radio Div., Baltimore 4, Md., 10, 15
For details see ad on pages 176, 366-367
Bludworth Marine Div., National Simplex-Bludworth, Inc., N.Y., 15

(Continued on page 128)

TRYLON® (T) TOWERS



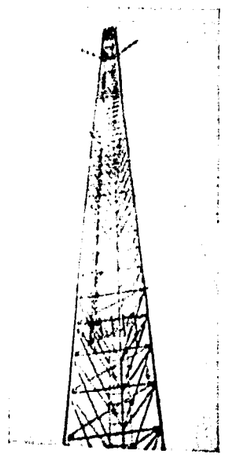
...For Rigid Sway and Twist Limits

From standard broadcast to extended microwave installations, Trylon towers have extreme rigidity to withstand difficult loading conditions with a wide safety margin to spare. Each unit is "tailored" to fit the specific requirements of its application.

Type 3500H—heights to 320 feet
Note the *balanced diagonal bracing* which increases the compression strength and greatly increases resistance to twist.

Type 3600—heights to 520 feet
As shown here, a Trylon 3600 tower is supporting an FM antenna at 270 feet. All Trylon towers are hot-dip galvanized *after* fabrication.

Types 6000—heights to 800 feet
This heavy-duty tower is specifically designed for minimum deflection with VHF-UHF television antennae.



PLUS . . . over 20 years' experience in designing, manufacturing, and installing many types of towers, rotators, antennae shorting and changeover switches, and other antenna specialties.

Trylon Towers are made only by

WIND TURBINE COMPANY
WEST CHESTER, PA.

Point-to-Point Equipment

(Continued from page 127)

Budelman Radio Corp., Conn., 5, 10, 15
Canadian General Electric Co., Canada, 5, 10, 15
Canadian Marconi Co., Canada, 10, 15
Canadian Westinghouse Co. Ltd., Canada, 10, 15
Chisholm Industries, Canada, 10, 15
Communicating Systems, N.Y., 10, 15
Communication Devices Co., N.Y., 10, 15
Communication Products Co., Broadway & Clark St., Marlboro, N.J., 5
For details see ad on page 286
Communications Co., Inc., Fla., 5, 10, 15
Connecticut Tel. & Elec., Conn., 10, 15
Craig Machine, Inc., Mass., 5
Crown Engineering, N.M., 10, 15
Denrad Mfg. Co., Inc., Tex., 15
Eldico of New York, Inc., 44-31 Douglaston Pkwy., Douglaston, L.I., N.Y., 5, 10, 15
For details see ad on page 257
Electro Craft Industries, Conn., 10, 15
Elizabeth Iron Works, Inc., N.J., 5
Erco Radio Labs., Inc., N.Y., 10, 15
Federal Electric Mfg., Canada, 10, 15
Federal Mfg. & Eng. Corp., N.Y., 10
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5, 10, 15
For details see ad on pages 368-373
Fisher Research Lab., Inc., Calif., 10, 15
Fretco Inc., Pa., 5
G. L. Electronics, Calif., 10, 15
Gates Radio Co., Ill., 15
Gee-Lar Mfg. Co., Ill., 5
Grady Instrument, Mass., 10, 15
Hammarlund Mfg. Co., Inc., 460 W. 34 St., New York 1, N.Y., 10
For details see ad on pages 424-427
Hughey & Phillips, Calif., 5
Kaar Engineering Corp., Calif., 10, 15
Kahn Research Labs., N.Y., 15.
La Pointe Electronics, Inc., Conn., 5
Lehigh Structural Steel Co., N.Y., 5
Lehigh Valley Electr. Engr. & Mfg Pa., 10
Leonard Electric Prod. Co., N.Y., 10, 15
Letting Radio Mfg. Co., N.Y., 15
Lingo & Son, Inc., John E., N.J., 5
Lytle Engineering & Mfg. Co., Ill., 15
Marconi's Wireless Telegraph Co., Ltd. England, 5, 10, 15
Mark Products Co., Ill., 5
McCarter Radio & TV Co., Canada, 5
Melpar, Inc., Va., 5, 10, 15
Motorola, Inc., Ill., 5, 10, 15
Motorola, Research Lab., Ariz., 5, 10, 15
Northern Radio Co., Inc. 145 W. 22 St. New York 11, N.Y., 10, Frequency Shift; Keyers, Converters, and Monitors
For details see ad on pages 410-412
Philco Corp., Pa., 10, 15
Chisholm-Ryder Co., Inc., N.Y., 5
Prodelin Inc., N.J., 5
Product Development Co., Inc., N.J.
Radio Corp of America, Camden, N.J. 5, 10, 15
For details see ad on pp. 88, 440-441
Radio Engineering Labs., N.Y., 10, 15
Radio Eng. Products, Canada, 5, 10, 15
Radio Laboratories, Inc., Wash., 10, 15
Radio Manufacturing Engineers, Ill., 15
Radio Receptor Co., Inc., 251 W. 19th St., New York 11, N.Y., 10, 15
For details see ad on pages 190, 2

(Continued on page 129)

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

THE EDGE INDEX FOR THE FIRST 3 DIRECTORIES (25 products) WILL BE FOUND OPPOSITE PAGE 96.

The first few times you use this

EDGE INDEX

follow the "how to use" instructions slowly—ONE STEP AT A TIME.

After that you will be able to open easily and almost instantly to the section or letter that you seek.

HOW TO USE

1. **With the directory open on the desk, place the four fingers of your RIGHT hand on the back cover and your right thumb near the middle of the edge of this page.**

2. **Raise your RIGHT hand (about 2 inches) and move it to the left until the pages are bent almost double.**

3. **From the 1 or 2 line symbol adjacent to the product you seek, run your eye across the page edges until you reach the horizontally corresponding symbol.**

4. **OPEN THERE**

IT IS EASIER IF YOU "FAN" OR "RIFFLE" THE LAST FEW PAGES WITH YOUR RIGHT THUMB.



Product No.		Page No.
26	Antennas & Access.	129
27	Batteries	131
28	Blowers & Fans	131
29	Cabinets and Consoles	133
30	Capacitors: Fixed	135
31	Capacitors: Variable	139
32	Chassis & Racks	140
33	Coils	143
34	Connectors	151
35	Converters	155
36	Cores, Complete	159
37	Crystals	161
38	Filters	163
39	Fuses & Holders	165
40	Magnetic Amplifiers	167
41	Magnets	169
42	Meters (Indicating Instruments)	171
43	Motors & Motor Generators	177
44	Pilot Lights & Assemblies	181
45	Power Supplies	181
46	Printed Circuits	187
47	Rectifiers, Metallic	189
48	Relays	191
49	Resistors	197
50	Semi-Conductors	205
51	Sockets	205
52	Switches	208
53	Telegraph Keys	211
53X	Thermostats	213
54	Transformers	213
55	Vacuum Tubes, Receiving	221
56	Vacuum Tubes, Rectifiers, Special Purpose	223
57	Vacuum Tubes, Transmitting	225
58	Voltage Regulators	225
59	Computers and Counters	227
60	Electronic Control Equipment	230
61	Geophysical Apparatus	231
62	Induction Heating Equipment	233
63	Medical Equipment	233
64	Nuclear Equipment	235
65	Servo-Mechanisms	235
66	Telemetering Equip.	239
67	Antennas	241
68	Receivers	243
69	Transmitters	244
70	Waveguides & Accessories	245
71	Cable & Wire	249
72	Ceramics	255
73	Consulting Engineers	256
74	Core Materials	259
75	Fabricators & Services	259
76	Gasses & Vapors	267
77	Hardware	267
78	Hermetic Seals	275
79	Insulating Materials	279
80	Laboratories & Custom Builders	281
81	Lacquers & Paints	285
82	Machinery & Tools	289
83	Metals	295
84	Moulded Products	297
85	Plastics	298
86	Solder	299
87	Vacuum Tube Parts	299
88	Audio Test Equip.	305
89	General Laboratory Equipment	309
90	General Test Equipment	313
91	Graphic Recorders	319
92	Lab. Standards of Frequency & Time	321
93	Microwave & Radar Test	325
94	Nuclear Test	329
95	Oscilloscopes Cathode-Ray	331
96	Radio-Frequency Test	333
97	Education	339
98	Publishing	339
99	Distribution	343

Classifications with a System!

THE IRE Directory Product Classifications have both a pattern and a purpose. They differ widely from most product indexes, deliberately. They aim to organize the hundreds of products and services of a complex technical industry according to the way engineers think. To this end, the product grouping follows the pattern of the IRE Professional Groups, broadly. The result is a division of all products and services into ten fundamental indexes into which 100 basic classifications have been organized.

YOU will note that we here differ from most directory compilers, for we do not mix meters with motors simply for alphabetical reasons. Products used in "Audio" whether components or complete apparatus form the first fundamental group. Yet, the same manufacturer and product may also appear in the "Component Parts" section. This system gives subject grouping for speed and convenience. A directory should aid a man who has forgotten some detail, or product name. Ours helps by grouping products as one would *think*.

1. **Audio Frequency Equipment** (Products 1 to 11)
2. **Broadcasting Equipment** (Products 12 to 17)
3. **Communications Equipment** (Products 18 to 25)
4. **Component Parts** (Products 26 to 58)
5. **Applications of Electronics** (Products 59 to 66)
6. **Radar, Microwave, UHF** (Products 67 to 70)
7. **Services and Materials** (Groups 71 to 87)

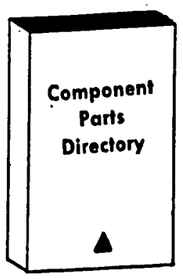
   Here we separate the consultant, the fabricating firm, the machine for radio manufacturing, and basic materials from being lost in an alphabetical maze of component and test equipment names.
8. **Test & Measuring Equipment** (Products 88 to 96)
9. **Education & Publishing** (Groups 97 & 98)
10. **Distribution Functions** (Service 99)

For detailed identification, these 100 products and and services, grouped in the 10 indexes, are further defined into nearly 500 named products. We have tried to avoid oversimplification, and a tremendous amount of information is given by our product number system. But, the basic indexing adds speed. Purely alphabetical directories are as slow and cumbersome as a telephone book. IRE engineers have liked our system better!

For safety, an alphabetical "terminology" index is given, preceding the product system in the pink pages introducing the company index. You will note also that after each firm, its products are listed by number code in the alphabetical list, and that sub-classifications shown by number code in the product indexes give much detail. Just a little study of the system will help you get great good from this book.

The IRE DIRECTORY is 10 Indexes in one book.

A Directory of 4. Component Parts



33 Major Groups

169 Products in these groups

Organized by function for Engineers

26 Antennas & Accessories.
27 Batteries.
28 Blowers & Cooling Fans.
29 Cabinets, Consoles, & Enclosures.
30 Capacitors, Fixed.
31 Capacitors, Variable.
32 Chassis & Racks.
33 Coils.
34 Connectors.
35 Converters.
36 Cores, Complete.
37 Crystals & Accessories.
38 Filters.
39 Fuses & Fuse Holders.
40 Magnetic Amplifiers.
41 Magnets.
42 Meters (Indicating Instruments)
43 Motors & Motor Generators.
44 Pilot Lights & Assemblies.
45 Power Supplies.
46 Printed Circuits.
47 Rectifiers, Metallic.
48 Relays.
49 Resistors.
50 Semi-Conductors (Diodes & Transistors)
51 Sockets.
52 Switches.
53 Telegraph Keys.
53X Thermostats
54 Transformers.
55 Vacuum Tubes, Receiving.
56 Vacuum Tubes, Rectifiers & Special Purpose.
57 Vacuum Tubes, Transmitting.
58 Voltage Regulators

The products and services of the Radio-Electronics Industry have been organized into ten basic directories following closely the organization of the IRE Professional Groups. But 100 major product groups are numbered consecutively throughout.

Always consult the pink pages at the start of the Directory of firms, for a terminology cross-index, or to find products by name. The pink pages list more than 500 products by name, as well as under the product groups. Page numbers are given for speed.

Point-to-Point Equipment

(Continued from page 128)

Radio Specialty Mfg. Co., Ore., 10, 15
Redifon Ltd., England, 5, 10, 15
Rogers Majestic Electronics, Ltd., Canada, 10, 15
Rosen Engineering Prod., Raymond, Pa., 5, 10, 15
Royalcall, Inc., Ohio, 10, 15
Sierra Electronic Corp., Calif., 15
Sonar Radio Corp., N.Y., 10, 15
Sondyna, A. G., Switzerland, 10
Spilsbury & Tindall, Canada, 5, 10, 15
Stelma, Inc., Conn., 10
Superior Marine Radio Co., Fla., 10, 15
Technical Appliance Corp., N.Y., 5
Technical Materiel Corp., N.Y., 5, 10, 15
Telechrome, Inc., 88 Merrick Rd., Amityville, L.I., N.Y., 10, 15, TV Relay
For details see ad on pages 120, 285
Telescreen Corp., Conn., 10, 15
Transmitter Equipment Mfg. Co., N.Y., 10, 15
Truscon Steel, Div. Republic Steel, Albert St., Youngstown, Ohio, 5
For details see ad on page 126
Ward Products, Div. Gabriel Co., Ohio, 5
West Coast Electronics Co., Calif., 5
Wilcox Electric Co., Inc., Mo., 10, 15
Wind Turbine Co., 248 E. Market St., West Chester, Pa., 5
For details see ad on page 128
Workshop Associates Div., Gabriel Co., Endicott St., Norwood, Mass., 5
For details see ad on page 112

26. Antennas & Accessories.

5. All-wave receiving
10. Dummy
15. Feeder line
20. Indoor types
25. Insulators
30. Lightning arresters
35. Mounting hardware
40. Small towers

Accurate Electronics Corp., Ohio, 25
Aerolite Electronics Corp., 507 26 St., Union City, N.J., 35
For details see ad on page 103
All Channel Antenna Corp., N.Y., 5
American Lava Corp., Cherokee & Mfr. Rd., Chattanooga 5, Tenn., 25
For details see ad on page 4
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35, 40
American Phenolic Corp., 1830 S. 54th Ave., Chicago 50, Ill., 5, 15, 25, 30, 35
For details see ad on page 2
Amy, Aceves & King, Inc., N.Y., 5, Multiple Outlet
Armstrong Co., A. T. R., Canada, 30, 35, 40
Arro Expansion Bolt Co., Ohio, 35
Bird Electronic Corp., Ohio, 10
Birnbach Radio Co., Inc., 145 Hudson St., New York 13, N.Y., 15, 25, 30, 35
For details see ad on pages 103, 248
Bogart Mfg. Co., N.Y., 5, 10, 15
Brach Mfg. Corp., N.J., 20, 30, 35
Bud Radio, Inc., 2118 E. 55 St., Cleveland 3, Ohio, 35, 40
For details see ad on pages 267, 346
Centralab, Div. Globe Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis., 25
See complete catalog in last section
Channel Master Corp., N.Y., 5, 35, 40
Chester Cable Corp., P. O. Box 316, Chester, N.Y., 15
For details see ad on page 20
Citation Products Co., 233 E. 146th St., New York 51, N.Y., 25
For details see ad on page 269
Clear Beam TV Antennas, Calif., 5, 35, 40
Cleveland Electronics, Inc., Ohio, 5, 30
Coaxial Connector Co., 35 N. 2nd Ave., Mt. Vernon, N.Y., 10
For details see ad on page 155
Coil Winders, Inc., N.Y., 10
Coilcraft, Inc., Ill., 5
Communicating Systems, Inc., N.Y., 5
Communication Products Co., Inc., Broadway & Clark, Marlboro, N.J., 5, 35
For details see ad on page 286
Consolidated Wire & Assoc. Cos., Ill., 5, 25, 30
Cornell-Dubilier Electric Corp., 333 Hamilton Blvd., South Plainfield, N.J., 5, 20, 30
For details see ad on page 6
Crowley & Co., Henry L., N.J., 10, 25
Dale Products, Inc., 1318 28 Ave., Columbus, Neb., 10
For details see ad on pages 452-453
Davis Electronics, Calif., 5
Demornay-Bonardi, Inc., Calif., 10
Dorne and Margolin, 30 Sylvester St., Westbury, L.I., N.Y., 5
For details see ad on page 130

(Continued on page 130)

Aircraft ANTENNAS by d&m

DORNE and MARGOLIN offers the aviation and electronics industry a superior antenna service complete from problem analysis to final design and quantity production. From v-h-f through microwaves D&M antennas provide unexcelled quality and performance. Inquiries on your specific problems will receive prompt attention.



NEW BROCHURE AVAILABLE

Call or write for your copy, now. When writing, please address Dept. E-1.

DORNE and MARGOLIN

30 SYLVESTER STREET
WESTBURY, LONG ISLAND, N.Y.

Antennas and Accessories

(Continued from page 129)

Douglas Microwave Co., Inc., 338 E. 95th St., New York 28, N.Y., 10
For details see ad on page 324
Electro Impulse Laboratory, 62 White St., Red Bank, N.J., 10
For details see ad on page 240
Electronic Mechanics, Inc., 101 Clifton Blvd., Clifton, N.J., 25
For details see ad on page 278
Electron Radar Products, Ill., 10
Engineering Co., N.J., 5
Espey Manufacturing Co., Inc., N.Y., 10
Fretco, Inc., Pa., 5, 10, 15, 20, 25, 30, 35
Gadgets, Inc., Ohio, 5, 10
Gates Radio Co., Ill., 10, 15, 25, 30, 35
Gee-Lar Mfg. Co., Ill., 5, 25, 30, 35
General Cement Mfg. Co., Ill., 5, 20, 30, 35, 40
General Electric Co., N.Y., 30
General Laminated Prods. Co., Inc., Ill., 25, 35
General R-F Fittings Co., 702 Beacon St., Boston 15, Mass., 10
For details see ad on page 151
Hi-Lo TV Antenna Corp., Ill., 5, 20
Hi-Temp Wires, Inc., N.Y., 15
Hughey & Phillips, Calif., 35
Hy Lite Antennae, Inc., N.Y., 5
IE Manufacturing, Ill., 25, 35, 40
Imperial Radar & Wire Corp., N.Y., 25, 35
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 5, 20, 30, 35
For details see ad on page 134
International Resistance Co., Pa., 10
Isolantite Manufacturing Corp., N.J., 25
Jacobs, Charles F., N.Y., 15
JFD Manufacturing Co., Inc., 6101 16th Ave., Brooklyn 4, N.Y., 5, 20, 25, 30, 35
For details see ad on pages 140, 242
Johnson Co., E. F., Waseca, Minn., 25
For details see ad on page 183
Jones Electronics Co., Inc., M. C., 96 N. Main St., Bristol, Conn., 10
For details see ad on page 51
Keystone Electronics Corp., N.Y., 25
Knapp Radio Specialties, Inc., Mass., 35
La Pointe Electronics, Conn., 5, 30, 40
Lapp Insulator Co., Inc., N.Y., 25
Lerner Instrument & Electronics, N.Y., 10
Marconi's Wireless Telegraph Co., Ltd., England, 15, 25, 40
Mark Products Co., Ill., 20
Master Mobile Mounts, Inc., Calif., 5, 10
McCarter Radio & TV Co., Canada, 5, 35
Mercury Electronic Co., N.J., 10
Metalace Corp., Electronics Div., N.Y., 25, 35, 40
Mica Fabricators Association, 420 Lexington Ave., New York 17, N.Y., 25
For details see ad on page 279
Michel Manufacturing Co., Wis., 5
Microlab, N.J., 10
Midwest Radio and Television, Ohio, 5
Minerals & Insulation Co., N.J., 25
Mueller Electric Co., Ohio, 25
National Electronic Mfg. Corp., N.Y., 5, 20, 30, 35
National Company, Inc., 61 Sherman St., Malden 48, Mass., 25
For details see ad on pages 434-435
National Electric Products Corp., Pa., 5, 35, 40
Neo-Sil Corp., N.J., 25
Network Manufacturing Corp., N.J., 10
Ohmite Manufacturing Co., Ill., 10
Peerless Products Industries, Ill., 20
Phelps-Dodge Copper Prods. Corp., 40 Wall St., New York 5, N.Y., 15
For details see ad on page 251
Philson Mfg. Co., Inc., N.Y., 20, 45
Phoenix Electronics, Inc., Mass., 5, 30, 35
Polytron Corp., N.Y., 20
Polytechnic Research & Development Co., Inc., 55 Johnson St., Brooklyn 1, N.Y., 10
For details see ad on pages 374-375
Porcelain Products, Inc., Ohio, 25
Porter Manufacturing Co., Ill., 5, 15, 20, 25, 30, 35, 40
Premax Products Div., Chisholm-Ryder Co., Inc., N.Y., 25
Prodelin Inc., N.J., 15
Radelco Manufacturing Co., Ohio, 30
Radiart Corp., Ohio, 5, 30, 35
RCA Victor Div., Tube Dept., 415 S. 5th St., Harrison, N.J., 30, 35
For details see ad on pp. 88, 440-441
Radio Kits, Inc., N.Y., 5
Raypar, Inc., 7800 W. Addison St., Chicago 34, Ill., 10
For details see ad on page 220
Resistoflex Corp., Belleville 9, N.J., 25
For details see ad on page 281
Rostan Corp., N.Y., 40
Schott Co., Walter D., Calif., 35
Sierra Electronic Corp., Calif., 10
Smith, Inc., Herman H., 436 18th St., Brooklyn 15, N.Y., 30, 35
See complete catalog in last section
Smith & Stone, Ltd., Canada, 25, 30
Snyder Mfg. Co., Pa., 5
South River Metal Prods. Co., N.J., 35
Specialty Assem. & Packing Co., N.Y., 10
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 10
See complete catalog in last section
Stainless, Inc., Pa., 30, 40
Square Root Manufacturing Corp., N.Y., 5, 10, 20
States Co., Conn., 10
Steward Mfg. Co., D. M., Tenn., 25
Stupakoff Ceramic & Mfg. Co., Box 390, Hillview Ave., Latrobe, Pa., 25
For details see ad on pages 139, 180, 203, 255, 265, 277, 295, 297, 303, 378-379
Summit Electronics, Inc., N.J., 10
Superior Porcelain Co., W.Va., 25
Swan Television Co., Ltd., Ernie, Canada, Community Types
Syncor Products Co., Mass., 25
Technical Appliance Corp., N.Y., 5, 30, 35
Telrex, Inc., 26 Neptune Hghwy., Asbury Park, N.J., 5, 20
For details see ad on page 258
Television Laboratories, Inc., Ill., 5
Tensolite Insulated Wire Co., Inc., 198 Main St., Tarrytown, N.Y., 15
For details see ad on page 253
Thomas & Sons Co., R., Ohio, 25
Thompson Products, Inc., Ohio, 10

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

Antennas & Accessories

Transradio Ltd., England, 15
Transvision, Inc., N.Y., Master TV Systems
United States Gasket Co., 611 N. 10 St., Camden 1, N.J., 10, 15
For details see ad on pages 450-451
Vesto Co., Inc., Mo., 40
Vidaire Electronics Mfg. Co., N.Y., TV Couplers
Video Industries Co., N.Y., 5
Ward Products Div., Gabriel Co., Ohio, 5
Weckesser Co., 5269 N. Avondale Ave., Chicago 30, Ill., 35
For details see ad on page 275
Warren Wire Co., Vt., 15
Western Gold & Platinum Works, Calif., 25
Wincharger Corp., Iowa, 40
Wind Turbine Co., 248 E. Market St., West Chester, Pa., 5, 25, 40
For details see ad on page 128

27. Batteries.

5. Dry batteries
10. Mercury batteries
15. Storage batteries
—lead-acid
20. Storage batteries —nickel-alkali

Acme Battery Corp., N.Y., 5
American Machine & Foundry Co., Mass., 10
Bright Star Battery Co., N.J., 5
Burgess Battery Co., Battery Div., Freeport, Ill., 5
For details see ad on page 131

Batteries

Centralab, Div. Globe Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis., 15
See complete catalog in last section
Electric Storage Battery Co., Pa., 15
Electronic Batteries, Inc., N.Y., 15
General Dry Batteries, Inc., Ohio, 5, 10
Interelectronics Corp., 2432 Grand Concourse, New York 58, N.Y., 5, Transistor & Wafer Cell, Miniature & Subminiature
For details see ad on page 51
Koehler Mfg. Co., Mass., 15
Magnavox Co., 2131 Bueter Rd., Ft. Wayne 4, Ind., 10
For details see ad on page 138
Mallory & Co., Inc., P. R., Ind., 10
National Carbon Co., N.Y., 5
National Carbon Ltd., Canada, 5
Olin Industries, Inc., Conn., 5
Radiation Research Corp., Fla., Nuclear
RCA Victor Div., Tube Dept., 415 S. 5th St., Harrison, N.J., 5
For details see ad on pages 88, 440-441
Ray-O-Vac Co., Wis., 5, 10
Reading Batteries, Inc., Pa., 15
Sonotone Corp., N.Y., 20
Specialty Battery Co., Wis., 5
Telmusic Service, Inc., N.J., 5, 10
United States Rubber Co., N.Y., Plastic & Rubber Separators
Willard Storage Battery Co., Ohio, 15, Silver Zinc
Yardney Electric Corp., 105 Chambers St., New York 7, N.Y., Storage Batteries, Silver Zinc
See complete catalog in last section

28. Blowers & Cooling Fans. 26-28

5. Air wheels & housings
10. Complete blower assemblies
15. Fan blades

Alliance Tool & Motor Co., Ltd., Canada, 10
C and H Sales Co., Calif., 10
Cole Instrument Co., Calif., 10
General Electric Co., N.Y., 10
Heinze Electric Co., 685 Lawrence St., Lowell, Mass., 5, 10, 15
For details see ad on page 132
Howard Industries, Inc., 1760 State St., Racine, Wis., 5, 10, 15
For details see ad on page 179
Induction Motors Corp., 570 Main St., Westbury, L.I., N.Y., 5, 10, 15
For details see ad on page 180
Mission Western Engineers, Inc., Calif., 10
Oster Manufacturing Co., John, 1 Main St., Racine, Wis., 10
For details see ad on page 181
Pioneer Electric & Research Corp., Ill., 10, 15
Ripley Co., Inc., Middleton, Conn., 5, 10
For details see ad on page 131
Rotron Mfg. Co., Inc., N.Y., 10
Small Motors, Inc., Ill., 10
Televiso Corp., Ill., 10

See also listings for Blower and Fan Motors on page 177.

Independent Research Proves: 2 out of 3 Engineers Prefer BURGESS BATTERIES!

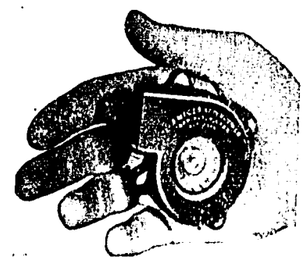


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No. 4FH
No. Z30NX

WRITE FOR ENGINEERING MANUAL AND CHECK SHEET—No obligation. By return mail you will receive the FREE Engineering Manual listing the complete line of Burgess Batteries together with detailed specifications; also the Burgess "Check Sheet" on which you may outline your battery requirements in the event that the battery you need has not already been developed. Address:

BURGESS BATTERY COMPANY
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Planning Heat Dissipation?
L-R BLOWER.... moves AIR
5 to 170 cubic feet a minute

There is a light, compact highly efficient L-R Blower to give you maximum heat dispersion under all climatic or temperature conditions. Each of these blowers requires minimum space and produces maximum C.F.M. Specifications are listed below so that you may choose the size best suited to your needs.

SPECIFICATIONS

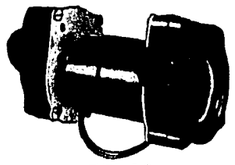
MODEL 1½, Wgt. (less motor) ..... 2½ oz. Hgt. 3"
Output: 3 to 22 C.F.M.
MODEL 2, Wgt. (less motor) ..... 5 oz. Hgt. 3¾"
Output: 10 to 30 C.F.M.
MODEL 2½, Wgt. (less motor) ..... 5½ oz. Hgt. 4¼"
Output: 10 to 65 C.F.M.
MODEL 3, Wgt. (less motor) ..... 12½ oz. Hgt. 6½"
Output: 40 to 170 C.F.M.

All models have light-weight, high-impact plastic housings, turbo-type wheels and are made for either clockwise or counter-clockwise rotation. Available with or without motor.

RIPLEY CO., INC.
Factory & Engineering Office: Middletown, Conn.

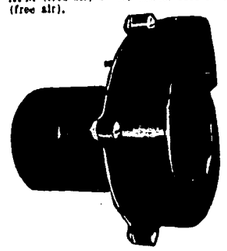
Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

HEINZE BLOWERS



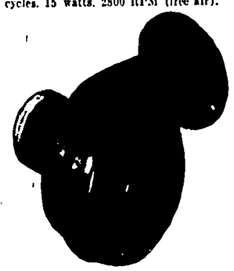
TYPE F-2

For cooling electronic tubes in transmitters, induction heaters and diathermy equipment. Quiet operation, low wattage, light weight. Will not cause radio interference. 115 volts, AC, 60 cycles, 15 watts. F-2D double (illustrated) 3000 RPM (free air) F-2S, single, 3100 RPM (free air).



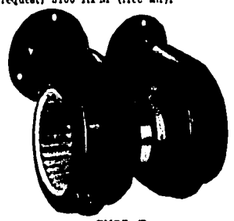
TYPE F-2½S

Generally the same features as Type F-2. Bakelite housing. 115 volts, AC, 60 cycles. 15 watts. 2800 RPM (free air).



TYPE DS

Powered by type D shaded pole induction motor. Normally supplied with inlet screen and outlet flanges for mounting. Can also be had with inlet damper or inlet mounting flange, "L" type bracket or flat strap bracket. 115 volts, AC, 60 cycles, for CW and CCW operation. 35 watts (other voltages and frequencies on request) 3100 RPM (free air).



TYPE Z

ZSD and ZRD, sturdy low speed type "Z" shaded pole induction motor. 3½" balanced air rotors with slow speed minimize air noise. 115 volts, AC, 60 cycles 45 watts, (available for 230 volt or 50 cycle operation) 1650 RPM (free air). ZRS. The most compact 50 CFM blower unit available today. Resilient mounting base to reduce mechanical vibration to a minimum can be furnished with flat strap bracket instead of outlet flange normally supplied.

115 volts AC, 60 cycles, 40 watts. (can be mounted for 230 volt operation) 1650 RPM (free air)

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685 Lawrence Street
LOWELL, MASS

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GLASS FIBRE REINFORCED PLASTICS

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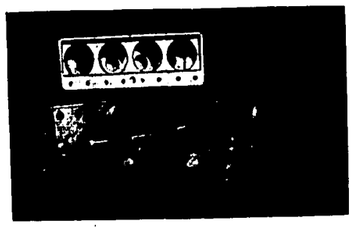
Panels—Frames—Cabinets—Chasses—Bases

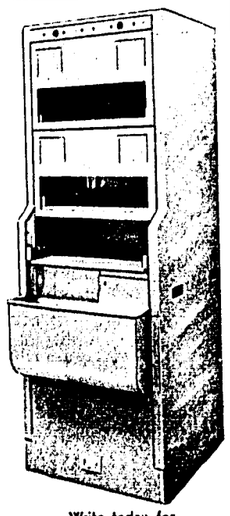
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Manufacturers of Sheet Metal Products Since 1925
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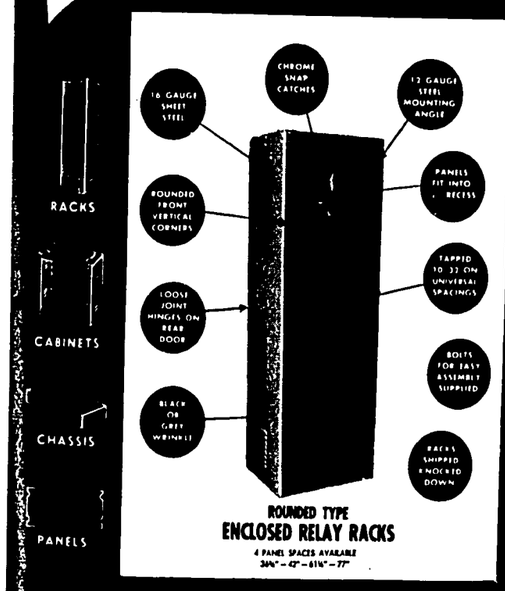
5. Metal cabinets
10. Metal relay rack panels
15. Moulded plastic cabinets
20. Wood cabinets

Abalon Precision Mfg. Corp., 540 Casanova St., New York 59, N.Y., 5, 10
For details see ad on page 140
Airplane & Marine Instruments, Inc., Pa., 5, 10
Alden Products Co., 113 N. Main St., Brockton 64, Mass., 5, 10, Slides
For details see ad on pages 150-151
Altec Lansing Corp., Calif., 5, 10, 20
American Insulator Corp., Pa., 15
American Machine & Foundry Co., Mass., 5, 10
American Radio & Television, Inc., Ark., 20
Anchor Specialty Mfg. Co., N.J., 5, 20
Ansley Mfg. Co., Arthur, Pa., 20
Ardente Acoustic Labs, Ltd., England, 10
Art-Lloyd Metal Prods. Corp., N.Y., 5, 10
Atlas Sound Corp., N.Y., Loudspeaker
Baker Company, Inc., Me., 5
Baltic Metal Products Co., N.Y., 5, 10
Bogen Co., Inc., David, N.Y., 20
Boyle Metalcraft Corp., 154 Sullivan St., Brooklyn 31, N.Y., 5, 10
For details see ad on page 132
Brooks & Perkins, Inc., Mich., 5, Magnesium
Brooks Radio & Television Corp., N.Y., 20
Buck Engineering Co., Inc., N.J., 5, 10
Bud Radio, Inc., 2118 E. 55 St., Cleveland 3, Ohio, 5, 10
For details see ad on pages 267, 346
Canadian Westinghouse Co., Ltd., Canada, 5, 10
Castlewood Manufacturing Co., Ky., 20
Central Stamping & Mfg. Co., Ill., 5, 10
Chisholm Industries, Ltd., Canada, 5, 10, 20
Churchill Cabinet Co., Ill., 20
Churchill Corp., Mass., 5, 10
Circuit Controls Co., Ill., 15
Cole Instrument Co., Calif., 10
Coles Electronic Corp., Pa., 5
Communication Equip. & Engnrng., Ill., 5, 10
Corry Jamestown Mfg. Corp., Pa., 5, 10
Cortland Industries, Inc., Ill., 15
Craig Machine, Inc., Mass., 5, 10
Crescent Industries, Inc., Ill., 5
Dahlstrom Metallic Door Co., N.Y., 5
Dale Products, Inc., 1318 28 Ave., Columbus, Neb., 5
For details see ad on pages 452-453
Dolin Metal Products, Inc., N.Y., 5
Edo Corp., N.Y., 5
Engineered Instruments, Inc., Calif., 5
Erie Resistor Corp., 644 W. 12th St., Erie, Pa., 15
For details see ad on page 18
Falls Metal Works, Ltd., 414 Main St., Little Falls, N.J., 5, 10
For details see ad on page 132
Falstrom Co., N.J., 5, 10
Federal Electric Products Co., N.J., 5
Feiner & Sons, Inc., P., N.Y., 5, 10
Felsenthal & Sons, Inc., G., Ill., 15
Ferro-Co Corp., N.Y., 5, 10
Gately Development Laboratory, N.J., 20
Gates Radio Co., Ill., 5, 10, 20
General Communications, Wis., 5, 10
Golden Corp., I., N.Y., 5, 10
Hadley Co., Robert M., Calif., 5, 10
Hammond Manufacturing Co., Ltd., Canada, 5, 10
Hawley Products Co., 333-339 N. 6th St., St. Charles, Ill., 15
For details see ad on page 132
Heldor Manufacturing Corp., 238 Lewis St., Paterson, N.J., 5
For details see ad on page 276
Heller & Co., W. C., Ohio, 5, Parts
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 5, 10, 15
For details see ad on page 134
Jackson Industries, Inc., Ill., 20
Jacksonville Metal & Plastics, Fla., 5
Jensen Manufacturing Co., Ill., 20
K-V Transformer Corp., Conn., 5, 10
Karlson Associates, N.Y., 20
H. & B. American Machine Co., N.Y., 5, 10, Consoles
Kolton Electric Mfg. Co., N.J., 5
Korrol Products Corp., N.Y., 5, 10
Langevin Manufacturing Corp., 37 W. 65 St., New York 23, N.Y., 5
For details see ad on page 218
Lansing Sound, Inc., James B., Calif., 20
La Rose & Associates, Inc., W. T., N.Y., 5
Lowell Manufacturing Company, Mo., 5, 10, 20
Marine Electric Corp., N.Y., 5, 10
Metal Fabricators Corp., 73 Pond St., Waltham 54, Mass., 5, 10
For details see ad on page 141
Metal Products Co., Tenn., 5, 10
Metallic Arts of New England, Inc., Mass., 5, 10
Minute Man Products, Inc., N.Y., 5, 10
Monument Eng. Co., Inc., Ind., 5
Mullenbach Electrical Mfg. Co., Calif., 5, 10
Multi-Metal Wire Cloth Co., Inc., N.Y., 5, 10
Newcomb Audio Products, Calif., 5
Northern Electric Co., Ltd., Canada, 5, 10
Olympic Metal Products Co., Inc., N.J., Component Cases
Par-Metal Products Corp., 32-62 49th St., Long Island City 3, N.Y., 5, 10, Consoles
For details see ad on page 141
Photo Chemical Products, Inc., 479 Walton Ave., New York 51, N.Y., 5, 10
For details see ad on page 187
Pentron Corp., Ill., 20
Pioneer Electric & Research Corp., Ill., 5
Premier Metal Products Co., 3160 Webster Ave., New York 67, N.Y., 5, 10
For details see ad on page 133
Protectoseal Co., Ill., Tanks, Cans
REF Mfg. Corp., N.Y., 5
R. J. Audio Products, N.Y., 20

(Continued on page 135)

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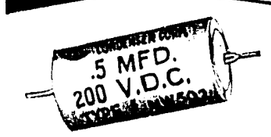


Approved SILICONE BUSHING *capacitor, oil impregnated, hermetically sealed.*

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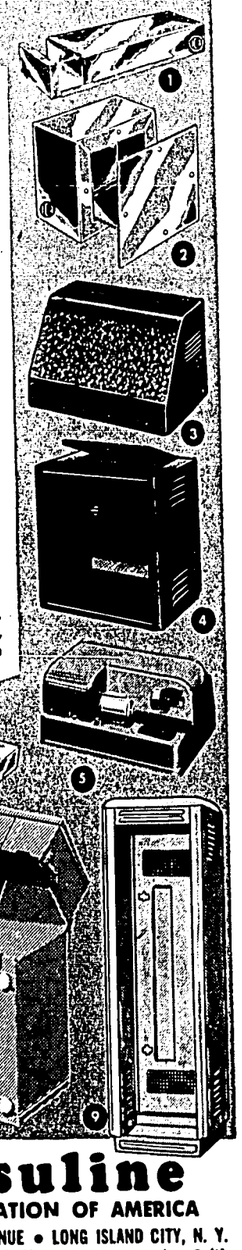
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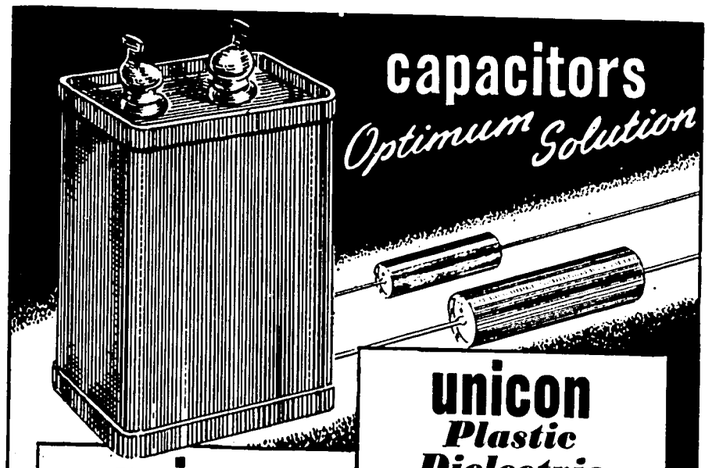
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Unicon Polystyrene Capacitors are characterized by extremely high insulation resistance and Q, and very low power factor and dielectric absorption.

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Plastic Dielectric Capacitors

Unicon Type D capacitors employ a newly developed plastic resin film as a dielectric.

The power factor, dielectric absorption, and temperature co-efficient of these condensers are much better than those of oil paper capacitors. They compare favorably in size with metallized paper capacitors of equal ratings and give far superior performance. Operation to 125°C is permissable. When high insulation resistance, without simultaneous low "soakage" and/or low power factor, is required, Type D capacitors make an excellent low-price substitute for Polystyrene or Teflon capacitors.

Unicon always gives your capacitor problems the Optimum Solution.

POLYSTYRENE LISTING

Cat. #	Cap.	WVDC	Style Housing	Dimensions
A1-1- 50	.05	100	1	1-1/2" Lt1/2" D
A1-1- 100	.10	100	1	1-1/2" Lt3/4" D
A3-1- 250	.25	100	3	1"x1-13/16"x1 H
A2-1- 500	.50	100	2	1-1/16"x1-13/16"x1-5/8" H
A2-1- 1000	1.00	100	2	1-1/16"x1-13/16"x2-3/4" H
A1-3- 1	.001	300	1	1-1/2" Lt1/2" D
A1-3- 2	.002	300	1	1-1/2" Lt1/2" D
A1-3- 5	.005	300	1	1-1/2" Lt1/2" D
A1-3- 10	.01	300	1	1-1/2" Lt1/2" D
A1-3- 20	.02	300	1	1-1/2" Lt1/2" D
A1-3- 50	.05	300	1	1-1/2" Lt3/4" D
A1-3- 100	.10	300	2	2-1/2" Lt3/4" D
A2-3- 250	.25	300	2	1-1/16"x1-13/16"x2-1/4" H
A2-3- 500	.50	300	2	1-1/16"x1-13/16"x3-1/4" H
A2-3- 1000	1.00	300	2	1-1/4"x2-1/2"x3-1/2" H
A2-3- 2000	2.00	300	2	1-1/4"x3-3/4"x3-3/4" H
A2-3- 5000	5.00	300	2	3-3/4"x4-9/16"x3-3/8" H
A2-3-10000	10.00	300	2	3-3/4"x4-9/16"x5-1/8" H

TYPE D LISTING

Cat. #	Cap.	WVDC	Style Housing	Dimensions
D3-2- 500	0.5	200	3	1"x1-13/16"x3/4" H
D3-2- 1000	1.0	200	3	1"x1-13/16"x3/4" H
D3-2- 2000	2.0	200	3	1"x1-13/16"x1" H
D2-2- 4000	4.0	200	2	1-1/16"x1-13/16"x2-1/4" H
D2-2- 6000	6.0	200	2	1-1/16"x1-13/16"x2-7/8" H
D2-2- 8000	8.0	200	2	1-3/16"x2-1/2"x2-7/8" H
D2-2-10000	10.0	200	2	1-3/16"x2-1/2"x3-1/2" H
D3-4- 500	0.5	400	3	1"x1-13/16"x3/4" H
D3-4- 1000	1.0	400	3	1"x1-13/16"x1" H
D3-4- 2000	2.0	400	3	2"x1-3/4"x1" H
D2-4- 4000	4.0	400	2	1-3/16"x2-1/2"x2-7/8" H
D2-4- 6000	6.0	400	2	1-3/16"x2-1/2"x4-3/4" H
D2-4- 8000	8.0	400	2	1-1/4"x3-3/4"x4-3/4" H
D2-4-10000	10.0	400	2	1-3/4"x3-3/4"x4-3/4" H
D3-6- 500	0.5	600	3	1"x1-3/4"x1" H
D2-6- 1000	1.0	600	2	1-1/16"x1-13/16"x2-1/4" H
D2-6- 2000	2.0	600	2	1-3/16"x2-1/2"x2-7/8" H
D2-6- 4000	4.0	600	2	1-1/4"x3-3/4"x3-1/4" H

NOTES:

A. Style 1 is hermetically sealed glass tube with metal end caps.

B. Style 2 is hermetically sealed rectangular metal can. See JAN-C-25 drawings of CP 70 cans for outline drawings.

C. Style 3 is hermetically sealed metal "bathtub" cans. See JAN-C-25 drawings of CP 53 cans for outline drawings.

D. 3% capacity tolerance is standard for polystyrene capacitors. 5% capacity tolerance is standard for type D capacitors. Specials to ½% for Polystyrene and to 2% for type D capacitors are available at extra cost.

Capacitors made to your specifications

Write for Catalog F

film capacitors, inc.

337 East 139th Street New York 54 N. Y.

Telephone CYpress 2-5180

Cabinets, Consoles & Enclosures

(Continued from page 153)

Radio City Products Co., Inc., N.Y., 5
Radio Engineering Labs, Inc., N.Y., 5, 10
Reiner Electronics Co., Inc., N.Y., 5
Rek-O-Kut Co., N.Y., 20
Remler Co., Ltd., Calif., 15
Research Instrument Co., N.Y., 5, 10, 15
Richardson Co., Ill., 15
Riester & Thesmacher Co., Ohio, 5
River Edge Industries, N.J., 20
Rogan Brothers, Ill., 15
Rowe Industries, Ohio, 5
Scientific Wood Cabinet Co., N.J., 20
Shaw Television Corp., N.Y., 20
Sherron Electronics Corp., N.Y., 5, 10
Shura-Tone Products, Inc., N.Y., 20, and Leatherette
Sparton of Canada, Ltd., Canada, 5
Standard Wood Products Corp., N.Y., 20
Stephens Manufacturing Corp., Calif., 20
Suckle Electronics Co., N.J., 5, 10
Suffolk Products Corp., N.Y., 5, 10
Syracuse Ornamental Co., Inc., N.Y., 15, 20
Transformer Metal Products Corp., N.Y., 5, 10
Triad Portable Case Corp., N.Y., 20, Leatherette
United Wood Specialty Mfg. Co., N.Y., 20
University Loudspeakers, Inc., [illegible] Kensico Ave., White Plains, N.Y.
For details see ad on page [illegible]
Vector Electronic Co., [illegible] San Fernando Rd., Los Angeles, Calif.
For details see ad on page [illegible]
Vega Company, Mass., [illegible]
Vibraloc Corp., Calif., [illegible]
Weltronic Co., Mich., [illegible]
Waterbury Companies, [illegible]
Worcester Pressed Steel [illegible] 10
Wright, Inc., Minn., 5

30. Capacitors: Fixed

5. Ceramic
10. Electrolytic
15. Metallized paper
20. Mica
25. Oil filled
30. Paper [illegible]
35. Paper [illegible]
40. Silvered mica
45. Vacuum

Aerovox Corp., 740 Belleville Ave., New Bedford, Mass., 5, 10, 15, 20, 25, 30, 35, 40
For details see ad on pages [illegible]
Allen-Bradley Co., Wis., 5
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35, 40, 45
American Mica Insulator Co., N.Y., 20
American Radionic Co., Inc., N.Y., 25, 30
Amperex Electronic Corp., N.Y., 45
Arnhold Ceramics, Inc., N.Y., 5, 20
Arrow Radio Co., Canada, 30
Asheville-Schoonmaker Mica Co., Va., 5

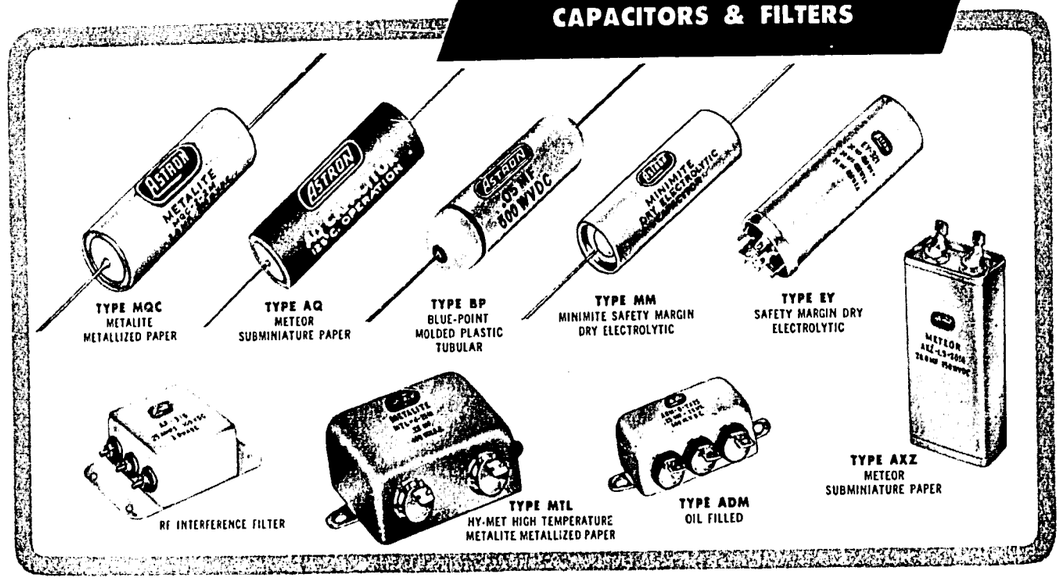
(Continued on page 137)

See also listings for Variable Capacitors on page 139.

Setting the Highest Standards in the Electronic Industry

ASTRON

CAPACITORS & FILTERS



Manufacturers in the radio, TV and electronic fields are making it a habit to specify ASTRON — for capacitors and filters built to a new high standard of performance and dependability. ASTRON pioneered the quality field, and today leads it, with a complete range of standard and special types, suited to a wide variety of applications. Whatever *your* needs, you'll find the answer at ASTRON.

SAFETY MARGIN*

Dry Electrolytic Capacitors

Extremely compact and stable capacitors, embodying the latest developments in electrolytic design. Built with a "Safety Margin" that protects against unusual weather or operating conditions. Choice of leading TV and electronic manufacturers. Variety of container styles and mountings to suit your needs.

METEOR*

Subminiature Paper Capacitors

Designed for operation to 125°C. without derating, through use of ASTRON's special high temperature impregnant, X-250*. Exceptional capacitance stability over the entire temperature range, high insulation resistance, low power factor, unusually low resonance loss and high test voltage. Meets all Armed Forces requirements. Wide variety of designs, or to your specifications.

BLUE-POINT*

Bonded Capacitors

Through an exclusive new design and manufacturing process (patent pending) developed by ASTRON engineers, the new Blue-Point capacitors provide heat and moisture protection to a degree never before possible in molded plastic capacitors. The blue point which identifies this capacitor bonds itself to the outer shell and leads, forming the tightest seal against moisture ever produced. Dry-assembled for consistent high quality and protection against contamination. Mineral-oil impregnated for continuous operation at 85°C. Heat resistant, non-inflammable outer shell and bond will not burn or melt under soldering iron. Positive anchored leads.

OIL FILLED Capacitors

Mineral-oil filled and impregnated, hermetically sealed. Designed for dependable performance under the most severe operating conditions. Meet the most rigid military specifications. Available in a wide variety of government specified case styles.

FOR COMPLETE INFORMATION ON ANY ASTRON PRODUCT, WRITE, OUTLINING YOUR REQUIREMENTS, TO:

ASTRON CORPORATION

255 Grant Avenue, E. Newark, New Jersey

RF INTERFERENCE FILTERS

One of America's largest manufacturers of RF interference filters, ASTRON is currently supplying filters in production quantities to leading aircraft and electronic manufacturers. ASTRON pioneered and developed subminiature filters and is today the nation's leading supplier of filters where small size and light weight, as well as dependable performance, are required.

Our filter specialists are equipped to recommend and design special filters for every electrical and physical requirement.

METALITE®

Metallized Paper Capacitors

Ideal for military and commercial applications due to their extremely small size, light weight and unique self-healing properties. The ultimate in capacitor miniaturization and dependability, available in a wide variety of standard and special types.

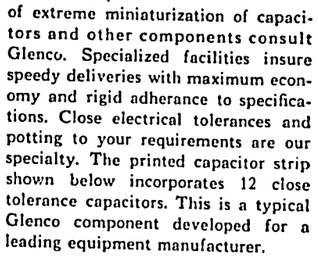
HY-METS* ASTRON's newly developed high temperature METALITE metallized paper capacitors provide all the desirable features of METALITE capacitors plus operation over a wide temperature range to +125°C. with exceedingly dependable performance characteristics.

*Trade Mark

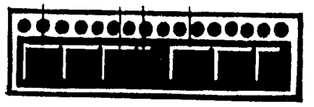
Export Division: Rocke International Corp., 13 E. 40th St., N.Y.C. In Canada: Charles W. Pointon, 1926 Gerrard St. East, Toronto.

IF YOU NEED SMALLER COMPONENTS consult— GLENNITE® —specialists in SUB-MINIATURE CAPACITORS AND ASSEMBLIES

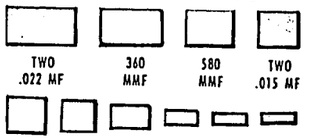
For prompt solutions to problems of extreme miniaturization of capacitors and other components consult Glenco. Specialized facilities insure speedy deliveries with maximum economy and rigid adherance to specifications. Close electrical tolerances and potting to your requirements are our specialty. The printed capacitor strip shown below incorporates 12 close tolerance capacitors. This is a typical Glenco component developed for a leading equipment manufacturer.



PRINTED CIRCUIT



COMPLETED ASSEMBLY WITH PROTECTIVE COATING



(ALL UNITS SHOWN ACTUAL SIZE)

GLENCO ALSO SPECIALIZES IN NON-LINEAR DIELECTRICS FOR DIELECTRIC AMPLIFIERS AND MEMORY DEVICES — CALL OR WRITE FOR DETAILED INFORMATION

GLENCO CORPORATION

DURHAM AVE., METUCHEN, NEW JERSEY

Telephone: MEtuchen 6-2800

(Continued from page 135)

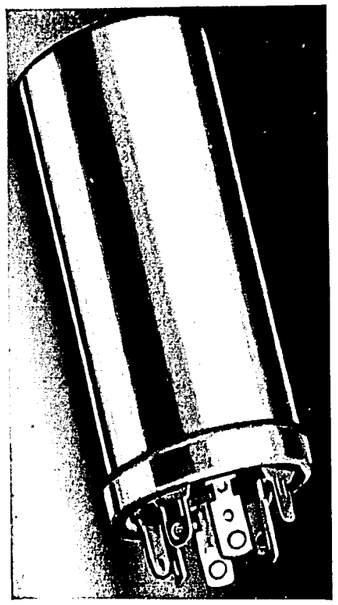
Astron Corp., 255 Grant Ave., East Newark, N.J., 10, 15, 25, 30, 35
For details see ad on page 136
Automatic Electric Co., Ill., 30
Automatic Manufacturing Corp., N.J., 5
Balco Research Laboratories, N.J., 15, 30, 35
Barco, Inc., P.O. Box 1222, Milwaukee 1, Wis., 10, Ultra Miniature
For details see ad on page 11
Bartlett, Frederick P., Ill., 10
Centralab, Div. of Globe Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis., 5
See complete catalog in last section
Ceramic Specialties Co., Ohio, 5
Chemo-Vac Electronic Corp., Calif., 45
Chicago Condenser Corp., 3255 W. Armitage Ave., Chicago 47, Ill., 25, 30, 35
For details see ad on page 134
Church Co., George H., Minn., 25, 30
Condenser Products Co., Ill., 5, 25, 35
Cornell-Dubilier Electric Corp., 333 Hamilton Blvd., South Plainfield, N.J., 5, 10, 15, 20, 25, 30, 35, 40, 45, Tantalum & Mylar
For details see ad on page 6
Corning Glass Works, N.Y., 5
Corson Electric Mfg. Corp., N.J., 25, 30, 35, Pulse Forming Network
Cosmic Radio Corp., N.Y., 10, 30
Deutschmann Corp., Tobe, Mass., 15, 25, 30, 35, Pulse
Dilectron Co., N.Y., 30, 35
Dolinko & Wilkens, Inc., N.J., 45
Dumont Airplane & Marine Instr., N.Y., 10, 25, 30, 35
Dumont Electric Corp., N.Y., 10, 25, 30, 35
Eitel-McCullough, Inc., 198 San Mateo Ave., San Bruno, Calif., 45
For details see ad on pages 402-403
Electro Motive Mfg. Co., Inc., S. Park & John Sts., Willimantic, Conn., 5, 20, 30, 40
For details see ad on page 40
Electronics Devices Co., N.Y., 5
Emerald Mfg. Co., Ill., 40
Erie Resistor Corp., 644 W. 12th St., Erie, Pa., 5, 35, 40
For details see ad on page 18
F.S.D. Laboratories, Conn., 10
Fansteel Metallurgical Corp., Ill., 10
Fast & Co., John E., Ill., 25, 30, 35
Film Capacitors, Inc., 337 E. 139 St., New York 54, N.Y., 35
For details see ad on page 135
Filtron Company, Inc., N.Y., 25, 30
General Electric Co., N.Y., 45
General Electric Co., N.Y., 5, 10, 25, 30, 35
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 20
For details see ad on pages 380-381, Cover IV
Girard-Hopkins, Calif., 25, 30
Glenco Corp., 212 Durham Ave., Metuchen, N.J., 5
For details see ad on page 137
Good-All Elec. Mfg. Co., Neb., 25, 30, 35
Gudeman Co., 340 W. Huron St., Chicago, Ill., 10, 15, 25, 30, 35
For details see ad on page 22
Gulton Mfg. Corp., N.J., 5
Hansell, Inc., U., R.I., 5
Herlec Corp., Wis., 5
Illinois Condenser Co., 1616 N. Throop St., Chicago 22, Ill., 10, 15, 25, 30, 35, 40
For details see ad on page 70
Industrial Condenser Corp., Ill., 10, 25, 30, 35
Interelectronics Corp., N.Y., 5, 20, 40
International Resistance Co., Pa., 35
Jeffers Electronics Div. Speer Carbon Co., Pa., 5, Fixed Comp. High Voltage
Jennings Radio Mfg. Co., 970 McLaughlin Ave., San Jose 8, Calif., 45
For details see ad on pages 390-392
Kellogg Switchboard & Supply Co., Dept. 69, 79 W. Monroe St., Chicago 3, Ill., 30
For details see ad on page 106
Knapp Radio Specialties, Inc., Mass., 5, 40
Lapp Insulator Co., Inc., N.Y., Gas Filled
La Rose & Associates, Inc., W. T., N.Y., 20
Magnavox Co., 2131 Bueter Rd., Ft. Wayne 4, Ind., 10
For details see ad on page 138
Maida Development Co., Va., 5
Mallory & Co., Inc., P. R., Ind., 5, 10, 20, 25, 30, 35, 40
Measurements Corp., Intervale Rd., Boonton, N.J., 5, 20
For details see ad on pages 284, 422-423
Mica Fabricating Co., N.Y., 20
Mica Fabricators Association, 420 Lexington Ave., New York 17, N.Y., 20
For details see ad on page 279
Micamold Radio Corp., N.Y., 10, 20, 25, 30, 40
Micarta Fabricators, Inc., Ill., 5
Minerals & Insulation Co., N.J., 20
Monson Corp., Ill., 30
Mucon Corp., N.J., 5
Muter Co., Ill., 5
National Capacitor Co., Mass., 15, 25, 30, 35
Neptune Electronics Co., N.Y., 10, 15, 25, 30
Nize Mfg. Co., Inc., N.Y., 30
Onondaga Pottery Co., N.Y., 5
Penta Laboratories, Inc., Calif., 45

(Continued on page 139)

Alphabetical List of Products will be found in the Pink Section preceding the alphabetical directory.

Magnavox Electrolytic Capacitors

MADE EXPRESSLY FOR THE MANUFACTURING TRADE SINCE 1919

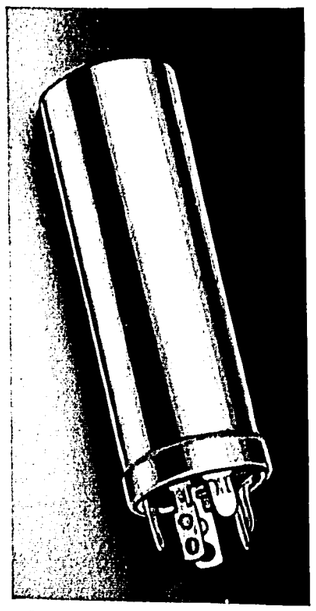


1¾" diameter FP available in 2, 2½, 3 and 4" lengths

• Magnavox products are world-renowned for their quality performance, long life, economy, dependability, uniformity and precision construction.

The table below shows a few of the standard type FP Capacitors. Manufacturer's specification requirements are given immediate attention.

TYPE FP—(As Illustrated)			
CATALOGUE No.	CAPACITY MFD.	WORKING VOLTS	SIZE
850115	10	350	1 x 2
850081	20	450	1 x 2
850109	30	500	1 x 3
850059	40	500	1 x 3
850097	50	350	1 x 3
850104	30	500	1⅜ x 2
850070	50	450	1⅜ x 2
850034	10-10	450-450	1 x 2
850071	15-15	450-450	1 x 3
850007	20-20	450-450	1 x 3
850052	30-10	475-475	1 x 3
850137	40-40	450-450	1⅜ x 3
850041	50-50	400-400	1⅜ x 3
850135	10-10-10	475-475-475	1 x 3
850008	50-50-50	150-150-150	1 x 3
850102	30-30-10	450-450-450	1⅜ x 3
850050	40-30-30	450-450-450	1⅜ x 3
850027	15-15-10-10	450-450-450-450	1⅜ x 2
850108	20-20-10-10	450-450-450-450	1⅜ x 3



1" diameter FP available in 2, 2½ and 3" lengths

ALSO AVAILABLE—Type "TM" (tubular metal) in single and dual capacities, diameter sizes ⅝", ¾", ⅞" and 1".

★ *Detailed catalogue available upon request.*

THE MAGNAVOX COMPANY

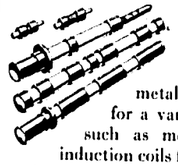
Dept. IRE

FORT WAYNE 4, INDIANA

Stupakoff

Metallized

CERAMICS



Stupakoff specializes in the application of metal to ceramic parts for a variety of purposes, such as metallized ceramic induction coils for radio receivers and transmitters; metallized ceramic shafts for air-tuning condensers; metallized plates for fixed rigid assemblies; printed circuits; ceramic trimmer condensers; terminals and terminal boards; strain and lead-in insulators; and many other ceramic-to-metal products.

Stupakoff high-precision ceramic assemblies offer many opportunities to reduce costs, increase production and improve electrical and electronic equipment. Further details will gladly be sent upon request.

STUPAKOFF CERAMIC & MFG. CO.

LATROBE, PENNSYLVANIA

(Continued from page 137)

Planet Mfg. Corp., 225 Belleville Ave., Bloomfield, N.J., 10
For details see ad on page 139
Plastic Capacitors, Inc., Ill., 35
Porter Manufacturing Co., Ill., 5, 10, 15, 30, 35, 40
Powell Co., Harold H., Pa., 25
Pymarid Electric Co., N.J., 10, 15, 25, 30
Quality Components, Inc., Pa., Low Value
Radiation, Inc., Fla., 5
Radio Industries, Inc., Ill., 40
Radio Materials Corp., 3325 N. California Ave., Chicago 18, Ill., 5
For details see ad on pages 436-437
Research Instrument Co., N.Y., 25, 45
Rockbar Corp., 211 E. 37 St., New York 16, N.Y., 5, 20, 40
For details see ad on page 77
Sangamo Electric Co., Ill., 10, 20, 25, 30, 40, Tantalum
Semco Electronics Corp., N.Y., 5, 20, 40
Solar Manufacturing Corp., Calif., 5
Sprague Electric Co., Mass., 5, 10, 15, 20, 25, 30, 35, 40
Stackpole Carbon Co., Tannery St., St. Marys, Pa., 35
For details see ad on pages 442-443
Standard Condenser Co., Ill., 15, 25, 30, 35, Plastic Film & High Temperature
Stupakoff Ceramic & Mfg. Co., Box 390, Hillview Ave., Latrobe, Pa., 5
For details see ad on pages 139, 189, 203, 255, 265, 277, 295, 297, 303, 378-379
Telegraph Condenser Co., Ltd., England, 5, 10, 20, 25, 30, 35, 40
Teleradio Engineering Corp., N.Y., 5, 10, 15, 20
Telex, Inc., Minn., 5
Vacuum Tube Products, Calif., 45
Vitramon, Inc., Conn., 5, 20
Winters Engineering, T. Starling, N.J., 25

31. Capacitors: Variable.

5. Neutralizing
10. Precision variable
15. Temperature compensating
20. Trimmers
25. Tuning
30. Vacuum

All Star Products, Inc., Ohio, 20, 25
American Machine & Foundry Co., Mass., 10, 15, 20, 25, 30
Arnhold Ceramics, Inc., N.Y., 20
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 5, 25
For details see ad on page 408
Bud Radio, Inc., 2118 E. 55 St., Cleveland 3, Ohio, 5, 20, 25
For details see ad on pages 267, 346
Cambridge Thermionic Corp., 440 Concord Ave., Cambridge 38, Mass., 10, 20
For details see ad on page 254
Cardwell Mfg. Corp., The Allen D. [illegible] Conn., 5, 10, 15, 20, 25
Centralab, Div. Globe Union Inc., [illegible] Keefe Ave., Milwaukee 1, Wis.
See complete catalog in Sec. [illegible]
Chemo Vac Electronics [illegible]
Condenser Products [illegible]
Corning Glass Works [illegible]
De Wald Radio Mfg. [illegible]
Dolinko & Wilkens, [illegible]
Eitel-McCullough, Inc., [illegible] Ave., San Bruno, Calif.
For details see ad [illegible]
Electro Motive Mfg. Co., [illegible] & John Sts., Willimantic, Conn.
For details see ad [illegible]
El Mec Laboratories [illegible]
Establissements "P" [illegible]
Emerald Mfg. Co., [illegible]
Erie Resistor Corp., [illegible] Erie, Pa., 15, 20
For details see ad [illegible]
General Instrument Corp., [illegible] Ave., Elizabeth 3, N.J., 15, 30, Oil Filled
For details see ad [illegible]
General Radio Co., [illegible] Ave., Cambridge, Mass.
For details see ad [illegible] Cover IV
Gertsch Products, Inc., [illegible]
Guthman & Co., Inc., [illegible]
Hammarlund Mfg. Co., Inc., 460 W. 34th St., New York 1, N.Y., 5, 10, 20, 25
For details see ad on pages 426-427
Herlee Corp., Wis., 15

(Continued on page 140)



Planet Capacitors "*Engineered for Quality*"

1 year service guarantee

Custom engineered to your specifications or supplied from stock, Planet capacitors meet the highest standards of the industry. Every capacitor is tested mechanically and electrically throughout its manufacture.

This rigid system of quality control makes our unconditional one-year guarantee possible. But making Planet capacitors right from the start means reasonable prices too!

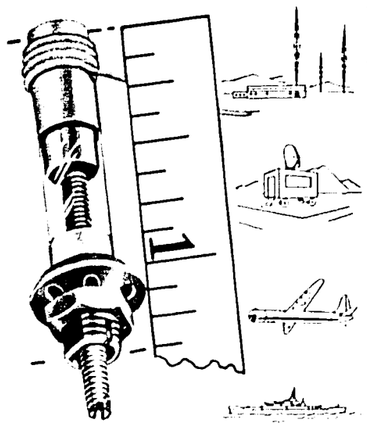
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PLANET MANUFACTURING CORPORATION
225 BELLEVILLE AVENUE
BLOOMFIELD, N.J.

PLANET

1954
Radio Engineering Show
March 22-25, 1954
Kingsbridge Armory
New York City

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.



NO OTHER LIKE IT!

- Approximately ZERO TEMPERATURE COEFFICIENT FOR QUARTZ AND INVAR construction.
- Approximately ± 50 PPM per degree C. for Glass and INVAR construction.
- One-piece SPRING LOADED PISTON and screw prevent backlash.
- SILVER BAND fused to exterior of precision drawn quartz or glass tube serves as optimum stationary electrode.
- "Q" of 1,000 at 1 mc.
- DIELECTRIC STRENGTH equals 1,000 volts DC at sea level pressure and 500 volts at 3.4 inches of mercury.
- 10,000 megohms INSULATION RESISTANCE MINIMUM.
- OPERATING TEMPERATURES, −55 C. to + 125 C. with glass dielectric. −55 C. to +200 C. with quartz dielectric.
- Over 100 megohms MOISTURE RESISTANCE after 24 hours exposure to 95% humidity of room temperature.
- PISTON DIMENSIONAL ACCURACY is held to close tolerance maintaining minimum air gap between piston and cylinder wall.

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leading manufacturers use

JFD PISTON TYPE VARIABLE TRIMMER CAPACITORS

in both civil and military equipment

No. VC 1 G (0.7 to 6.0 mmf.) Glass Dielectric
No. VC 5 (1.0 to 10.0 mmf.) Quartz Dielectric
No. VC 11 (1.0 to 10.0 mmf.) Quartz Dielectric
No. VC 11 G (1.0 to 12.0 mmf.) Glass Dielectric
No. VC 20 (0.5 to 1.9 mmf.) Glass Dielectric

JFD MFG. CO.
BROOKLYN 4, N.Y.
BENSONHURST 6-9200
world's largest manufacturer of tv antennas & accessories

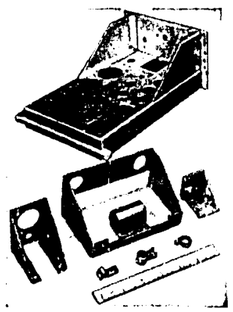
METAL FABRICATION

To Your Specifications

Abalon's excellent engineering facilities and expert production supervision are at your service.

We have a large stock of dies on hand and complete up-to-date facilities for metal fabrication from any type metal with any type finish.

Estimates per your blueprints cheerfully given.



- **PANELS**
- **CHASSIS**
- **ENCLOSURES**
- INSTRUMENT PANELS
- HIGH VOLTAGE CAGES
- SPARE PARTS BOXES
- MULTI-RACK CABINETS
- RECEIVER and TRANSMITTER HOUSING
- FOLDAWAY and HINGED CHASSIS
- CHASSIS of ALL TYPES
- METAL ASSEMBLIES
- BRACKETS and SMALL STAMPINGS
- TRANSFORMER LAMINATIONS

Years of experience in metal fabrication

Abalon PRECISION MFG. CORP.
540 CASANOVA STREET NEW YORK 59, N.Y.
LUdlow 9-6330, 9-5682

Capacitors: Variable

(Continued from page 139)

JFD Mfg. Co. Inc., 6101-16th Ave., Brooklyn 4, N.Y., 10
For details see ad on pages 140, 242
Jennings Radio Mfg. Co., 970 McLaughlin Ave., San Jose 8, Calif., 5, 10, 20, 25, 30
For details see ad on pages 390-392
Johanson Manufacturing Corp., N.J., 5, 10, 20, 25
Johnson Co., E. F., Waseca, Minn., 5, 20, 25
For details see ad on page 183
Knapp Radio Specialties, Inc., Mass., 20
Lapp Insulator Co., Inc., N.Y., Gas Filled
Lavoie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N.J., 10
For details see ad on page 328
Maida Development Co., Va., 15, 20
Mallory & Co., Inc., P. R., Ind., 20
Measurements Corp., Intervale Rd., Boonton, N.J., 20, 25
For details see ad on pages 284, 422-423
Millen Mfg. Co., Inc., 150 Exchange St., Malden 48, Mass., 5, 20, 25
For details see ad on page 334
Molded Insulation Co., Pa., 25
Muirhead & Co., Ltd., England, 10
Mullard Overseas Limited, England, 10, 20
Muter Company, Ill., 20
National Company, Inc., 61 Sherman St., Malden 48, Mass., 5, 20, 25
For details see ad on pages 434-435
Onondaga Pottery Co., N.Y., 15
Parts Producing Corp., N.Y., 10, 25
Penta Laboratories, Inc., Calif., 30
Porter Manufacturing Co., Ill., 5, 10, 15, 20, 25, 30
Research Instrument Co., N.Y., 5, 10, 15, 25, 30
Sickles Co., F. W., Div. General Instrument Corp., Chicopee, Mass., 20
For details see ad on page 421
Solar Manufacturing Corp., Calif., 20
Sprague Electric Co., Mass., 20
Stupakoff Ceramic & Mfg. Co., Box 390, Hillview Ave., Latrobe, Pa., 15, 20
For details see ad on pages 139, 189, 203, 255, 265, 277, 295, 297, 303, 378-379
Tarzian, Inc., Sarkes, Ind., 20, 25
Telegraph Condenser Co., Ltd., England, 20
United Electronics Company N.J., 30
Vacuum Tube Products, Calif., 30
Wheaton Co., T. C., N.J., 5, 10, 20, 25
White Industries, Inc., N.Y., 25

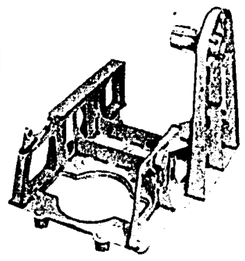
32. Chassis & Racks.

5. Aluminum chassis 10. Steel chassis 15. Relay racks & cabinets

Abalon Precision Mfg. Corp., 540 Casanova St., New York 59, N.Y., 5, 10, 15
For details see ad on page 140
Airplane & Marine Instruments Inc., Pa. 5, 10, 15
Alden Products Co., 113 N. Main St., Brockton 64, Mass., 5, 10, 15
For details see ad on pages 150-151

Chassis & Racks

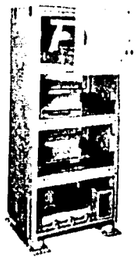
Alliance Tool & Motor Co., Ltd., Canada, 10
Alloy Metalsmiths, Inc., N.J., 5, 10, 15
Altec Lansing Corp., Calif., 15
American Machine & Foundry Co., Mass., 5, 10, 15
Anchor Specialty Mfg. Co., N.J., 15
Ardente Acoustic Labs, Ltd. England, 5, 10, 15
Art-Lloyd Metal Prods. Corp., N.Y., 5, 10, 15
Auto Test, Inc., Ill., 10
Baltic Metal Products Co., N.Y., 5, 10, 15
Bardwell & McAlister, Calif., 5, 10
Boyle Metalcraft Corp., 154 Sullivan St., Brooklyn 31, N.Y., 5, 10, 15
For details see ad on page 132
Buck Engineering Co., Inc., N.J., 5, 10, 15
Bud Radio, Inc., 2118 E. 55 St., Cleveland 3, Ohio, 5, 10, 15
For details see ad on pages 267, 346
Canadian Westinghouse Co., Ltd., Canada 5, 10, 15
Canoga Corp., Calif., 5, 10, 15
Central Stamping & Mfg. Co., Ill., 5, 10, 15
Churchill Corp., Mass., 5, 10, 15
Cole Instrument Co., Calif., 15
Coles Electronics Corp., 5, 10
Communication Equip. & Engineering, Ill., 5, 10, 15
Corry Jamestown Mfg. Corp., Pa., 15
Craig Machine, Inc., Mass., 5



Machined Weldments for Sonar & Radar

Consoles; Racks & Cabinets

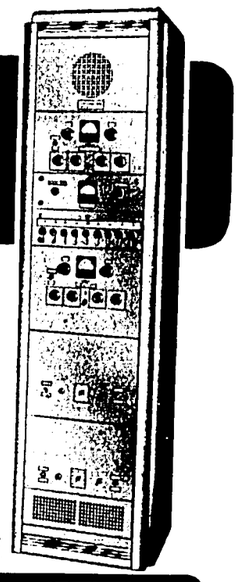
Specialists in Aluminum, Stainless & Magnesium



METAL FABRICATORS CORPORATION
73 POND STREET, WALTHAM (BOSTON 54), MASS. *Tel.* Waltham 5-6800

TAKE NO CHANCES WITH VITAL EQUIPMENT... *Specify*

SERIES 6918 or 6924
RACKS by PAR-METAL



18½" or 24" DEEP, for 19" WIDE PANELS

- *Panel Spaces:* 61¼", 70", or 77" high.
- Finished in Prime Coat, Black Wrinkle, Grey Lacquer, Grey Wrinkle.
- Series 6918 or 6924 Racks may be used in *"rows"* or *"gangs,"* as corner trims are removable from *front* of cabinet.
- Standard shelves and roller trucks are manufactured by us for use with these Racks.

THESE RACKS ARE MODERATELY PRICED and AVAILABLE FOR SHIPMENT FROM STOCK

Planning an electronic product? Consult Par-Metal for
RACKS • CABINETS
CHASSIS • PANELS
Our P-6924 Rack as used by Gai-Tronics, Inc., Reading, Pa.

Remember, Par-Metal equipment is made by electronic specialists, not just a sheet metal shop.

Made by Electronic Specialists!

PAR-METAL PRODUCTS CORPORATION
32-62 — 49th ST., LONG ISLAND CITY 3, N. Y.
Tel.: AStoria 8-8905
Export Dept.: Rocke International Corp.
13 East 40 Street, New York 16, N. Y.

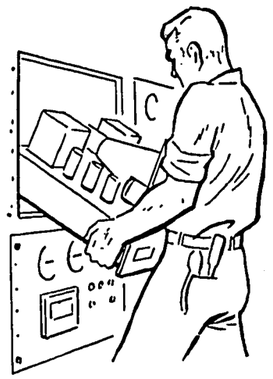
WRITE FOR CATALOG!

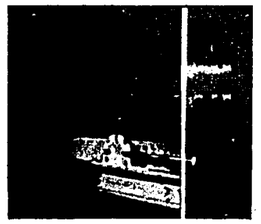
Crescent Industries Inc., Ill., 5, 10
Dahlstrom Metallic Door Co., N.Y., 5, 10, 15
Dale Products, Inc., 1318 28 Ave., Columbus, Neb., 5, 10
For details see ad on pages 452-453
Dietz Co., Henry G., N.Y.
Dolin Metal Products, Inc., N.Y., 5, 10
Falls Metal Works, Ltd., 414 Main St., Little Falls, N.J., 5, 10, 15
For details see ad on page 132
Falstrom Co., N.J., 5, 10, 15
Feiner & Sons, Inc., P., 5, 10, 15
Ferro-Co Corp., N.Y., 5, 10, 15
Franklin Electronics, Inc., Pa., 5, 10
Gates Radio Co., Ill., 5, 10, 15
Golden Corp., L., N.Y., 5, 10, 15
Grant Pulley & Hardware Co., 31-87 Whitestone Pkwy., Flushing 54, N.Y., Equipment Slides
For details see ad on page 142
Hadley Co., Robert M., Calif., 5, 10, 15
H & B American Machine Co., N.Y., 5, 10, 15
Hammond Manufacturing Co., Ltd., Canada, 10, 15
Harmon Electronics Co., Mo., 5, 10, 15
Heldor Manufacturing Corp., 238 Lewis St., Paterson, N.J., 5, 10
For details see ad on page 276
Heller Co., Gerald K., Md., 10
Henry & Miller Industries, Inc., N.Y., 5, 10, 15
HE Manufacturing, Ill., 5, 10
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 5, 10, 15
For details see ad on page 134
Interelectronics Corp., 2432 Grand Concourse, New York 58, N.Y., Subminiature Battery Racks
For details see ad on page 51
Jacksonville Metal & Plastics, Fla., 5, 10, 15
Kellogg Switchboard & Supply Co., Dept. 69, 79 W. Monroe St., Chicago 3, Ill., 15
For details see ad on page 106
Kinney Co., Joseph, Pa., Panels
Kolton Electric Mfg. Co., N.J., 10
Korrol Products Corp., N.Y., 5, 10, 15
Lamagna Mfg. Co., Inc., N.J., 5, 10
Langevin Manufacturing Corp., 37 W. 65 St., New York 23, N.Y., 10
For details see ad on page 218
Lehigh Valley Electr. Engr. & Mfg., Pa., 5, 10
Lesa, S.P.A., Italy, 15
Lowell Manufacturing Co., Mo., 5, 10, 15
Marine Electric Corp., N.Y., 5, 10, 15
Metal Fabricators Corp., 73 Pond St., Waltham 54, Mass., 5, 10, 15
For details see ad on page 141
Metal Products Co., Tenn., 5, 10, 15
Metallic Arts of New England, Inc., Mass., 5, 10, 15
Minute Man Products, Inc., N.Y., 5, 10
Monument Eng. Co., Inc., Ind., 5, 10
Mullenbach Electrical Mfg. Co., Calif., 10, 15
Multi Metal Wire Cloth Co., Inc., N.Y., 5, 10, 15
Newcomb Audio Products, Calif., 15
North Electric Manufacturing Co., Ohio, 15

(Continued on page 143)

Why put up with this costly,

time-wasting step any longer?...

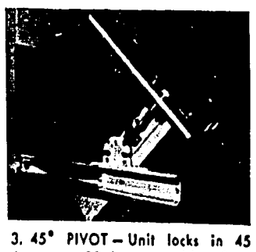




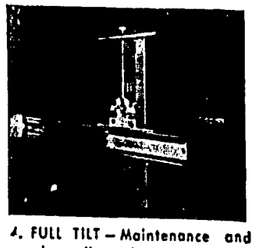
1. FULL EXTENSION — Continuous ball bearing action permits smooth, non-jar chassis removal. Locks in fully extended position, must be unlocked to return.



2. PIVOT RELEASE — Withdrawing release rods disengages them from quadrant mechanism, enables perfectly balanced unit to be tilted by simply raising.



3. 45° PIVOT — Unit locks in 45 degree or 90 degree position. Special pivoted positions can be obtained to fit individual requirements.



4. FULL TILT — Maintenance and repairs easily made. Access to component is gained in a few seconds. Special slides can provide plus or minus 90° tilt.

Design accessibility into your equipment

When repairs and maintenance of electronic equipment are needed, wasted time costs money! Alert manufacturers have totally eliminated the laborious step of "getting at" vital components by installing Grant Industrial Slides. Is your equipment mechanically up to its high electronic standards? If not, Grant offers you:

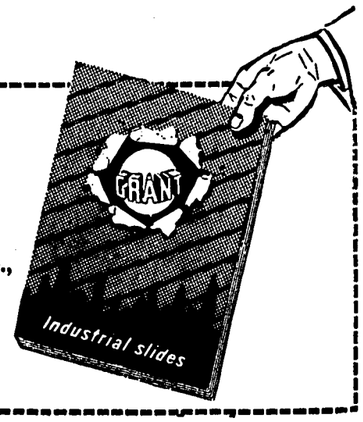
Stock Slides — A great variety of types, suitable for most needs, is *in stock* and available for immediate delivery.

Custom Slides — A complete research and engineering staff is ready to assist you at your plant, convert your blueprints into working plans and develop slides that suit your needs perfectly.

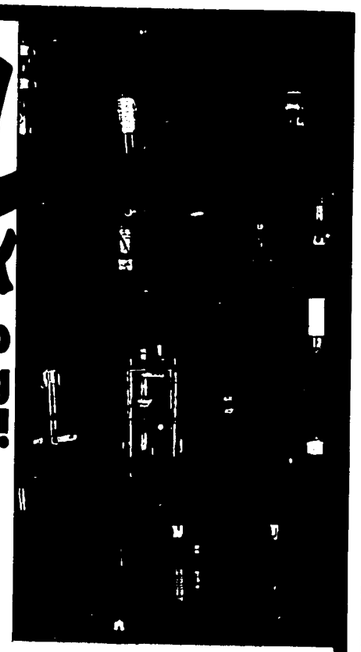
Grant Industrial Slides

a product of the engineering design department of Grant Pulley and Hardware Company

For your copy of Grant's Industrial Slide Catalog write today to: Grant Pulley & Hardware Co., 31-87 Whitestone Parkway, Flushing, New York.



COIL and CHOK to exacting standards!



3 REASONS WHY ACE COILS AND CHOKES ARE SPECIFIED FOR MILITARY AND COMMERCIAL EQUIPMENT.

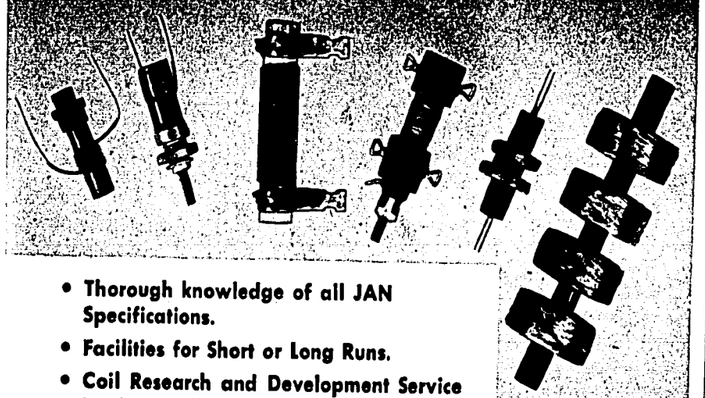
1—All level quality control
2—Advanced engineering technique
3—Timely deliveries

Phone, wire or write for prompt quotations.

ACE COIL & ELECTRONICS CO.

915 Middlesex Ave. Met. 6-3580 Metuchen, N. J.

COILS to rigid Specifications for any Application



- Thorough knowledge of all JAN Specifications.
- Facilities for Short or Long Runs.
- Coil Research and Development Service in cooperation with your Engineering Staff.

AEROCOIL, Incorporated

24 CLIFF STREET, JERSEY CITY, NEW JERSEY

TELEPHONE JOURNAL SQUARE 3-7445-7

Chassis & Racks

(Continued from page 141)

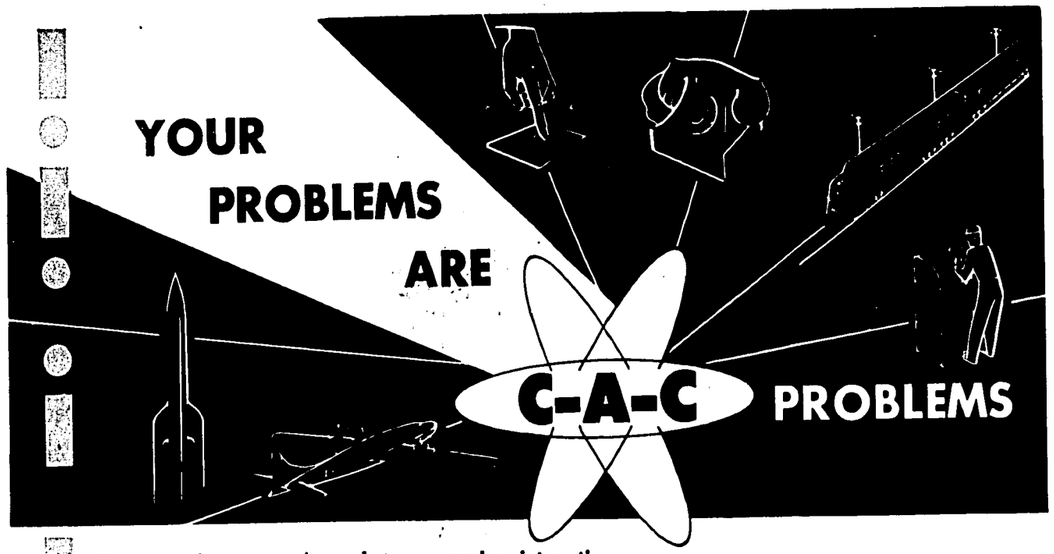
Northern Electric Co., Ltd., Canada 5, 10, 15
Par-Metal Products Corp., 36-62 49th St., Long Island City 3, N.Y., 5, 10, 15
For details see ad on page 141
Photo Chemical Products, Inc., 479 Walton Ave., New York 51, N.Y., 5, 10, 15
For details see ad on page 187
Powell Co., Harold H., Pa., 5, 10
Premier Metal Products Co., 3160 Webster Ave., New York 67, N.Y., 5, 10, 15
For details see ad on page 133
REF Mfg. Corp., N.Y., 15
Radio City Products Co., Inc., N.Y., 10
Reflectone Corp., Conn., 5, 10, 15
Radio Engineering Products, Canada, 5, 15
Reiner Electronics Co., Inc., N.Y., 5
Repath Co., Paul R. Calif., 5, 10
Research Instrument Company, N.Y., 5, 10, 15
Riester & Thesmacher Co., Ohio, 5, 10
Robinson Aviation, Inc., Teterboro, Air Terminal, Teterboro, N.J., 5, 10
For details see ad on page 90
Rowe Industries, Ohio 5, 10
Scovill Mfg. Co., Conn., 5, 10
Sherron Electronics Corp., N.Y., 5, 10, 15
Sparton of Canada, Ltd., Canada, 5, 10, 15
Suckle Electronics Co., N.J., 5, 10, 15
Suffolk Products Corp., N.Y., 5, 10, 15
Transformer Metal Products Corp., N.Y., 5, 10, 15
United Specialties Co., Pa., 5, 10
Weltronic Co., Mich., 10
White Industries, Inc., N.Y., 10
Worcester Pressed Steel Co., Mass., 10, 15

33. Coils.

5. Audio frequency chokes
10. Deflection yokes
15. Focusing coils
20. RF chokes
25. Toroids
30. Tuning

A. J. F. Industries, Inc., N.Y., 5, 10
A. P. W. Co., N.J., 15, 25
Ace Coil & Electronics Co., 914 Middlesex Ave., Metuchen, N.J., 20, 30
For details see ad on page 143
Acro Products Co., Pa., 5
Acro Transformer & Mfg. Corp., N.Y., 5
Advance Electronics Co., 451 Highland Ave. Passaic, N.J., 25
For details see ad on page 325
Aerocoil, Inc., 24 Cliff St., Jersey City, N.J., 20, 25, 30
For details see ad on page 143
Aerovox Corp., 740 Belleville Ave., New Bedford, Mass., 20, 25
For details see ad on pages 362-363
Aircraft Transformer Corp., West & Willow Aves., Long Branch, N.J., 5
For details see ad on page 1
Aladdin Radio Industries, Inc., Tenn., 20, 30
Alcar Instruments, Inc., N.J., 20, 25, 30
Alden Products Co., 113 N. Main St., Brockton 64, Mass., 25, Magnetic Storage Coils
For details see ad on pages 150-151

(Continued on page 145)



Hardly a day passes but what we receive interesting research problems on the application of toroids.

CAC engineers welcome the opportunity to consider your specific requirements in frequency selective networks—

For your convenience use our specification list (below) which covers most filter requirements:

FILTER SPECIFICATIONS

1. Pass Band
   a) Frequency limits: _____ to _____
   b) Max. insertion loss at min. point: _____ db
   c) Required flatness: ± _____ db
2. Attenuation Band
   a) Frequency limits & relative attenuation required:
      1) _____ to _____; _____ db
      2) _____ to _____; _____ db
      etc
3. Terminations *
   a) Input
      1) impedance in pass band: _____ ohms
      2) impedance beyond pass band: ☐ increase ☐ decrease ☐ not important
      3) ☐ balanced, ☐ unbalanced
   b) Output
      1) impedance in pass band: _____ ohms
      2) impedance beyond pass band: ☐ increase ☐ decrease ☐ not important
      3) ☐ balanced, ☐ unbalanced
4. Operating Conditions
   a) Power level _____ DBM
   b) Temperature range _____° to _____° F or C
   c) Vibration requirements _____.
5. Case Requirements
   a) Max. dimension: _____ in. x _____ in. x _____ in.
   b) Mounting by No. _____ - _____ (thread) x _____ in. ☐ studs ☐ tapped inserts.
   c) Location of terminals and mounting provisions: on _____ in. x _____ in. surface.
   d) Hermetic Seal: ☐ yes ☐ no.
   e) Finish Color; ☐ dark gray ☐ light gray ☐ black ☐ Special (Specify)
6. Other Requirements
   a) Military specifications applicable: ☐ MIL-T-27 ☐ _____ ☐ none
   b) Special Requirements: _____

*NOTE: If low frequency limit of pass band is d.c., input and output impedances are usually equal and must both be either balanced or unbalanced.

TOROIDAL INDUCTORS
Data For Standard Types

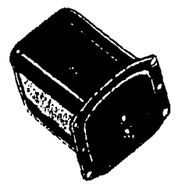
Type	Normal Lmax.	Appr. Size O.D. x H	Useful Freq. Range	Qmax @ Freq.	T.C.	Iac-ma
206	3.0 Hy	.90x .40	Up to 15 KC	140 @ 9 KC	1	23
930	17.5 Hy	1.20x .60	Up to 15 KC	170 @ 7.5 KC	1	42
254	35 Hy	1.85x .85	Up to 15 KC	220 @ 5 KC	1	67
466	60 Hy	2.15x1.00	Up to 15 KC	260 @ 5 KC	3	95
848	1.4 Hy	.90x .40	10- 50 KC	170 @ 20 KC	1	33
395	8.0 Hy	1.20x .60	10- 50 KC	220 @ 20 KC	1	61
381	17.0 Hy	1.55x .65	10- 50 KC	250 @ 17.5 KC	3	71
608	600 Mh	.90x .40	30- 75 KC	165 @ 60 KC	3	50
579	7.5 Hy	1.55x .65	30- 75 KC	185 @ 30 KC	2	110
041	320 Mh	.90x .40	50-200 KC	115 @ 120 KC	3	68
013	4.0 Hy	1.55x .65	50-200 KC	145 @ 70 KC	3	150

REMARKS

Qmax—Values taken at approx. .01 Iac. Q decreases with increasing current to about .50 Qmax at 1.0 Iac—higher inductance values have lower Qmax at lower frequency due to dielectric losses of winding distributed capacity. All values are for inductors wound with Heavy Formex wire.

T.C.—Temperature characteristics as follows:
1—approx. 100 ppm/°F
2— ± .1% 55 to 90°F
3— ± .1% 30 to 130°F
(most types with temp. characteristic 1 are available with characteristic 3 at no sacrifice in performance)

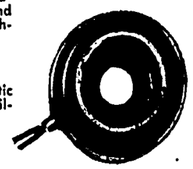
Iac—r.m.s. current which raises 0.1 Hy inductor to max. (2% above initial) inductance — (1% increase occurs at approx 0.35 Iac.



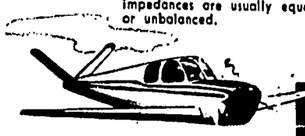
Custom miniaturization of filters is achieved through use of miniaturized components and advanced design techniques.



Uncased coils adjusted to your specifications.



Moistureproof Plastic Coated Toroids available in all types.



Via C.A.C. Beechcraft, we are only hours away from you—we solicit the invitation to discuss your problems across your own desk.

COMMUNICATION ACCESSORIES Company

Coils

(Continued from page 143)

Allied Control Co., Inc., N.Y., 5 Transformer Relay
Allied Allegri Machine Co., Inc., N.J., 20, 30
Alpha Electronics, Inc., N.J., 10
American Machine & Foundry Co. Mass., 20, 25
Amplifier Corp. of America, N.Y., 5
Atlantic Electronics Corp., N.J., 20, 30
Automatic Manufacturing Corp., N.J., 20
Ballastran Corp., Ind., 5, 10
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 5, 20, 25, 30
For details see ad on page 408
Bellaire Electronics, Inc., N.Y., 20, 30
Best Mfg. Co., Inc., N.J., 15 PM Type
Bittermann Electric Co., Conn., 5, 20, 25, 30
Blackstone Electric Co., Ill., 30 Miniature edgewise wound inductors
Bond Electronics Corp., N.J., 5. 20, 30
Bud Radio, Inc., 2118 E. 55 St., Cleveland 3, Ohio, 20
For details see ad on pages 267, 346
Burnell & Co., 45 Warburton Ave., Yonkers 2, N.Y., 25
For details see ad on page 16
Burnett Radio Laboratory, Wm. W. L., Calif., 20
Caddell-Burns Mfg. Co., Inc., N.Y., 20, 30
Cambridge Thermionic Corp., 440 Concord Ave., Cambridge 38, Mass., 20
For details see ad on page 254
Campbell Co., Colin, Conn., 5, 25
Canadian Marconi Co., Canada 5, 20
Canadian Westinghouse Co., Ltd., Canada 5
Central Transformer Co., Ill., 5
Centronics Co., N.Y., 20
Chicago Electronic Eng. Co., 5
Chicago Transformer Div., Essex Wire Corp., 3501 N. Elston Ave., Chicago 18, Ill., 10, 15, 25
For details see ad on page 212
Clippard Instrument Laboratory, Ohio, 20
Coil Winders, Inc., N.Y., 5, 10, 15, 20, 30
Coilcraft, Inc., Ill., 5, 20, 30
Cole Instrument Co., Calif., 20, 25
Coles Electronic Corp., Pa., 20
Communication Accessories Co., 110 St. & Hillcrest Rd., Hickman Mills, Mo., 25
For details see ad on page 144
Communication Parts, Ill., 20, 25, 30
Component Manufacturers, Inc., N.Y., 10, 15, 20, 25, 30
Condor Radio Mfg., Co., Ariz., 20
Constantine Engineering Labs., N.J., 5, 10, 20
Continental Electronics Mfg. Co., Tex., 20
Control Corp., Minn., 5
Copper Wire Products, Canada, 5, 15
Corning Glass Works, N.Y., 30
Corona Engineering Service, N.Y., 25
Cossor (Canada) Ltd., Canada, 10
Crest Laboratories, Inc., N.Y., 5
Cycle Electronic Labs., N.J., 5
D & R Limited, Calif., 25
DX Radio Products Co., Inc., Ill., 5, 10, 15, 20, 25, 30
Danbury Transformer Corp., Conn., 5
De Coursey Eng. Laboratory, Calif., 25
Delta Radio Co., N.Y., 20, 25, 30
Deutschmann Corp., Tobe, Mass., 25
Dietz Design & Mfg. Co., Grandview, Mo., 5, 20, 25, 30
For details see ad on page 27
Dormeyer Industries, Ill., 15
Electrical Windings, Inc., 15
Electro-Mec Laboratory, 21-09 43 Ave., Long Island City 1, N.Y., 25
For details see ad on page 31
Electrometric Inc., Ill., 20, 30
Electronic Coils, Inc., Mass., 20, 25
Electronic Components Corp., Ill., 5, Filter Choke
Electronic Specialty Products, N.J., 20, 30
Electronic Systems Co., N.Y., 20
Electronic Transformer Co., Inc., 207 W. 25 St., New York 1, N.Y., 5
For details see ad on page 214
Electro Temp, Inc., Mich., 15
El-Rad Mfg. Co., Ill., 5, 20, 30
Emerald Mfg. Co., Ill., 10, 15, 20, 25, 30
Empire Coil Co., Inc., N.Y., 5, 20
Engineered Instruments, Inc., Calif., 20
Epco Products, Inc., 2500 Atlantic Ave., Brooklyn 7, N.Y., 5
For details see ad on page 217
Essex Electronics, N.J., 20, 30
Farley, Ltd., T. S. Canada 20, 30
Federal Telephone & Radio Corp., 100 Kingsland Road, Clifton N.J., 5, 25
For details see ad on pages 368-373
Feldman & Co., Henry, Calif., 10
Ferranti Electric, Inc., N.Y., 5
Filtron Company, Inc., N.Y., 20
Forbes & Wagner, Inc., N.Y., 20, 30
Freed Transformer Co., Inc., 1718-36 Weirfield St., Brooklyn 27, N.Y., 5, 25
See complete catalog in last section
Fugle-Miller Laboratories, 309 Main St., Metuchen, N.J., 5, 10, 15, 20, 30
For details see ad on page 145
Gates Radio Co., Ill., 20, 30
General Precision Lab., Inc., 63 Bedford Road, Pleasantville, N.Y., 5, 20
For details see ad on page 116
General Transformer Co., Ill., 5
General Winding Co., N.Y., 10, 15, 25
Glaser Steers Corp., N.J., 15
Goslin Elec. & Mfg., Co., Calif., 5
Gramer Transformer Corp., Ill., 5
Grayburne Corp., N.Y., 20
Guardian Electric Mfg. Co., 1621-1RE W. Walnut St., Chicago 12, Ill., 10, 15
For details see ad on page 62
Guthman & Co., Inc., Edwin I., Ill., 5, 10, 20, 30
Hadley Co., Robert M. Calif., 5
Halldorson Transformer Co., Ill., 5, 10, 15
Hammond Manufacturing Co., Ltd., Canada, 5
Harnett Electric Corp., 138 Haven Ave., Port Washington, L.I., N.Y., 5, 15, 20, 30
For details see ad on page 264
(Continued on page 147)



RESISTORS • FOCUS COILS DEFLECTION YOKES

Precision-built for critical electronics applications

Whatever your requirements for top quality wire-wound components, you can count on I-T-E. Power resistors, precision resistors, deflection yokes, focus coils—all I-T-E products are specially designed and precision-built to meet critical commercial and government specifications. Broad engineering background, extensive production facilities, and close control assure *quality* components in any *quantity* you require.

I-T-E POWER RESISTORS

Non-hygroscopic ceramic foundations are in accordance with JAN specifications.

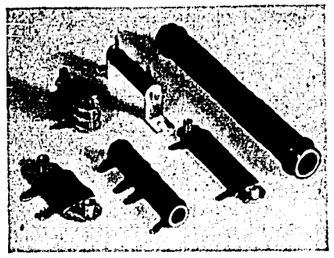
Purest resistance wires are uniformly wound to prevent shorted turns and excessive hot spots. All connections silver-soldered.

Vitreous enamel coating (organic if required) provides a glazed moisture-repellent surface with fast heat-dissipation qualities.

Advanced production methods assure high stability, long life.

Standard Tolerance: ±10%. ±5% *and less* made to order.

Standard fixed resistors: 5-200 watts
Adjustable resistors: 10-200 watts
Oval resistors: 30-75 watts
Ferrule resistors: 12-200 watts
Special resistors: built to specifications



I-T-E PRECISION RESISTORS

High-quality wire alloys are used—free from internal stresses and strains.

Semi-automatic precision winding method assures even tension—eliminates hot spots.

Hermetic or vacuum-impregnated sealing for protection against destructive effects of sales, moisture, and atmospheric conditions.

Accelerated aging process prior to calibration assures accuracy.

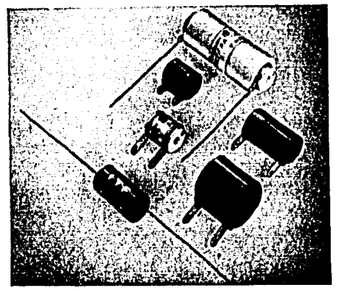
Critical quality control eliminates all resistors which do not come up to high I-T-E standards.

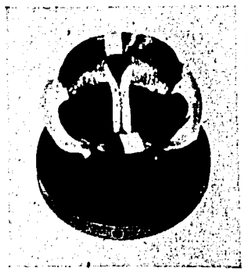
Standard Tolerance: ±1%. Specified tolerances down to ±0.05%.

Type A: lightweight, hermetically sealed—for precision operation up to 125° C. Surpass JAN R-93. *Characteristic A*, and MIL R-93 A specifications.

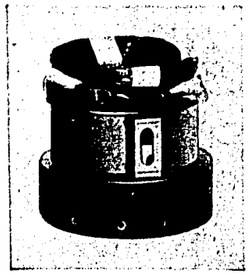
Type B: vacuum-impregnated, moisture-resistant. For JAN R-93, *Characteristic B*, specifications.

Ratings from 0.01 ohm-10 megohms, 0.125-5 watts.





90° DEFLECTION. FLARED WINDINGS.



70° DEFLECTION. FORM-WOUND.

I-T-E DEFLECTION YOKES

Up to 90° deflection without neck shadow. Design allows ½" pullback on neck of TV tube.

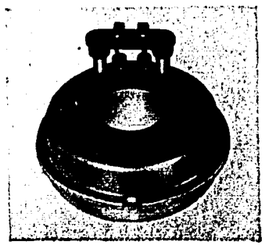
High sensitivity provides full deflection at low line voltages.

Full focusing for sharp horizontal and vertical focus. Excellent side and corner resolution.

Shrink-proof insulation between horizontal and vertical coils.

Minimum "pincushion" distortion—as result of special I-T-E coil design.

Thorough electrical and visual pretesting—for shorts, inductance, resistance, induced voltage, insulation breakdown, cross-talk.

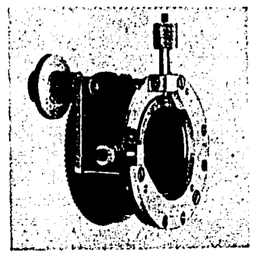


I-T-E FOCUS COILS

High quality focus coils—small, compact, lightweight. Precision-built to commercial or government specifications. For use with tubes up to 90° deflection. Minimum spot distortion. Retain proper focus over wide range of line voltage variations.

Hermetically-sealed electromagnet type for government use. Meets MIL-T-27 specs. Precision-wound of fine, uniform copper wire. Sealed in nitrogen—for minimum temperature rise.

Permanent magnet type for government use. Meets MIL-T-27 specs. *Locked* controls assure uniform focus after severe shock and vibration.



Specify
PRECISION WIRE-WOUND PRODUCTS
RESISTOR DIVISION • I T E CIRCUIT BREAKER CO • 1924 Hamilton St Philadelphia 30 Pa

Heppner Mfg. Co., Box 1207, Round Lake, Ill., 10, Ion Traps
For details see ad on page 64
Highland Engineering Co., Main & Urban, Westbury 21, L.I., N.Y., 5
For details see ad on pages 217, 283
Hillburn Electronic Products Co., N.Y., 20, 30
Houlihan Co., T. J. Ill., 20, 30
Hycor Co., Inc., Calif., 25
I-T-E Circuit Breaker Co., 1924 Hamilton St., Philadelphia 30, Pa., 10, 15
For details see ad on page 146
Industrial Specialties Corp., N.Y., 5, 10, 15, 25
Industrial Television, Inc., N.J., 20, 30
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 20
For details see ad on page 134
International Resistance Co., Pa., 20
Jeffers Electronics Corp., Div., Speer Carbon Co., Pa., 20
Johnson Co., E. F., Waseca, Minn., 20, 30
For details see ad on page 183
Joyner Corp., Ind., 15, 25, 35
K-V Transformer Corp., Conn., 5
Kellogg Switchboard & Supply Co., Dept. 69, 79 W. Monroe St., S. Cicero Ave., Chicago 3, Ill., 25
For details see ad on page 106
Kenyon Transformer Co., Inc., 840 Barry St., New York 59, N.Y., 5, 15, 25
For details see ad on pages 406-407
Knapp Radio Specialties, Inc., Mass., 10, 15, 20, 30
Langevin Manufacturing Corp., 37 W. 65 St., New York 23, N.Y., 5
For details see ad on page 218
Lear, Inc., Calif., 25
Lectrohm, Inc., Ill., 20
Lee Spring Company, Inc., N.Y., 20
Lehigh Valley Electr. Engr. & Mfg., Pa., 20, 30
Lenkurt Electric Co., Inc., Calif., 25, 30
Leonard Electric Products Co., N.Y., 5, 20, 25, 30
Lesa, S. P. A., Italy, 5, 25
Linell Eng. Corp., Chas. S., Ill., 25
Lynch Carrier Systems, Inc., Calif., 25
Lytle Engineering & Mfg. Co., Ill., 20, 30
Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N.Y., 25
For details see ad on page 167
Magnetic Research Corp., Calif., 25
Magnetics, Inc., P.O. Box 230, Butler, Pa., 25
For details see ad on page 160
Magnex Corp., N.Y., 5, 10, 15, 20, 25, 30
Mallory & Co., Inc., P. R., Ind., 20
May, Donald M., Calif., 5, 20
Measurements Corp., Intervale Rd., Boonton, N.J., 5, 20
For details see ad on pages 284, 422-423
Melco Products, Inc., Minn., 5, 25
Mepar, Inc., Va., 5, 25
Mepco, Inc., 35-37 Abbett Ave., Morristown, N.J., 20
For details see ad on pages 388-389
Mercury Electronic Labs., Inc., Ill., 20, 25, 30
Merit Coil & Transformer, Ill., 10, 15, 20, 30
Michel Manufacturing Co., Wis., 20, 30
Mico Instrument Co., 79 Trowbridge St., Cambridge 38, Mass., 25
For details see ad on page 63
Microtran Co., N.Y., 05
Midwest Coil & Transformer Co., Ill., 5
Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass., 20
For details see ad on page 334
Miller Co., J. W. Calif., 20, 30
Modelectric Products Corp., N.J., Photo Flash
Mullard Overseas Ltd., England, 10
Muter Co., Ill., 20
National Company, Inc., 61 Sherman St., Malden 48, Mass., 20
For details see ad on pages 434-435
New York Transformer Co., Inc., N.J., 5
North Hills Electric Co., N.Y., 20, 25, 30
Nothelfer Winding Labs., N.J., 20, Reactors
Ohmite Manufacturing Co., Ill., 20
Omega Manufacturing, N.Y., Magnet
Ontario Industries, Inc., N.Y., 5, 25
Ortho Filter Corp., 196 Albion Ave., Paterson 2, N.J., 5, 25
For details see ad on page 101
Orthon Corp., 196 Albion Ave., Paterson 2, N.J., 5, 20
For details see ad on page 117
PCA Electronics, Calif., 5, 10, 20, 25, 30
Painton and Co., Ltd., England, 20
Partridge Transformers, Ltd., England, 5, 20
Peerless Electrical Products, Calif., 5, 25
Permoflux Corp., Ill., 5
Polydoroff & Associates, W. J., D.C., 20, 25, 30
Porter Mfg. Co., Ill., 5, 10, 15, 20, 25, 30
Power Transformer Co., Inc., N.J., 15
Q L C Corp., N.J., 20, 30
Quam-Nichols Co., Ill., Ion Trap
Qutronic Transformer Corp., N.Y., 5, 25
RCA Victor Div., Tube Dept., 415 S. 5th St., Harrison, N.J., 5, 10, 15, 20
For details see ad on pages 88, 440-441
Radio Eng. Products, Canada, 5, 25
Radio Industries, Inc., Ill., 20, 25, 30
Ram Electronics, Inc., N.Y., 10, 15
Randall, Inc., Douglas, R.I., 5
Raypar, Inc., 7800 W. Addison St., Chicago 34, Ill., 20, 25
For details see ad on page 220
Raytheon Manufacturing Co., Equipment Sales Div., 138 River St., Waltham 54, Mass., 10, 25
For details see ad on page 228
Redman Electronics Corp., Conn., 20, 30, High Voltage Power Supply
Reliable Spring & Wire Form, Ohio, 30
Research Instrument Co., N.Y., 25, 30
Richardson Labs., Kenneth, N.Y., 5
Rogers Corp., Conn., 15
Rola Company, Inc., Ohio, 5, 10
Rollins Corp., Del., 5
Ross Manufacturing Co., Ill., 10, 20
SNC Manufacturing Co., Inc., Wis., 5
Sag Harbor Industries, N.Y., 5, 10, 15
Senn Corp., Ind., 10

(Continued on page 149)

THE EASIEST AND THE FASTEST WAY
to find the product you are looking for
is to consult the alphabetical list of
products in the pink section of this
directory, immediately preceding the
alphabetical directory.

TOROIDAL INDUCTORS
BY
TOROCOIL COMPANY

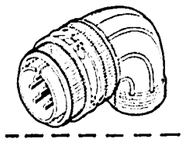
Featuring—
- Highest Quality
- Quick Delivery on Experimental or Production Quantities
- Lowest Cost
- Cased or Uncased

Write today for prices and literature completely describing our line of Toroids and Decade Inductors.

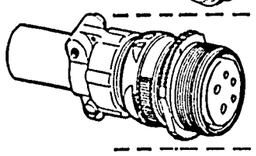
1374 MOBILE COURT • ST. LOUIS 10, MISSOURI

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

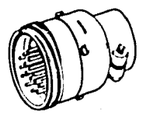
CANNON PLUGS *for better electronic equipment*



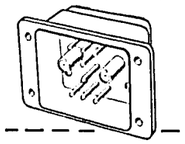
AN — AN Series... conforming to military specification MIL-C-5015. 15 diameters and 260 layout patterns for the aircraft, communications, instrument and electronics industries. 6 approved shapes, AN 3100 to AN 3108. AN-M Series also meets the specification.



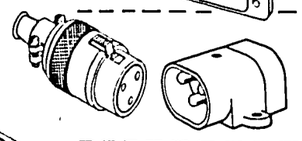
AN-M — AN-M Series... 5 basic shell shapes, 12 shell size diameters and 105 layout variations in resiliant material insulation. For resistance to moisture, vibration and high gravitational forces.



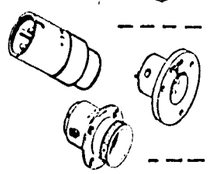
K,RK — K, RK Series... 8 basic shell shapes, 8 diameters and 204 cataloged layout variations. Special Acme thread. For aircraft, communications, instrument and electronic applications.



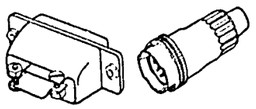
DP — DP, DPB, DPD, DPD2, DPR and DPM Series... Used for rack-and-panel instrument panel and subassembly applications. Rectangular in shape with 27 basic layout variations in DPB and DPD.



P,O — P and O Series... 22 shell shapes and 7 layout patterns ... used in audio and vidio amplification, tape recording and related applications.



X,XK,XL — X, XK and XL Series... 23 basic shell shapes and 8 layout arrangements for cord-end or wall mounting ..engineered for audio-circuitry but applicable to many low level circuits and wide electrical uses.



D,U — **Sub-Miniature Connectors**... The D and U Series for cord-end, rack-and-panel or wall mounted applications. The D Series has 3 basic shapes with up tc 50 contacts. Used for portable radio, audio circuitry and like applications. The hermetically sealed UH Series, cylindrical with 4 basic shell shapes, accommodates up to 12 contacts in 12 layout patterns. DH Types used for hermetically sealed miniature components.



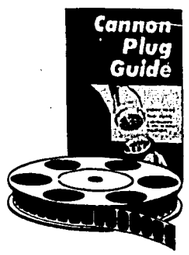
GS — **Hermetically Sealed Connectors**... with steel shells and contacts withstand high pressures. Available in the GS, KH, DH and U Series. Insulation is a vitreous material, fused under high temperature to shell and steel contacts thus forming a permanent hermetic seal that allows no leakage.

CANNON ELECTRIC

CANNON ELECTRIC

Since 1915

FACTORIES IN LOS ANGELES, TORONTO, NEW HAVEN
Representatives in principal cities. Address inquiries to Cannon Electric Co., Dept. 377-A, Los Angeles 31, California



Send for a copy of the Cannon Plug Guide. It will help you understand the vast application coverage of the Cannon line and lead you to the right connector for your own application. Be sure to see Cannon's informative film, "Contact", available for free showings. Write to Modern Talking Picture Service, Inc., 45 Rockefeller Plaza, New York 20, N. Y., for film.

2 from TORWICO

Toroids

Are you a producer of—
Guided Missiles
Microwave Systems
Magnetic Amplifiers
Carrier
—and other equipment requiring toroidal coils and components?

Then... call on Torwico
whose engineering and production facilities stand ready to supply you with—
High Q Toroidal Inductors
Toroidal Transformers
Discriminator & Oscillator Coils
Magnetic Amplifier Coils
Tuned Circuits
Filters
Low Level Audio Transformers

Toroidal Coils—
wound or designed to your Specs — Exact turns or Inductance Tolerance — Vacuum wax impregnated or coated with special encapsulating material

Cased Components—
Hermetically sealed, potted or filled with an inert gas to meet MIL-T-27 Requirements



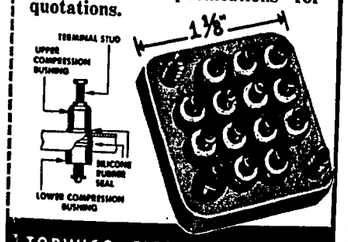
Only Torwico

offers a Terminal Header with the exclusive Floating Terminal. This construction produces a rugged terminal which can withstand excessive vibration and shock — thermal shock from −65° F. to 400° F.

The silicone insulations are particularly effective in retarding DC plating.

With all of their definite advantages, Torwico Terminals are surprisingly low in cost and are made consistent with the quality standards needed to meet rigid military (MIL-T-27, Grade 1, Class A) and civilian specifications.

Please write for samples and send your detailed specifications for quotations.



TORWICO ELECTRONICS, INC.
965 Frelinghuysen Ave., Newark 5, N. J.

Sickles Co., F. W., Div. of General Instrument Corp., Chicopee, Mass., 10, 20, 25, 30
For details see ad on page 421
Smallwood, Ltd., S. G., Canada, 20, 30, TV Coils, RF Antenna, Oscillator Blocking Coils, Loop Antenna
Smith Mfg. Co., Nathan R., Calif., 5
Sondyna A. G., Switzerland, 5, 20
Southern Elec. & Transmission, Tex., 25
Spellman Television Co., Inc., 3029 Webster Ave., New York 67, N.Y., High Voltage
For details see ad on page 185
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 20
See complete catalog in last section
Square Root Manufacturing Corp., N.Y., 5, 20, 25, 30
Standard Coil Products Co., Ill., 20, 30
Standard Electrical Products, Ohio, 25
Standard Transformer Corp., Ill., 5
Stanwyck Winding, N.Y., 5, 20, 25, 30
Sterling Transformer Corp., N.Y., 20
Summit Coil Co., N.J., 20
Superex Electronics Corp., N.Y., 20, 30
Superior Transformer Corp., Ill., 5
Syntronic Instrument, Inc., Ill., 10, 15
Telectron Co., Ohio, 10
Teleradio Eng., N.Y., 10, 15, 20, 30
Telex, Inc., Minn., 5
Television Laboratories, Ill., 10, 15, 25
Tel-Rad Mfg. Co., 7 Madison St., Fennimore, Wis., 10, 15, 20
For details see ad on page 87
Tetrad Co., Inc., Calif., 5, 15, 20, 25
Todd Electronic Co., Inc., N.Y., 5, 20
Todd Products Co., Inc., N.Y., 5, 10
Torocoil Company, 1374 Mobile Ct., St. Louis 10, Mo., 25
For details see ad on page 147
Torwico Electronics, Inc., 961 Frelinghuysen Ave., Newark 5, N.J., 25
For details see ad on page 149
Transformer & Electronic Specialty Co., 3824 Terrace St., Philadelphia 28, Pa., 5
For details see ad on page 221
Transformer Engineers, Calif., 5, 25
Transformer Specialty Co., Inc., 328 Rockhill Rd., Bala-Cynwyd, Pa., 5
For details see ad on page 219
Transvision, Inc., N.Y., 5, 20, 30
Triad Transformer Corp., 4055 Redwood Ave., Venice, Calif., 5, 10, 15, 25
For details see ad on page 89
Tri Dex Electronics, Calif., 20, 25, 30
Union Spring & Mfg. Co., N.J., 5, 10, 15, 20, 25, 30
United States Electronics, N.J., 5, 20, 25
United Transformer Co., 150 Varick St., New York 13, N.Y., 5, 20, 25, 30
See complete catalog in last section
Universal Mfg. Co., Inc., 404 Hillside Ave., Hillside, N.J., 25
For details see ad on pages 149, 247
Victoreen Instrument Co., Ohio, 15
Vokar Corp., Mich., 5, 30
West Coast Electronics Co., Calif., 5
Westinghouse Electric Corp., Pa., 25
Wheaton Co., T. C., N.J., 20, 30
Wheeler Insulated Wire Co., Conn., 5, 15
White Industries, Inc., N.Y., 5, 20, 30
Wirt Company, Pa., 20, 30



TOROIDAL COILS

Magnetic Amplifiers—Transformers—Reactors—Inductance and Choke Coils.
Toroids wound to MIL-T-27 specifications on our own developed machines. Wire sizes from #10 (101 MIL) to #36 (5 MIL) Teflon or heavy form VAR.
Excellent delivery on custom Toroids—Small or large production.

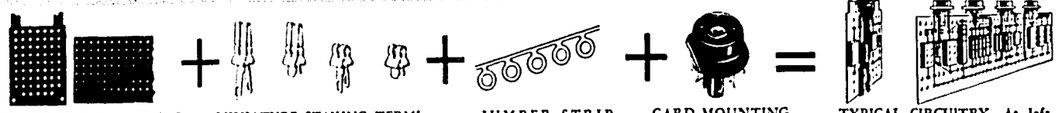
We invite your inquiries.

Universal Manufacturing Company, Inc.
404 Hillside Avenue · Hillside, N. J.

For Basic Plug-in Unit Building Blocks, it's ALDEN

Now you can design your equipment for greater accessibility, simple servicing, 30-second restoration of service by plug-in replacement units, with Alden Standard Components.

ALDEN TERMINAL CARD SYSTEM to make circuitry in compact vertical planes



PREPUNCHED TERMINAL MOUNTING CARDS give tremendous flexibility to lay out almost any circuitry, for Plug-in Packages or Alden Basic Chassis.

MINIATURE STAKING TERMINALS mount in any pattern on Cards. Ratchet slots hold elements for fast soldering without pliering or wrap-around.

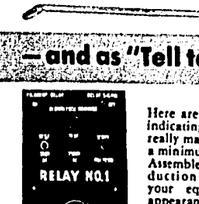
JUMPER STRIP stakes right under Terminals, providing common circuit without soldering.

CARD-MOUNTING TUBE SOCKETS for miniature 7-pin and 9-pin, and octal tubes.

TYPICAL CIRCUITRY. At left, arranged for Alden "20" Plug-in Package. At right, for mounting in Alden Basic Chassis. See descriptions below.

These planes become plug-in units thru ALDEN PLUG-IN PACKAGE COMPONENTS

4 SIZES OF PLUG-IN PACKAGES



BASIC COMPONENTS FOR 4 SIZES OF PLUG-IN PACKAGES

To make vertical circuitry units into compact plug-ins here are components for 7-pin, 9-pin, 11-pin and 20-pin packages. Conceived with tremendous design flexibility allowing only a few parts to accommodate tremendous variety of circuitry, both shielded and open. Bases grooved to receive up to 3 Terminal Cards. Brilliant color coding for quality appearance and quick locating to mating sockets, non-interchangeable in the "11" and "20" Series.

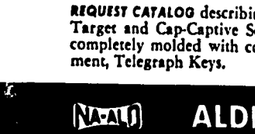


ALDEN '20" PACKAGES SHIELDED OR OPEN



SPACE-SAVING DESIGN OF PACKAGES AND SOCKETS PERMIT COMPACT ARRANGEMENT

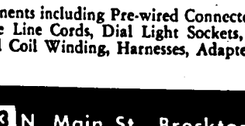
How to organize planes of circuitry as plug-in chassis, with ALDEN CHASSIS COMPONENTS



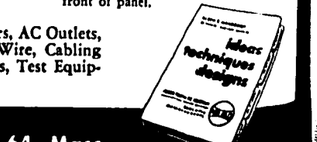
ALDEN BASIC CHASSIS
Simple U frame is open-sided. Terminal cards simply snap in. You have 100% accessibility for soldering final connections and making service checks. Hinged front panel is separable for mounting its components as separate easy sub-assembly. All production is by in-the-open sub units assembled with utmost ease.



COMPLETED CHASSIS
Here the chassis is completely assembled, fitted with slide-in Back Connectors and Serve-A-Unit Lock and inserted in rack mounting Case which has mating Back Connectors and receives the bullet nose of the Serve-A-Unit Lock which pilots, draws in, locks and ejects the Chassis. Portable Cases below receive Chassis in same manner.

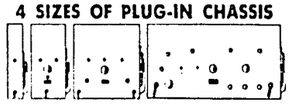


ALDEN SERVE-A-UNIT LOCK
The Serve-A-Unit Lock used in the Alden Basic Chassis pilots the chassis to accurate mating of the Back Connectors, and with a twist of the wrist draws in and locks securely in any plane and with sufficient pressure to seal compression gaskets. A reverse twist ejects chassis. This Lock is designed to make ANY plug-in unit speedily accessible for checking, servicing or replacement. Installed as shown.

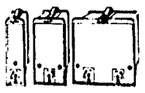


ALDEN BACK CONNECTORS
These slide-in Back Connectors carry all connections from Basic Chassis to the case and give one point of check for all in-out leads. Mounted in an orderly row on Chassis with mating row on Back Plate of Case, they permit direct, efficient wiring, with isolation of critical leads. They eliminate rats-nest congestion of conventional connectors because leads are instantly accessible, and can be color coded and numbered for easy identification. Contacts can be jumped for test.

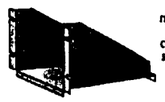
4 SIZES OF PLUG-IN CHASSIS



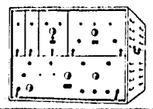
2" 4" 8" 17"



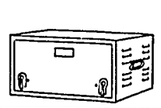
PORTABLE CASES



ALDEN RACK ADAPTER for mounting any chassis in standard rack.

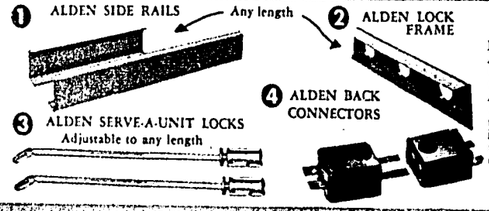


ALDEN UNI-RACKS, single or double tier, house all sizes of Alden Chassis — stack as at right.

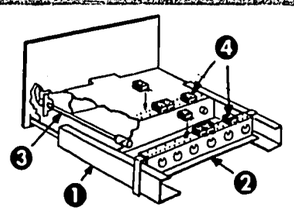




Build your own plug-in, slide-in chassis with this ALDEN SERVE-A-UNIT KIT:



IT'S AS SIMPLE AS THIS
Arrange Alden Side Rails (1) and Alden Lock Frame (2) to suit your chassis. Alden Serve-A-Unit Locks (3) mount in your chassis to engage pre-punched holes in Alden Lock Frame (2) to pilot, draw in, lock or eject.



Arrange Alden Back Connectors (4) in orderly row on Alden Lock Frame. Mount mating Alden Back Connectors on your Chassis.

— and as "Tell tales" to instantly spot trouble in any plug-in use ALDEN SENSING ELEMENTS



Here are tiny sensing and indicating elements that really make sense. Require a minimum of panel space. Assemble by simplest production methods. Give your equipment quality appearance, safety convenience in use and servicing.



MINI-TEST POINT JACK — 110BCS. Only 1" overall this Jack has famous Alden wrap-around contact efficient after thousands of insertions. For checking any critical voltage from front panel while in operation.



ALDEN PANI-LITE — 86L Only ⅞" overall, this lite makes it practical to put an indicator anywhere needed. Unbreakable 1-piece lens-light — replaceable from front. Brilliant illumination, assorted colors.



ALDEN FUSELITE — 440-FH Glowing light signals immediately blown fuse. To replace fuse, simply unscrew 1-piece lens-light and blown fuse comes out with it. Serviced entirely from front of panel.

REQUEST CATALOG describing Alden's complete integrated line of components including Pre-wired Connectors, AC Outlets, Target and Cap-Captive Screws, Tube Caps, Tube Sockets, Detachable Line Cords, Dial Light Sockets, Wire, Cabling completely molded with connectors, Static Magnetic Memory, Toroidal Coil Winding, Harnesses, Adapters, Test Equipment, Telegraph Keys.

NA-ALO ALDEN PRODUCTS CO. 113 N. Main St., Brockton 64, Mass.

SIMPLIFY PRODUCTION WITH ALDEN PRE-WIRED CONNECTORS

If you're designing any equipment that has to be connected, manufactured in volume, standardize on this complete service of connectors designed to Cut Your Assembly Problems, Simplify Your Purchasing, Eliminate Quality Problems.

ALDEN PRE-WIRED CONNECTORS ARE UNIQUE

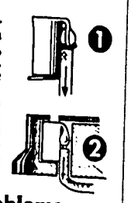
Leads are attached to the top of the contact, assembled at high rates, with no danger of cold solder joints, and minimum use of material.



100% molded insulation surrounds each contact and lead, yet takes less space and eliminates danger of insulation pull-back.

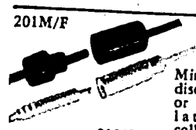


This system actually provides *strain relief* for each contact without UL knots, fishpaper or bulky clamps. ❶ Solder tab and bond give great strength in vertical direction. ❷ Molded clip pockets restrict all movement of the lead to this vertical direction so that 22-gage wire will break before the Alden Solder Tap connection gives.



See how beautifully Alden solves your connector problems packing greater reliability into less space at lower cost!

201M/F



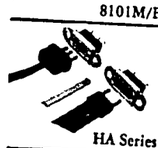
8101M/F

SINGLE LEAD DISCONNECTS
Miniature hi-voltage disconnects. Phenolic or polyethylene insulation. UL safety collar.

Speaker Connector Series



TWO TO SEVEN LEAD
Beautiful detachable terminal connectors that do away with terminal strips, save soldering and cabling.



HA Series

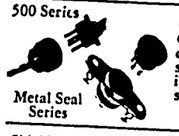
TWO AND THREE LEAD
Excellent miniature antenna lead-ins or signal connectors.

Non-interchangeable Series



TWO TO ELEVEN LEAD
For cables having several connectors, prevent misconnects by specifying Alden Non-Interchangeable Connectors.

500 Series



Metal Seal Series

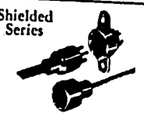
ONE TO FOUR LEAD
Compact inexpensive connector with UL safety collar for carrying AC power or signal.



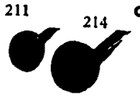
212/5 212

MINI DUO-DECALS
Have only 3 parts: "Top Connected" contacts, leads, molding. Voltage breakdown exceeds that of tube base.

Shielded Series



ONE TO FIVE LEAD
Plugs, Connectors and Sockets that answer most needs for 1 to 5 shielded leads.



211 214

C-R TUBE CONNECTORS
Quality equipment for instruments, TV, radar. Magnal, duodecal, diheptal. 100% insulation each clip and lead.

TUBE CAPS for every purpose

Completely prewired—Phenolic, Injection

90 SERIES



Quality phenolics, completely insulated for radio receiver, transmitter or TV tubes.

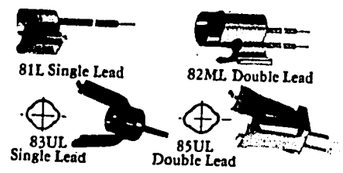
ISL SERIES



Integrally molded with insulation, lead and grid in one piece to meet any environmental and electrical conditions.

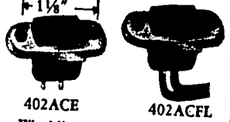
DIAL LIGHT SOCKETS

Designed for low-cost high-volume production, with tailored leads ready to drop aboard your equipment. 4 basic designs you can standardize on for almost all needs.



QUALITY ELECTRICAL COMPONENTS specially designed for volume production, eliminating screwdriver and terminal posts, reducing assembly into your equipment to simple spot weld or rivet.

AC CONVENIENCE OUTLET



402ACE 402ACFL

World's smallest, most rugged. Complete series of tiny outlets with solder tabs or tailored leads. Assemble by simplest possible spot weld or rivet. Now you can include convenience outlets where never before possible.

SAFETY FUSEHOLDER

1—Internal split ferrule prevents fuse breakage. 2—Ejector spring holds fuse tight and noiseless, aids ejection. 3—U-Shaped contact withdraws blown fuse.



440-FH



DETACHABLE LINE CORD

202FIAC



Reduce all problems to just a tiny plug mounted in your equipment. Subtract bulky underwriters knot and cumbersome cord production problems. Add customer convenience and sales appeal to your equipment.

NA-ALO ALDEN PRODUCTS CO

SEND FOR COMPLETE CATALOG
113 N. MAIN ST., BROCKTON 64, MASS.

34. Connectors.

5. AN Standard types
10. Co-axial
15. Microphone
20. Multiple circuit connectors
25. Power
30. Slip ring and commutating connectors

Accurate Electronics Corp., Ohio, 20

Airflyte Electronics Co., 21 Cottage St., Bayonne, N.J., 30
For details see ad on page 5

Airplane & Marine Instruments, Pa., 10, 20, 30

Alden Products Co., 113 N. Main St., Brockton 64, Mass., 10, 15, 20, 25
For details see ad on pages 150-151

Allied Industries, Inc., Ky., 10

American Machine & Foundry Co., Mass., 5, 20, 25, 30

American Phenolic Corp., 1830 S. 54 Ave., Chicago 50, Ill., 5, 10, 15, 20, 25
For details see ad on page 2

Arey Machine Co., N.J., 15, 20, 25

Armstrong Co., A. T. R., Canada, 10

Bendix Aviation Corp., Research Labs, Fisher Bldg., Detroit 2, Mich., 5, 10
For details see ad on pages 176, 366-367

Bendix Aviation Corp., Scintilla Magneto Div., Sherman Ave., Sidney, N.Y., 5, 20, 25
For details see ad on pages 176, 366-367

Bogart Mfg. Co., N.Y., 10

Breeze Corporations, Inc., N.J., 20, 35

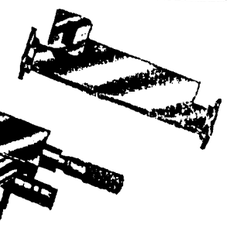
Brookhaven Electronics Corp., N.C., 10

Buggie Inc., H. H., 726 Stanton St., Toledo 1, Ohio, 10, 20, 25
For details see ad on page 153

(Continued on page 153)

R-F FITTINGS

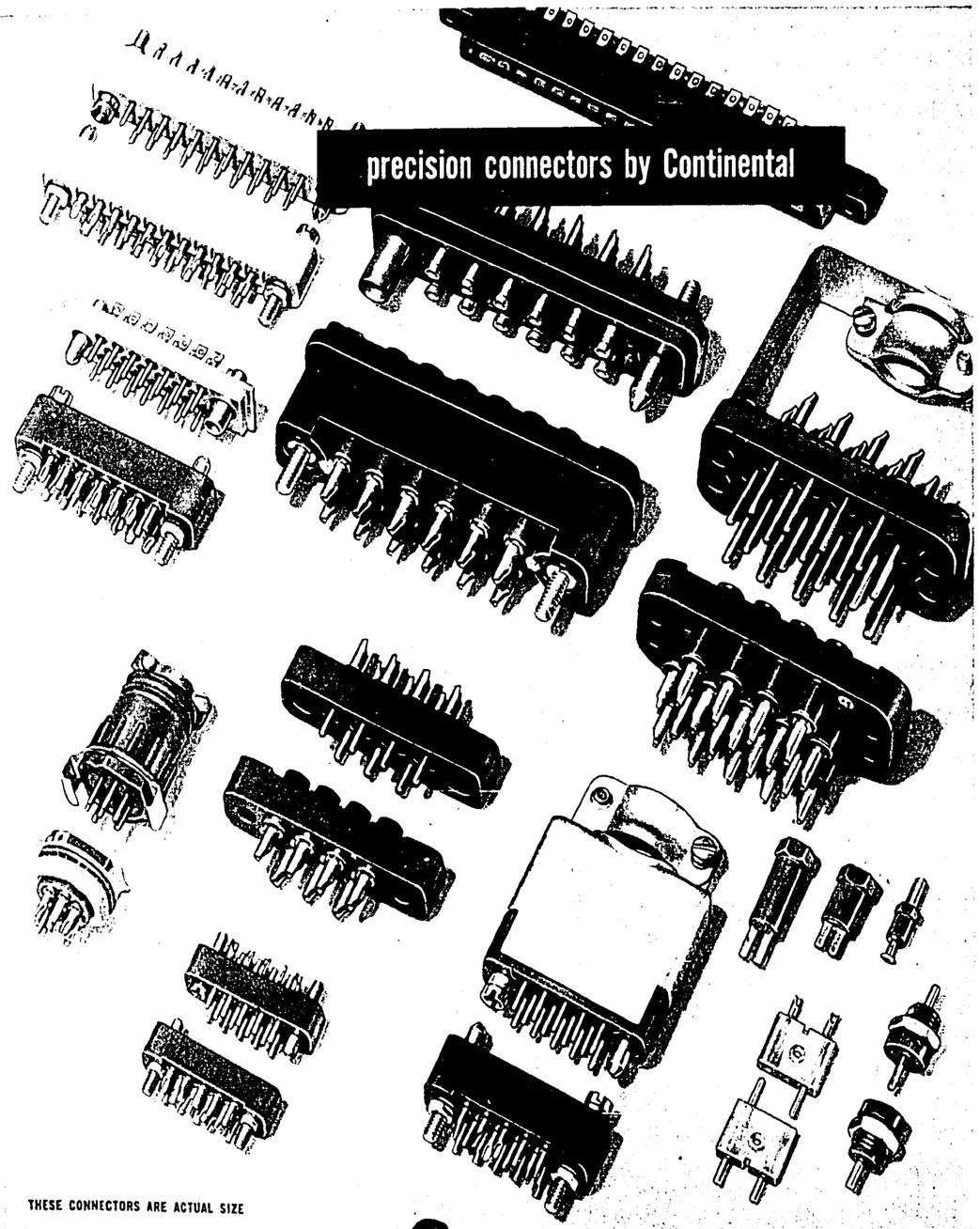
for commercial and military applications



Standard and special co-ax connectors, cable assemblies, wavemeters, crystal mounts, dummy load, directional couplers, and other microwave components. Descriptive bulletin on request.



GENERAL R-F FITTINGS COMPANY
702 Beacon Street, Boston 15, Massachusetts



THESE CONNECTORS ARE ACTUAL SIZE

Series SM-20.....Sub-Miniature Rectangular Connectors
Series 20.....Miniature Rectangular Connectors
Series H-20 .....Hermetical Seal Miniature Rectangular Connectors
Series C-20.....Miniature Hexagonal Connectors (Vibration Proof)
Series EZ-16.....Easy Release Power Connectors (Spring Loaded contacts)
Series 16.....Rectangular Power Connectors
Series 14.....Rectangular Power Connectors
Series PC.....Printed Circuit Connectors
Miniature Precision Stand-offs
SPECIAL DESIGNS—submit your connector problems to our engineering department.

Continental Connectors

ELECTRONIC SALES DIVISION DeJUR-AMSCO CORPORATION

Write Dept. IDC-9, DeJur-Amsco Corporation
45-01 Northern Blvd., Long Island City 1, N.Y.

Scientific minds at H. H. Buggie. And Company are constantly at work with electronic

research

to make possible advanced

design

and outstanding features of

engineering

all of which is supplemented by skilled craftsmanship in

manufacturing

to provide outstanding products including . . .

CONNECTORS, CABLE ASSEMBLIES and COMPONENTS for America's electronics industry

AN Types
RF Types
Rack and Panel
Cable Assemblies



IN ADDITION to the products listed above, H. H. Buggie And Company designs, engineers and manufactures many *special parts and assemblies* for companies in the field of electronics. We invite your inquiries.

H. H. BUGGIE And Company

TOLEDO 4, OHIO

Skilled in Electronic Component Parts RESEARCH • DESIGN ENGINEERING MANUFACTURING

Sales Engineers in All Principal Cities

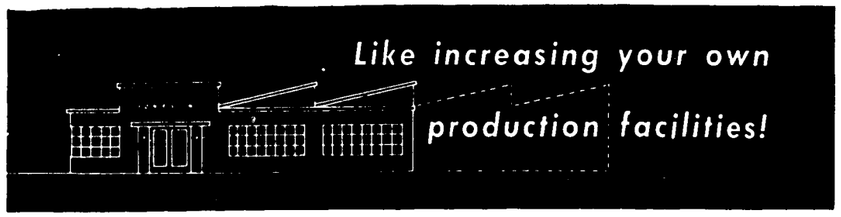
Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

Connectors

(Continued from page 151)

Burndy Engineering Co., Inc., Conn., 10
Cannon Electric Co., 3209 Humbodt St., Los Angeles 31, Calif., 5, 10, 15, 20, 25
For details see ad on page 148
Cinch Mfg. Corp., 1026 S. Homan Ave., Chicago 24, Ill., 15, 20
For details see ad on pages 384-385
Circle Mfg. Co., Inc., N.J., 10
Clarke Instrument Div., National Electric Machine Shops., Md., 5, 10
Coaxial Connector Co., 35 N. 2nd Ave., Mt. Vernon, N.Y., 10, 15, 20, 25
For details see ad on page 155
Collectron Corp., 216 E. 45 St., New York 17, N.Y., 30
For details see ad on page 23
Commercial Radio Sound Corp., N.Y., 10
Dante Elec. Mfg. Co., Conn., 5, 25
DeJur-Amsco Corp., 4501 Northern Blvd., Long Island City 1, N.Y., 20, 25
For details see ad on pages 152, 168
Dialight Corp., 60 Stewart Ave., Brooklyn 37, N.Y., 15
For details see ad on page 182
Diamond Manufacturing Corp., Mass., 10
Eby, Inc., Hugh H., 4700 Stenton Ave., Philadelphia 44, Pa., 10, 15, 20
For details see ad on page 207
Elco Corp., Pa., 20, 25
Electro Development Corp., Calif., 30
Electro Precision Products, Inc., N.Y., 10
Electro Tec Corp., 4 Romanelli Ave., South Hackensack, N.J., 30
For details see ad on page 44
Electro-Voice, Inc., Mich., 15
F-R Machine Works, Inc., 44-14 Astoria Blvd., Long Island City 3, N.Y., 5, 10
For details see ad on page 283
Gee-Lar Mfg. Co., Ill., 5, 10
General Cement Mfg. Co., Ill., 15
General Electric Co., Wiring Device Dept. 09, 95 Hathaway St., Providence 7, R.I., 5
For details see ad on page 41
General Plate Div., Metals & Controls Corp., Mass., 30
General R-F Fittings Co., 702 Beacon St., Boston 15, Mass., 10
For details see ad on page 151
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 10
For details see ad on pages 380-381, Cover IV
Glaser-Steers Corp., N.J., 5
Gombos Co., Inc., John, 103-109 Montgomery Ave., Irvington 11, N.J., 10
For details see ad on page 154
Gremar Manufacturing Co., Inc., Mass., 10
Industrial Products Co., Conn., 10
Instrument Corporation of America, Blacksburg, Va., 30
For details see ad on page 72
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 15
For details see ad on page 134
Johnson Co., E. F., Waseca, Minn., 20
For details see ad on page 183
Jones Div., Howard B., Cinch Mfg. Corp., 1026 S. Homan Ave., Chicago 24, Ill., 15, 20
For details see ad on pages 384-385
Joy Mfg. Co., Mo., 25

(Continued on page 155)

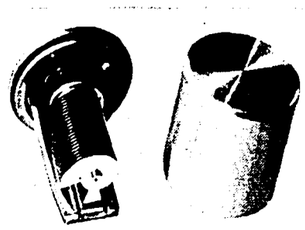


JOHN GOMBOS COMPANY

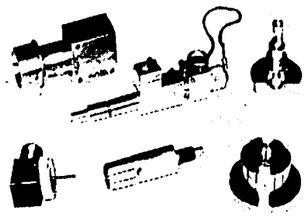
MANUFACTURES ELECTRONIC PARTS, COMPONENTS, ASSEMBLIES

***to your design* — accurately . . . economically . . . on schedule**

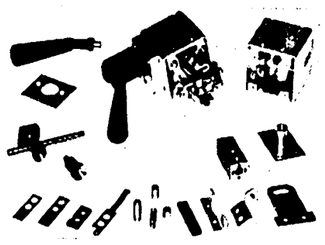
● VARIABLE CONDENSER Closely tracking, rotor plates built to contour tolerances of five ten-thousandths of an inch. Stator plate assembly soldered to within one thousandth of an inch.



● CONNECTOR AND ADAPTER ASSEMBLIES, including crystal converters and waveguide connectors. Materials are beryllium copper and phosphor bronze. Examples of precision screw machine, milling and boring operations. Tolerances as close as two ten-thousandths of an inch.



● FOUR WAY TRACKING SWITCH. With its component parts, this assembly shows examples of stamping, milling and screw machine work. Accurate alignment of crossbar contact points and free function of plunger and handle subassemblies are "musts".

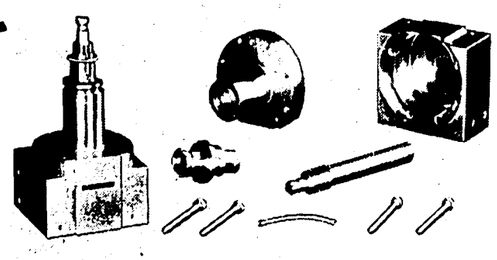


Make John Gombos Company an "annex" to your plant. Turn over to us the responsibility of manufacturing the parts your own facilities are not geared to produce . . . jobs that are crowding your schedules. Increase your plant capacity without additional overhead. Through efficient organization, experienced and highly skilled workmanship, close supervision and constant research . . . by utilizing the most advanced machinery and testing equipment, we are able to meet the strictest performance requirements. For more than a decade, we have been serving the leaders in the electronics industry who *demand* quality, accuracy and dependability.

Specialists in Microwave Components

Our varied experience in the manufacture of precision electronic parts, as well as machine parts, used in the communication and aircraft industries, includes fabrication of beryllium copper, molybdenum, tantalum, Palladium, Monel, plexiglass, polystyrene and many other materials. Some of the microwave components we have produced are: radar filters, crystal converters, cavity tuners, connectors and adapters, tees and directional couplers and precision waveguides. Other examples of precision work include magnetic tuners, crystal-heater ovens and cathode-ray tube parts.

Design & Engineering Assistance



ELECTRONIC DEVICES — GOMBOS — PRECISION PARTS

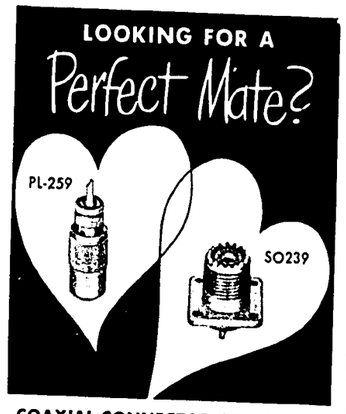
Send for brochure and facilities list

● MICROWAVE CAVITY Made of stainless steel, gold plated; tolerance, five ten-thousandths of an inch limit. Extra fine thread on shaft; class 3 fit between mating surfaces.

JOHN GOMBOS

a manufacturing service built on **accuracy**

COMPANY, INC., 103-109 MONTGOMERY AVE., IRVINGTON, N. J.

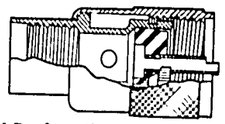


COAXIAL CONNECTOR CO. offers a fresh, economical and improved approach to the manufacture of the "Old Reliables." Practical know-how stands solidly behind every connector made by Coaxial.

It has been proved time and again that our J.A.N. precision-made connectors have been held aloft as a standard for the industry. Pride of workmanship coupled with a short manufacturing cycle insures the kind of product that you want when you want it.

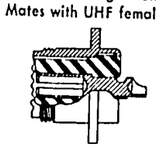
Design problems? Engineering information? Special requirements? Engineering specialists will give you the benefit of Coaxial's know-how.

UHF SERIES CONNECTORS
For dependable low-cost, general purpose use. Satisfactory up to 200 megacycles and may be used with caution up to 500 megacycles.



AN Designation
PL-259, PLUG (NT. 49190)
Non-weatherproof type. Mates with UHF female. Two-piece construction. For use with Cable RG-/U: 8, 9, 10, 11, 12, 13, 63, 65.

AN Designation
PL-259A, PLUG (NT. 49195)
Similar to PL-259. It is a 3-piece unit for ease of handling. Non-weatherproof. Mates with UHF female. SO239.



AN Designation
SO-239, NT. 49194 Receptacle
Mates with male plugs PL-259, PL-259A, UG-203/U. Non-weatherproof, single piece construction. For use with Cable RG-/U8, 9, 10, 11, 12, 13, 63, 65.

Also available special Adapter for the above Plugs (UG-175/U, UG-176/U) used with RG-58/U, RG-59/U, RG-62/U and other small cables.

FREE! Cross Reference Chart! Just ask for it or for more information.

COAXIAL CONNECTOR CO.
35 N. 2nd Ave., Mt. Vernon, N. Y. MOunt Vernon 8-6416
CBWU—GOVERNMENT DESIGNATION

(Continued from page 153)

Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 10, 15, 20, 25
For details see ad on pages 414-415
Makepeace Co., D. E., Pine & Dunham Sts., Attleboro, Mass., 30
For details see ad on page 80
Mendelsohn Speedgun Co., Inc., 457 Bloomfield Ave., Bloomfield, N.J.
For details see ad on page 155
Metals & Controls Corp., Mass., 30
Methode Manufacturing Corp., 2021 W. Churchill St., Chicago 47, Ill., 20
For details see ad on page 208
Molded Insulation Co., Pa., 5, 10, 15, 20
Morse Co., Frank W., Mass., 5
Mycalex Corporation of America, 125 Clifton Blvd., Clifton, N.J., 30
For details see ad on pages 430-431
Mycalex Electronics Corp., 30 Rockefeller Plaza, New York 20, N.Y., 30
For details see ad on pages 430-431
Mycalex Tube Socket Corp., 30 Rockefeller Plaza, New York 20, N.Y., 30
For details see ad on pages 430-431
Neo-Sil Corp., N.J., 20, 25
Neptune Electronics Co., N.Y., 5, 10, 15
Ney Company, The J. M., 71 Elm St., Hartford 1, Conn., 30
For details see ad on page 209
P M Industries, Inc., Conn., 30
Painton and Company, Ltd., England, 10, 20
Photocircuits Corp., N.Y., 30
Phelps-Dodge Copper Products Corp., 40 Wall St., New York 5, N.Y., 10
For details see ad on page 251
Polytechnic Research & Development Co., Inc., 55 Johnson St., Brooklyn 1, N.Y., 10
For details see ad on pages 374-375
Polyphase Instrument Co., Pa., 30
Porter Manufacturing Co., Ill., 5, 10, 15, 20, 25, 30
Powell Co., Harold H., Pa., 5, 10
Product Development Co., Inc., N.J., 10
Pyle National Co., Ill., 15, 20, 25
Radelco Manufacturing Co., Ohio, 5
Relay Sales, Ill., 10
Remler Co., Ltd., Calif., 20, 25
Smith, Inc., Herman H., 436 18th St., Brooklyn 15, N.Y., 10, 15
See complete catalog in last section
Soreng Mfg. Corp., Ill., 20
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 5, 10
See complete catalog in last section
Switchcraft, Inc., 1340 N. Halstead St., Chicago 22, Ill., 15
For details see ad on page 104
T L G Electric Corp., N.Y., 5
Titeflex, Inc., N.J., 5
Transco Products, Inc., Calif., 20, 30
Transradio, Ltd., England, 10
Trimm, Inc., 400 W. Lake St., Libertyville, Ill., 15
For details see ad on page 107
Ucinite Co., 459 Watertown St., Newtonville 60, Mass., 10
For details see ad on page 447
Union Plate & Wire Co., Mass., 30
U. S. Components, Inc., 454-462 E. 148th St., New York 55, N.Y, 10, 20
For details see ad on page 96
United States Gasket Co., 611 N. 10th St., Camden 1, N.J., 5, 10, 25
For details see ad on pages 450-451
Waltham Horological Corp., Mass., 10
Western Electronic Enterprises, Calif., 5, 10
Wilgreen Industries, 99 Murray St., New York 7, N.Y., Jobber
For details see ad on page 409
Winchester Electronics, Inc., 15 Crescent St., Glenbrook, Conn., 20, 30
For details see ad on page 156
Wright Engineering Co., Calif., 10, 15, 20

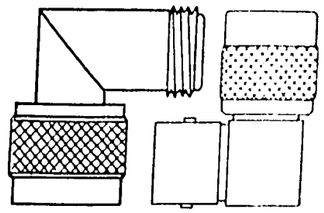
35. Converters.

5. DC Choppers 10. Vibrators

Aeroflex Research, Inc., N.Y., 5
Airpax Products Co., Md., 5, 10, DC to AC
American Machine & Foundry Co., Mass., 5, 10
American Television & Radio Co., Minn., 5, 10, Auto Radio & Inverters
Avion Instrument Corp., N.J., 5
Bailey Meter Co., Ohio, DC to AC
Ballantine Laboratories, Inc., 102 Fanny Rd., Boonton, N.J., Inverters
For details see ad on page 304
Bendix Aviation Corp., Red Bank Div., Eatontown, N.J., Inverters
For details see ad on page [illegible]
[illegible]

MENSCO

COAXIAL CONNECTORS



TYPE N Threaded Lock — TYPE C Bayonet Lock

Made according to strict interpretation of JAN & MIL SPECS

Approved for Service Equipment

Your Inquiries Invited

Write or Phone for Catalogue

MENDELSOHN

SPEEDGUN CO., INC.

457 Bloomfield Ave. Bloomfield, N. J.
Phone BL 2-1270

Winchester Electronics Incorporated

ELECTRICAL CIRCUIT CONNECTORS



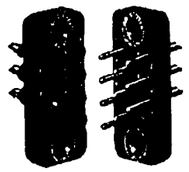
SERIES "B"

2/3 ACTUAL SIZE

..can solve your toughest weight and space problems!

Our Engineering and Development Department can help you with your requirements for special connectors.

SERIES "A"



1/2 ACTUAL SIZE

DESCRIPTION	Types Available	
	Receptacle	Plug
LIGHTWEIGHT AIRCRAFT TYPE Polarized; Rack, Panel or Cable mounted—with Hood or Clamp and Cable strain relief. (Figures in above Code Nos. indicate number of contacts.)	A7S A10S A15S A18S	A7P A10P A15P A18P

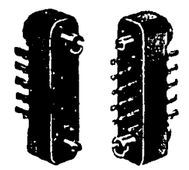
SERIES "HMRE"



ACTUAL SIZE

DESCRIPTION	Plug
HERMETIC PLUG Each special contact fused in glass into special base plate provided for soldering into a rectangular hole in an hermetically sealed housing or bulkhead. Used with Standard "MRE" Receptacle. (Used with Standard MRE Receptacles)	HMRE7P-G HMRE9P-G HMRE14P-G HMRE18P-G HMRE20P-G HMRE21P-G HMRE26P-G HMRE34P-G HMRF41P-G HMRE50P-G

SERIES "SMRE"



ACTUAL SIZE

DESCRIPTION	Receptacle	Plug
SUB-MINIATURE For Aircraft, Instruments and Portable Equipment Light weight, Polarized, Self-aligning with special guide pins. Rack, Panel or Cable mounted with Hood and Cable strain relief. (Other sizes to meet your requirements)	SMRE7S-G SMRE14S-G SMRE20S-G SMRE26S-G SMRE29S-G SMRE34S-G	SMRE7P-G SMRE14P-G SMRE20P-G SMRE26P-G SMRE29P-G SMRE34P-G

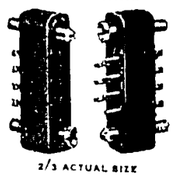
SERIES "CR"



1/2 ACTUAL SIZE

DESCRIPTION	Receptacle (Panel)	Plug (Cable)
MINIATURE PRESSURE-TIGHT This connector is typical of several recent designs requiring a miniature connector (1" dia. x 1¾" lgth.) in an aluminum die-cast shell. It is sealed with neoprene gaskets around the inserts and around each contact for pressure-tight construction.	CR5-2S (Standard type, pin contacts in plug.) CR5-2P-R (Reversed type, pin contacts in receptacle) (5 contacts #20 AWG) (2 contacts #18 AWG)	CR5-2P CR5-2S-R

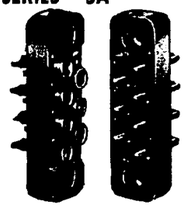
SERIES "MRE"



2/3 ACTUAL SIZE

DESCRIPTION	Receptacle	Plug
MINIATURE For Aircraft, Instruments and Portable Equipment Light weight, Polarized, Self-aligning with special guide pins. Rack, Panel or Cable mounted with Hood and Cable strain relief.	MRE7S-G MRE8S-G MRE9S-G MRE12-21S-G MRE14S-G MRE18S-G MRE20S-G MRE21S-G MRE26S-G MRE34S-G MRE41S-G MRE50S-G MRE75S-G	MRE7P-G MRE8P-G MRE9P-G MRE12-21P-G MRE14P-G MRE18P-G MRE20P-G MRE21P-G MRE26P-G MRE34P-G MRE41P-G MRE50P-G MRE75P-G

SERIES "SA"



2/3 ACTUAL SIZE

DESCRIPTION	Types Available	
	Receptacle	Plug
LIGHTWEIGHT AIRCRAFT SMALL Polarized; Rack, Panel or Cable mounted—with Hood or Clamp and Cable strain relief (Figures in above Code Nos. indicate number of contacts.)	SA7S SA10S SA15S SA18S	SA7P SA10P SA15P SA18P

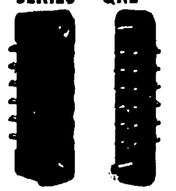
SERIES "HM"



ACTUAL SIZE

DESCRIPTION	Plug
HERMETIC PLUG (Round Hole) Special contacts fused in glass into special base plate provided for soldering into a round hole in an hermetically sealed housing or bulkhead. Used with Standard "M" Receptacle. (Used with Standard M4S, M5S or M7S Receptacles)	HM4P HM5P HM7P

SERIES "QRE"



2/5 ACTUAL SIZE

DESCRIPTION	Receptacle	Plug
QUICK-DISCONNECTING SELF-ALIGNING Spring-loaded contacts for ease in separation. Self-aligning with special guide pins. Rack, Panel or Cable mounted with Hood and Cable strain relief.	QRE6S QRE12S QRE18S QRE24S QRE34S QRE208S AQRE12S MAQRE18S	QRE6P QRE12P QRE18P QRE24P QRE34P QRE208P AQRE12P MAQRE18P

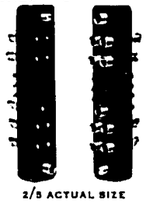
SERIES "M"



4/5 ACTUAL SIZE

DESCRIPTION	Receptacle	Plug
MINIATURE For Aircraft, Instruments and Portable Equipment Light weight, Polarized, Locking Ring. Panel or Cable mounted with Hood and Cable strain relief. (Figures in above Code Nos. indicate number of contacts.)	SM1S SM2S M4S M5S PM6S M7S M9S M12S M48S	SM1P SM2P M4P M5P PM6P M7P M9P M12P M48P

SERIES "F"



2/5 ACTUAL SIZE

DESCRIPTION	Receptacle	Plug
SPECIAL CONNECTORS Unique design permits the use of two sizes of wire — #20 and #14 AWG—and assures uniform electrical and mating characteristics. Light-weight, polarized and panel mounted, these connectors are available with or without guides. (Figures in above Code Nos. indicate number of contacts. First figure for #20 AWG, second figure for #14 AWG.)	F5S-G F2S-8P-G F9S-9P-G	F5P-G F2P-8S-G F9P-9S-G

MANY FEATURES are covered by our Pat. No.'s 161900, 162795, 2411861, 2466370, 2513080, 2526325, 2532538. Other Pats. Pend.

MONOBLOC* CONSTRUCTION eliminates unnecessary creepage paths and reduces possibility of moisture and dust pockets and provides stronger molded parts.

MOLDED MELAMINE body parts insure greater mechanical strength and high dielectric and arc resistance.

PRECISION MACHINED CONTACTS are gold plated over silver for consistent electrical conductivity, prevention of corrosion and ease in soldering.

Connectors & components meet applicable government specifications.

Write or telephone our Engineering Department for information on the above or other connectors—or for consultation on difficult connector problems. Many other standard and special types available.

*Trade Mark

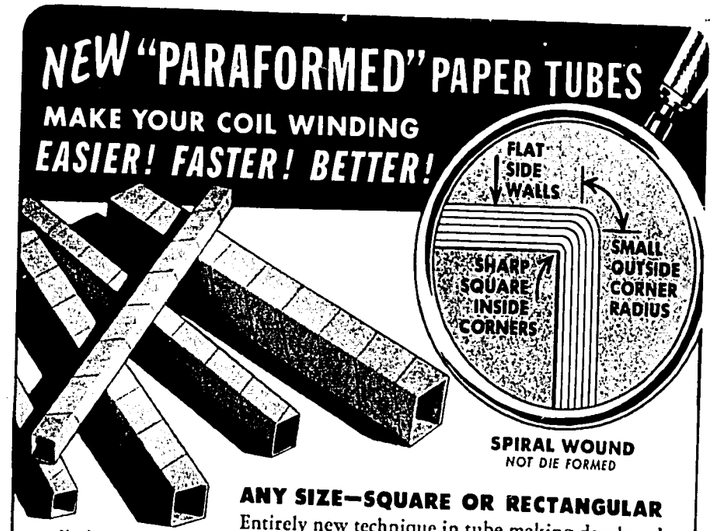
West Coast Branch:
1729 WILSHIRE BOULEVARD
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WINCHESTER ELECTRONICS
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NEW "PARAFORMED" PAPER TUBES

MAKE YOUR COIL WINDING
EASIER! FASTER! BETTER!



- No sharp outside edges to cut wire
- Has full rigidity and physical strength
- Permits winding coils to closer tolerances
- No need for wedges to tighten wire
- Allows faster stacking of wound coils

ANY SIZE—SQUARE OR RECTANGULAR

Entirely new technique in tube making developed and perfected by PARAMOUNT now for the first time solves many coil winding problems, *yet costs you no more!* Hi-Dielectric. Hi-Strength. Kraft, Fish Paper, Acetate, Red Rope or any combination wound on automatic machines. Produced from stock arbors or special sizes engineered for you.

Write on Company letterhead for Stock Arbor List of over 2000 sizes

PARAMOUNT PAPER TUBE CORP.
617 LAFAYETTE STREET, FORT WAYNE 2, INDIANA
Manufacturers of Paper Tubing for the Electrical Industry Since 1931

Converters

(Continued from page 155)

Bodnar Industries, 19 Railroad Ave., New Rochelle, N.Y., 15
For details see ad on page 269
Bristol Co., Conn., 5
Cardwell Mfg. Corp., The Allen D., Conn., UHF Converters
Carter Motor Co., 2645 N. Maplewood Ave., Chicago 47, Ill., 400, CPS Inverters
For details see ad on page 19
Ceramaseal Co., N.Y., Ceramic Envelopes
Controlectric, N.Y., Polyphase
Cornell-Dubilier Electric Corp., 333 Hamilton Blvd., South Plainfield, N.J., 10
For details see ad on page 6
Electronic Research Associates, Inc., P.O. Box 29, Caldwell, N.J., 35, Constant Current
For details see ad on pages 180, 335
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., AC to DC, DC to AC, & Magnetic
For details see ad on pages 368-373
General Magnetic, Inc., N.J., 5
James Vibrapowr Co., Ill., 5, 10
Janette Electric Mfg. Co., Ill., Inverted Rotary
Kurman Electric Co., Inc., N.Y., 10
Lear, Inc., Calif., 5
Lesa, S. P. A., Italy, 5
Mallory & Co., Inc., P. R., Ind., 10
Millivac Instrument Corp., N.Y., 5

(Continued on page 159)

Power Supply Problems?

HERE ARE TWO SOLUTIONS
RANGING FROM A FEW WATTS TO SEVERAL HUNDRED

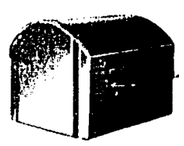
MODEL S-124



Input: 5 to 7 VDC
Output: 112 VDC @ 30 ma
Efficiency: 70%
Size: 1-3/8" x 1-11/16" x 1-3/4"
Weight: 4-1/2 oz.

Input: 28 VDC
Output: 275 VDC @ 400 ma
—250 VDC @ 100 ma
115 V 400 cps AC @ 60 VA
6.3 VAC @ 2.25 amps.
Efficiency: 75%
Size: 5-7/8" x 4" x 5-1/4"
Weight: 6-1/2 lbs.

MODEL S-122

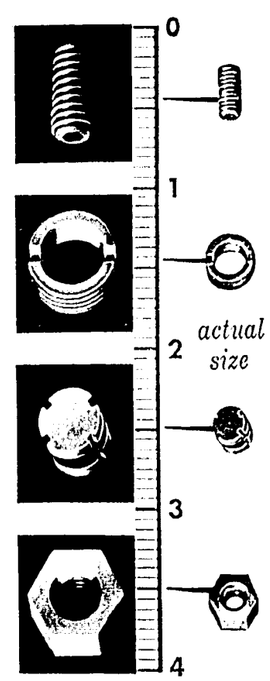


VIBRATOR POWER SUPPLIES TO FIT YOUR PARTICULAR PROBLEMS

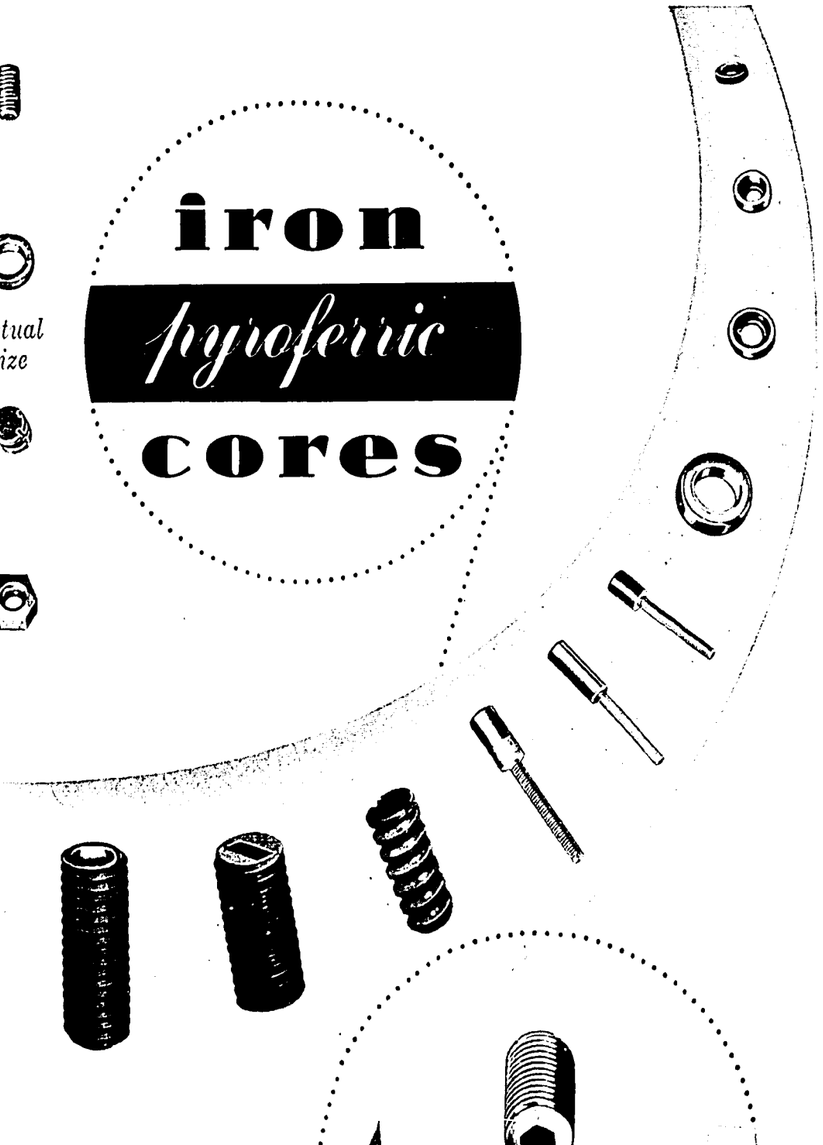
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RESEARCH • DEVELOPMENT • MANUFACTURING • VIBRATORS • VIBRATOR POWER SUPPLIES

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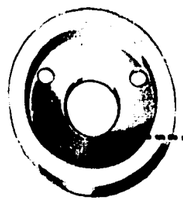


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PYROFERRIC IRON CORES are scientifically manufactured, under strictest quality controls to close electrical and mechanical tolerances.

PYROFERRIC services are available for the engineering of your core production requirements . . . your letterhead request will bring you M.P.A. Data Sheets and tables which give complete information including recommended sizes and tolerances, as well as a cross-referenced index of manufacturers' material designation.

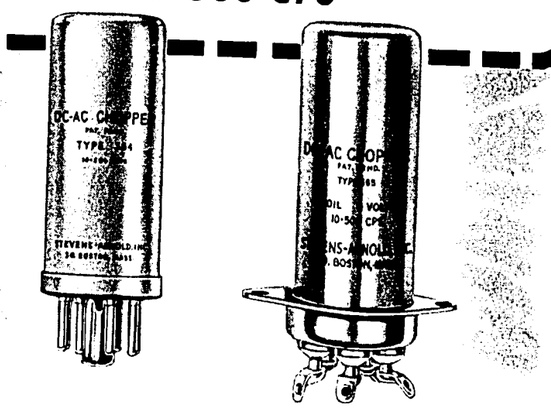


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PYROFERRIC BLDG. | BRONX BOULEVARD at 216th St., N.Y.C. 67

DC-AC CHOPPERS

New 1953 Models for Military Use — 0-500 CPS



Tops in Performance — Tops in Dependability

Stevens-Arnold choppers are electro-mechanical precision vibrators that are used as modulators or demodulators. Designed specifically for airborne applications, and 1000 hours operation.

- Gold contacts used exclusively. Gold is the only material that assures superior chopper-performance in the critical 0-1½ volt DC range.
- Multiple testing guarantees uniformity. Before shipment, each unit must pass *two* complete operating tests at 3 different temperatures— −55°C., +25°C. and +85°C.
- Not only are all military specifications met, but liberal safety factors have been provided to meet emergency conditions of voltage and frequency. Example: —frequency tolerance 0-500 cps, coil voltage tolerance +30% −20%.



Also Available 60-CYCLE TYPES

A complete line of single and double-pole types.



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22 Elkins Street South Boston 27, Mass.

STEVENS-ARNOLD, Inc.
22 Elkins St., South Boston 27, Mass.
Please send me the following catalog (s)
☐ Catalog 208 B — (0-500 cps)
☐ Catalog 246 D — (60 cps)

NAME_____
COMPANY_____
STREET_____
CITY_____ ZONE____ STATE_____

5A-6

Converters

(Continued from page 157)

Minneapolis-Honeywell Regulator Co., Pa., 5
National Co., Inc., 61 Sherman St., Malden 48, Mass., 20
For details see ad on pages 434-435
Oak Mfg. Co., Ill., 5, 10
PM Industries, Inc., Conn., 5
Radiart Corp., Ohio, 10
Stevens-Arnold, Inc., 22 Elkino St., South Boston 27, Mass., 5
For details see ad on page 159
Vibration Research Laboratories, Inc., 42 Oak Avenue, Tuckahoe, N.Y., 5, 10
For details see ad on pages 157, 285
Victoreen Instrument Co., Ohio, 10
Vokar Corp., Mich., 5, 10

36. Cores, Complete.

5. Ferrites
10. Pre-formed, spirally wound
15. Powdered metal

Aladdin Radio Industries, Inc., Tenn., 15
Alden Products Co., 113 N. Main St., Brockton 64, Mass., Laminated
For details see ad on pages 150-151
Allen-Bradley Co., Wis., 5
American Machine & Foundry Co., Mass., 5, 10, 15
Amplex Mfg. Co., Mich., 15
Arnold Engineering Co., [illegible]
Canadian Westinghouse [illegible] 10
Crowley & Co., Inc., [illegible] 15
Ferricore, Inc., N.Y., 5, [illegible]
General Ceramics & Steatite Corp., Crows Mill Rd., Keasbey, N.J.
For details see ad on page 349
Grayburne Corp., N.Y., 5
Gries Reproducer Co., [illegible] Tuned
Lenkurt Electric Co., Inc., [illegible]
Magnetic Core Corp., N.Y., 5, [illegible]
Magnetic Metals Co., N.Y., 5
Magnetics, Inc., P.O. Box 250, Butler, Pa., 10
For details see ad on page 160
Measurements Corp., Intervale Rd., Boonton, N.J., 15
For details see ad on pages [illegible] 423
Melpar, Inc., Va., 15
Moloney Electric Co., Mo., 10
Mullard Overseas, Ltd., England, 5
National Moldite Co., N.J., 5, 15
Paramount Paper Tube Corp., 617 Lafayette St., Ft. Wayne 2, Ind., 10
For details see ad on page 157
Permoflux Corp., Ill., 10
Polydoroff & Associates, W. J., D.C., 5, 15
Pyroferric Co., Inc., 621 E. 216 St., New York 67, N.Y., 15
For details see ad on page 158
Quality Components, Inc., Pa., 15
Radio Cores, Inc., 9540-50 Tulley Ave., Oak Lawn, Ill., 15
For details see ad on page 161
Speer Carbon Co., Pa., 5

(Continued on page 161)

TAPE WOUND CORES

High Permeability Magnetic Materials

MATERIALS: Normally stocked in thicknesses checked. Other materials and thicknesses available on special order.

Material Code	.001	.002	.003	.004	.006
Orthonol	1A	2A	*	4A	*
Hy Mu 80	1D	*	3D	*	6D
4 79 Permalloy	1E	*	3E	*	6E
Armco 48	*	*	3H	*	6H
AEM 4750	*	*	3G	*	6G
Carpenter 49	*	*	3B	*	6B
Armco Trancor TO	1K	2K	3K	4K	*

* Normally not stocked in this gauge. Available on special order.

CASES: Cores are enclosed in fitted plastic boxes and filled with silicone grease to protect them from strains of winding, vibration and shock.

SIZES: Cores can be made to any size. More popular sizes are listed below.

	CORE SIZE			CASE SIZE		
Part No.	ID	OD	Height	ID	OD	Height
50000	.500	.750	.125	.440	.810	.195
50007	.625	1.000	.250	.575	1.070	.330
50002	.650	.900	.125	.590	.960	.195
50003	.750	.938	.250	.680	1.010	.330
50106	.750	1.125	.1875	.680	1.195	.260
50124	.750	1.250	1.000	.685	1.320	1.090
50011	1.000	1.250	.125	.930	1.320	.195
50004	1.000	1.250	.250	.930	1.320	.330
50029	1.000	1.375	.250	.930	1.445	.330
50026	1.000	1.500	.375	.930	1.570	.455
50038	1.000	1.500	.500	930	1.570	.610
50115	1.125	1.375	250	1.055	1.445	.330
50039	1.250	1.500	.250	1.180	1.570	.330
50030	1.250	1.750	.500	1.180	1.820	.330
50035	1.250	1.750	.500	1.180	1.820	.610
50012	1.250	1.750	1.000	1.180	1.820	1.110
50008	1.250	1.875	.500	1 180	1.945	.610
50040	1.500	2.000	1.000	1.400	2.100	1.110
50018	1.625	2.000	.250	1.525	2.100	.330
50020	1.625	2.000	1.000	1.525	2.100	1.110
50017	2.000	2.500	500	1.860	2.650	.610
50041	2.000	2.500	1.000	1.860	2.650	1.110
50031	2.500	3.000	500	2.375	3.125	.610
50042	2.500	3.500	1.000	2.313	3.688	1.188
50043	2.500	4.000	1.000	2.313	4.188	1.188
50044	3.000	4.000	1.000	2.813	4.188	1.188

When ordering use complete core code number consisting of Part Number suffixed by Material Code. Example: #50011-2A is 1.000 ID x 1.250 OD x .125 h x .002" Orthonol

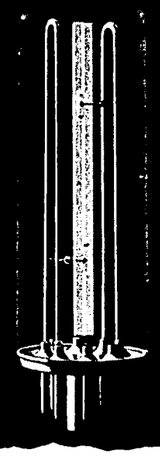
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IN HIGH QUALITY *LOW FREQUENCY* CRYSTALS



WHY HEEMCO?

- We're specialists. Our complete research, engineering and manufacturing facilities are devoted to low frequency oscillator and filter crystals and their application
- Excellent delivery is maintained
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NEW KINGSTOWN, PENNA.



Radio Core Quality Control

All Radio Cores manufactured are produced with special attention to both mechanical and electrical tolerances, resulting in lower incoming inspection and assembly costs on the part of the customer.

Detailed Radio Core information, samples, designs and specific costs may be obtained by writing Department No. IRE S 53.

Write for "Engineered Radio Cores" Technical Data Booklet No. IRE S 53.

Radio Cores, Inc.

9540-50 Tulley Avenue Oak Lawn, Illinois

MEMBER mpa METAL POWDER ASSOCIATION

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

Cores, Complete

(Continued from page 159)

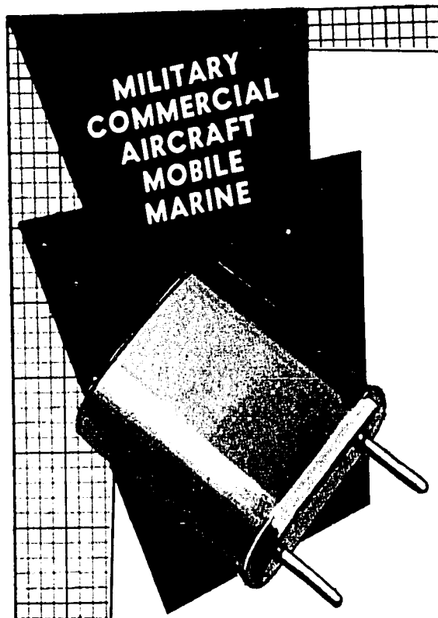
Sprague Electric Co., Mass., 5
Stackpole Carbon Co., Tannery St., St. Marys Pa., 5, 15
For details see ad on pages 442-443
Standard Electrical Products Co., Ohio, Strip Wound
Thomas & Skinner Steel Prod. Co., Inc., 1113 E. 23rd St., Indianapolis 7, Ind., 10, Laminations
For details see ad on page 169
Torocoil Co., 1374 Mobile Court, St. Louis 10, Mo., 15
For details see ad on page 147
United States Gasket Co., 611 N. 10th St., Camden 1, N.J., 5, 15
For details see ad on pages 450-451

37. Crystals & Accessories.

5. Crystal holders
10. Crystal ovens
15. Oscillating quartz
crystals
20. Piezo electric
25. Tourmaline

American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25
American Phenolic Corp., 1830 S. 54th Ave., Chicago 50, Ill., 5
For details see ad on page 2
Bassett, Inc., Rex, Fla., 5, 10, 15, 20
Bliley Electric Co., 229 Union Sta. Bldg., Erie, Pa., 10, 15, 20
For details see ad on page 12
Breon Laboratories, Pa., 5, 10, 15, 20
Brush Electronics, Ohio, 20
Burnett Radio Laboratory, Wash., D. C., Calif., 5, 10, 15, 20
C and H Sales Co., Calif., 15
Canadian Marconi Co., Canada, 20
Cathodeon, Ltd., England, 15
Centralab, Div. Globe Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis., 5
See complete catalog in last section
Clark Crystal Co., Mass., 5, 15, 20
Cox & Company, Inc., N.Y., 20
DX Radio Products, Inc., Pa., 5, 15
Dallons Laboratories, Calif., 15, 20
Diamond Drill Carbon Co., N.Y., 15
Quartz
Diamond Manufacturing Corp., Mass.
Diamond Microwave Corp., Mass., 5
Electrical Industries, Inc., 44 Summer Ave., Newark 4, N.J., 5
For details see ad on page 14
Erie Resistor Corp., 644 W. 12th St., Erie, Pa., 20
For details see ad on page 18
Fusite Corp., 6000 Fernview Ave., Cincinnati 13, Ohio, 5
For details see ad on page 50
Gates & Co., Inc., George W., N.Y., Quartz Etch
General R-F Fittings Co., 702 Beacon St., Boston 15, Mass., 5
For details see ad on page 151
Glenco Corp., 212 Durham Ave., Metuchen, N.J., 20
For details see ad on page 137
Hanauer, M. B., N.Y., 15, 25, Blanks
Hermetic Seal Products Co., 29-37 S. 6th St., Newark 7, N.J., 5
For details see ad on page 66
Hermetite Corp., Mass., 5
Hill Electronic Engineering & Mfg. Co., New Kingstown, Pa., 15, 20
For details see ad on page 160

(Continued on page 161)



Specify...

KEYSTONE

"Performance-Tested"

QUARTZ CRYSTALS

for Maximum:

✓ *Accuracy*
✓ *Stability*
✓ *Ruggedness*

RIGID, uncompromising quality control techniques, scientifically developed inspection and test procedures at each stage of manufacture, insure the absolute dependability of every Keystone Crystal!

Keystone Piezo crystals, now in use throughout the world in military and commercial applications, are justifying the high processing standards we established years ago!

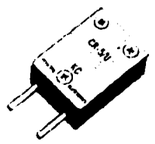
Whatever your need, in standard or special frequency control units, pressure mounted or plated, count on Keystone for the right answer! Our engineering and research personnel and facilities are available for developing your particular requirement. We invite your inquiries.

Write for
Keystone Quartz Crystal literature.

TYPE KC-1
Range:
0.8 to 75
Megacycles



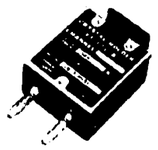
TYPE KC-2
Range:
1.0 to 10
Megacycles



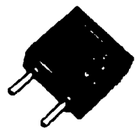
TYPE KC-3
Range:
15 to 50
Megacycles



TYPE KC-4
Range:
1.75 to 12.5
Megacycles



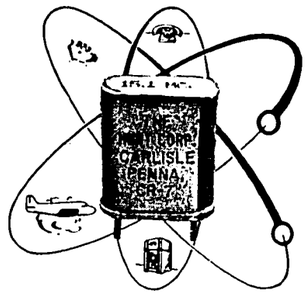
TYPE KC-5
Range:
0.2 to 20
Megacycles



KEYSTONE ELECTRONICS CO.
114 Manhattan Street Stamford, Connecticut

STABILITY

HUNT CR-7 CRYSTAL



Miniature Type CR-7
Crystal Unit

(Illustration is actual size)

THE Hunt CORPORATION
CARLISLE 2, PENNSYLVANIA

(Continued from page 161)

Hoffman Co., P. R., 321A Cherry St., Carlisle, Pa., 15, Blanks
For details see ad on page 163
Howard Moldings, Inc., Mo., 5
Hunt Corp., 453 Lincoln St., Carlisle 2, Pa., 15
For details see ad on page 163
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 5
For details see ad on page 134
Isolantite Manufacturing Corp., N.J., 5
Kaar Engineering Corp., Calif., 15
Keystone Electronics Co., 114 Manhattan St., Stamford, Conn., 5, 10, 15, 20
For details see ad on page 162
Knights Co., James, 101 E. Church St., Sandwich, Ill., 5, 10, 15
For details see ad on page 55
Marconi's Wireless Telegraph Co., Ltd., England, 15
McCoy Electronics Co., Mt. Holly Springs, Pa., 10, 15, 20
For details see ad on page 61
Mica Fabricating Co., N.J., 15, 20
Midland Mfg. Co., Inc., 3155 Fiberglas Rd., Kansas City 15, Kan., 15
For details see ad on page 82
Minerals & Insulation Co., N.J., 5
Monitor Products Co., Calif., 5, 10, 15, 20
National Co., Inc., 61 Sherman St., Malden 48, Mass., 5
For details see ad on pages 434-435
National Electronic Mfg. Corp., N.Y., 5
Northern Electronic & Vacuum Ind., Canada, Scintillating
Philmore Mfg. Co., Inc., N.Y., 5
Polytech Devices, Inc., N.J., 5, 15
Precision Piezo Service, La., 15
Premier Research Laboratories, N.Y., 5, 10, 15, 20, 25
Radio Corp. of America, Engineering Products Div., Camden, N.J., 15
For details see ad on pages 88, 440-441
Radio Specialty Mfg. Co., Ore., 15
Redifon, Ltd., England, 15
Reeves-Hoffman Corp., 145 Cherry St., Carlisle, Pa., 15
For details see ad on page 164
Scientific Radio Products, Inc., Neb., 10, 15, 20, Sub Assemblies
Scientific Radio Service, Md., 15
Soreng Mfg. Corp., Ill., 10
Spilsbury & Tindall, Ltd., Canada, 15
Standard Crystal Co., Mo., 10, 15, 20
Standard Piezo Co., 265 E. Pomfret St., P.O. Box 278, Carlisle, Pa., 5, 10, 15, 20
For details see ad on page 92
Stupakoff Ceramic & Mfg. Co., Box 390, Hillview Ave., Latrobe, Pa., 5
For details see ad on pages 139, 189, 203, 255, 265, 277, 295, 297, 303, 378-379
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y. 5
For details see ad on pages 417-420
Valpey Crystal Corp., Mass., 5, 10, 15, 20, 25
Vectron, Inc., 400 Main St., Waltham 54, Mass., 10, 15
For details see ad on page 308
Wakefield Industries, Inc., Ill., 10
Wright Electronic Development, Mo., 15, 20, 25

DO YOU NEED

Quartz Crystal Units—designed to meet your most rigid requirements. Wide ranges of frequencies. Meet MIL-C-3098A specs.

Quartz Crystal Semi-Finished Blanks—cut from best quality Brazilian quartz, to close angle tolerances. Any size, shape and cut, from AT to Z.

Quartz Lapping Machines—supplied in 3 models. PR1 and PR2, planetary action and PR3, eccentric action, for covering the range of low frequencies to ultra-high frequencies.

Lapping Carriers or Workholders—made of any material, to your size, having holes punched per your requirements.

Quartz Cutting Saws—a precision machine, designed to cut blanks to very close tolerances. Uniform in angle and thickness. May be used for multiple sawing holding up to 20 saw blades.

Electrodes—precision ground and polished. Stainless steel. Made in any size, thickness, and having a controlled air gap.

We are one of the oldest and largest manufacturers of quartz crystal blanks and processing machinery in the world, having supplied over 25% of the crystal blanks used during the past emergency. Your inquiry will be promptly answered.

P. R. HOFFMAN CO.
321A Cherry St. Carlisle, Pa.

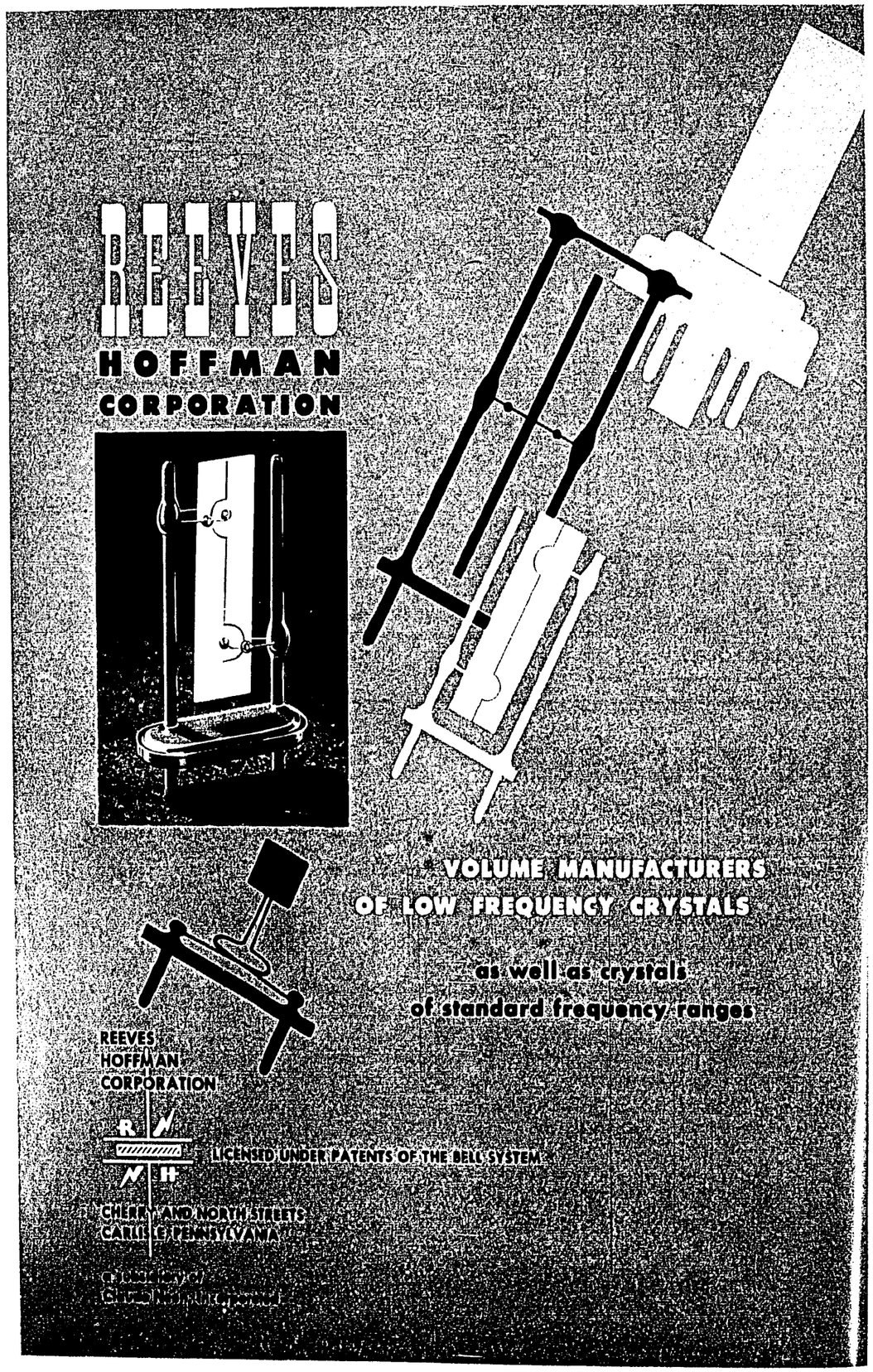
38. Filters.

5. RF noise reduction 10. Mechanical

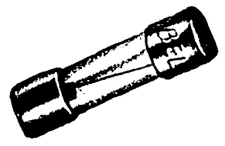
Aerocoil, Inc., 24 Cliff St., Jersey City, N.J., 5
For details see ad on page 143
Aerovox Corp., 740 Belleville Ave., New Bedford, Mass., 5
For details see ad on pages 362-363
Affiliated Products, Inc., Pa., 5, Power Line
Air Associates, Inc., N.J., 5
All Tronics, Inc., N.Y., 5
American Machine & Foundry Co., Mass., 5, 10
Arrow Radio Co., Canada, 5
Astron Corp., 255 Grant Ave., East Newark, N.J., 5
For details see ad on page 136
Balco Research Laboratories, N.J., 5
Bardwell & McAlister, Calif., 5
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 5
For details see ad on page 408
Bird Electronic Corp., Ohio, 5

(Continued on page 165)

See also listings for Audio Frequency Filters on page 101.



Brush Development Co., Ohio, 5
Bud Radio, Inc., 2118 E. 55 St., Cleveland 3, Ohio, 5
For details see ad on pages 267, 346
Caddell-Burns Mfg. Co., Inc., N.Y., 5
Centralab, Div. Globe Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis., 5
See complete catalog in last section
Chicago Electronic Eng. Co., Ill., 5
Church Co., George H., Minn., 5
Cole Instrument Co., Calif., 5
Collins Radio Co., 855 35th St., N.E., Cedar Rapids, Iowa, 10
For details see ad on pages 428-429
Communicating Systems, Inc., N.Y., 5
Communication Parts, Ill., 5
Cornell-Dubilier Electric Corp., 333 Hamilton Blvd., S. Plainfield, N.J., 5
For details see ad on page 6
Deutschmann Corp., Tobe, Mass., 5
Dietz Design & Mfg., Grandview, Mo., 5
For details see ad on page 27
Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio, 5, High & Low Pass, Band Reject, & Wave Traps
For details see ad on page 165
ESC Corp., N.Y., 5
Electronic Designs, Inc., N.Y., 5
Electronic Systems Co., N.Y., 5
Emerald Mfg. Co., Ill., 5
Erie Resistor Corp., 644 W. 12th St., Erie, Pa., 5
For details see ad on page 18



8AG PIGTAILS
3AG SLO-BELS
3AB MOUNTINGS
SFE SPECIAL DESIGNS

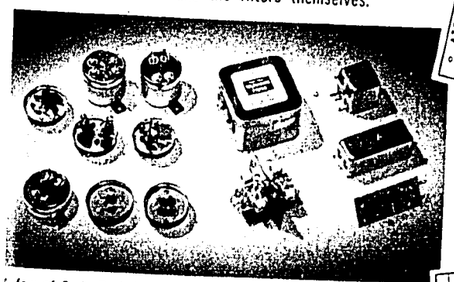
UL LISTINGS and CATALOGS AVAILABLE

BEL FUSED BEL GLASS TUBE FUSES WELL FUSED

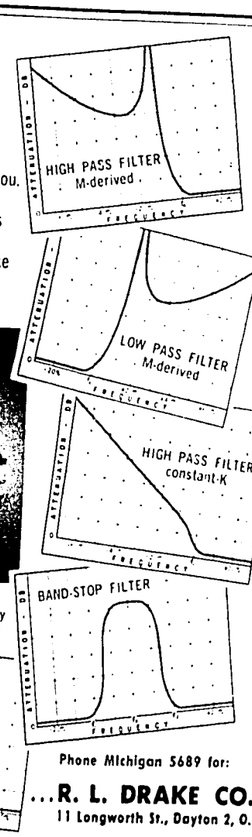
BEL FUSE, Inc.—311 MOUNTAIN ROAD — UNION CITY, N.J.
Export Agent: **Roburn Agencies, Inc., 39 Warren St., N. Y. C.**

DO YOU HAVE A
TV Interference Problem?

A filter of the right attenuation characteristics, fitted to the proper frequencies, can solve it for you. Many TV set manufacturers have found this to be true and are including our filters in their new designs as a precaution against undesired responses. They have found it more economical to call upon R. L. Drake Co.'s experience and production facilities than to develop and make the filters themselves.



A few of R. L. Drake's adjustable or pre-set . . . IF, VHF, UHF . . . High Pass, Broad Band Rejection Filters and Traps being used by leading TV set manufacturers. Response curves shown at right



If you need an effective yet inexpensive solution to your interference problem, why not contact our engineering department today? Your inquiries are invited. .....

Phone Michigan 5689 for:

...R. L. DRAKE CO.
11 Longworth St., Dayton 2, O.

Filtron Company, Inc., N.Y., 5
Gates Radio Co., Ill., 5, 10
Gudeman Co., 340 W. Huron St., Chicago 10, Ill., 5
For details see ad on page 22
Hill Electronic Engineering & Mfg. Co., New Kingstown, Pa., 5, Crystal
For details see ad on page 160
Industrial Condenser Corp., Ill., 5
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 5
For details see ad on page 134
Johnson Co., E. F., Waseca, Minn., RF Low Pass
For details see ad on page 183
Lear, Inc., Calif., 5
Lytle Engineering & Mfg. Co., Ill., 5
Mallory & Co., Inc., P. R., Ind., 5
Micamold Radio Corp., N.Y., 5
Microlab, N.J., 5
Miller Co., J. W., Calif., 5
National Electronic Mfg. Corp., N.Y., 5
Nize Mfg. Co., Inc., N.Y., 5
North Hills Electric Co., Inc., N.Y., 5
Ortho Filter Corp., 196 Albion Ave., Paterson 2, N.J., 5
For details see ad on page 101
Orthon Corp., 196 Albion Ave., Paterson 2, N.J., 5
For details see ad on page 117
Resdel Engineering, Calif., 5
Sherman Ind. Electronics Co., N.Y., 5
Sonar Radio Corp., N.Y., 5
Sprague Electric Co., Mass., 5
Superex Electronics Corp., N.Y., 5
Telegraph Condenser Co., Ill., 5
Televiso Corp., Ill., 5
U. S. Electronics Corp., N.Y., 5
United Technical Labs., N.J., 5
United Transformer Co., 150 Varick St., New York 13, N.Y., 5
See complete catalog in last section
Vidaire Electronics Mfg. Corp., N.Y., 5
TV Wavetrap
Vocaline Company of America, Inc., Old Saybrook, Conn., 5
Vokar Corp., Mich., 5
White Industries, Inc., N.J., 5
Yonkers Industries, Inc., N.Y., 5
Wave Traps

39. Fuses & Fuse Holders.

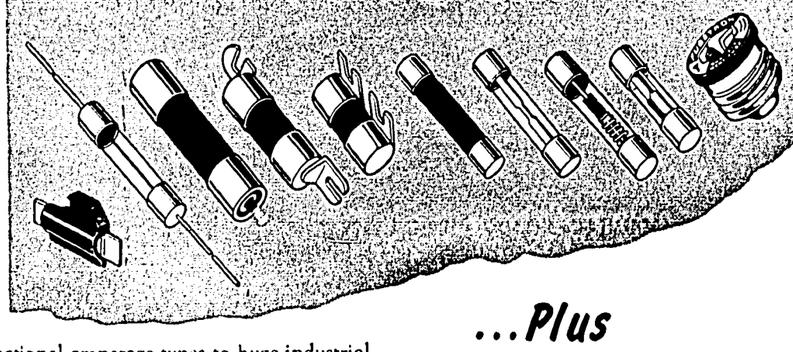
5. Fuses 10. Fuse Holders

Aerolite Electronics Corp., 507 26 St., Union City, N.J., 10
For details see ad on page 103
Alden Products Co., 113 N. Main St., Brockton 64, Mass., 10, Indicating Fuseholders
For details see ad on pages 150-151
American Machine & Foundry Co., Mass., 5, 10
American Radio Hardware Co., N.Y., 10
Armstrong Co., A. T. R., Canada 5, 10
Atlantic Electronics Corp., N.Y.,
Atlas E. E. Corp., Mass., 10
Bel Fuse, Inc., 311 Mountain Rd., Union City, N.J., 5, 10
For details see ad on page 165
Brach Mfg. Corp., N.J., 10

(Continued on page 167)

WHATEVER YOUR FUSE NEEDS
THIS ONE SOURCE SAVES TIME AND TROUBLE

BUSS FUSES
for TELEVISION...RADIO...RADAR INSTRUMENTS...CONTROLS...AVIONICS



From fractional amperage types to huge industrial fuses, BUSS has specialized in a complete fuse line for the past 39 years. Whatever your circuit protection problem, you can choose from this complete line not only with convenience but with confidence in the unequalled BUSS reputation for quality and dependability.

Evidence of BUSS dependability is the rigid electronic testing every fuse must undergo before leaving the factory. Ultra-sensitive electronic devices check it to exacting standards of construction, calibration and physical dimension.

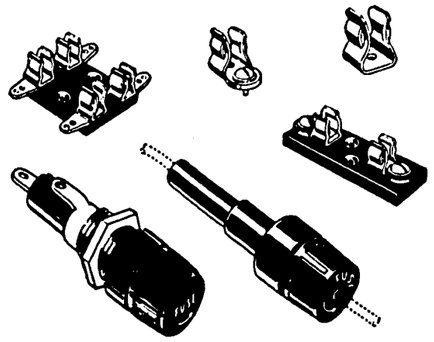
When you install BUSS Fuses you can forget about fuse troubles yet you can be certain of positive protection.

Turn To BUSS Engineers With Your Fuse Problems.

They will be glad to assist you in selecting the fuse to do the job best... and if possible a fuse that will be available from local wholesaler's stocks.

USE THE HANDY COUPON—*It's just good business to rely on BUSS FUSES*

...Plus
A COMPLETE LINE OF FUSE CLIPS, BLOCKS AND HOLDERS



BUSSMANN Mfg. Co. (Division of McGraw Electric Co.)
University at Jefferson, St. Louis 7, Mo.

Please send me bulletin SFB containing facts on BUSS small dimension fuses and fuse holders.

*Name*_____

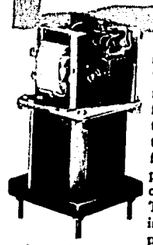
*Title*_____

*Company*_____

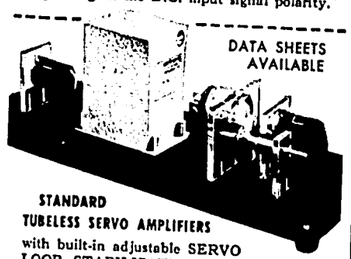
*Address*_____

*City & Zone*_____ *State*_____ IRE-D53

STANDARD PACKAGED PUSH-PULL MAGNETIC AMPLIFIERS by MA



MAGNETIC AMPLIFIERS—These high gain, high performance Magnetic Amplifiers are especially suitable to drive two phase induction servo motors requiring from 0.1 watt to 20 watts per phase on either 400 cps or 60 cps powerlines. The output power is either in phase or 180 out of phase with the powerline depending on the D.C. input signal polarity.



DATA SHEETS AVAILABLE

STANDARD TUBELESS SERVO AMPLIFIERS with built-in adjustable SERVO LOOP STABILIZATION. Packaged, completely self-contained, magnetic servo amplifiers for position servo systems where either A.C. or D.C. error signals are available. Designed for instrument type and power type servo systems to work with synchro control transformers or potentiometers and two phase induction servo motors.

New Automatic Universal TRANSISTOR CURVE TRACER



WRITE FOR COMPLETE INFORMATION

USES

Designing transistor circuits — comparing, matching and selecting — detecting anomalies — studying effects of temperature, age, normal usage, over-loading — detecting failures and cause.

FEATURES

Tests NPN, PNP, Junction, Point Contact Transistors—flexible to accommodate new types. Dynamically plots entire family of curves simultaneously on standard laboratory DC oscilloscope. Function switch selects: output or transfer curve in grounded base or grounded emitter connection. Calibrating axis generated internally as integral part of display are always in correct quadrant.

MAGNETIC AMPLIFIERS • INC
An Affiliate of General Ceramics & Steatite Corp.
632 TINTON AVE., NEW YORK 55, N.Y.
Telephone CYPRESS 2-6611

Fuses and Fuse Holders

(Continued from page 165)

Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo., 5, 10
For details see ad on page 166
Cinch Mfg. Corp., 1026 S. Homan Ave., Chicago 24, Ill., 10
For details see ad on pages 384-385
Dante Electric Co., Conn., 10
Eby, Inc., Hugh H., 4700 Stenton Ave., Philadelphia 44, Pa., 10
For details see ad on page 207
Federal Screw Products, Inc., 224 W. Huron St., Chicago 10, Ill., 10
For details see ad on page 270
Gee-Lar Mfg. Co., Ill., 5, 10
General Cement Mfg. Co., Ill., 10
General Fuse Co., South River, N.J., 5, 10
For details see ad on page 167
General Laminated Prods. Co., Inc., Ill., 10
Ideal Industries, Inc., Ill., 10
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 10
For details see ad on page 134
JFD Mfg. Co. Inc., 6101-16th Ave., Brooklyn 4, N.Y., 10
For details see ad on pages 140, 242
Keystone Electronics Corp., N.Y., 10
Kolton Electric Mfg. Co., N.J., 10
Kulka Electric Mfg. Co., Inc., N.Y., 10
Littelfuse, Inc., 1865 Miner St., Des Plaines, Ill., 5, 10
For details see ad on page 58
Micarta Fabricators, Inc., Ill., 5
Morse Co., Frank W., Mass., 5, 10
National Electronic Mfg. Corp., N.Y., 5, 10
National Tel-Tronics Corp., N.Y., 10
Neo-Sil Corp., N.J., 10
Smith, Inc., Herman H. 436 18th St., Brooklyn 15, N.Y., 10
See complete catalog in last section
Smith & Stone, Ltd., Canada, 5, 10
Star Fuse Co., Inc., N.Y., 5, 10
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 10
For details see ad on pages 417-420

40. Magnetic Amplifiers.

5. Complete assemblies

Acro Products Co., Pa., 5
Aerovox Corp., 740 Belleville Ave., New Bedford, Mass., 5
For details see ad on pages 362-363

Magnetic Amplifiers

Aircraft Transformer Corp., West & Willow Aves., Long Branch, N.J., 5, Amplifiers
For details see ad on page 1
Airpax Products Co., Md., 5
American Machine & Foundry Co., Mass., 5
Atlantic Electronics Corp., N.Y., 5
Bailey Meter Co., Ohio, 5
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 5
For details see ad on page 408
Bendix Aviation Corp., Research Lab., Fisher Bldg., Detroit 2, Mich., 5
For details see ad on pp. 176, 366-367
Bogue Electric Mfg. Co., 52 Iowa Ave., Paterson 3, N.J., 5
For details see ad on page 13
Campbell Co., Colin, Conn., 5
Canadian Westinghouse, Ltd, Canada, 5
Chicago Electronic Eng. Co., Ill., 5
Clifton Precision Products Co., Pa., 5
Cole Instrument Co., Calif., 5
Constantine Engineering Labs., N.J., 5
De Coursey Engineering, Calif., 5
D & R Ltd., Calif., 5
Doelcam Corp., Mass., 5
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, 5
For details see ad on pages 368-373
Ford Instrument Co., Div. Sperry Corp., 31-10 Thomson Ave., Long Island City 1, N.Y., 5
For details see ad on page 235
General Electric Co., Ind., 5
General Electric Co., N.Y., 5
General Magnetics, Inc., N.J., 5
Industrial Control Co., N.Y., 5
Kearfott Co., Inc., 1150 McBride Ave., Little Falls, N.J., 5
For details see ad on page 53
Lear, Inc., Calif., 5
Lee Electric & Mfg. Co., Calif., 5
Loral Electronics Corp., N.Y., 5
Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N.Y., 5
For details see ad on page 167
Magnetics Research Co., N.Y., 5
Magnetics, Inc., P. O. Box 230, Butler, Pa., 5
For details see ad on page 160
Maxson Corp., W. L., 460 W. 34 St., New York 1, N.Y., 5
For details see ad on page 122
Minnesota Electronics Corp., Minn., 5
Motordyne, Inc., Calif., 5

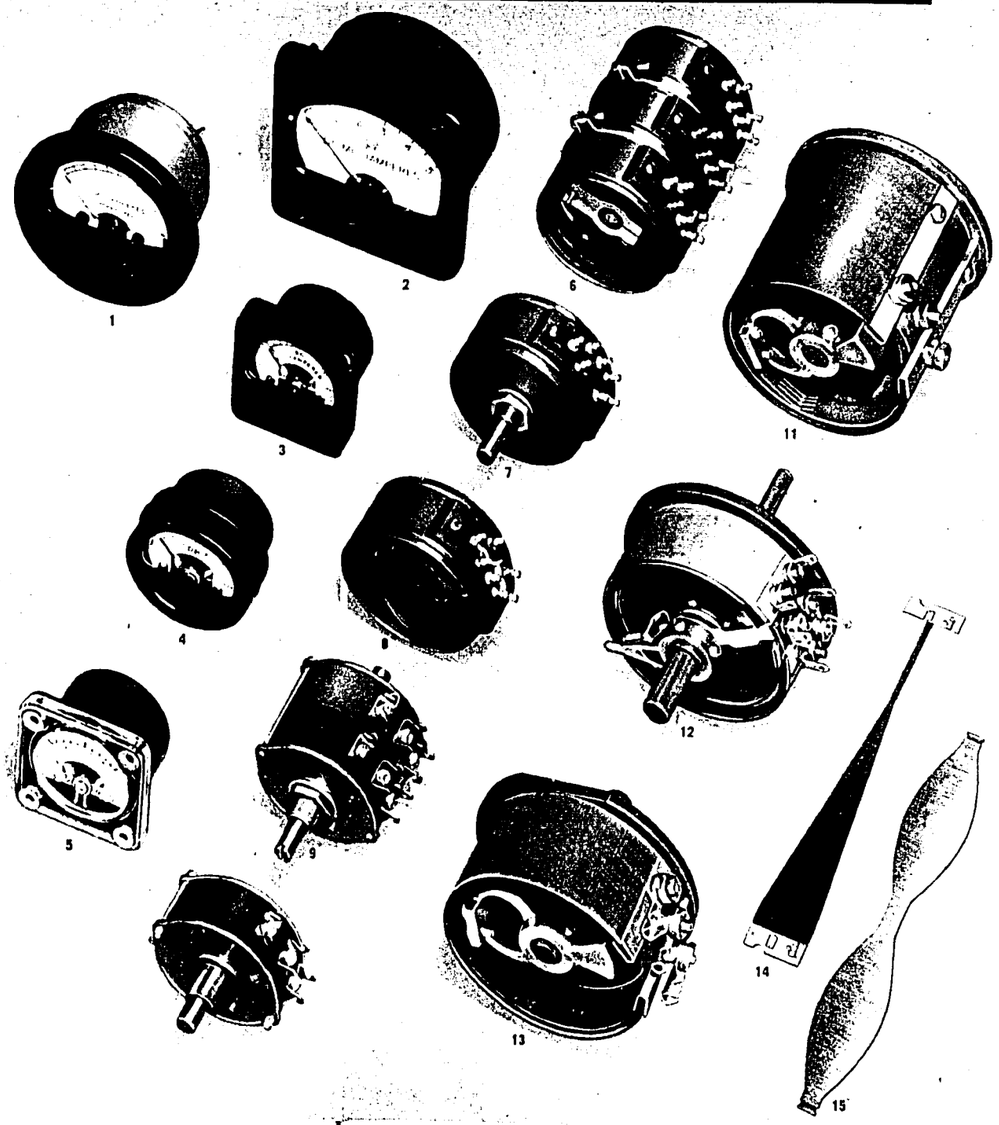
(Continued on page 169)

LIGHTNING BOLT FUSES
BEST ENGINEERED CIRCUIT PROTECTION
ALL SIZES SMALL DIMENSION
GLASS TUBE FUSES—
3 AG, SFE, 8 AG—
ALL TIME LAGS

General Fuse

General Fuse Company
SOUTH RIVER • NEW JERSEY

precision electronic instruments by **DeJUR**



PANEL INSTRUMENTS

1. 2½" Ruggedized Meter. Meets MIL-M-10304. Model R210
2. 3½" A.S.A. Meter meets MIL-M-6A. Model S312
3. 1½" Meter. Conserves space. Built to SC-73-3. Model 112
4. 1½" Meter. Metal Case. Single Hole Mounting. Model 120
5. 1½" Ruggedized Meter. Meets MIL-10304. Model R112

PRECISION POTENTIOMETERS

6. Multiple ganging and external phasing 2" Diameter Model C200
7. Single hole mounting Model C200
8. Single Sine-Cosine Model C200
9. Dual Unit Model L402
10. 1-11/16" Diameter Center tapped Model L400
11. 3" Diameter 11 watt JAN-R-19 Const. Model 275
12. Dual Concentric Model 282
13. 3" Diameter 8 watt JAN-R-19 Const. Model 260
14. Non-Linear Card C200
15. Sine-Cosine Card C200

Actual performance records prove that these DeJUR components withstand adverse conditions of vibration, heat and moisture. Each is engineered and manufactured to meet rigid government requirements. In addition to its wide variety of stock instruments, DeJUR offers top-flight laboratory, engineering and manufacturing facilities for production of these precision units adapted to your specifications. Inquiries are invited.

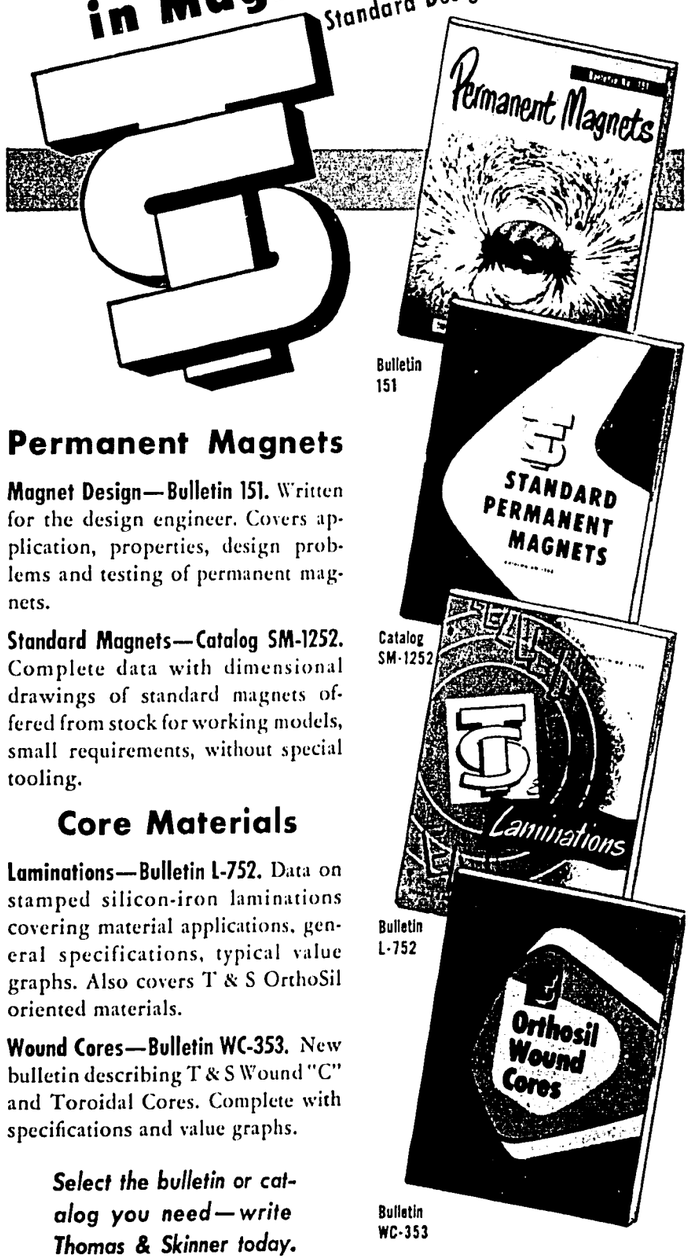
Write for more detailed information on any of the products shown on this page to Dept. IDP-9

DeJUR-AMSCO CORPORATION

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MANUFACTURERS OF SCIENTIFIC PRECISION EQUIPMENT FOR OVER 30 YEARS

Specialists
in Magnetic Materials
Standard Designs—Special Shapes



Permanent Magnets

Magnet Design—Bulletin 151. Written for the design engineer. Covers application, properties, design problems and testing of permanent magnets.

Standard Magnets—Catalog SM-1252. Complete data with dimensional drawings of standard magnets offered from stock for working models, small requirements, without special tooling.

Core Materials

Laminations—Bulletin L-752. Data on stamped silicon-iron laminations covering material applications, general specifications, typical value graphs. Also covers T & S OrthoSil oriented materials.

Wound Cores—Bulletin WC-353. New bulletin describing T & S Wound "C" and Toroidal Cores. Complete with specifications and value graphs.

Select the bulletin or catalog you need—write Thomas & Skinner today.

THOMAS & SKINNER Steel Products Company, Inc.

1125 EAST 23RD STREET, INDIANAPOLIS 7, IND.

Magnetic Amplifiers

(Continued from page 167)

Ortho Filter Corp., 196 Albion Ave., Paterson, 2, N.J., 5
For details see ad on page 101
PCA Electronics Inc., Calif., 5
Partridge Transformers, Ltd., England, 5
Pennsylvania Testing Laboratory, Pa., Test Stand
Pentron Corp., Ill., 5
Perkin Engineering Corp., Calif., 5
Phebco, Inc., Md., 5
Power Transformer Co., Inc., N.J., 5
Presto Recording Corp., P.O. Box 500, Paramus, N.J., 5
For details see ad on page 110
Qutronic Transformer Corp., N.Y., 5
Raytheon Manufacturing Co., Equipment Sales Div., 138 River St., Waltham 54, Mass., 5
For details see ad on page 228
Reeve Electronics, Inc., Ill., 5
Regulator Equipment Corp., N.J., 5
Square Root Manufacturing Corp., N.Y., 5
Standard Electrical Products Co., Ohio, 5
Summers Gyroscope Co., Calif., 5
Superex Electronics Corp., N.Y., 5
Thompson Products, Inc., Ohio, 5
Transformer Engineers, Calif., 5
United Transformer Co., 150 Varick St., New York 13, N.Y., 5
See complete catalog in last section
Vickers Electric Division, Mo., 5
Wallind-Pierce Corp., Calif., 5
Westinghouse Electric Corp., Pa., 5

41. Magnets.

5. Electro 10. Permanent

All Star Products, Inc., Ohio, Ion Trap
Allied Control Co., Inc., N.Y., 5
American Machine & Foundry Co., Mass., 5, 10
Arnold Engineering Co., Ill., 10
Bittermann Electric Co., Conn., 5
Carboloy Dept., General Electric Co., Mich., 10
Central Transformer Co., Ill., 5
Cole Instrument Co., Calif., 5
Comar Elec. Co., 3449 W. Addison St., Chicago 18, Ill., 5
For details see ad on page 195
Connecticut Telephone & Electric Corp., Conn., 5
Crowley & Co., Inc., Henry L., N.J., 10
Crucible Steel Co. of America, 405 Lexington Ave., New York 17, N.Y., 10
For details see ad on page 10
Cycle Electronic Labs., N.J., 5
Dormeyer Industries, Ill., 5
General Electric Co., Mich., 10
Glaser-Steers Corp., N.J., TV
Heppner Mfg. Co., Box 1207, Round Lake, Ill., Focusing
For details see ad on page 64
Indiana Steel Products Co., Valparaiso, Ind., 10
For details see ad on page 171
Industrial Specialties Corp., N.Y., 5
Jerrell Electronics, Ohio, 5
Little, Inc., Arthur D., Mass., 5

(Continued on page 171)

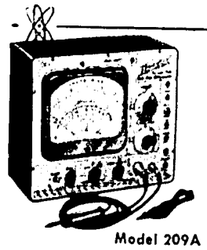
THE STANDARD OF QUALITY **HICKOK** INSTRUMENTS FOR OVER FORTY THREE YEARS



Model 539A

Laboratory
TUBE TESTER
Engineer's Portable

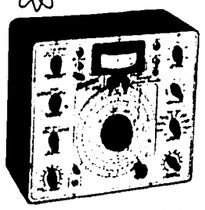
Designed with professional accuracy for engineers in the radio, television, aviation, communication and industrial fields. Tests all tubes normally encountered in electronic work. Provides increased accuracy for testing high gain type tubes. Permits choice of 3 AC signals. Adjustable DC bias, metered to within 1% giving highest accuracy of the tube performance test. 8 other models available.



Model 209A

Capacitance METER *and* TRUE VTVM

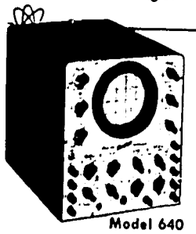
An accurate multi-purpose instrument for laboratory and industrial use. Measures wide ranges of inductance, capacitance, resistance, current and voltages, both AC and DC. Built with 9 inch Zero-Center scale. Matched high frequency probe is included to make this instrument a True VTVM. Peak-to-peak or RMS. Useful to 300 MC. DC probe is available to extend range to 30,000 volts.



Model 292X

Microvolt
SIGNAL GENERATOR
125 KC to 120 MC and 150 to 220 MC on fundamentals

An accurate microvolt signal generator that meets the needs of such high-frequency users as police, fire dept. and military as well as industrial laboratories. Calibrated output from 0.5 to 100,000 microvolts. Also available: 292XAL with continuous coverage. 125KC to 165MC on fundamentals.

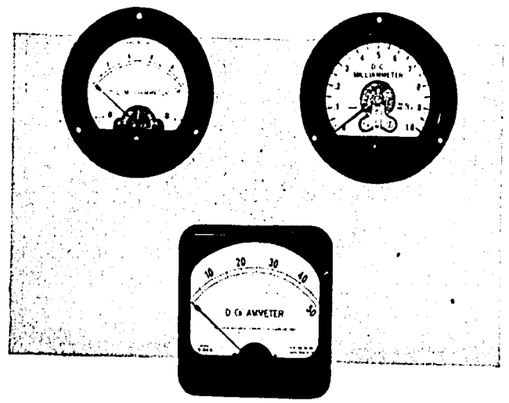


Model 640

5" Oscilloscope

An outstandingly versatile 'scope designed for general purpose industrial laboratory and television applications. Both driven and recurrent sweep. Wide band amplifier: Frequency response DC, 0-4.5 MC, down 3 db. 17 M. V. per inch sensitivity. Calibrating voltages, triggered sweep, provision for Z-axis modulation, combination light shield, and camera base are provided. Stable, shielded and shock mounted. Three other models are available.
Write for technical details on the complete HICKOK Test Equipment line.

Electrical
INDICATING METERS



For over 43 years HICKOK has pioneered, developed, and improved electrical indicating instruments. Today, HICKOK manufacturers meters of all classes ranging from the most accurate laboratory types with an accuracy of 0.2% of full scale deflection on down to small pocket portable types with an accuracy of 1½%.

A complete line of switchboard types for use on electrical and power switchboards are available in 6" square, 6" round, horizontal edgewise, and up to the very large 14" with an accuracy of 1% or better. Provided in all AC and DC ranges including amperes, volts, watts, frequency, power factor, etc.

A very complete line of panel meters in both round and square types from 2½" to 9" are also available in the popular microammeter, ammeter, voltmeter, wattmeter, etc. This panel meter line is exceptionally complete and includes the very latest ruggedized types to meet military specifications

HICKOK has pioneered and perfected the smaller panel size 250° meters with a scale 2½ times as long as the conventional panel instrument. Also available, are hermetically sealed 250° meters as well as the standard molded types in many sizes and ranges.

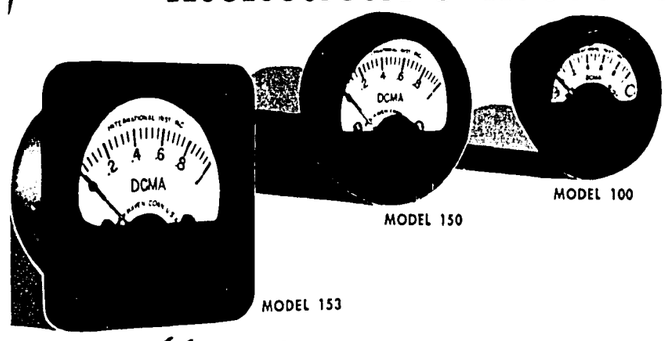
HICKOK has also introduced the internal pivot design to provide a high standard of accuracy and dependability in an instrument with removeable pivots. Though adding considerable utility, this HICKOK sturdy assembly is even thinner than most external pivot designs. Among special movements developed by HICKOK are: electrodynamometer, galvanometers, true logarithmic deflections, special curves for special purposes and ruggedized designs for highest shock tests.

Full technical information on the complete line of HICKOK instruments and test equipment is available on request. Kindly list details of your requirements.

THE HICKOK ELECTRICAL INSTRUMENT COMPANY
10551 Dupont Avenue • Cleveland 8, Ohio

Are SIZE and WEIGHT Critical Factors in YOUR DESIGN . . . . ?

international instruments
INCORPORATED
are specialists in 1" and 1½"
miniature meters



You get • PROMPT DELIVERY
• WIDE SELECTION OF RANGES
• METERS DESIGNED TO SPECIAL REQUIREMENTS

If your instrument requirements demand the smallest possible size and weight *without* sacrificing accuracy and dependability, International Instruments can help you. International Instruments is a pioneer in the production of miniature instruments — the first to produce and sell 1" barrel diameter instruments, 1½" illuminated meters as well as 1½" self-contained AC Voltmeters, DB and VU Meters.

The meters shown above feature a miniaturized D'Arsonval type movement. Expert design, precision workmanship, and rigid quality control in every stage of manufacture make possible reduction in size while retaining high standards of performance.

Accuracy is held to ±3% of full scale deflection. Light, strong metal cases are easily mounted in any panel. Special scales, ranges and other characteristics can be provided to meet your particular requirements. Meters designed to meet applicable sections of Government Specifications are housed in watertight cases. They are used extensively in equipment used by the armed services.

If smaller size and lighter weight can help you to solve your instrument problems, write for engineering data sheets that cover our standard instruments. Or simply submit your specifications to our engineering department.

LIAISON ENGINEERS IN PRINCIPAL CITIES

international instruments
INCORPORATED
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Please send me engineering data sheets covering the International Line of Instruments.
NAME _____
POSITION _____
CO. NAME _____
CO. ADDRESS _____
CITY _____ ZONE ____ STATE ____

Magnets 41-42
(Continued from page 169)

Litton Industries, Calif., 5
Magnetic Devices, Inc., Md., 5
Magnetic Core Corp., N.Y., 10
Master Appliances, Inc., Ind., 5
Perfection Electric Co., Ill., Ion Traps
Permag Corp., 214 Taaffe Pl., Brooklyn 5, N.Y., 10
For details see ad on page 354
Richardson Labs., Kenneth, N.Y., 5
Sag Harbor Industries, Inc., N.Y., 5
Simonds Saw and Steel Co., N.Y., 10
Smith Mfg. Co., Nathan R., Calif., 5
Square Root Manufacturing, N.Y., 5
Standard Electrical Products, Ohio, 5
Thomas & Skinner Steel Prod Co., 1113 E. 23rd St., Indianapolis 7, Ind., 10
For details see ad on page 169
Varian Associates, 661 Hansen Way, Palo Alto, Calif., 5, 10
For details see ad on pages 454-455

42. Meters (Indicating Instruments).

5. Ammeters
10. Elapsed time
15. Frequency indicating
20. Galvanometers
25. Micro-ammeters
30. Milli-ammeters
35. Voltmeters
40. Volume level, (DB & VU)
45. Wattmeters & watt hour meters

Adler Communications Labs., N.Y., 40
Advance Electronics Co., 451 Highland Ave., Passaic, N.J., 15
For details see ad on page 325
Aero Instrument Co., Calif., 10, 15
Aerolux Light Corp., N.Y., 35
(Continued on page 173)

INDIANA PERMANENT MAGNETS

—for Uniform High Energy!

Look to INDIANA for *quality* permanent magnets—for skill in manufacture—for ingenious engineering aid in *both* design and application. INDIANA is the world's largest exclusive producer of permanent magnets. More than 35,000 different needs have been met successfully by INDIANA *"packaged energy."*

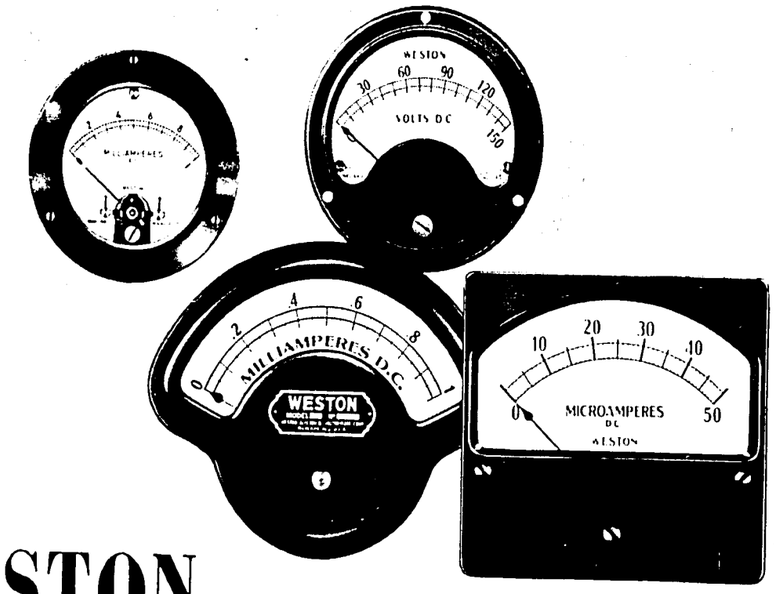
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Cunife
Indalloy
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★ ALL SIZES
ALL SHAPES
ALL MATERIALS

INDIANA is the only manufacturer furnishing *all* commercial grades of permanent magnet alloys. And you have a choice of cast, sintered, formed, or ductile metals. *Whatever* the requirement, INDIANA can serve you well. Send for Catalog No. 11-W.

Sole Makers of HYFLUX Alnico V—highest energy product of any magnet material.

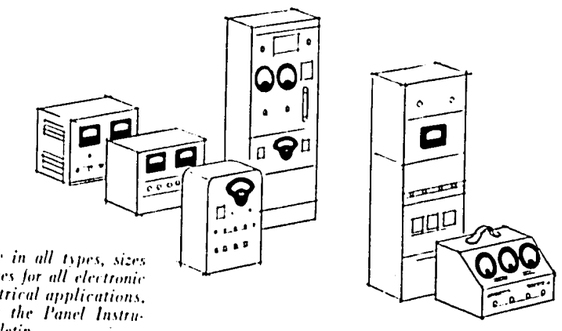
THE INDIANA STEEL PRODUCTS CO.
Valparaiso, Indiana
Specialists in Permanent Magnets Since 1908



WESTON

PANEL INSTRUMENTS...

...outward evidence of the high quality built within fine electronic equipment

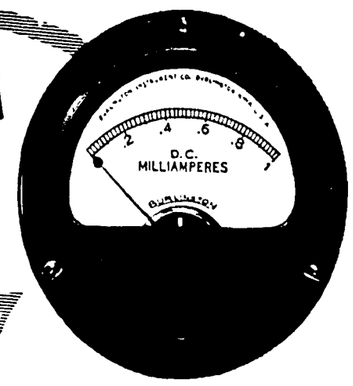


Available in all types, sizes and ranges for all electronic and electrical applications. Send for the Panel Instrument bulletin.

WESTON ELECTRICAL INSTRUMENT CORPORATION, 614 Frelinghuysen Avenue, Newark 5, N. J.

Burlington

HERMETICALLY AC-SEALED-DC INSTRUMENT



- Copper — cadmium — dichromate finished case.
- Black satin onodized aluminum bezel.
- Excellent shielding due to case material and construction.
- Double strength clear glass.
- Glass to metal seal under controlled humidity and temperature conditions.
- D'Arsonval permanent magnet type movement for DC applications.
- Magnetically damped, moving iron vane type movement for AC applications.

RUGGED CONSTRUCTION FOR SUPERIOR PERFORMANCE

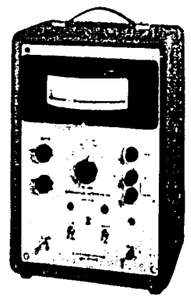
- Available in 1½" square, 2½" and 3½" round case types.
- Guaranteed for one year against defective workmanship and materials.

Burlington "Hermetically Sealed" Instruments are designed to conform to JAN and MIL specifications.

BURLINGTON INSTRUMENT COMPANY
DEPT. I-73, BURLINGTON, IOWA

Measure Resistance up to 20,000,000 Megohms

WITH MODEL 29A MEGOHMMETER



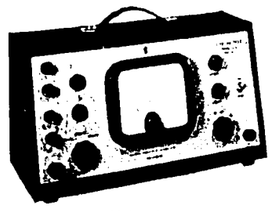
WITH 11 RANGES COVERING
FROM .3 TO 20 MILLION MEGOHMS
Direct Reading on 6½" Mirror Scale

Test Potentials: 85V DC and 500V DC, by plugging in on 115V 60 cycle lines. Also .5 to 1000V DC by using external supply. Test voltage unaffected by the value of resistance under test.

Direct Reading: Fast in operation with unusual stability even on highest ranges. Safe . . . current limited to 5 milliamperes.

For Full Details Write for Bulletin No. 1029

Measure Time as short as
1 MICROSECOND UP TO 10 SECONDS



Write for Bulletin No. 1030

Direct Reading on 5" Scale
WITH NEW

CHRONOTEST ELECTRONIC TIMER

A remarkable instrument with exceptional stability, allowing ample time for readings.

Small size . . . Compact . . . Light Weight. Extremely easy to operate. Cannot be damaged by overload or electrical misuse. Three models with 6 ranges each.

HERMAN H. STICHT CO., INC. 27 PARK PLACE, NEW YORK 7, N. Y.

Meters 42

(Continued from page 171)

Air-O-Tronics, Calif., 15
American Mach. & Metals Co., Pa., 5, 35
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35, 40, 45
Assembly Products, Inc., Ohio, 5, 20, 25, 30, 35
Bassett, Inc., Rex, Fla., 15
Beede Electrical Instrument Co., N.H., 5, 25, 30, 35
Berkeley, Div. Beckman Instruments, Inc., 2200 Wright Ave., Richmond, Calif., 10, 15
For details see ad on page 8
Beta Electric Corp., N.Y., 25, 35
Biddle Co., James G., Pa., 15, 20
Borden Engineering Co., N.J., 20
Bristol Co., Conn., 5, 10, 25, 30, 35, 45
Brush Development Co., Ohio, 5
Brush Electronics, Ohio, 35
Burlington Instrument Co., 203 N. 3rd St., Burlington, Iowa, 5, 10, 15, 25, 30, 35, 40
For details see ad on page 173
Burton Rogers Co., Mass., 5, 20, 25, 30, [illegible]
C and H Sales Co., Calif., 5, 10, 15, 20, 25, 30, 35
Canadian Research Institute, Canada, 5, 20, 25, 30, 35, 40, 45
Canadian Westinghouse Co., Ltd., Canada, 5, 10, 15, 25, 30, 35, [illegible]
Century Geophysical Corp., Okla., 20
Cole Instrument Co., Calif., 5, 10, 15, 20, 25, 30, 35, 40, 45
Columbia Electric Mfg. Co., 5, 35
Connecticut Telephone & Elect. Corp., Conn., 40
Cramer Company, Inc., R. W., Conn., 10
Cubic Corp., Scott & Canon Sts., San Diego 6, Calif., 45
For details see ad on page 327
Cyclotron Specialties Co., Calif., Impulse Registers
Daven Co., N.J., 40
DeJur-Amsco Corp., 45-01 Northern Blvd., Long Island City 1, N.Y., 5, 25, 30, 35, 40
For details see ad on pages 152, 168
Delta Electrical Instrument Co., Calif. 5, 20, 25, 30, 35, 40, 45
Detectron Co., Calif., 10, 15
Electric Design & Mfg. Co., Iowa, 5, 25, 30, 35
Electro Mechanical Research Inc., Conn., 20
Electro Medical Laboratory, Inc., Vt., 10
Electronic Instruments, Ltd., England, 35, 40
Elliott Brothers London, Ltd., England, 5, 15, 20, 25, 30, 35, 40, 45
Elm Laboratories, N.Y., 15
Ferranti Electric, Inc., N.Y., 35
Ferranti Electric Ltd., Canada, 45
Freed Transformer Co., Inc., 1718-36 Weirfield St., Brooklyn 27, N.Y., 35
See complete catalog in last section
G-M Laboratories, Inc., Ill., 20
G W Associates, Calif., 45
Gates Radio Co., Ill., 10, 15, 40
General Electric Co., Mass., 10, Timers
General Electric Co., N.Y., 5, 10, 15, 20, 25, 30, 35, 45
Geotechnical Corp., Tex., 20
Greibach Res. & Dev. Labs., N.Y., 5, 20, 25, 30, 35, 40

(Continued on page 175)

IT'S SAFER TO SPECIFY...

Simpson

INSTRUMENTS THAT STAY ACCURATE



for Accurate, Dependable Electrical Measurements

Your product design and production control can only be as good as the components and tools used in building and checking your equipment.

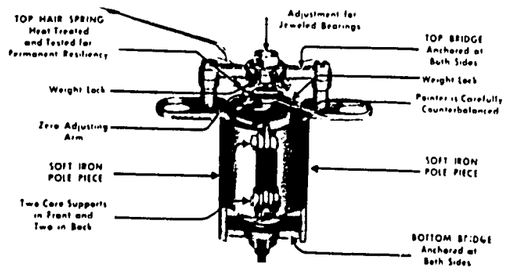
Only the finest standards are used in the manufacture of Simpson test equipment and panel instruments. You see, Simpson designs everything that goes into its panel instruments and test equipment. That's why you're safer when you specify Simpson.

When you specify Simpson Panel Meters, for example, your product has the finest panel meters obtainable, and at a sensible price. This minimizes the danger of rejects and failures in the field . . . helps make your product more stable from a performance standpoint, more efficient, and more accurate.

Simpson test equipment, too, is engineered to give you this same dependable accuracy. Created by electronic engineers who know your problems, these fine testers are designed to make your own checking needs simple and, above all, accurate.

Our engineers will be pleased to assist you with your panel instrument and testing problems. There is no obligation when you utilize this fine service.

SIMPSON "FULL BRIDGE TYPE MOVEMENT"



SIMPSON ELECTRIC COMPANY

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IN CANADA: BACH-SIMPSON, LTD., LONDON, ONTARIO

phaostron

RUGGEDIZED and HERMETICALLY SEALED

panel meters and null indicators



1½", 2½", 3½" and 4½" sizes.

Built to JAN-I-6 and MIL-R-10304 specifications, these meters incorporate aged Alnico magnets, R.F. shielding, shock mounted jewels, glass-to-metal *HERMETIC SEALS* and *RUGGEDIZED*, shock mounted construction.

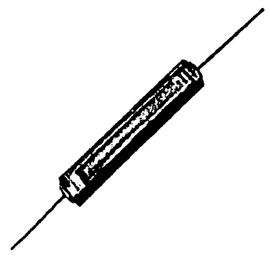
Manufactured in an air-conditioned, temperature-controlled plant, these *Environment Free* instruments are available in A.C. and D.C. models.

phaostron

HERMETICALLY SEALED

"CARB-OHMS"

deposited carbon resistors



¼ to 2 watts *HERMETICALLY SEALED* in glass (the CA-H pictured here) and in a Specification Series (the CA-4R) which exceeds MIL-R-10509 spec. for fixed, accurate resistors.

For equipment subject to extremes of temperature, for high frequency applications and for closely matched units, these conservatively rated resistors provide the utmost in stability, precision and dependability.

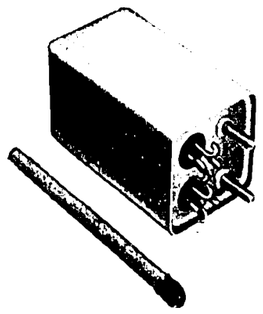
100% inspection on each "CARB-OHM" assures conformance to specifications and ratings.

phaostron

HERMETICALLY SEALED

SENSITIVE MINIATURE RELAYS

perfectly counter-balanced armature



Contact arrangements up to and including D.P. D.T. 3 amp at 28 volts D.C., or 100 milliamperes at 150 volts D.C. resistive load.

This miniature *HERMETICALLY SEALED* relay is designed to operate thru wide ranges of environment including the shock requirements of MIL-E-5400. It will withstand 50 G's acceleration without malfunctioning and its use is recommended wherever extremes of shock, temperature and severe vibration are encountered.

Required coil power as low as 20 milliwatts.
Coil resistance up to 15,000 ohms.
Weight, max. 3.0 oz.

BEST BY ANY COMPARISON

ENVIRONMENT FREE ELECTRICAL EQUIPMENT by Phaostron

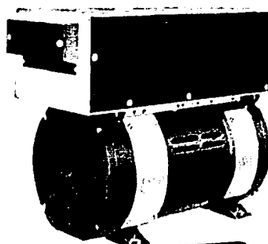
PHAOSTRON COMPANY • 151 PASADENA AVE. • SOUTH PASADENA, CALIF

Meters 42

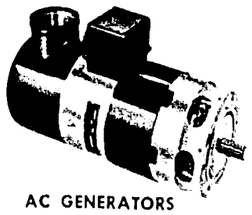
(Continued from page 174)

Haydon Co., A. W., 240 N. Elm St., Waterbury 20, Conn., 10
For details see ad on page 178
Haydon Manufacturing Co., Inc., Conn., 10, 25, 30
Heath Co., 305 Territorial Rd., Benton Harbor, Mich., 15, 30, 35, 45
For details see ad on page 331
Heiland Research Corp., 130 E. 5th Ave., Denver 9, Colo., 20
For details see ad on page 232
Hickok Electrical Instrument Co., 10551 Dupont Ave., Cleveland 8, Ohio, 5, 15, 20, 25, 30, 35, 40, 45
For details see ad on page 170
Industrial Timer Corp., N.J., 10
Instrument Electronics Corp., N.Y., 35
International Instruments, Inc., P.O. Box 2954, New Haven 15, Conn., 5, 25, 30, 35, 40
For details see ad on page 171
J B T Instruments, Inc., Conn., 10, 15, 20
Leupold and Stevens Instruments, Ore., Remote Register
Logistics Research, Inc., Calif., Graph Plotters
MacDonald Co., Inc., W. S., Mass., 25
Marconi Instruments, Ltd., N.Y., 15, 35
Marion Electrical Instr. Co., 400 Canal St., Manchester, N.H., 5, 10, 25, 30, 35, 40, Hermetic Seal
For details see ad on page 234
Measurements Corp., Intervale Rd., Boonton, N.J., 15, 35
For details see ad on pages 284, 422-423
Meters Inc., Ind., 5, 20, 25, 30, 35, 40
Metropolitan Electr. & Instr. Co., N.Y., 5, 20, 25, 30, 35
Midwestern Geophysical Lab. Okla., 20
Minneapolis-Honeywell Regulator, Pa., 20
Oak Ridge Products, N.Y., 5, 25, 30, 35
Phaostron Co., 151 Pasadena Ave., South Pasadena, Calif., 5, 25, 30, 35
For details see ad on page 175
Precise Development Corp., N.Y., 35
Precise Measurements Co., 942 Kings Highway, Brooklyn 23, N.Y., 35
For details see ad on page 294
Precision Apparatus Co., Inc., 92-27 Horace Harding Blvd., Elmhurst, L.I., N.Y., 25, 30, 35
For details see ad on page 330
Precision Measurement Co., N.Y., 35
Pyramid Instrument Corp., N.Y., 5, 35
RCA Victor Division, Tube Dept., 405 S. 5th St., Harrison, N.J., 25
For details see ad on pages 88, 440-441
Radio Kits, Inc., N.Y., 35
Rawson Electrical Instrument Co., Mass., 5, 25, 30, 35
Reiner Electronics Co., Inc., N.Y., 35
Roller-Smith Corp., Pa., 5, 15, 20, 25, 30, 35, 40, 45
Rubicon Co., Pa., 20
Sanborn Co., 39 Osborn St., Cambridge 39, Mass., 20
For details see ad on page 320
Sensitive Research Instrument Co., 9-11 Elm Ave., Mt. Vernon, N.Y., 5, 20, 25, 30, 35, 45
For details see ad on page 307

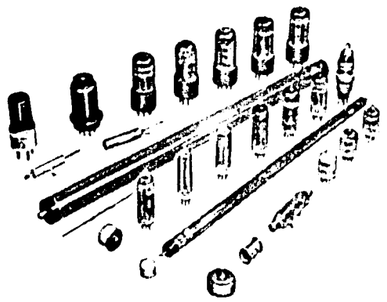
(Continued on page 177)



INVERTERS



AC GENERATORS



SPECIAL-PURPOSE ELECTRON TUBES

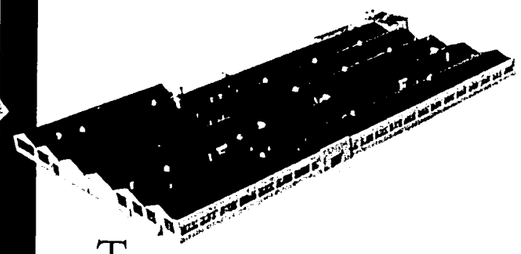


DYNAMOTORS

Bendix Aviation Corporation

concentrates development, sales and production of special-purpose electron tubes, inverters and AC generators with its dynamotors and small motors at its

Red Bank Division



To provide its customers with an unequalled source for special-purpose electron tubes, inverters and AC generators, Bendix Aviation Corporation has placed its entire development, sales and manufacture of these products with its Red Bank Division at Eatontown, N. J. Here in a modern new plant of over 118,000 square feet have been concentrated the most highly skilled personnel and the latest available machinery to produce the highest quality electron tubes, inverters and AC generators possible. At the same time, a full-scale program is being carried on continuously at Red Bank to develop these products for even greater efficiency and versatility. In addition to its new products . . . taken over from the Eclipse-Pioneer Division, Teterboro, N. J. . . . the Bendix Red Bank Division will continue producing its established line of dynamotors and small DC motors. If you require precision items of these types, it will pay you to take advantage of the unique experience and facilities offered to you by Bendix Red Bank.

Division of Bendix Aviation Corporation

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N.Y.

Bendix Red Bank

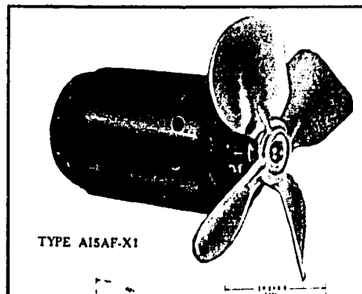
EATONTOWN, NEW JERSEY

Sessions Clock Co., Conn., Timers
Shallcross Mfg. Co., 524 Pusey Ave., Collingdale, Pa., 20, 40
For details see ad on page 98
Sherman Ind., Electronics Co., N.J., Timers
Shurite Meters, Conn., 5, 30, 35
Simpson Electric Co., 5200 W. Kinzie St., Chicago 44, Ill., 5, 20, 25, 30, 35, 40, 45
For details see ad on page 174
Specialty Assem. & Packing Co., N.Y., 15, 20
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 15, 45
See complete catalog in last section
Standard Electric Time Co., 73 Logan St., Springfield 2, Mass., 10, 15
For details see ad on page 325
Stark Electronic Instrument Ltd., Canada, 5, 25, 30, 35
Sterling Manufacturing Co., Ohio, 5, 30, 35
Sticht Co., Inc., Herman H., 27 Park Place, New York 7, N.Y., 10
For details see ad on page 173
Sun Electric Corp., Ill., 5, 25, 30, 35, 40
Supreme Inc., Miss., 5, 20, 25, 30, 35, 40
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 35
For details see ad on pages 417-420
Thwing-Albert Instrument Co., Pa., 20, 35
Triplett Electrical Instrument, Co., Ohio, 5, 20, 25, 30, 35, 40, 45
Walkirt Co., Calif., 15
Waveforms Co., N.Y., 25, 30, 35, 40
Wayne-Kerr Laboratories, Ltd., Sycamore Grove, New Malden, Surrey, England, 45
For details see ad on page 316
Welch Mfg. Co., W. M., Ill., 5, 20, 25, 30, 35, 40, 45
Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N.J., 5, 10, 15, 20, 25, 30, 35, 40, 45
For details see ad on page 172
Westinghouse Electric Corp., N.J., 5, 10, 15, 25, 30, 35, 45
Westinghouse Electric Corp., Pa., 5, 10, 15, 25, 30, 35, 40, 45
Winslow Co., Inc., N.J., 20

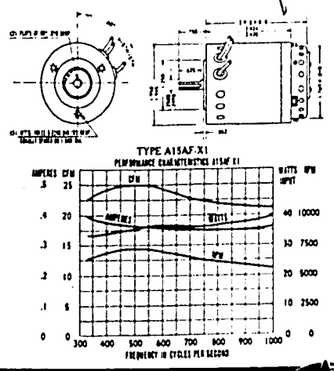
43. Motors & Motor-Generators.

5. Blower & fan motors
10. Dynamotors
15. Frequency changers
20. Motor-generators
25. Synchronous motors
30. Timing motors

Aero Mfg. Co., Ohio, Shaded Pole
Air Marine Motors, Inc., 2183 Jackson Ave., Seaford, L.I., N.Y., 5, 15, 25
For details see ad on page 177
Allard Instrument Corp., N.Y., 5, 10, 15, 25, 30
Alliance Manufacturing Co., Ohio, 5
Alliance Tool & Motor Co., Ltd., Can., 5, 10, 25



TYPE A15AF-X1



PRECISION MOTOR PERFORMANCE

Axial fan blower, 3 phase self-cooled motor is designed to start at a —55° C and feature maximum possible H P per unit weight and volume. The temperature will rise 45° C when fully loaded with 4" 4 blade, 29 degree pitch fan; Silicone wire and impregnation. At full load the input is 94 watts, the line current .54 amperes and the efficiency is 60%.

SPECIFICATIONS
Conform to NEMA Standards and other Gov't specifications.
Continuous duty

WEIGHT	22 oz.
C F M	22 Average
R P M	6250 Average
VOLTS	115
CYCLES	320-1000

can be supplied CW and CCW suitable for 50 to 60 CPS

AIR MARINE MOTORS INC.

2183 JACKSON AVENUE. SEAFORD, L I N Y

WAntagh 2-7309

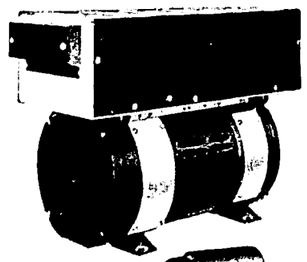
Allis Co., Louis, Wis., 5, 15, 20
American Electric Motors, Inc., Calif., 5, 15, 20, 25, 30
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30
Amglo Corp., Ill., 30 DC
Arma Corp., N.Y., 25 Resolvers
Bendix Aviation Corp., Research Lab., Fisher Blvd., Detroit 2, Mich., 10, 15, 20, 25
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Eclipse-Pioneer Div., Teterboro, N.J., 20, 25
For details see ad on pages 366-367
Bendix Aviation Corp., Red Bank Div., Eatontown, N.J., 10, 20, 30
For details see ad on page 176
Berndt-Bach, Inc., Calif., 20
Bludworth Marine Div., National Simplex Bludworth, Inc., N.Y., 20
Bogue Electric Mfg. Co., 52 Iowa Ave., Paterson 3, N.J., 15, 20, 25
For details see ad on page 13
Borg Corp., Geo. W., Wis., 20
Bristol Motor Co., Conn., 25, 30
Brown Brockmeyer Co., Ohio 20
C and H Sales Co., Calif., 5, 10, 15, 20, 25, 30
Canadian Research Institute, Canada, 15
Canadian Westinghouse Co., Ltd., Canada, 5, 15, 20, 25, 30
Carter Motor Co., 2645 N. Maplewood Ave., Chicago 47, Ill., 10
For details see ad on page 19
Century Electric Co., Mo., 20, 25
Champion Electric Corp., England, 5
Clifton Precision Products Co., Pa., 25
Columbia Electric Mfg. Co., Ohio, 20
Connecticut Telephone & Elect. Corp., Conn., Miniature
Continental Electric Co., Inc., N.J., 10, 15, 20
Controlectric, N.Y., 5
Cramer Company, Inc., R. W., Conn., 25, 30
Cycle Electronic Labs., N.J., 30
D & R Limited, Calif., 15, 20
Diehl Manufacturing Co., N.J., 5 Resolvers
Eastern Air Devices, Inc., N.Y., 5, 25, 30
Eicor, Inc., Ill., 5, 10, 20
Electric Products Co., Ohio, 15, 20, 25
Electric Specialty Co., Conn., 10, 15, 20, 25
Electro Craft Industries, Inc., Conn., 5, 20
Electro Engineering Products Co., 609 W. Lake St., Chicago 10, Ill., 5, 10
For details see ad on page 31
Electryme Motor Products Corp., Ill., 25, 30
Ford Instrument Co., Div. Sperry Corp., 31-10 Thomson Ave., Long Island City 1, N.Y., 25
For details see ad on page 235
Franklin Electronics, Inc., Pa., 15
General Electric Co., N.Y., 5, 10, 15, 20, 25
Gorator Corp., Va., 15, 20
Geotechnical Corp., Tex., 30

(Continued on page 179)

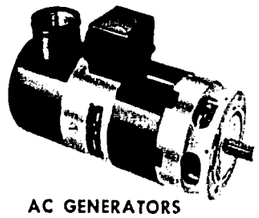
Bendix Aviation Corporation

concentrates development, sales and production of special-purpose electron tubes, inverters and AC generators with its dynamotors and small motors at its

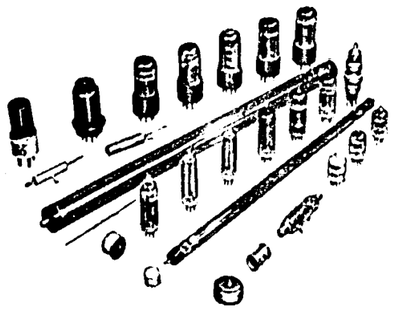
Red Bank Division



INVERTERS



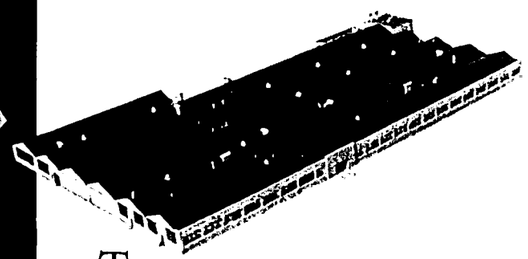
AC GENERATORS



SPECIAL-PURPOSE ELECTRON TUBES



DYNAMOTORS



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Division of Bendix Aviation Corporation

Bendix Red Bank

EATONTOWN, NEW JERSEY

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N.Y.

Meters

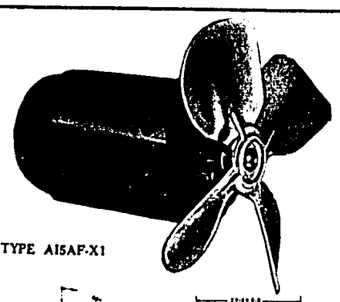
(Continued from page 175)

Sessions Clock Co., Conn., Timers
Shallcross Mfg. Co., 524 Pusey Ave., Collingdale, Pa., 20, 40
For details see ad on page 98
Sherman Ind., Electronics Co., N.J., Timers
Shurite Meters, Conn., 5, 30, 35
Simpson Electric Co., 5200 W. Kinzie St., Chicago 44, Ill., 5, 20, 25, 30, 35, 40, 45
For details see ad on page 174
Specialty Assem. & Packing Co., N.Y., 15, 20
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 15, 45
See complete catalog in last section
Standard Electric Time Co., 73 Logan St., Springfield 2, Mass., 10, 15
For details see ad on page 325
Stark Electronic Instrument Ltd., Canada, 5, 25, 30, 35
Sterling Manufacturing Co., Ohio, 5, 30, 35
Sticht Co., Inc., Herman H., 27 Park Place, New York 7, N.Y., 10
For details see ad on page 173
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Supreme Inc., Miss., 5, 20, 25, 30, 35, 40
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 35
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Walkirt Co., Calif., 15
Waveforms Co., N.Y., 25, 30, 35, 40
Wayne-Kerr Laboratories, Ltd., Sycamore Grove, New Malden, Surrey, England, 45
For details see ad on page 316
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Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N.J., 5, 10, 15, 20, 25, 30, 35, 40, 45
For details see ad on page 172
Westinghouse Electric Corp., N.J., 5, 10, 15, 25, 30, 35, 45
Westinghouse Electric Corp., Pa., 5, 10, 15, 25, 30, 35, 40, 45
Winslow Co., Inc., N.J., 20

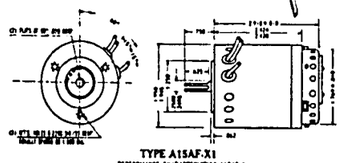
43. Motors & Motor-Generators.

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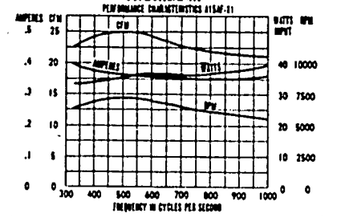
Acro Mfg. Co., Ohio, Shaded Pole
Air Marine Motors, Inc., 2183 Jackson Ave., Seaford, L.I., N.Y., 5, 15, 25
For details see ad on page 177
Allard Instrument Corp., N.Y., 5, 10, 15, 25, 30
Alliance Manufacturing Co., Ohio, 5
Alliance Tool & Motor Co., Ltd., Can., 5, 10, 25



TYPE A15AF-X1



TYPE A15AF-X1
PERFORMANCE CHARACTERISTICS A15AF-X1



PRECISION MOTOR PERFORMANCE

Axial fan blower, 3 phase self-cooled motor is designed to start at a —55° C and feature maximum possible H P per unit weight and volume. The temperature will rise 45° C when fully loaded with 4" 4 blade, 29 degree pitch fan; Silicone wire and impregnation. At full load the input is 94 watts, the line current .54 amperes and the efficiency is 60%.

SPECIFICATIONS
Conform to NEMA Standards and other Gov't specifications.
Continuous duty

WEIGHT	22 oz.
C F M	22 Average
R P M	6250 Average
VOLTS	115
CYCLES	320-1000

can be supplied CW and CCW suitable for 50 to 60 CPS

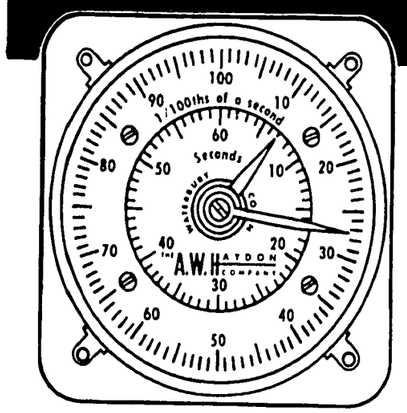
AIR MARINE MOTORS INC.
2183 JACKSON AVENUE SEAFORD L I N Y
WAntagh 2-7309

Motors & Motor-Generators

Allis Co., Louis, Wis., 5, 15, 20
American Electric Motors, Inc., Calif., 5, 15, 20, 25, 30
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30
Amglo Corp., Ill., 30 DC
Arma Corp., N.Y., 25 Resolvers
Bendix Aviation Corp., Research Lab., Fisher Blvd., Detroit 2, Mich., 10, 15, 20, 25
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Eclipse-Pioneer Div., Teterboro, N.J., 20, 25
For details see ad on pages 366-367
Bendix Aviation Corp., Red Bank Div., Eatontown, N.J., 10, 20, 30
For details see ad on page 176
Berndt-Bach, Inc., Calif., 20
Bludworth Marine Div., National-Simplex Bludworth, Inc., N.Y., 20
Bogue Electric Mfg. Co., 52 Iowa Ave., Paterson 3, N.J., 15, 20, 25
For details see ad on page 13
Borg Corp., Geo. W., Wis., 20
Bristol Motor Co., Conn., 25, 30
Brown-Brockmeyer Co., Ohio 20
C and H Sales Co., Calif., 5, 10, 15, 20, 25, 30
Canadian Research Institute, Canada, 15
Canadian Westinghouse Co., Ltd., Canada, 5, 15, 20, 25, 30
Carter Motor Co., 2645 N. Maplewood Ave., Chicago 47, Ill., 10
For details see ad on page 19
Century Electric Co., Mo., 20, 25
Champion Electric Corp., England, 5
Clifton Precision Products Co., Pa., 25
Columbia Electric Mfg. Co., Ohio, 20
Connecticut Telephone & Elect. Corp., Conn., Miniature
Continental Electric Co., Inc., N.J., 10, 15, 20
Controlectric, N.Y., 5
Cramer Company, Inc., R. W., Conn., 25, 30
Cycle Electronic Labs., N.J., 30
D & R Limited., Calif., 15, 20
Diehl Manufacturing Co., N.J., 5 Resolvers
Eastern Air Devices, Inc., N.Y., 5, 25, 30
Eicor, Inc., Ill., 5, 10, 20
Electric Products Co., Ohio, 15, 20, 25
Electric Specialty Co., Conn., 10, 15, 20, 25
Electro Craft Industries, Inc., Conn., 5, 20
Electro Engineering Products Co., 609 W. Lake St., Chicago 10, Ill., 5, 10
For details see ad on page 31
Electyme Motor Products Corp., Ill., 25, 30
Ford Instrument Co., Div. Sperry Corp., 31-10 Thomson Ave., Long Island City 1, N.Y., 25
For details see ad on page 235
Franklin Electronics, Inc., Pa., 15
General Electric Co., N.Y., 5, 10, 15, 20, 25
Georator Corp., Va., 15, 20
Geotechnical Corp., Tex., 30

(Continued on page 179)

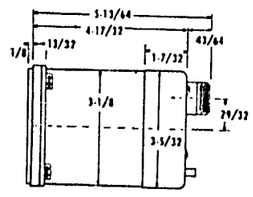
New **A. W. HAYDON COMPANY**



STOP CLOCK

High Speed Stop Clock Accrued Seconds Indicator With Fluorescent Dial and Hands . . . Also Available For Other Intervals.

This new, hermetically-sealed *Stop Clock* further enlarges the complete line of A. W. HAYDON COMPANY A.C. and D.C. Timers, time delay relays and timing motors. This accurate, panel-mounted timer totalizes hundredths of a second up to a minute. Hermetically-sealed, it weighs approximately 2 lbs. Comes with automatic reset.

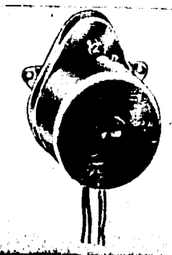


SPECIAL FEATURES:

- Precision timing measuring hundredths of seconds to one minute.
- Automatic reset.
- Hermetically sealed.
- For operation on 50, 60, or 400 cycles A.C. or 20-30V D.C. 400 cycle unit has D.C. clutch.

A. W. HAYDON CO. 400 CYCLE MOTOR has improved performance for aircraft use.

- Light in Weight — Small Compact Size.
- Now . . . you can run timing systems directly from 400 cycle power.
- Features fast start and stop, as well as high torque, and reversability.
- Get all the facts in the new A. W. Haydon Co. catalog, described below.



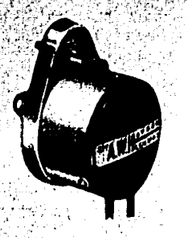


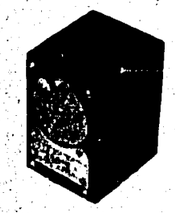
SERIES 5700 CHRONOMETRIC D.C. GOVERNED TIMING MOTOR

- Extreme accuracy — 1/10 of 1%.
- Wide range of voltage, temperature, load.
- Light weight . . . Compact.
- Reversible.

SERIES 5300 D.C. TIMING MOTOR

- Rugged, Accurate, Reliable.
- Compact . . . Reversible, variable speed.
- Special windings available for operation from vacuum tubes or as tachometer generator.



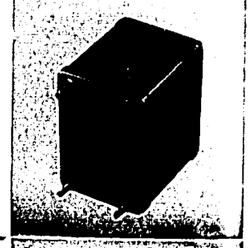


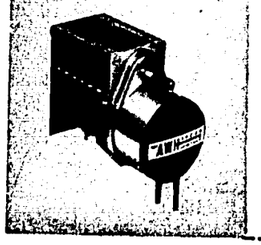
TIME DELAY RELAY WITH ADJUSTABLE DIAL A.C. SERIES 11400 OR D.C. SERIES 6400

- Wide selection of time range.
- Features ease of adjustment.
- Flexible, compact design.
- Positive operation.

HERMETICALLY SEALED TIMER SERIES 6400, 11400, 7900, 12900, 3600

- Maximum protection against weather, humidity, explosive atmospheres, and high altitude.
- Light weight, corrosion-resistant enclosure.
- Flexible design.



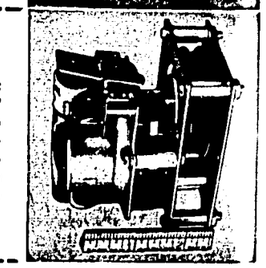


REPEAT CYCLE TIMER A.C. SERIES 13600 OR D.C. SERIES 3600

- Durable . . . Long life.
- Wide range of time cycles.
- Multiple control circuits.
- Easily adaptable to meet specific requirements.

DELAYED-RESET TIME-DELAY RELAY

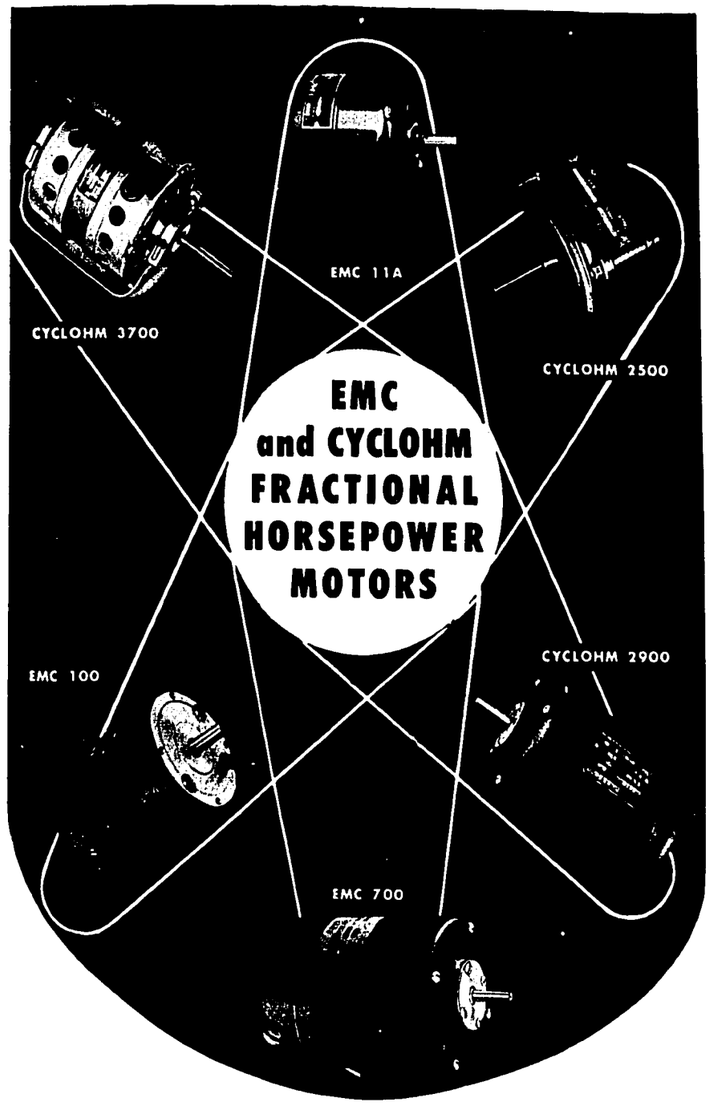
New time-delay relay uses basic "Series 6400" d-c. and "Series 11400" a-c. time delay relay. Makes possible delayed reset proportional to time delay, and a circuit reclosure time proportional to length of current interruption. Reset is controlled by escapement mechanism.



SEND FOR CATALOG

PREFERRED WHERE PERFORMANCE IS PARAMOUNT

The **A. W. HAYDON COMPANY**
240 NORTH ELM STREET
WATERBURY 20, CONNECTICUT
Design and Manufacture of Electrical Timing Devices



. . . used extensively by the electronics industry . . .

A list of our customers in the Electronics Industry includes many leading manufacturers—Philco, RCA, Federal Tel. & Tel., Collins Radio, Magnecord, Hazeltine Labs, Presto Tape Recording Co., and many more.

Yes, EMC and CYCLOHM fractional h. p. motors are used by leading companies for hundreds of applications. If you have an application for fractional h. p. motors, check with us on your requirements. Write today for our catalog or better yet, ask to see a Howard representative.

Universal and Direct Current
1/1000 to 1/2 h.p.
Shaded Pole 1/2000 to 1/15 h.p.
Induction types 1/1400 to 1/4 h.p.

HOWARD INDUSTRIES, INC. RACINE, WIS.
DIVISIONS: EMC ELECTRIC MOTOR CORP.
CYCLOHM MOTOR CORP.

HOWARD

Motors & Motor-Generators

(Continued on page 177)

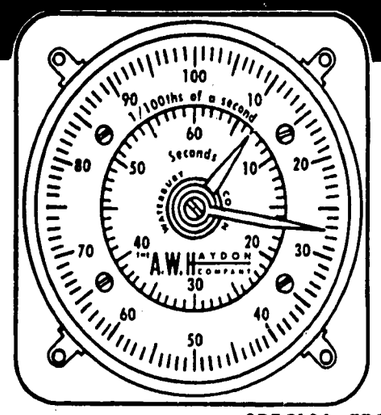
Gleason-Avery, Inc., N.Y., 5, 25, 30
Haydon Co., A. W., 240 N. Elm St., Waterbury 20, Conn., 25, 30
For details see ad on page 178
Heinze Electric Co., 685 Lawrence St., Lowell, Mass., 5
For details see ad on page 132
Hertner Electric Co., Ohio, 5, 15, 20, 25, 30
Horlick Co., William I., Mass., 15, 20
Howard Industries, Inc., 1760 State St., Racine, Wis., 5, 10, 20, 25, 30
For details see ad on page 179
Hughey & Phillips, Calif., 30
Imperial Electric Co., N.Y., 5, 15, 20
Induction Motors Corp., 570 Main St., Westbury, L.I., N.Y., 5, 20, 25, 30
For details see ad on page 180
Janette Electric Mfg. Co., Ill., 15, 20
Kearfott Co., Inc., 1150 McBride Ave., Little Falls, N.J., 5, 20, 25, 30
For details see ad on page 53
Ketay Mfg. Corp., N.Y., 25
Kinetix Instrument Co., Inc., N.Y., 25
Kollsman Instrument Corp., 80-08 45th Ave., Elmhurst 1, L.I., N.Y., 25
For details see ad on page 43
Lear, Inc., Calif., 10, 25
Leland Electric Co., Ohio, 5, 20
Lesa, S.P.A., Italy, 10, 20, 35
Lytle Engineering & Mfg. Co., Ill., 30
Maxson Corp., W. L., 460 W. 34 St., New York 1, N.Y., 20
For details see ad on page 122
Minneapolis-Honeywell Regulator Co., Pa., 25
Mission Electric Mfg. Co., Inc., Calif., 5, 10, 25, 30
Mission Western Engineers, Inc., Calif., 5, 10, 20, 25
Motordyne, Inc., Calif., 5, 10
Oster Manufacturing Co., John, 1 Main St., Racine, Wis., 5, 25, Fixed & Variable AC
For details see ad on page 181
Pioneer Electric & Research Corp., Ill., 5, 20
Reeves Instrument Corp., N.Y., Resolvers
Rek-O-Kut Co., N.Y., 25
Reynolds Electric Co., Ill., 5
Rhodes Inc., M. H., Conn., 30
Rotron Mfg. Co., Inc., N.Y., 5
Servomechanisms, Inc., Post & Stewart Aves., Westbury, L.I., N.Y., 5, 25
For details see ad on page 237
Servo-Tek Products Co., Inc., N.J., 5
Sessions Clock Co., Conn., 25, 30
Small Motors, Inc., Ill., 5, 10, 20, 25
Specialty Battery Co., Wis., Miniature
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 25
See complete catalog in last section
Stancil-Hoffman Corp., Calif., 25
Star Kimble Motor Division, N.J., 15, 20, 25

(Continued on page 181)

For quick product reference, see alphabetical list of products in pink section preceding alphabetical directory.

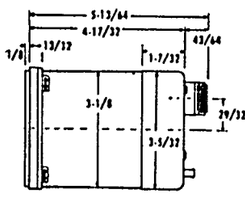
New A. W. HAYDON COMPANY

STOP CLOCK



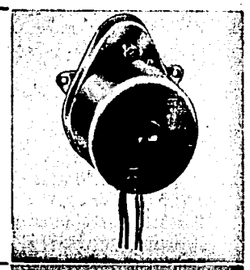
High Speed Stop Clock Accrued Seconds Indicator With Fluorescent Dial and Hands . . . Also Available For Other Intervals.

This new, hermetically-sealed *Stop Clock* further enlarges the complete line of A. W. HAYDON COMPANY A.C. and D.C. Timers, time delay relays and timing motors. This accurate, panel-mounted timer totalizes hundredths of a second up to a minute. Hermetically-sealed, it weighs approximately 2 lbs. Comes with automatic reset.



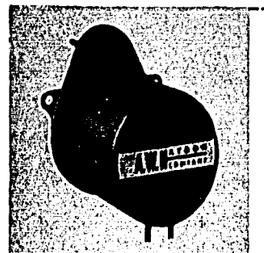
SPECIAL FEATURES:

- Precision timing measuring hundredths of seconds to one minute.
- Automatic reset.
- Hermetically sealed.
- For operation on 50, 60, or 400 cycles A.C. or 20-30V D.C. 400 cycle unit has D.C. clutch.



A. W. HAYDON CO. 400 CYCLE MOTOR has improved performance for aircraft use.

- Light in Weight — Small Compact Size.
- Now . . . you can run timing systems directly from 400 cycle power.
- Features fast start and stop, as well as high torque, and reversability.
- Get all the facts in the new A. W. Haydon Co. catalog, described below.



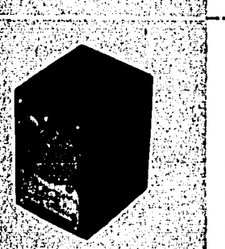
SERIES 5700 CHRONOMETRIC D.C. GOVERNED TIMING MOTOR

- Extreme accuracy — 1/10 of 1%.
- Wide range of voltage, temperature, load.
- Light weight . . . Compact.
- Reversible.



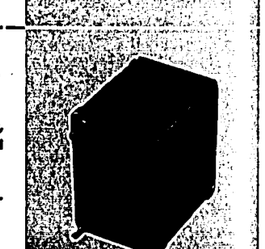
SERIES 5300 D.C. TIMING MOTOR

- Rugged, Accurate, Reliable.
- Compact . . . Reversible, variable speed.
- Special windings available for operation from vacuum tubes or as tachometer generator.



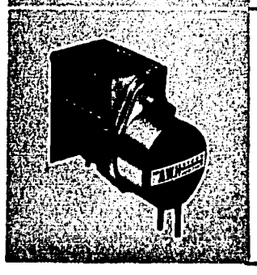
TIME DELAY RELAY WITH ADJUSTABLE DIAL A.C. SERIES 11400 OR D.C. SERIES 6400

- Wide selection of time range.
- Features ease of adjustment.
- Flexible, compact design.
- Positive operation.



HERMETICALLY SEALED TIMER SERIES 6400, 11400, 7900, 12900, 3600

- Maximum protection against weather, humidity, explosive atmospheres, and high altitude.
- Light weight, corrosion-resistant enclosure.
- Flexible design.



REPEAT CYCLE TIMER A.C. SERIES 13600 OR D.C. SERIES 3600

- Durable . . . Long life.
- Wide range of time cycles.
- Multiple control circuits.
- Easily adaptable to meet specific requirements.



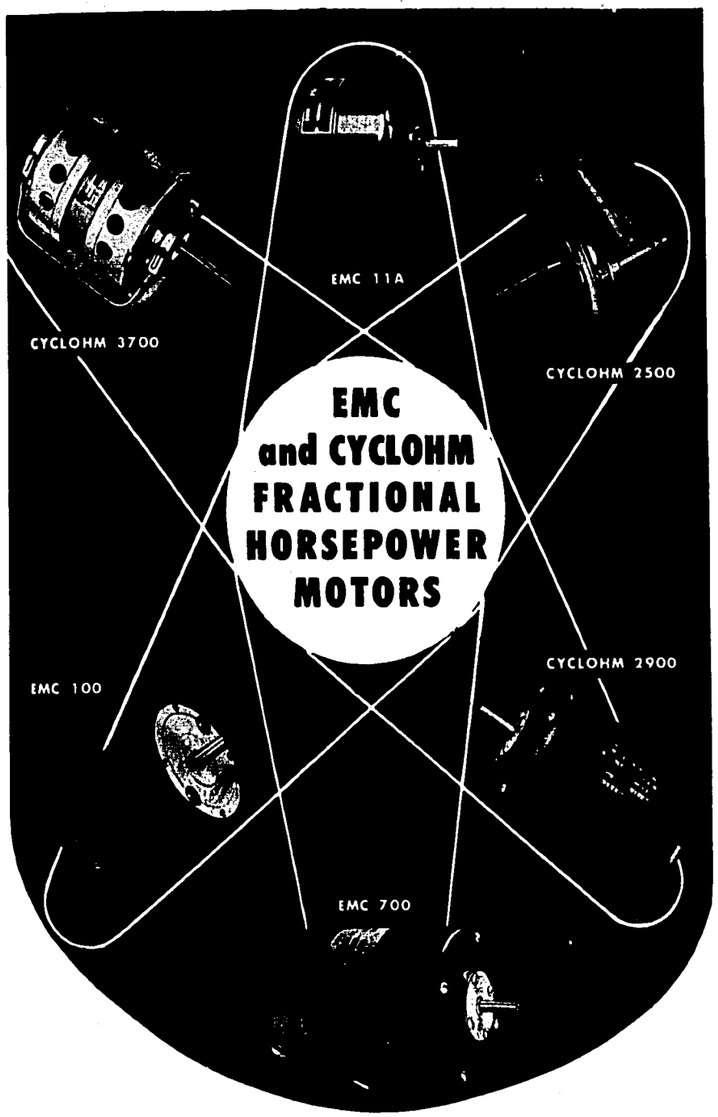
DELAYED-RESET TIME-DELAY RELAY

New time-delay relay uses basic "Series 6400" d-c. and "Series 11400" a-c. time delay relay. Makes possible delayed reset proportional to time delay, and a circuit reclosure time proportional to length of current interruption. Reset is controlled by escapement mechanism.

SEND FOR CATALOG

PREFERRED WHERE PERFORMANCE IS PARAMOUNT

The A. W. HAYDON COMPANY
240 NORTH ELM STREET
WATERBURY 20, CONNECTICUT
Design and Manufacture of Electrical Timing Devices



. . . used extensively by the electronics industry . . .

A list of our customers in the Electronics Industry includes many leading manufacturers—Philco, RCA, Federal Tel. & Tel., Collins Radio, Magnecord, Hazeltine Labs, Presto Tape Recording Co., and many more.

Yes, EMC and CYCLOHM fractional h. p. motors are used by leading companies for hundreds of applications. If you have an application for fractional h. p. motors, check with us on your requirements. Write today for our catalog or better yet, ask to see a Howard representative.

Universal and Direct Current
1/1000 to 1/2 h.p.
Shaded Pole 1/2000 to 1/15 h.p.
Induction types 1/1400 to 1/4 h.p.

HOWARD INDUSTRIES, INC. RACINE, WIS.
DIVISIONS: EMC ELECTRIC MOTOR CORP.
CYCLOHM MOTOR CORP.

HOWARD

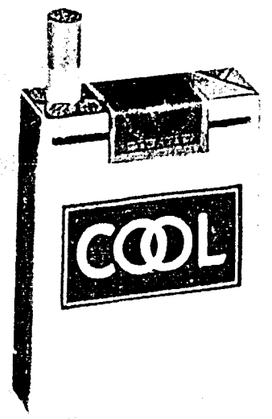
Motors & Motor-Generators

(Continued on page 177)

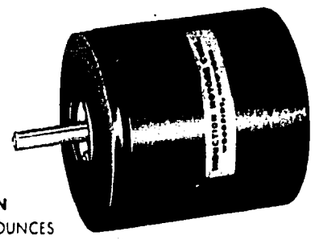
Gleason-Avery, Inc., N.Y., 5, 25, 30
Haydon Co., A. W., 240 N. Elm St., Waterbury 20, Conn., 25, 30
For details see ad on page 178
Heinze Electric Co., 685 Lawrence St., Lowell, Mass., 5
For details see ad on page 132
Hertner Electric Co., Ohio, 5, 15, 20, 25, 30
Horlick Co., William I., Mass., 15, 20
Howard Industries, Inc., 1760 State St., Racine, Wis., 5, 10, 20, 25, 30
For details see ad on page 179
Hughey & Phillips, Calif., 30
Imperial Electric Co., N.Y., 5, 15, 20
Induction Motors Corp., 570 Main St., Westbury, L.I., N.Y., 5, 20, 25, 30
For details see ad on page 180
Janette Electric Mfg. Co., Ill., 15, 20
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For details see ad on page 43
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Leland Electric Co., Ohio, 5, 20
Lesa, S.P.A., Italy, 10, 20, 35
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Mission Western Engineers, Inc., Calif., 5, 10, 20, 25
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Oster Manufacturing Co., John, 1 Main St., Racine, Wis., 5, 25, Fixed & Variable AC
For details see ad on page 181
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Reeves Instrument Corp., N.Y., Resolvers
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Reynolds Electric Co., Ill., 5
Rhodes Inc., M. H., Conn., 30
Rotron Mfg. Co., Inc., N.Y., 5
Servomechanisms, Inc., Post & Stewart Aves., Westbury, L.I., N.Y., 5, 25
For details see ad on page 237
Servo-Tek Products Co., Inc., N.J., 5
Sessions Clock Co., Conn., 25, 30
Small Motors, Inc., Ill., 5, 10, 20, 25
Specialty Battery Co., Wis., Miniature
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 25
See complete catalog in last section
Stancil-Hoffman Corp., Calif., 25
Star Kimble Motor Division, N.J., 15, 20, 25

(Continued on page 181)

For quick product reference, see alphabetical list of products in pink section preceding alphabetical directory.



Compact LOW-INERTIA SERVO MOTORS

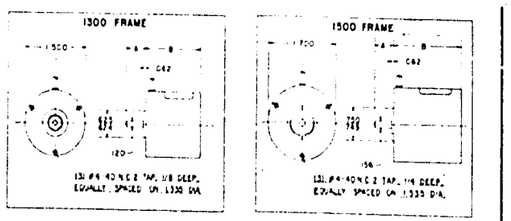


PRECISION BUILT
FOR POSITIVE ACTION
MINIMUM WEIGHT, 4 OUNCES

WE CUSTOM-BUILD MOTORS to meet Your Specs and All Government Specs

The servo motor shown on this page is representative of the many types we manufacture that combine low weight and compactness with rigidly exact performance.

It is available for two phases, 60 to 400 cycles, in 2-, 4-, 6- and 8-pole construction. It can be supplied with low-backlash precision gear head. It can be built to meet any military specifications with regard to humidity, high ambient temperature, vibration and altitude.

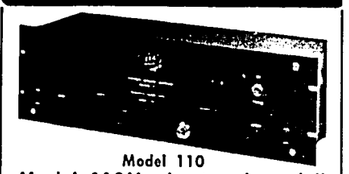


We specialize in the design and production of servo motors, actuators, gear motors and torque motors. IMC motors are widely used in aircraft control, guided missiles, gunfire control, rocket control, industrial control and many other servo and instrument applications that require motors of 1/1000 to 1/10 horsepower.

For applications that require any type of fractional or subfractional horsepower motor . . . check your specs with

INDUCTION MOTORS CORP.
570 MAIN STREET, WESTBURY, LONG ISLAND, N. Y.

NEW! Tubeless Regulated Dual DC Supply for Transistor Application



Model 110
Model 110M (metered model)

Features

- √ No Tubes-Long Life
- √ Negligible Warm-up Time
- √ Dual Output-Positive or Negative
- √ Continuously Variable Outputs
- √ Output #1—Triple Range at 60 ma 0-1.0, 10, 100 v.
- √ Output #2—0-100 v at 60 ma
- √ DC Impedance less than 100 ohms
- √ Line Regulated 95-125 v
- √ Ripple Less Than 0.01%
- √ Moderately Priced

Write for our Bulletins on this and other Transistor Products.

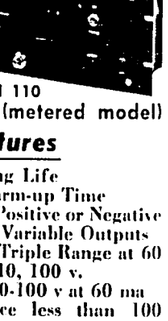
Electronic Research Associates, Inc.
Dept. ID, Box 29, Caldwell, N.J.

TERMINAL STRIPS PILOT LIGHT SOCKETS



TERMINAL STRIPS FAST DELIVERY of a wide variety of standard and special types of terminal strips

NYLON INSULATED PILOT LIGHT SOCKETS UNDERWRITERS APPROVED Dial Light Sockets with unbreakable molded Nylon sleeves. Supplied with standard and special brackets. Also other types.



WRITE FOR CATALOG

Aeronautical ELECTRIC COMPANY
5656 Northwest Highway, Chicago 30, Ill.

Motors & Motor-Generators

(Continued from page 179)

Technical Advisory Associates, N.Y., 5, 10, 15, 25, 30
Tele King Corp., N.Y., 10
Televiso Corp., Ill., 5
Universal Electric Co., Mich., 5
Varo Mfg. Co., Inc., Tex., 15
Vocaline Company of America, Inc., Conn., 25, 30
Welch Mfg. Co., W. M., Ill., 20
Westinghouse Electric Corp., Pa., 15, 20, 25
Wincharger Corp., Iowa, 5, 10

ADVERTISEMENTS IN THIS DIRECTORY

are designed to help you by furnishing more complete detail than a simple listing can possibly give. Page numbers are given as part of every listing for each advertiser. Be sure to look up these ads to complete your information on the products advertised. For example, see the following advertisements featuring pilot lights:

Dialight Corp.	182
Drake Mfg. Co.	28
E. F. Johnson Co.	183

44. Pilot Lights & Assemblies. 43-45

5. Brackets, jewels, mounts, sockets, etc.
10. Incandescent lights
15. Neon lights

Accurate Electronics Corp., Ohio, 5
Aerolite Electronics Corp., 507 26 St., Union City, N.J., 5
For details see ad on page 103
Aerolux Light Corp., N.Y., 15
Aeronautical Electric Co., 5656 Northwest Highway, Chicago 30, Ill., 5
For details see ad on page 180
Airflyte Electronics Co., 21 Cottage St., Bayonne, N.J., 15, Potted
For details see ad on page 5
Alden Products Co., 113 N. Main St., Brockton 64, Mass., 5, 10, 15
For details see ad on pages 150-151
American Machine & Foundry Co., Mass., 5, 10, 15
American Radio Hardware Co., N.Y., 5
Armstrong Co., A. T. R., Canada, 5
Automatic Electric Co., Ill., 5, 10
Bardwell & McAlister, Calif., 5
Canadian Westinghouse Co., Ltd., Canada, 10, 15
Dialight Corp., 60 Stewart Ave., Brooklyn 37, N.Y., 5, 10, 15
For details see ad on page 182
Drake Mfg. Co., 1711 W. Hubbard St., Chicago 22, Ill., 5, 15
For details see ad on page 28
Federal Screw Products, Inc., 224 W. Huron St., Chicago 10, Ill., 5
For details see ad on page 270
Gates & Co., Inc., George W., N.Y., 10
General Cement Mfg. Co., Ill., 5, 15
General Electric Co., N.Y., 5
General Laminated Prods. Co., Inc., Ill., 5
Hart Manufacturing Co., Conn., 15
Industrial Devices, Inc., N.J., 15
Johnson Co., E. F., Waseca, Minn., 5
For details see ad on page 183
Keystone Electronics Corp., N.Y., 15
Kinetix Instrument Co., Inc., N.Y., 10
Kulka Electric Mfg. Co., Inc., N.Y., 5
Micarta Fabricators, Inc., Ill., 5
National Carbon Co., N.Y., 10
National Tel-Tronics Corp., N.Y., 5
Oxford Electric Corp., Ill., 10
Radiant Lamp Corp., N.J., 10
Signalite, Inc., N.J., 15
Smith, Inc., Herman H., 436 18th St., Brooklyn 15, N.Y., 5
See complete catalog in last section
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 10
For details see ad on pages 417-420
Tung-Sol Electric, Inc., 95 Eighth Ave., Newark 4, N.J., 10
For details see ad on page 94
Ucinite Co., 459 Watertown St., Newtonville, Mass., 5
For details see ad on page 447
United-Carr Fastener Corp., 31 Ames St., Cambridge 42, Mass., 5
For details see ad on page 446
Universal Aviation Equipment, N.Y., 10

45. Power Supplies.

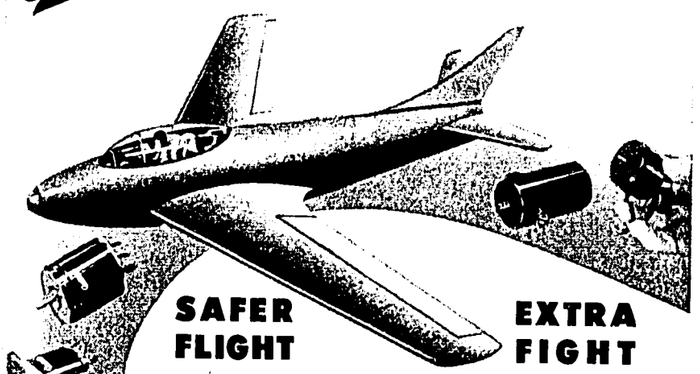
5. High voltage, (kilovolt)
10. Low voltage
15. Medium voltage
20. Primary power
25. Voltage regulated power sources
sources, fuel-engine driven

Adler Communications Labs., N.Y., 25
Aerovox Corp., 740 Belleville Ave., New Bedford, Mass., 25
For details see ad on pages 362-363
Airmec Limited, England, 25
Airpax Products Co., Md., 10, 15
Airplane & Marine Instruments, Pa., 10, 15, 25
Alcar Instruments, Inc., N.J., 10
Alco Electronics Mfg. Co., Mass., 10, 15, 25
Alcor Electronics Corp., N.Y., 10, 15, 25
Altec Lansing Corp., Calif., 10, 25
American Electric Motors, Inc., Calif., 20, 25
American Electroneering Corp., Calif., 15, 25
American Electronic Labs., Inc., Pa., 5, 10, 15, 25
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25
American Television & Radio Co., Minn., 10, 15
Amplifier Corp. of America, N.Y., 10, 15
Anton Electronic Labs., Inc., 1226 Flushing Ave., Brooklyn 37, N.Y., 25
For details see ad on page 226
Applegate & Co., C. J., Colo., 5, 10, 15, 25
Approved Electronic Instrument Co., N.Y., 10
Arc Equipment Co., N.J., 5, 10, 15
Associated Research, Inc., Ill., 5
Associated Specialties Co., 1751 Main St., Orefield, Pa., Current Regulated
For details see ad on page 185
Atomic Instrument Co., 84 Massachusetts Ave., Cambridge 39, Mass., 5
For details see ad on page 229

(Continued on page 185)

Oster MFG. CO. CINCINNATI, OHIO

AVIATION PRODUCTS
for air-borne quality and dependability



SAFER FLIGHT **EXTRA FIGHT**

Here is an engineering and production skill you can use to help you achieve safer flight, extra fight. For 25 years, OSTER has specialized in electro-mechanical products. A staff of trained field engineers is at your service. Call on us to help you select the product best suited to your job.

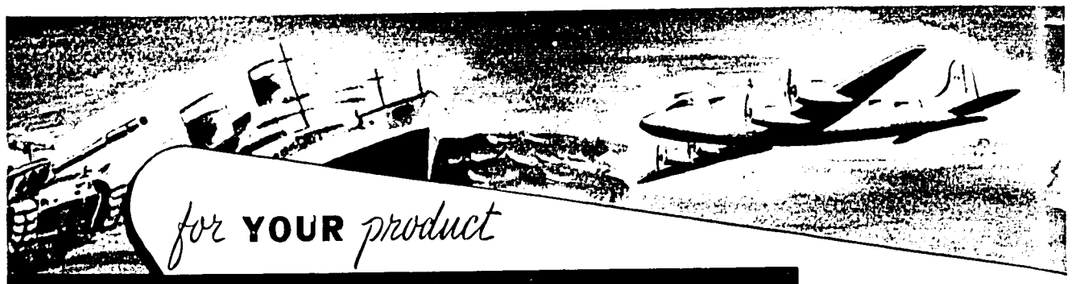
INSTRUMENT CONTROL MOTORS
1. Synchro Generator
2. Synchro Control Transformer
3. Synchro Transmitters
4. Synchro Differentials
5. Synchro Receivers
6. Synchro Resolvers
7. Two Speed Synchros
8. Reference Generators
9. Low Inertia Servo Motors
10. Servo Torque Units
11. Tachometer Generators

DRIVE MOTORS & BLOWER MOTORS
1. Permanent Magnet
2. DC
3. 60 Cycle AC
4. 400 Cycle, 1 Phase
5. 400 Cycle, 2 Phase
6. 400 Cycle, 3 Phase
7. 50 — 1600 Cycle, Variable Frequency

AIRCRAFT ACTUATORS
1. Rotary
2. Linear

JOHN OSTER MANUFACTURING COMPANY
AVIATION DIVISION
RACINE, WISCONSIN

©1953



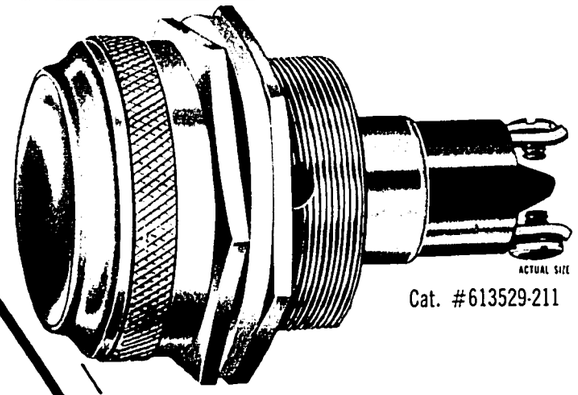
for **YOUR** *product*

WHICH PILOT LIGHT DO YOU NEED?

DIALCO

THE BIG ONE

This Pilot Light Assembly was first made to accommodate the *S-11 lamp* and was intended for use in the cabs of great diesel locomotives.



ACTUAL SIZE

Cat. #613529-211

Dialco HAS THE COMPLETE LINE OF INDICATOR and PANEL LIGHTS

This BIG one

or

this LITTLE one

THE LITTLE ONE

The miniaturization program on defense products required the development of this *sub-miniature* light. It is used on communication equipment and aircraft. Midget flanged base bulbs to fit are rated 1.3, 6, 12, and 28 volts.



ACTUAL SIZE

Cat. #8-1930-621

Samples to suit your own special conditions and requirements will be sent promptly and *without cost*. Just outline your needs. Let our engineering department assist in selecting the *right lamp* and the *best pilot light* for YOU.

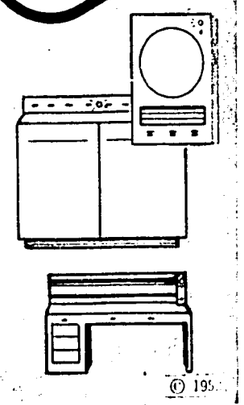


Write for the Dialco HANDBOOK of PILOT LIGHTS

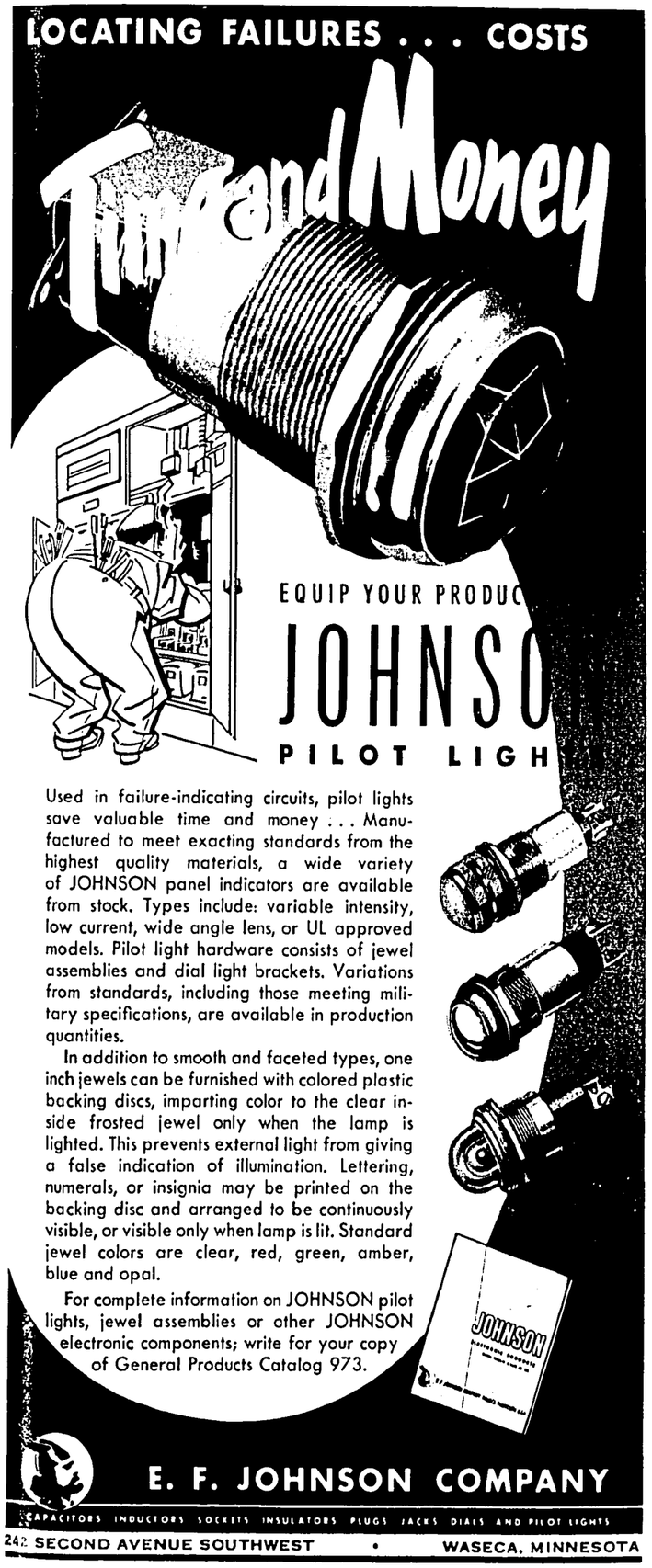
Foremost Manufacturer of Pilot Lights

DIALIGHT CORPORATION

60 STEWART AVE., BROOKLYN 37, N. Y. HYACINTH 7-7600



© 195



Power Supplies 45

(Continued from page 181)

Auto Test, Inc., Ill., 10, 15
Avion Instrument Corp., N.J., 10, 15, 25
Bassett Inc., Rex, Fla., 5, 10, 15
Bell Sound Systems, Inc., Ohio, 10, 15
Belock Instrument Corp., N.Y., 25
Bendix Aviation Corp., Eclipse-Pioneer Div., Teterboro, N.J., 10
For details see ad on pages 366-367
Berkshire Laboratories, 584 Beaver Pond Rd., Lincoln, Mass., 10, 15, 25
For details see ad on page 315
Beta Electric Corp., N.Y., 5, 10, 15
Beva Laboratory, N.J., 5, 25
Biophysical Instruments, Inc., Pa., 5, 15
Bliss-Warren Electronic Corp., N.J., 15, 20, 25
Bodnar Industries, Inc., 19 Railroad Ave., New Rochelle, N.Y., 5
For details see ad on page 269
Bogue Electric Manufacturing Co., 52 Iowa Ave., Paterson 3, N.J., 5, 10, 25
For details see ad on page 13
Bone Engineering Corp., Calif., 20, 25
Browning Laboratories, Inc., 750 Main St., Winchester, Mass., Klystron
For details see ad on page 326
Brownthorn Electronics, Inc., N.Y., 10, 15, 25
Burke Electric & X-Ray Co., Ltd., Canada, 5
Burroughs Corp., New Products Div., 511 N. Broad St., Philadelphia 23, Pa., 25
See complete catalog in last section
Canadian Research Institute, Canada, 5, 10, 15, 20, 25
Canadian Westinghouse Co., Ltd., Canada, 5, 10, 15, 25
Carter Motor Co., 2645 N. Maplewood Ave., Chicago 47, Ill., 10
For details see ad on page 19
Chatham Electronics Corp., 630 W. Mt. Pleasant Ave., Newark 2, N.J., 5, 10, 15, 25
For details see ad on pages 404-405
Clark Crystal Co., Mass., 25
Coil Engineering and Mfg. Co., Ind., 10, 15
Cole Instrument Co., Calif., 5, 10, 15, 25
Communicating Systems, Inc., N.Y., 5, 10, 15
Communication Measurements Lab., Inc., 350 Leland Ave., Plainfield, N.J., 10
For details see ad on page 312
Components Supply Co., N.Y., 10
Computer Corporation of America, N.Y., 25
Computing Devices of Can., Ltd., Canada, 5, 10, 25
Condenser Products Co., Ill., 5, 10, 15
Constable Engineering Co., J. M., N.Y., 5, 10, 15, 25
Control Instrument Co., Inc., N.Y., 25
Cornell-Dubilier Electric Corp., 333 Hamilton Blvd., South Plainfield, N.J., 5, 10, 15
For details see ad on page 6
Cubic Corp., Scott & Canon Sts., San Diego 6, Calif., 10, 15, 25
For details see ad on page 327
Curtiss-Wright Corp., N.J., 10, 15, 25
Danbury Transformer Corp., Conn., 10, 15
De Wald Radio Mfg. Corp., N.Y., 5, 10, 15

(Continued on page 184)

NEUTRONIC presents a new line of
REVERSIBLE HIGH VOLTAGE RF POWER SUPPLY UNITS

REVERSIBLE OUTPUT ENTIRELY CONTROLLED BY CONVENIENTLY LOCATED LEVER ON FRONT PANEL



Available in the following 4 models:

Model R-22C 3-30 KV 2 ma. @ 18 KV
Model R-22CR 5-30 KV 2 ma. @ 18 KV
Model R-22M 3-30 KV 3 ma. @ 20 KV
Model R-22MR 5-30 KV 3 ma. @ 20 KV

Model R22 SERIES Regulated or Unregulated

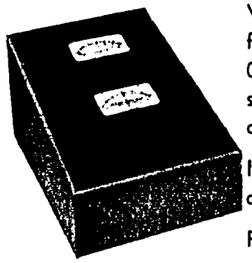
Standard Rack Panel Mounting size 19¼ × 21¾ × 15¼

OTHER NEUTRONIC POWER SUPPLY UNITS

21K	1-10 KV	10 ma. @ 5 KV	....	23CR	5-40 KV	1.3 ma. @ 25 KV	.5%
21KR	1-10 KV	10 ma. @ 5 KV	.5%	23M	5-45 KV	1.5 ma. @ 30 KV	....
21M	1-12 KV	6 ma. @ 10 KV	....	23MR	5-45 KV	1.5 ma. @ 30 KV	.5%
21MR	1-12 KV	6 ma. @ 10 KV	.5%	24C	5-50 KV	1 ma. @ 35 KV	....
22C	3-26 KV	2 ma. @ 18 KV	....	24CR	5-50 KV	1 ma. @ 35 KV	.5%
22CR	5-26 KV	2 ma. @ 18 KV	.5%	24M	5-55 KV	2 ma. @ 30 KV	....
22M	5-26 KV	3 ma. @ 20 KV	....	24MR	5-55 KV	2 ma. @ 30 KV	.5%
22MR	5-26 KV	3 ma. @ 20 KV	.5%	33S	1-30 KV	4.5 ma. Entire Range	
23C	5-40 KV	1.3 ma. @ 25 KV	....	33HRR	1-30 KV REVERSIBLE	5 ma. Entire Range " "	0.1%

MOST NEUTRONIC MODELS CAN BE FURNISHED WITH REGULATION OF 0.1% IF DESIRED

THE NEW NEUTRONIC KILOVOLTMETER AND VARIATION PERCENTAGE INDICATOR



With this new meter you can now measure voltages from zero to 60 Kilovolts in three ranges (0-1200 volts; 0-30 KV; and 0-60 KV) and you can also observe on a second meter, the voltage variations directly in percentage down to .05%.

Invaluable in measuring variations or regulation percentage of any power supply.

For quickly determining the specifications for a proposed power supply . . . eliminates guesswork.

For observing exact parameter variations in any voltage due to circuit operation.

Write for further details and specifications.

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CONTROL DEVICES

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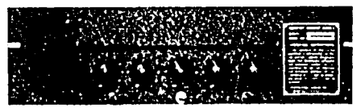
Power Supplies

(Continued from page 183)

Douglas Labs., Inc., 373 Fourth Ave., New York 16, N.Y., 5, 10, 15, 25
For details see ad on page 401
Douglas Radio Labs., Mass., 5, 10, 15, 25
DuMont Labs., Inc., Allen B., Instrument Div., 760 Bloomfield Ave., Clifton, N.J., 5
For details see ad on page 29
Eder Engineering Co., Wis., 5, 10, 15, 25
Edmar Communication Co., Pa., 10
Eicor, Inc., Ill., 10, 15, 25
Electronic Specialty Products, N.J., 5
Eldico of New York, Inc., 44-31 Douglaston Pkwy., Douglaston, L.I., N.Y., 5, 10, 15
For details see ad on page 257
Electrical Device Mfg. Co., N.J., 5, 10, 15, 25
Electro Craft Industries, Inc., Conn., 5
Electro Products Laboratories, Inc., 4501 N. Ravenswood Ave., Chicago 40, Ill., 10, 15
For details see ad on page 231
Electronic Heating Corp., Mass., 5
Electronic Instruments Div., Burroughs Corp., Pa., 25
Electronic Measurements Co., Inc., N.J., 5, 10, 15, 25
Electronic Research Associates, Inc., P.O. Box 29, N. Caldwell, N.J., 15, Transistor
For details see ad on pages 180, 335
Elm Laboratories, N.Y., 10
El-Mec Laboratories, Inc., N.J., 25
El-Tronics, Inc., Pa., 5, 10, 15, 25
Embassy Engrng Co., N.Y., 5
Essex Electronics, N.J., 5
F. S. D. Laboratories, Conn., 10
Fairchild Recording Equipment Corp., N.Y., 15
Federal Mfg. & Engineering Corp., N.Y., 10
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 10, 15, 25
For details see ad on pages 368-373
Fluke Engineering Co., John, Wash., dc
Franklin Electronics, Inc., Pa., 5, 10, 15
Furst Electronics, Ill., 5, 10, 20
Furzehill Laboratories, Ltd., England, 10, 25
Galbraith & Son Electric Corp., C. C., 450 Avenue of the Americas, New York 11, N.Y., 10, 15, 25
For details see ad on page 104
Gates Radio Co., Ill., 5, 10, 15, 25
General Communications, Wis., 10, 15, 25
General Electric Co., Ind., 10, 15
General Electric Co., N.Y., 5
General Electrosonics, Inc., N.Y., 5, 10, 15, 25
General Hermetic Sealing Corp., 99 E. Hawthorne Ave., Valley Stream, L.I., N.Y., 5, 10, 15, 25
For details see ad on page 275
General Magnetics, Inc., N.J., 10, 15, 25
General Precision Lab., Inc., 63 Bedford Road, Pleasantville, N.Y., 10, 25
For details see ad on page 116
Geotechnical Corp., Tex., 10, 15
Goslin Elec. & Mfg. Co., Calif., 5, 10, 15
Gramer Transformer Corp., Ill., 25
Harmon Electronics Co., Mo., 10, 15
Hartman Engineering Co., Mass., 5, 10, 15, 25
Hastings Instrument Co., Inc., Va., dc

Heller Co., Gerald K., Md., 10
Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif., 15, 25
See complete catalog in last section
High Voltage Eng. Corp., Mass. 5
Highland Engineering Co., Main & Urban, Westbury 21, L.I., N.Y., 5, 10, 15
For details see ad on pages 217, 283
Hi-Video, Inc., N.Y., 10
Huggins Laboratories, Calif., 15
Inductograph Products, Inc., N.Y., 5, 10, 15, 25
Industrial Electro. of Can., Ltd., Canada, 5, 10, 15, 25
Industrial Rectifier Co., N.Y., 10
Industrial Television, Inc., N.J., 5
Inet, Inc., Calif., 5, 20, 25, dc
Jerrell Electronic, Ohio, 5, 25
Jersey City Technical Lab., N.J., 10, 25
Kahn & Co., Inc., Conn., 10
Kalbfell Laboratories, Inc., 1090 Morena Blvd., San Diego 10, Calif., 10, 15
For details see ad on page 257
Kepco Laboratories, Inc., 131-38 Sanford Ave., Flushing 55, N.Y., 5, 10, 15, 25
For details see ad on page 224
Key Electronics Corp., N.Y., 10
Kollsman Instrument Corp., Subsidiary Standard Coil Products Co., 80-08 45 Ave., Elmhurst 1, L.I., N.Y., 25
For details see ad on page 43
Krohn-Hite Instrument Co., Mass., 10, 25
Laboratory for Electronics, Inc., 75 Pitts St., Boston 14, Mass., 25
For details see ad on pages 432-433
Lamagna Mfg. Co., Inc., N.J., 10
Lambda Electronics Corp., 103-02 Northern Blvd., Corona 1, L.I., N.Y., 5, 10, 15, 25
For details see ad on page 57
Langevin Manufacturing Corp., 37 W. 65 St., New York 23, N.Y., 10, 15, 25
For details see ad on page 218
Lawn Electronics Co., N.J., 5, 10, 15, 25
Lee Electric & Mfg. Co., Calif., 5, 10, 25
Leland Electric Co., Ohio, 20, 25
Loram Products Corp., Ohio, 25
Loral Electronics Corp., N.Y., 5
MacLeod & Hanopol, Inc., Mass., 25
Magnatran, Inc., N.J., 5, 25
Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N.Y., 25
For details see ad on page 167
Magnetic Research Corp., Calif., 10, 15
Magnex Corp., N.Y., 5, 10, 15
Mallory & Co., Inc., P. R., Ind., 10, 25
Manson Laboratories, Conn., 5, 10, 15, 25
Marsh-Theiss, Inc., N.Y., 5, 10, 15, 25
Maxson Corp., W. L., 460 W. 34 St., New York 1, N.Y., 25
For details see ad on page 122
McColpin Christie Corp., Calif., 10, 15, 25
McNeal, J. D., Conn., 5, 10, 15
Mercury Electronic Co., N.J., 10, 15, 25
Metal Products Co., Tenn., 25
Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass., 15
For details see ad on page 334
Model Rectifier Corp., 557 Rogers Ave., Brooklyn 25, N.Y., 10, 15, 25
For details see ad on page 191
Moulic Specialties Co., Ill., 25
Mullard Overseas, Ltd., England, 5
Multi-Tron Laboratory, Ill., 5, 10, 15
Neutronic Associates, 83-56 Vietor Ave., Elmhurst 73, L.I., N.Y. 5, 10, 15, 25
For details see ad on page 184
North American Philips Co., N.Y., 5
North Electric Manufacturing Co., Ohio, 10, 25
Northern Electric Co., Ltd., Canada, 10, 15
Nuclear Instrument & Chemical, Ill., 5
Nucleonic Co. of America, N.Y., 5
Oak Mfg. Co., Ill., 5, 10
Omega Manufacturing, Inc., N.Y., 25
Opad-Green Co., N.Y., 10, 15, 25
Oregon Electronic Mfg. Co., Ore., 15, 25
Ortho Filter Corp., 196 Albion Ave., Paterson 2, N.J., 5, 10, 15, 25
For details see ad on page 101
Owen Laboratories, Calif., 10, 25
Partridge Transformers, Ltd., England, 5, 10
PCA Electronics, Inc., Calif., 10, 15
Pennsylvania Testing Laboratory, Pa., 25

(Continued on page 186)



RACK MOUNTING MODELS

THIS IS THE SUPPLY IN WHICH THE OUTPUT VOLTAGE VARIES TO HOLD THE LOAD CURRENT CONSTANT.

DESIGNED FOR PRODUCTION TESTING, RESEARCH, INSTRUMENTATION, AND CALIBRATING USE.

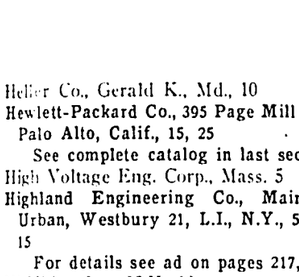
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OUTPUT CURRENT IS HELD CONSTANT AS LOAD VARIES

OTHER MODELS AVAILABLE
WRITE DEPT. 101 FOR LITERATURE

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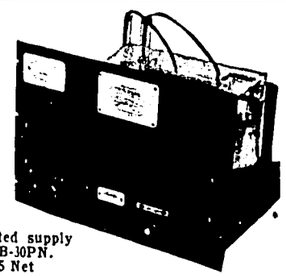
SPELLMAN HIGH VOLTAGE POWER SUPPLIES



MODEL LAB-40 CONTINUOUSLY VARIABLE REGULATED 25 TO 40 KV DC SUPPLY
Has a 4 to 6 KV focus tap for use with flying spot kinescope recording and television projection tubes, etc. Regulations of 0.5% at 1 milliampere. Available with either locking controls or standard knob. Dimensions: 19" wide x 12¼" high x 15" deep.

With Meter $620 Net
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MODEL LAB-30PN REVERSIBLE POLARITY FROM FRONT PANEL—CONTINUOUSLY VARIABLE 1 TO 30 KV DC SUPPLY
Regulated supply with regulations of 0.5% at 1 milliampere. Up to 2 milliamperes may be drawn from 30KV down. This 16 tube unit is of the RF type consisting of a separate oscillator and buffer feeding the power oscillator into a doubler rectifier. Regulations accomplished through feed-back into a DC amplifier plus output control of the buffer. Rack Model—19" wide x 12" high x 13" deep. Bench Model 21" wide x 14" high x 15" deep. With Meter $670 Net. Less Meter $595 Net.



Model LAB-30 is a positive polarity output regulated supply with same characteristics and dimensions as LAB-30PN.
With Meter $570 Net Less Meter $495 Net

MODEL RG-30M
Continuously Variable 15-30 KV Regulated DC Power Supply .....$295 Net
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Reversible Polarity Continuously Variable 1-30 KV Unregulated Power Supply .....$205 Net
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MODEL 2040 40 Kilovolt DC Power Supply .....$136 Net
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SPELLMAN TELEVISION CO., INC. 3029 WEBSTER AVENUE BRONX, N. Y.

Complete Data

Spreads and catalogs to provide you with detailed information on products and services of 57 firms will be found in the back of this Directory, beginning on page 361.

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have coils, condensers, resistors and all wiring at a fraction of their present cost, eliminate assembly errors, reduce size of product—THEN CENTRONICS'

PRINTED CIRCUITS (Using our own improved photo-etch process)

are for you.

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More than likely your competitors may be contemplating using printed circuitry. In that case they will have the advantages of lower costs, smaller space and greater precision.

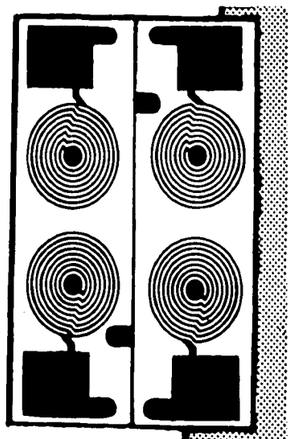
WHERE PRINTED CIRCUITS ARE BEING USED

In all phases of the electronic field. For instance TV I.F.'s, TV Tuners, UHF TV cross over networks, and switches. You can also replace the entire wiring of radios, TV sets and many other devices.

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Send for our brochure or ask for our sales engineer in your area to visit you to discuss your needs.

If you wish, send us a sketch or blue print of your product today. In return you will receive from us a sketch of your unit showing its appearance as a printed circuit and complete price quotations.



A Printed Circuit
High Pass Filter

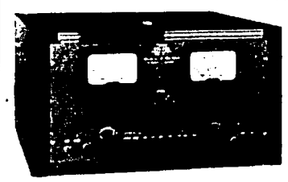
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2 Regulated POWER SUPPLIES for the price of 1

in the ½ Twin Model 520AT



● Universal's **NEW** Twin Model 520AT offers you two **completely independent** regulated power supplies in a single cabinet. May be used together or as separate units. Each unit furnishes 0 to 500 volts D.C. at 0 to 200 Ma. Price $425.

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200A	0-500 V, DC 0-200 Ma	0.2 V	$295
Twin Model 425AT	0-400 V, DC 0-250 Ma, Max Ea. Unit	0.5%	$350
520A	0-500 V, DC 0-200 Ma	0.5%	$230
425A	0-400 V, DC 0-250 Ma, Max	0.5%	$175

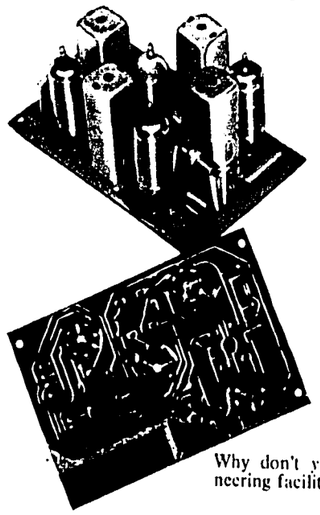
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— Reducing inventory costs
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Power Supplies

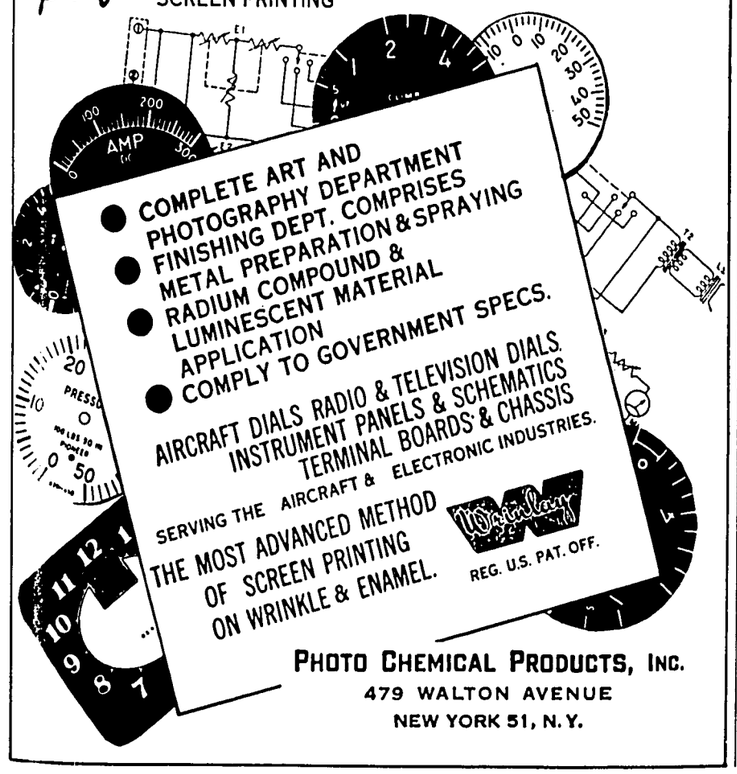
(Continued from page 185)

Penntronics, Pa., 15, 25
Pentron Corp., Ill., 25
Perkin Engineering Corp., Calif., 5, 10, 15, 25, Magnetic Amplifier Regulated
Phebco, Inc., Md., 5, 10, 15
Philbrick Researches, Inc., Geo. A., Mass., 25
Plastic Capacitors, Ill., 5
Polarad Electronics Corp., N.Y., 5, 10, 25
Polytechnic Research & Development Co., Inc., 55 Johnson St., Brooklyn 1, N.Y., 5
For details see ad on pages 374-375
Power Equipment Co., Mich., 10, 15, 25
Precise Measurements Co., 942 Kings Highway, Brooklyn 23, N.Y., 5, 25
For details see ad on page 294
Precision Associates, Inc., N.Y., 10, 15, 25
Precision Measurement Co., N.Y., 5, 25
Pulse Techniques, Inc., N.J., 10
Q.O.S. Corp., N.Y., 5
R M S Associates, Inc., N.Y., 15, 25
Radiation, Inc., Fla., 25
Radio Corp. of America, RCA Victor Div., Camden, N.J., 5
For details see ad on pp. 88, 440-441
Radio Engineering Prods., Canada, 25
Radio Sonic Corp., N.Y., 5, 10, 15
Raytheon Manufacturing Co., Equipment Sales Div., 138 River St., Waltham 54, Mass., 10, 25
For details see ad on page 228
Ready Power Co., Mich., 20
Regulator Equipment Corp., N.J., 25

Resdel Engineering, Calif., 5, 10, 15, 25
Research Electronics, Pa., 5, 15
Research, Inc., Minn., 5, 10, 15
Rich Electronics, Inc., Fla., 5, 25
Rowe Industries, Ohio, 5
Schauer Manufacturing Corp., Ohio, 10, 15, 25
Scientific Electric, N.J., 5, 10, 15, 25
Scientific Instrument Labs., N.Y., 15
Scientific Specialties Corp., Mass., 5, 15
Scott, Inc., H. H., Mass., 10, 15, 25
Sherron Electronics Corp., N.Y., 5, 10, 15, 25
Simpson Mfg. Co., Inc., Mark, N.Y., 10, 15
Sola Electric Co., 4633 W. 16th St., Chicago 50, Ill., 25
For details see ad on page 225
Sonar Radio Corp., N.Y., 5, 10, 15, 25
Sondyna, A. G., Switzerland, 25
Sorensen & Co., Inc., Conn., 10, 15, 25
Spellman Television Co., Inc., 3029 Webster Ave., New York 67, N.Y., 5, 15
For details see ad on page 185
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 25
See complete catalog in last section
Square Root Mfg. Corp., N.Y. 5
Standard Electrical Prod. Co., Ohio, 25
Standard Electronic Research, N.Y., 25
Stark Electronic Instruments, Ltd., Canada, 15
Suffolk Products Corporation, N.Y., 5
Summit Electronics, Inc., N.J., 15, 25
Superex Electronics Corp., N.Y., 5, 10, 15, 25
Superior Electric Co., 83 Laurel St., Bristol, Conn., 25
See complete catalog in last section
Syntronic Instruments, Inc., Ill., 5
T L G Electric Corp., N.Y., 5, 10, 15, 25
Tech Laboratories, Inc., N.J., 25
Telechrome, Inc., 88 Merrick Rd., Amityville, L.I., N.Y., 5, 10, 15, 25
For details see ad on pages 120, 285
Teletronics Laboratory, Inc., N.Y., 10, 15, 25
Televiso Corp., Ill., 5, 10, 15, 25
Tel-Instrument Co., 50 Paterson Ave., East Rutherford, N.J., 15, 25
For details see ad on page 120
Thompson Products, Inc., Ohio, 5
Trad Television Corp., 1001 First Ave., Asbury Park, N.J., 15
For details see ad on page 338
Transmitter Equipment Mfg. Co., N.Y., 5, 10, 15, 25
Triumph Mfg. Co., Ill., 25
Union Spring & Mfg. Co., N.J. 5, 10, 15, 25
Universal Electronics Co., 2012 S. Sepulveda Blvd., Los Angeles 25, Calif., 5, 10, 15, 25
For details see ad on page 186
Universal X-Ray Prod., Inc., Ill., 5
Varian Associates, 661 Hansen Way, Palo Alto, Calif., 25, Klystron
For details see ad on pages 454-455
Varo Mfg. Co., Inc., Tex., 10, 15, 25
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For details see ad on page 308
Vickers Elec. Div., Mo., 5, 10, 15, 25
Victoreen Instrument Co., Ohio, 5, 10, 15
Video Corp. of Amer., N.Y., 5, 10, 15, 25
Video Products Corp., N.J., 15, 20
Virginia Electronics Co., D.C., 25
Vokar Corp., Mich., 5, 10, 15, Power Packs
Wayne-Kerr Laboratories, Ltd., Sycamore Grove, New Malden, Surrey, England, 25
For details see ad on page 316
Western Sound & Elec. Labs., Inc., Wis., 10, 15, 25
White Industries, Inc., N.Y., 10
Wincharger Corp., Iowa, 20
Winters Engineer, T. Starling, N.J., 5

46. Printed Circuits.

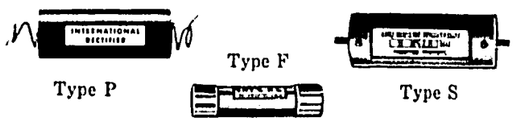
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10. Printed electronic
15. Solder dipped prewired chassis
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For details see ad on pages 362-363
Alco Electronics Mfg. Co., Mass., 15
Alden Products Co., 113 N. Main St., Brockton 54, Mass., 5, 10, 15
For details see ad on pages 150-151
American Machine & Foundry Co., Mass., 5, 10, 15
Ardente Acoustic Labs., Ltd., England, 5
Balco Research Laboratories, N.J., 15
Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, North Hollywood, Calif., 5, 10, 15
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Research Lab., Fisher Bldg., Detroit 2, Mich., 5, 10
For details see ad on pages 176, 366-367
Cardwell Mfg. Corp., Allen D., Conn., 5, 10, 15
Centralab, Div. Globe Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis., 5, 10
See complete catalog in last section
Centronics Co., 21-04 127 St., College Point 56, L.I., N.Y., 5, 10, 15
For details see ad on page 186
Citation Products Co., 233 E. 146th St., New York 51, N.Y., 5
For details see ad on page 269
Clary Multiplier Corp., Calif., 5, 15
Communication Measurements Lab., Inc., 350 Leland Ave., Plainfield, N.J., 10, 15
For details see ad on page 312
Cornell-Dubilier Electric Corp., 333 Hamilton Blvd., S. Plainfield, N.J., 10
For details see ad on page 6
Decimeter, Inc., Colo., 10
Dietz Co., The Henry G., N.Y., 5
Eby, Inc., Hugh H., 4700 Stenton Ave., Philadelphia 44, Pa., 5, 10
For details see ad on page 207
Electralab, Inc., 105 First St., Cambridge 41, Mass., 5, 10, 15
For details see ad on page 186
Electron Radar Products, Ill., 10
Elm Laboratories, N.Y., 5
El-Mec Laboratories, Inc., N.J., 5, 10
Emeloid Co., Inc., N.J., 15
(Continued on page 189)

International RECTIFIER CORPORATION
EL SEGUNDO CALIFORNIA

Selenium Rectifiers

HI-VOLTAGE SELENIUM RECTIFIERS
Phenolic Cartridge Type



Type P Type F Type S

DIAMETER: From ⅛" to 1"
LENGTH: From ½" to 12"
CURRENT, half-wave: 1.5 ma to 60 ma
VOLTAGE, DC output: 20 volts to 10,000 volts
Send for Bulletin H-1

SELENIUM DIODES



DIAMETER: From ⅛" to 13/32"
LENGTH: From ¼" to ½"
RMS applied voltage: From 26 volts to 208 volts
DC output voltage: From 20 volts to 160 volts
DC output current: avg. from 200 microamperes to 11 milliamperes
Reverse Leakage at 10 volts RMS: 0.6 microamperes to 2.4 microamperes
Potted in thermosetting compound
Temperature Range: From —60° C to 100° C
Available in 1, 2, 3, 4, 5, 6, 7 and 8 cell Diodes.

WRITE FOR BULLETIN SD-1

GERMANIUM DIODES



ALL TYPES AVAILABLE INCLUDING UHF TYPES
Write for Bulletin GD-1

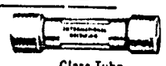
HERMETICALLY SEALED RECTIFIERS



Octal Tube Base Type Metal Case



Metal Case Pigtail Leads Glass Seal

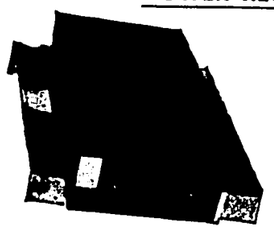


Glass Tube Ferrule Ends

DIAMETER: From 3/16" to 1-1/4"
LENGTH: From 9/16" to 10"
CURRENT, half-wave: 1.5 ma to 60 ma
VOLTAGE, DC output: 20 volts to 4,000 volts

WRITE FOR BULLETIN H-1

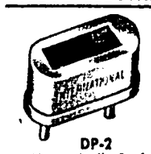
POWER RECTIFIERS



CELL SIZES: From 1" x 1" to 6¼" x 7¼"
CURRENT RATINGS, per cell: 0.125 amperes to 7 amperes
VOLTAGE RATINGS, inverse per cell: 22 volts rms to 40 volts rms
Efficiency to 87%
Power factor 95%
Suitable for oil immersion.
Ratings to 250 KW

Send for Bulletin C-249

PHOTO-ELECTRIC CELLS — SELF-GENERATING TYPE



DP-2 Hermetically Sealed 25 microamperes*

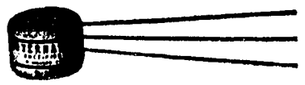


Unmounted Cells Available Output up to 600 microamperes*

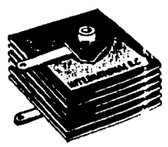
At 100 foot-candles illumination and 100 ohms external resistance.

Write for Bulletin PC-649

MINIATURE RECTIFIERS



Completely encapsulated Selenium Rectifiers. Available in half-wave, center tapped or bridge units in various voltages and current ratings.



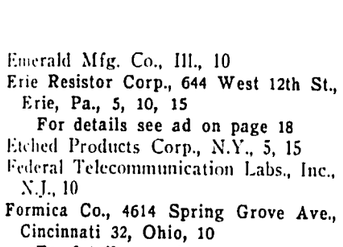
Miniature Rectifiers RS Type From 65 to 1,000 ma.

INTERNATIONAL RECTIFIER
CORPORATION
1521 E GRAND AVE EL SEGUNDO CALIFORNIA PHONE OREGON 8-3778
CHICAGO 205 W WACKER DRIVE PHONE FRANKLIN 2-3889
NEW YORK 501 MADISON AVENUE PHONE PLAZA 5-8665

(Continued from page 187)

Emerald Mfg. Co., Ill., 10
Erie Resistor Corp., 644 West 12th St., Erie, Pa., 5, 10, 15
For details see ad on page 18
Etched Products Corp., N.Y., 5, 15
Federal Telecommunication Labs., Inc., N.J., 10
Formica Co., 4614 Spring Grove Ave., Cincinnati 32, Ohio, 10
For details see ad on page 48
Glass Products Co., 6911 S. Chicago Ave., Chicago 37, Ill., 5, 10, 15
For details see ad on page 189
Glenco Corp., 212 Durham Ave., Metuchen, N.J., 5, 10, 15
For details see ad on page 137
Gulton Mfg. Corp., N.J., 10
Harman-Kardon, Inc., N.Y., 5, 10
Harnett Electric Corp., 138 Haven Ave., Port Washington, L.I., N.Y., 5, 10, 15
For details see ad on page 264
Herlec Corp., Wis., 10
Hopp Press, Inc., N.Y., 5
Interelectronics Corp., N.Y., 5
International Resistance Co., Pa., 10
Kalbfell Laboratories, Inc., 1090 Morena Blvd., San Diego 10, Calif., 10, 15
For details see ad on page 257
Lamoree, C. D., Calif., 10
Leonard Electric Products Co., N.Y., 5
Lytle Engineering & Mfg. Co., Ill., 5
Magnex Corp., N.Y., 5, 10
Melpar, Inc., Va., 5
Methode Manufacturing Corp., 2021 W. Churchill St., Chicago 47, Ill., 5, 10, 15
For details see ad on page 208

Stupakoff
PRINTED CIRCUITS
★ Compact
★ Precision-made



By combining in one compact, sealed unit a specified number of printed resistors and capacitors of precision values, Stupakoff Printed Circuits save space and weight, speed assembly, reduce costs, minimize assembly errors. By using Stupakoff Printed Circuits instead of the individual components, soldered connections are reduced up to 80%, assemblies are lighter and more compact, your assembly time is reduced and better products are made.

STUPAKOFF CERAMIC & MFG. CO.
LATROBE, PENNSYLVANIA

Micarta Fabricators, Inc., Ill., 5
Michel Manufacturing Co., Wis., 5
Micro-Circuits Co., New Buffalo, Mich., 5, 10
For details see ad on page 287
Molded Insulation Co., Pa., 5, 10, 15
Mycalex Corp. of America, 125 Clifton Blvd., Clifton, N.J., 5
For details see ad on pages 430-431
New England Etching & Plating, Mass., 5
Oak Mfg. Co., Ill., 15
Onondaga Pottery Co., N.Y., 10
PCA Electronics Inc., Calif., 5, 10
Photo Chemical Products, Inc., 479 Walton Ave., New York 51, N.Y., 10
For details see ad on page 187
Photocircuits Corp., N.Y., 5, 10, 15
Plastics & Electronics Corp., P.O. Box 38, Station J, Buffalo 8, N.Y., 5, 10
For details see ad on page 99
Premier Metal Etching Co., N.Y., 5
RCA Victor Div., Tube Dept., 415 S. 5th St., Harrison, N.J., 10
For details see ad on pp. 88, 440-441
Radio Industries, Inc., Ill., 10
Research Instrument Co., N.Y., 5
Richardson Co., Ill., Plastic Laminates
Sanders Associates, Inc., 137 Canal St., Nashua, N.H., 15
For details see ad on page 42
Solar Manufacturing Corp., Calif., 5, 10
Sound Devices, Inc., N.Y., 10
Sprague Electric Co., Mass., 10
Standard Coil Products Co., Inc., Ill., 5
Stupakoff Ceramic & Mfg. Co., Box 390, Hillview Ave., Latrobe, Pa., 10
For details see ad on pages 139, 189, 203, 255, 265, 277, 295, 297, 303, 378-379
Superex Electronics Corp., N.Y., 5, 10, 15
Sylvania Electric Products, Inc., 1740 Broadway, New York 19, N.Y., 10
For details see ad on pages 417-420
Taylor Fibre Co., Pa., 15
Tech Laboratories, Inc., N.J., 10
Technograph Printed Electronics, N.Y., 5
Telvision Laboratories, Inc., Ill., 5, 15
Telex, Inc., Minn., 15
Trans-Gel Products, N.Y., 5
Tri Dex Electronics, Calif., 5, 15
United States Gasket Co., 611 N. 10th St., Camden 1, N.J., 5, 10
For details see ad on pages 450-451
U.S. Components, Inc., 454-462 E. 148th St., New York 55, N.Y., 5, 15
For details see ad on page 96
Vokar Corp., Mich., 5, 10
Walkirt Co., Calif., 5
Winchester Electronics, Inc., 15 Crescent St., Glenbrook, Conn., Card Receptacles
For details see ad on page 156

47. Rectifiers, Metallic.

5. Copper oxide, etc. 15. Silicon
10. Selenium

American Machine & Foundry Co., Mass., 5, 10, 15
Armstrong Co., A. T. R., Canada, 10
Barry Electronics Corp., N.Y., 10
Bogue Electric Manufacturing Co., 52 Iowa Ave., Paterson 3, N.J., 10
For details see ad on page 13
Bradley Laboratories, Inc., Conn., 5, 10
Canadian Westinghouse Co., Ltd., Canada, 5, 10
Conant Laboratories, Neb., 5, 10
Electronic Devices, Inc., N.Y., 10
Electronic Rectifiers, Inc., Ind., 10, Magnesium Copper Sulfide
Fansteel Metallurgical Corp., Ill., 10
Federal Electric Mfg. Co., Ltd., Canada, 10
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 10
For details see ad on pages 368-373
General Communications, Wis., 10
General Electric Co., N.Y., 5, 10
General Electric Co., N.Y., Germanium
Industrial Electro. of Can., Ltd., Canada, 5, 10
Inet, Inc., Calif., 10
International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif., 10
For details see ad on page 188
International Resistance Co., Pa., 10
Kotron Rectifier Corp., N.J., 10
Lee Electric & Mfg. Co., Calif., 10
Mallory & Co., Inc., P. R., Ind., 5, 10
Model Rectifier Corp., 557 Rogers Ave., Brooklyn 25, N.Y., 10
For details see ad on page 191
Oak Electronics Co., N.Y., 10
Opad-Green Co., N.Y., 10
Perkin Engineering Corp., Calif., 10
Powell Co., Harold H., Pa., 10

(Continued on page 191)

TO CUT COSTS — Or For Miniaturization
. . . Consider Printed Circuits



The low cost, high production aspects of printed circuitry is worthy of your investigation. We will be happy to provide you with samples and information relating to our printed circuit work upon your request.

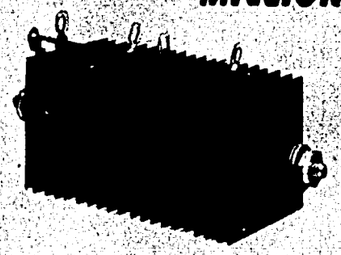
Complete and cordial co-operation will be given in adapting our printed circuits to your design.

GLASS PRODUCTS CO. 6911 S. South Chicago Ave. FAirfax 4-1050 Chicago 37, Ill.

Seletron

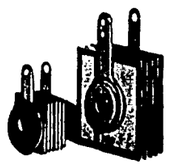
SELENIUM RECTIFIERS

MILLIONS IN SERVICE THROUGHOUT THE WORLD!



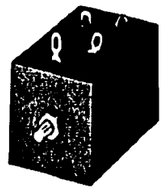
INDUSTRIAL TYPE RECTIFIERS

For a multiple of applications; power supplies, magnetic amplifiers, electroplating, battery charging, etc. Available in current rating from milliamperes to thousands of amperes, and from a few volts to thousands of volts.



HALF-WAVE RADIO TYPE RECTIFIERS

Economical rectifiers for many and varied applications. Especially applicable for radio and TV. Available in current ratings through 500 ma.

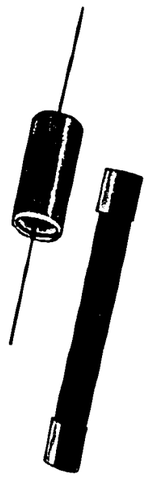


ENCAPSULATED RECTIFIER TYPES

For adequate protection for military and other stringent uses. Recommended for use where size and weight are important considerations; such as aircraft applications.

CARTRIDGE HIGH VOLTAGE ASSEMBLIES

With either pigtails or ferrules. These versatile cartridge assemblies rated at 5 mils are available in voltages ranging to thousands of volts.







HERMETICALLY SEALED UNITS

Built to special requirements to meet unusually stringent conditions. Designed to meet individual needs.

HIGH TEMPERATURE TYPES

These selenium rectifiers are capable of operating in an ambient temperature of 125° C., with no increase in the size of the cell as compared with a similar rectifier operating in a normal ambient.

See Radio Receptor Co.'s page showing our Germanium Diodes and Germanium Transistors on page 202 of this directory.

Our engineering department will be glad to aid you in the solution of your rectifier problems. Submit your requirements and let us make recommendations...without obligation, of course! See our catalog in Sweet's Product Design file...or write us requesting Bulletin 1

Seletron and Germanium Division

RADIO RECEPTOR COMPANY, INC.

Since 1922 in Radio and Electronics

Sales Dept. 251 W 19th St., New York 11, N. Y. • Factory 84 N 9th St., Brooklyn 11, N. Y.

Specify

ADVANCE RELAYS

for precise circuitry

















There are many reasons why Industry specifies ADVANCE RELAYS: They meet or surpass Military and Civilian requirements—many types have AN approval—many are hermetically sealed—*all* are lightweight—small—rugged—compact—and *all* are precision-built for efficient, trouble-free, long life performance.

If you have relay problems involving contact loads, coil resistances, close differential, timing features, input sources, critical environment or any particular requirements involving unusual or accurate circuit behavior, ADVANCE can supply the relay.

A complete line of relays for radar, radio, electronic and electrical equipment applications.

Write for new, descriptive Catalog containing detailed information about ADVANCE Relays and facilities.



ADVANCE ELECTRIC AND RELAY COMPANY

2435 NO. NAOMI ST., BURBANK, CALIF.

Sales Representatives in Principal [illegible]

Rectifiers, Metallic

(Continued from page 189)

Radio Receptor Co., Inc., 251 W. 19th St., New York 11, N.Y., 10
For details see ad on pages 190, 202
Schauer Manufacturing Corp., Ohio, 5, 10
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 10
For details see ad on pages 417-420
Syntron Co., Pa., 10
Takk Corp., Ohio, Cold Cathode
Tarzian, Inc., Sarkes, Ind., 10
Transitron Electronic Corp., Mass., 15
Vickers Electric Division, Mo., 10
Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N.J., 5
For details see ad on page 172
Westinghouse Electric Corp., Pa., 5, 10

48. Relays.

5. Co-axial
10. D'Arsonval
15. Frequency selective
20. Hermetically sealed
25. Keying
30. Mercury contact
35. Polarized
40. Power control & overload
45. Stepping
50. Telephone
55. Time delay

A.G.A. Div., Elastic Stop Nut Corp. of America, 1027 Newark Ave., Elizabeth 3, N.J., 55, Circuit Breakers
For details see ad on page 3
Adams & Westlake Co., 1953 N. Michigan Ave., Elkhart 1, Ind., 20, 30, 40, 55
See complete catalog in last section
Advance Electric & Relay Co., 2435 N. Naomi St., Burbank, Calif., 5, 20, 25, 35, 40, 50, 55
For details see ad on page 191

Relays 47-48

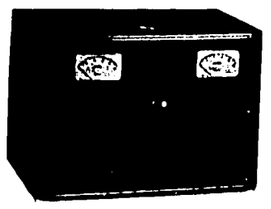
Airflyte Electronics Co., 21 Cottage St., Bayonne, N.J., 20
For details see ad on page 5
Airpax Products Co., Md., 20, 35
Allard Instrument Corp., N.Y., 15, 45
Allen-Bradley Co., Wis., 40, 55
Allied Control Co., Inc., N.Y., 5, 20, 25, 35, 40, 50, 55, High Volt
Alpha Electronics, Inc., N.J., 35, Coils Only
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55

(Continued on page 193)

Index

to all products listed in this Directory will be found in the **Pink Section** immediately preceding the alphabetical directory of firms. Pages i-viii.

Selenium Rectifier Power Units



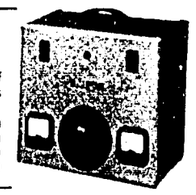
D.C. POWER SUPPLIES

MODEL SV-30-20

INPUT: 117V, 60 cycle, single phase.
OUTPUT: 0-30 volts at 0-20 amps. D.C.
CONTROLS: Powerstat, Heinemann magnetic circuit breaker, Klixon thermal circuit breaker, 4½" rectangular voltmeter and ammeter accurate to 2%, neon pilot light, 5 way binding posts for output.

SV-30-20 full wave rect. D.C. $260.00
SF-30-20 3% ripple 300.00
SA-30-20 0.4% ripple 345.00

D. C. LABPACK



INPUT: 117 volts, 60 cycle, single phase
OUTPUT: 0-28 volts at listed current, continuously variable
CONTROLS: Powerstat, circuit breaker, neon pilot lamp, on-off switch voltmeter and ammeter accurate to 3%, 5 way binding posts for output.

Model L 28-5, 5 Amperes full wave rectified D.C. $87.50
Model LF28-4, 4 Amperes D.C. 2% ripple 107.50
Model L 28-10, 10 Amperes full wave rectified D.C. 155.00
Model LF28-8, 8 Amperes D.C. 2% ripple 170.00

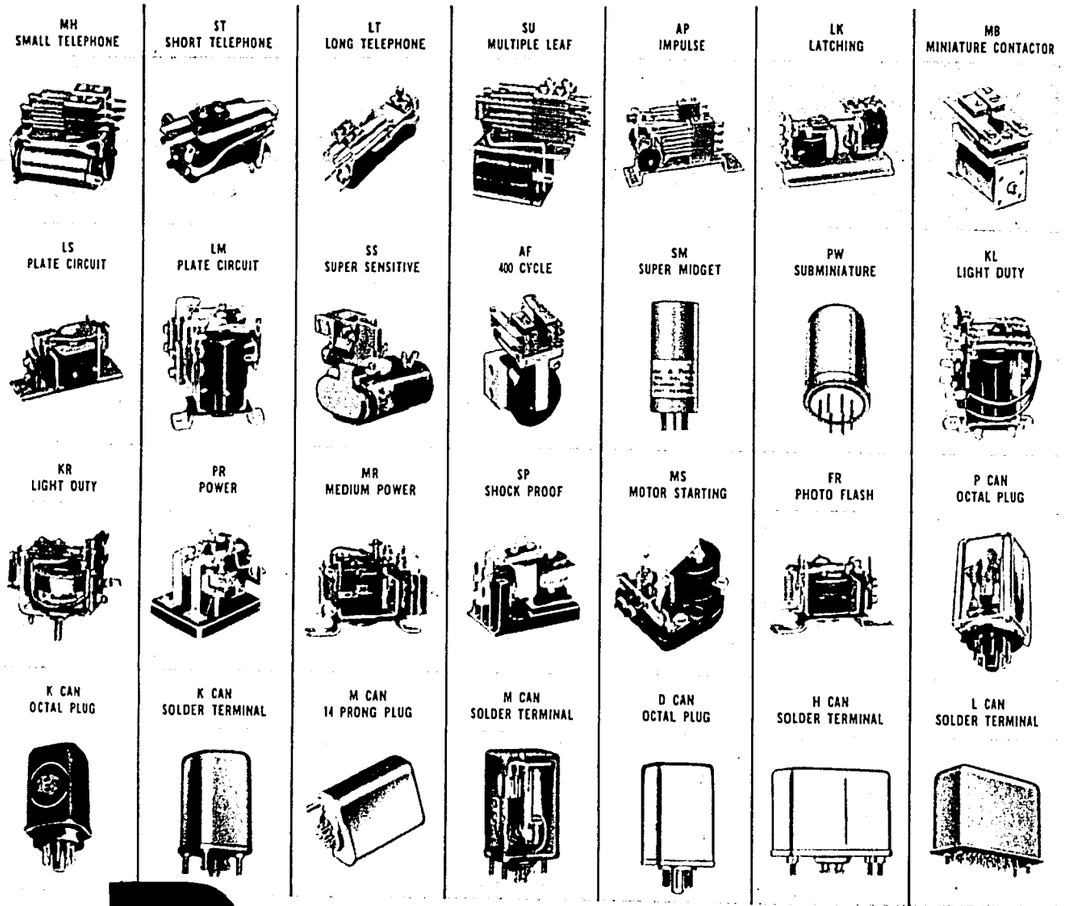
The illustrated standard units represent the power supplies we manufacture. Many applications are designed to the exact requirements of the user, giving maximum utility together with economy. Prompt quotation and delivery.

POWER CONVERSION FOR—

Production and laboratory testing of D.C. apparatus from A.C. power lines, allowing continuous variation of D.C. voltage and current to simulate changing battery or line voltage conditions.
Commercial operation of vibrator power packs, dynamotors, D.C. motors, relays and other devices which require D.C.

- Replacing storage or primary batteries.
- Battery charging.
- Life testing of battery operated equipment.
- High current selenium rectifier plate power supplies.

MODEL RECTIFIER CORPORATION
557 Rogers Ave., B'klyn 25, N. Y.



Relays

made by POTTER & BRUMFIELD

Open or in Hermetically Sealed Enclosures

SPECIALTY DESIGNING, MANUFACTURING

for every application

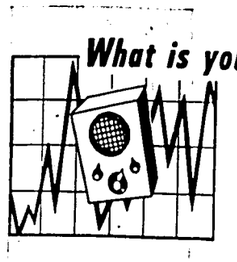
Contact your nearest P & B Sales Engineering office for quotations and samples.

ALBANY 7, NEW YORK, 100 State Street, Albany 3-3628
ATLANTA 5, GEORGIA, 4030 Club Drive, Cherokee 2483
BOSTON 16, MASS., 25 Huntington Avenue, Commonwealth 6-7705
BUFFALO 7, NEW YORK, 1807 Elmwood Ave., Bedford 3757
CEDAR RAPIDS, IOWA, 309 Guaranty Bldg., Phone: 4-0833
CHICAGO 44, ILLINOIS, 5967 W. Madison St., Columbus 1-1928
CLEVELAND 15, OHIO, 1836 Euclid Avenue, Main 1-1286
DALLAS 5, TEXAS, 7322 Marquette Ave., EMerson 6286
DAYTON 2, OHIO, 18 W. Monument Avenue, HEmlock 9661
DAYTON 2, OHIO, B-4 Talbott Bldg., Fulton 8188
DENVER 7, COLORADO, 5528 East Colfax Ave., FReemont 3067
DETROIT 35, MICHIGAN, 19481 James Couzens H'way, Vermont 8-3460
INDIANAPOLIS 1, INDIANA, 2208 E. Washington Street, Market 8517
KANSAS CITY 2, MISSOURI, 4210 Main St., Westport 7564
LOS ANGELES 6, CALIFORNIA, 2230 W. Eleventh St., DUnkirk 3-4197
MEMPHIS 4, TENNESSEE, 1336 Madison Avenue. Phone 2-1914
MERIDEN, CONNECTICUT, P. O. Box 196, Phone: 7-4555
MILWAUKEE 3, WISCONSIN, 744 North 4th Street, Broadway 2-0517
MINNEAPOLIS 17, MINNESOTA, 5022 29th Avenue, South, Drexel 1895
MONTREAL, P. Q., CANADA, 5257 Queen Mary Road, ELwood 9602
NEW ORLEANS 22, LOUISIANA, 4108 Clermont Drive, CRescent 4182
NEW YORK 16, N. Y., 211 E. 37th St., VAnderbilt 6-3463
PHILADELPHIA, 3611 Berry Ave. (DREXEL HILL, PA.), Clearbrook 9-0231
PITTSBURGH 19, PA., 600 Grant Street, Court 1-0131
SAN FRANCISCO, CALIF., (Menlo Park), 625 Laurel Ave., DAvenport 5-4983
ST. LOUIS 5, MISSOURI, 311 Connor Building, Parkview 7622
SEATTLE 1, WASHINGTON, 2217 Fourth Ave., MAin 3750
SYRACUSE 1, NEW YORK, P. O. Box 1224, Baldwinsville 662
TORONTO 13, ONT. CANADA, 2273 Danforth Avenue, Oxford 1127
TULSA 10, OKLAHOMA, 1526 E. Fourth St., Phone: 3-9149
UTICA, NEW YORK, 1123 Howard Ave., Utica 4-2754
VANCOUVER 9, B.C., CANADA, 1998 Maple Street, BAyview 3812
WASHINGTON 5, D. C., 222 Bond Bldg., EXecutive 3-7457
WILMINGTON, NORTH CAROLINA, 4924 Oleander Drive, Phone: 5749
EXPORT: ROCKE INTERNATIONAL CORPORATION
13 East 40th Street • New York 16, N. Y., U. S. A. • Murray Hill 9-0230

Write for catalog 122 or Bulletin 100

Potter & Brumfield PRINCETON, INDIANA Telephone 1596

Your local electronic parts distributor stocks standard P & B relays



What is your Delay or Regulating Problem?

For the most effective solution use the

SIMPLEST, MOST COMPACT
MOST ECONOMICAL
HERMETICALLY SEALED

AMPERITE
THERMOSTATIC DELAY RELAYS



STANDARD

Provide delays ranging from 2 to 120 seconds.

- Actuated by a heater, they operate on A.C., D.C., or Pulsating Current.
- *Hermetically sealed.* Not affected by altitude, moisture, or other climate changes.
- Circuits: *SPST only*—normally open or normally closed.

Amperite Thermostatic Delay Relays are compensated for ambient temperature changes from −55° to +70°C. Heaters consume approximately 2 W. and may be operated continuously. The units are *most compact, rugged, explosion-proof, long-lived, and—very inexpensive!*

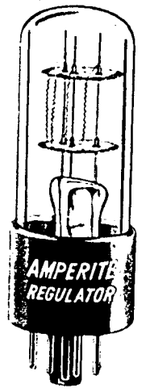


MINIATURE

TYPES: Standard Radio Octal, and 9-Pin Miniature.

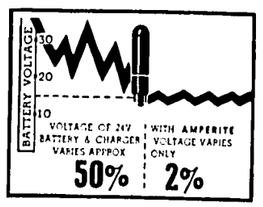
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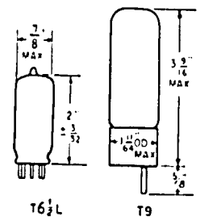
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T9 BULB

- Amperite Regulators are designed to keep the current in a circuit ***automatically regulated*** at a definite value (for example, 0.5 amp).
- For currents of 60 ma. to 5 amps. *Operates on A.C., D.C., or Pulsating Current.*
- Hermetically sealed, light, compact, and most inexpensive.





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Amperite Regulators are the simplest, most effective method for obtaining *automatic regulation* of current or voltage. *Hermetically sealed,* they are not affected by changes in altitude, ambient temperature (−55° to +90°C), or humidity. Rugged; no moving parts; changed as easily as a radio tube.

Write for 4-page Technical Bulletin No. AB-51

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Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

Relays

(Continued from page 47)

American Relay & Controls Inc., Ill., 20, 40, 50, 55
Amperite Co., Inc., 561 Broadway, New York 12, N.Y., 55
For details see ad on page 193
Armstrong Co., N. T. R., Canada, 30
Assembly Products, Inc., Ohio, 10, 35, 55
Automatic Electric Co., Ill., 20, 25, 30, 35, 45, 50, 55
Automatic Elec. Mfg. Co., Minn., 5, 20, 25, 40, 50
Automatic Switch Co., N. J., 40, 55
Automatic Temperature Control, Pa., 55
Biddle Co., James G., Pa., 15
Branson Corp., N. J., 20, 55
Canadian Westinghouse Co., Ltd., Canada, 40, 55
Clare & Co., C. P., Ill., 20, 25, 30, 35, 40, 45, 50, 55
Coaxial Connector Co., 35 N. 2nd Ave., Mt. Vernon, N.Y., 5
For details see ad on page 155
Cole Instrument Co., Calif., 10, 15, 20, 35, 40, 45, 50, 55
Comar Elec. Co., 3349 Addison St., Chicago 18, Ill., 5, 20, 40, 50, 55
For details see ad on page 195
Cook Electric Co., Ill., 5, 20, 40, 45, 50, 55
Corona Engineering Service, N.Y., 30
Cramer Company, Inc., The R. W., Conn., 55
Cutler-Hammer, Inc., Wis., 15, 55
De Coursey Engineering Labs., Calif., 40
Delta Electrical Instrument Co., Calif., 10
Dictograph Products, Inc., N.Y., 50
Ebert Electronics Co., N.Y., 30, 55
Edison, Inc., Thomas A., Instrument Div., 62 Lakeside Ave., West Orange, N.J., 10, 20, 35, 40, 55
For details see ad on page 194
Elastic Stop Nut Corp. of America, 2330 Vauxhall Rd., Union, N.J., 55
For details see ad on page 36
Electric Design & Mfg. Co., Iowa, 10
Electric Regulator Corp., Conn., Close Differential
Electrical Products Corp., Calif., 20
Electro-Seal Corp., 946 North Ave., Des Plaines, Ill., 20
For details see ad on page 262
El-Mec Laboratories, Inc., N.J., Voltage & Current Sensitive
Emerald Mfg. Co., Ill., 55
Eureka Television & Tube Corp., N.J., 55
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 25, 35, 45, 50
For details see ad on pages 368-373
G-V Controls, Inc., N.J., 15, 20, 40, 55
Gavco Corp., N.Y., Directional Power
General Communication Co., 681 Beacon St., Boston 15, Mass., 5
For details see ad on page 210
General Communications, Wis., 45, 50, Video Switching Relays
General Control Co., Mass., 55
General Electric Co., N.Y., 20, 40, 55
General Hermetic Sealing Corp., 99 E. Hawthorne Ave., Valley Stream, L.I., N.Y., 20
For details see ad on page 275
Goslin Elec. & Mfg. Co., Calif., 20, 40

(Continued on page 195)

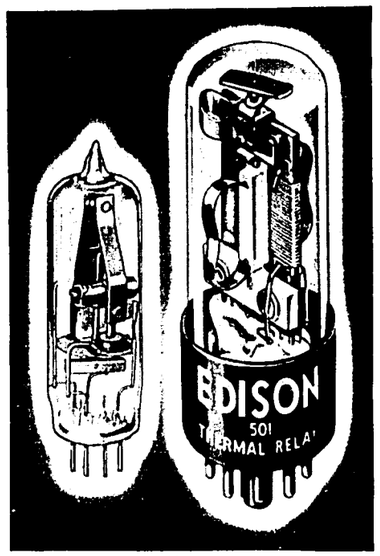
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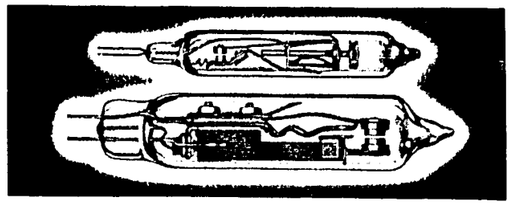
SPECIFICATIONS

Standard Octal Base

Delays . . . 2 seconds to 5 minutes
Heater . . . 5 watts nominal, continuous operation
Voltages: 6.3, 26.5 and 117
Contacts . . . 6 amps maximum, 3 amps to 450 volts a.c. or d.c.
Vibration . . . 1/16" amplitude at 55 cps. 50g shock.
Ambient . . . −60 to +85°C **Seated Height** . . . 3¼ max.

Miniature 7-Pin Base

Delays . . . 5 seconds to 75 seconds
Heater . . . 2.5 watts nominal, continuous operation
Voltages: 6.3 and 27.5
Contacts . . . 2.5 amps max. 1 amp at 125 volts d.c.
Vibration . . . 1/16" amplitude at 55 cps. 50g shock.
Ambient . . . −60 to +85°C **Seated Height** . . . 2¼ max.



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Ambient protection for frequency standards • Precision heat control for electronic laboratory instruments • Overheat detection and fire alarm.

SPECIFICATIONS

Heavy duty—type D8
Max. temp. . . . 320°C
Max. watts . . . 1000
Max. amps. . . . 8.0 d.c.
Calibration tolerance . . . ±2.5°C
Length, 2¾"; **dia.**, 9/16" (approx.)

Precision control—type S1
Max. temp. . . . 190°C
Max. watts . . . 150
Max. amps 1.0
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Length, 2½"; **dia.**, ⅜" (approx.)

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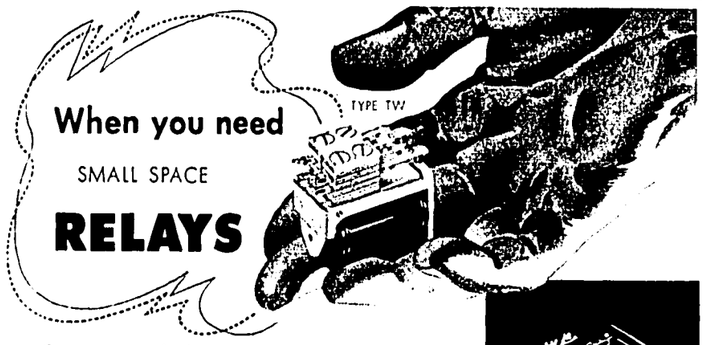
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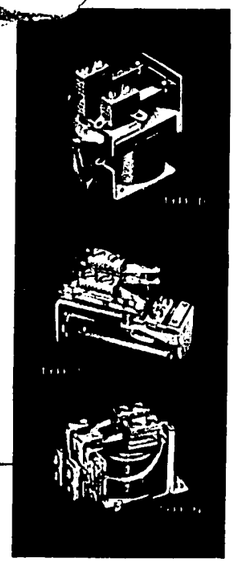
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(Continued from page 193)

Greibach Res. & Dev. Labs., N.Y., 10
Guardian Electric Mfg. Co., 1621 W. Walnut St., Chicago 12, Ill., 20, 25, 40, 45, 50, 55
For details see ad on page 62
Haller, Raymond and Brown, Inc., Pa., Carrier Controlled
Hart Manufacturing Co., Conn., 20
Haydon Co., A. W., 240 N. Elm St., Waterbury 20, Conn., 55
For details see ad on page 178
Heinemann Electric Co., N.J., 55
Hughey & Phillips, Calif., 20, 30, 40, 55
Industrial Products Co., Conn., 5
Industrial Specialties Corp., N.Y., 25, 40, 45
Industrial Timer Corp., N.J., 55
Jennings Radio Mfg. Co., 970 McLaughlin Ave., San Jose, Calif., 40, Vacuum, High Power
For details see ad on pages 390-392
Johnson Co., E. F., Waseca, Minn., RF Contractors
For details see ad on page 183
Kellogg Switchboard & Supply Co., Dept. 69, 79 W. Monroe St., Chicago 3, Ill., 35, 45, 50
For details see ad on page 106
Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 5
For details see ad on pages 414-415
Kurman Electric Co., Inc., N.Y., 15, 20, 25, 35, 50, 55
Leach Relay Co., Calif., 20, 25, 40, 55
Leader Electronics, Inc., Ohio, 35, 45
Lektra Laboratories, Inc., N.Y., 55
Leland, Inc., G. H., Ohio, 45
Lumenite Electronic Co., Ill., 55
Lysco Mfg. Co., Inc., N.J., 5
Lytle Engineering & Mfg. Co., Ill., 40
Magnetic Devices, Inc., Md., 35, 40
Magnecraft Electric Co., Ill., 20, 25, 40, 50, 55
Maspeth Telephone & Radio Corp., N.Y., 35, 50
Maxson Corp., W. L., 460 W. 34th St., New York 1, N.Y., 35
For details see ad on page 122
McNeal, J. D., Conn., 55
Milwaukee Gas Specialty Co., Wis., 20, 35
Molded Insulation Co., Pa., 50, Miniature
Motordyne, Inc., Calif., 40, 55
Mullenbach Electrical Mfg. Co., Calif., 55
Neomatic, Inc., Calif., 20, 25, 35, 40
North Electric Manufacturing Co., Ohio, 20, 35, 45, 50, 55
Northern Electric Co., Ltd., Canada, 30, 45, 50
Oak Mfg. Co., Ill., 45
Omega Manufacturing, Inc., N.Y., 40, 55
PSC Applied Research, Ltd., Canada, 45
Parts Producing Corp., N.Y., 20, 25, 35
Photoswitch Inc., Mass., 55
Phaostron Co., 151 Pasadena Ave., South Pasadena, Calif., 20, Sensitive Miniature
For details see ad on page 175
Phillips Control Corp., Ill., 20, 40, 50, 55
Pollak Corp., Joseph, 75-99 Freeport St., Boston 22, Mass., 5, 15
For details see ad on page 194
Potter & Brumfield, Princeton, Ind., 20, 25, 40, 50, 55
For details see ad on page 192
Price Electric Corp., Md., 5, 20, 25, 40, 45, 50, 55
Product Development Co., Inc., N.J., 5
RBM Div., Essex Wire Corp., Logansport, Ind., 20, 50
For details see ad on page 86
Radio Engineering Products, Canada, 25, 35
Relay Sales, Ill., 5, 15, 20, 25, 30, 35, 40, 45, 50, 55
Relays, Inc., N.Y., 20, 25, 50
Research, Inc., Minn., 40
Reynolds Electric Co., Ill., 55
Rhodes, Inc., M. H., Conn., 55
Rich Electronics, Inc., Fla., 25
Ripley Co., Inc., Middletown, Conn., 55
For details see ad on page 131
Servo Tek Products Co., Inc., N.J., Electronic
Sheldon Electric Co., N.J., 55
Sightmaster Corp., N.Y., 20, 35
Sigma Instruments Inc., Mass., 15, 20, 25, 35, 55
Signal Engineering & Mfg. Co., 154 W. 14 St., New York 11, N.Y., 5, 20, 25, 35, 40, 50, 55
For details see ad on page 197
Standard Electrical Products Co., Ohio, 20, 25, 30, 40, 55
Sterling Engineering Co., N.H., 20, 40, 50
Stevens-Arnold, Inc., 22 Elkins St., South Boston 27, Mass., 15, 20, 25, 35, High Speed
For details see ad on page 159
Struthers-Dunn, Inc., Pa., 5, 20, 25, 30, 40, 45, 55
Sunvic Controls, Ltd., England 20, 55
Technical Advisory Associates, N.Y., 15, 45
Tetrad Co., Inc., Calif., 15
Thermo Instruments Co., Calif., Plate Current
Transco Products, Inc., Calif., 5
Transelectric Mfg. Co., Pa., 50
Ultrasonic Corp., Mass., 40
Varo Mfg. Co., Inc., Tex., 15
Victoreen Instrument Co., Ohio, 55, Tube
Vocaline Company of America, Inc., Conn., 55
Ward Leonard Electric Co., N.Y., 20, 25, 40, 55
Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N.J., 10, 20, 30, 40, 50, 55
For details see ad on page 172
Westinghouse Electric Corp., N.J., 40
Westinghouse Electric Corp., Pa., 10, 15, 35, 40, 55
Wheaten Co., T. C., N.J., 20
Wilson & Co., G. C., N.J., 55
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Kingsbridge Armory,
New York City

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- WIRE WOUND PRECISION
- HIGH VOLTAGE
- HIGH FREQUENCY
- HERMETICALLY SEALED
- HIGH MEGOHM

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	RPC TYPE	GOVERNMENT SPECIFICATIONS JAN-R-93	GOVERNMENT SPECIFICATIONS MIL-R-93A	DIMENSIONS (INCHES) LENGTH	DIMENSIONS (INCHES) DIAM.	RESISTANCE (ohms) MIN.	MAX. WITH LOW T.C. ALLOY .0015 DIA.	MAX. WITH LOW T.C. ALLOY .001 DIA.	WATTS JAN. or MIL	WATTS COMM.
WIRE WOUND PRECISION RESISTORS % Tolerances 1, 0.5, 0.25, 0.1, 0.05, 0.02	AFB*	RB10B	RB15	15/32	17/32	0.1	.160 Meg.	.65 Meg.	.25	.5
	AGB*	RB10B	RB15	15/32	5/8	0.1	.235 Meg.	1.0 Meg.	.25	.5
	AFC*	RB11B	RB16	5/8	17/32	0.1	.225 Meg.	1.0 Meg.	.33	.5
	AGC*	RB11B	RB16	5/8	5/8	0.1	.330 Meg.	1.5 Meg.	.33	.5
	AFF*	RB12B	RB17	1	17/32	0.1	.475 Meg.	2.0 Meg.	.5	1.0
	AGF*	RB12B	RB17	1	5/8	0.1	.700 Meg.	3.0 Meg.	.5	1.0
	AJS	RB13B	RB18	1- 9/32	11/16	0.1	1.25 Meg.	5.0 Meg.	.5	1.0
	ALP	RB14B	RB19	2- 1/16	13/16	0.1	2.5 Meg.	10.0 Meg.	1.0	2.0
Type C Axial Wire Leads	CAB	.....	.....	9/16	9/32	2.0	20,000	0.15 Meg.	....	.25
	CAF	RB51B	RB52B†	13/16	9/32	1.0	50,000	0.40 Meg.	.25	.5
	CCD	RB51B	RB52B†	13/16	3/8	0.5	.125 Meg.	1.0 Meg.	.25	.5
Type S Hermetic Sealed Axial Wire Leads	SCB	.....	.....	9/16	11/32	5.0	20,000	0.15 Meg.	....	.25
	SCF	RB51A	RB52A†	13/16	11/32	5.0	50,000	0.40 Meg.	.25	.5
	SED	RB51A	RB52A†	13/16	15/32	5.0	.125 Meg.	1.0 Meg.	.25	.5

STYLE	TYPE	WATTS Max. (commercial)	VOLTS MAX.	DIMENSIONS Inches Length	DIMENSIONS Inches Diam.	RESISTANCE Minimum	RESISTANCE Maximum Megohms
HIGH VOLTAGE RESISTORS % Tolerances 15, 10, 5, 3 Matched Pairs 2% Type D— Bands & Ferrules Type T— 20% Only	BBF*	1	3,500	1	11/32	.05 Meg.	10,000
	BBM*	2	7,500	1 3/4	11/32	.10 Meg.	25,000
	BBR*	3	15,000	3	11/32	.20 Meg.	25,000
	BBV	5	30,000	5 1/2	11/32	.40 Meg.	25,000
	BFQ	4	15,000	2 1/2	19/32	20 Meg.	25,000
	BFT	6	25,000	4	19/32	.40 Meg.	25,000
	BFW	10	40,000	6 1/2	19/32	.70 Meg.	25,000
	DPW	20	35,000	6 1/2	1 1/8	1 Meg.	50,000
	DPX	30	65,000	10 1/2	1 1/8	2 Meg.	50,000
	DVY	50	90,000	14 1/2	1 1/2	4 Meg.	100,000
	DZW	30	40,000	6 1/2	2	3 Meg.	35,000
	DZZ	90	125,000	18 1/2	2	7.5 Meg.	100,000
	TBR	2	15,000	3	5/16	1 Meg.	10
	TFQ	3	20,000	2 1/2	9/16	1 Meg.	10
HIGH MEGOHM RESISTORS % Tolerances 10, 5	HBF*	1	3,500	1	11/32	10 Meg.	2 Million
	HBM*	2	7,500	1 3/4	11/32	10 Meg.	10 Million
	HBR*	3	15,000	3	11/32	10 Meg.	50 Million
HIGH FREQUENCY RESISTORS % Tolerances 20, 15, 10, 5 Type G— Bands & Ferrules	FAC‡	1/4	250	9/16	0.10	30 Ohms	10
	FBF*	1	375	1	5/16	20 Ohms	25
	FBM*	2	750	1 3/4	5/16	35 Ohms	50
	FBR*	3	1,400	3	5/16	65 Ohms	100
	FBV	5	2,600	5 1/2	5/16	120 Ohms	100
	FFQ	4	1,100	2 1/2	9/16	30 Ohms	50
	FFT	6	1,900	4	9/16	50 Ohms	75
	FFW	10	3,100	6 1/2	9/16	80 Ohms	100
	GPW	20	2,750	6 1/2	1 1/8	35 Ohms	50
	GPX	30	4,750	10 1/2	1 1/8	60 Ohms	100
	GVY	50	6,750	14 1/2	1 1/2	65 Ohms	100
	GZW	30	3,000	6 1/2	2	25 Ohms	35
	GZZ	90	8,500	18 1/2	2	60 Ohms	100

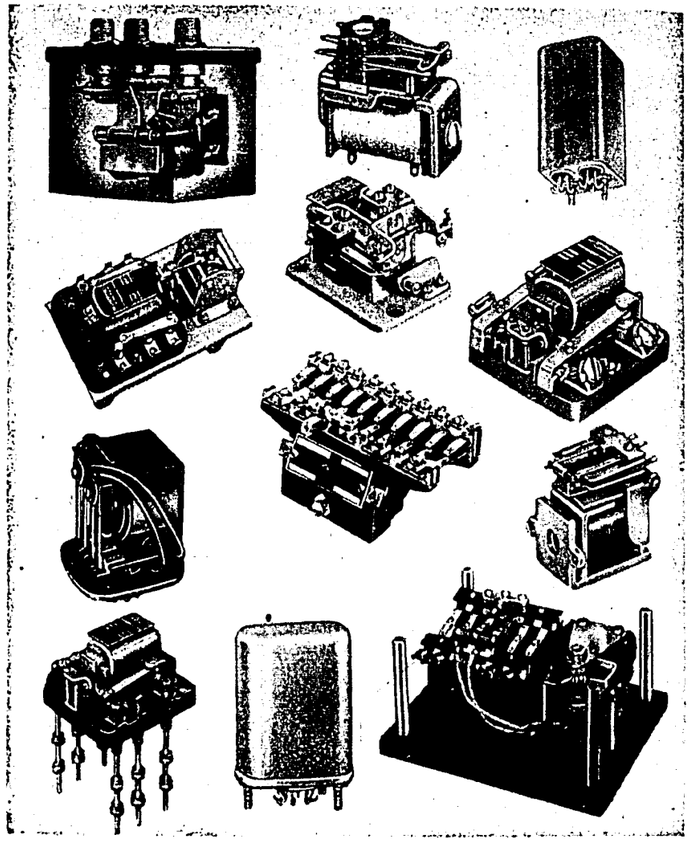
* Furnished with lugs or wire leads. All others, lugs only unless otherwise noted.
‡ Axial wire leads only.
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25. Rheostats
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45. Wirewound, fixed
50. Wirewound, precision

A B Metal Products, Ltd., England, 10, 20, 40

Ace Coil & Electronics Co., 914 Middlesex Ave., Metuchen, N.J., 45, 50
For details see ad on page 143

Aerovox Corp., 740 Belleville Ave., New Bedford, Mass., 5, 15, 40, 45
For details see ad on pages 362-363

Airflyte Electronics Co., 21 Cottage St., Bayonne, N.J., 30
For details see ad on page 5

Allen-Bradley Co., Wis., 10, 20, 25, 35, Composition Fixed

Amalgamated Electronics, N.Y., 40, 50

American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

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Arnhold Ceramics, Inc., N.Y., 15, 20, 30, 35, 45

Associated Research, Inc., Ill., 50

Atlas Resistor Co., N.Y., 40, 45

Automatic Electric Co., Ill., 45

Avion Instrument Corp., N.J., 50

Balco Research Laboratories, N.J., 15, 20, 30

Bendix Aviation Corp., Friez Instrument Div., Baltimore 4, Md., Thermistors
For details see ad on pages 176, 366-367

Biddle Co., James G., Pa., 25

Bond Electronics Corp., N.J., 45, 50

Borg Corp., Geo. W., Wis., 20

Bourns Laboratories, Calif., 20, 25, 40, 45, 50

Brown Electro-Measurement Corp., Ore., 20, 25, 50

Campbell Industries, Inc., St. Elmo Station, Chattanooga 9, Tenn., 15
For details see ad on page 199

Carboloy Dept., General Electric Co., Mich., Thermistors

Carborundum Co., N.Y., 5, 15, 35

Carter Parts Co., Ill., 20, 25, 40, 45

Central Scientific Co., Ill., 10, 20, 25, 40

Centralab, Div. Globe Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis., 10, 20, 40
See complete catalog in last section

Chase Resistor Co., N.J., 15, 30

Chatham Electronics Corp., 630 W. Mt. Pleasant Ave., Newark 2, N.J., 30, 35
For details see ad on pages 404-405

Chicago Telephone Supply Corp., 1142 W. Beardsley Ave., Elkhart, Ind., 10, 20, 25, 40, 50
For details see ad on pages 376-377

Cima Corp., Mass., 20, 45, 50

Clarostat Mfg. Co., Inc., Washington St., Dover, N.H., 10, 20, 25, 35, 40, 45, 50
For details see ad on pages 394-395

Coilcraft, Inc., Ill., 45, 50

Cole Instrument Co., Calif., 20, 40, 45, 50

Columbia Electric Mfg. Co., Ohio, 25

Continental Carbon, Inc., 13900 Lorain Ave., Cleveland 1, Ohio, 45, Deposited Carbon
For details see ad on page 199

Cornell Electronics Corp., N.Y., 20

Corning Glass Works, N.Y., 5, 15

(Continued on page 199)

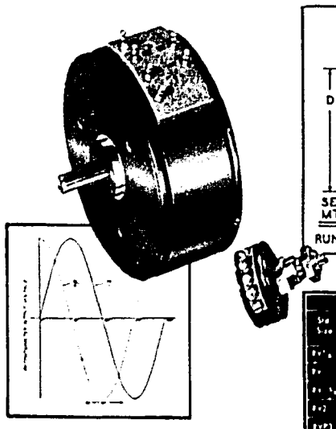
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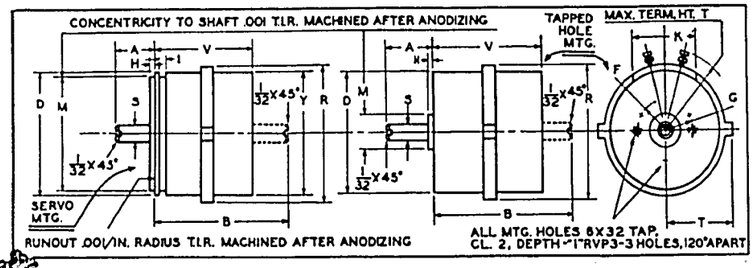
TIC PRECISION POTENTIOMETERS

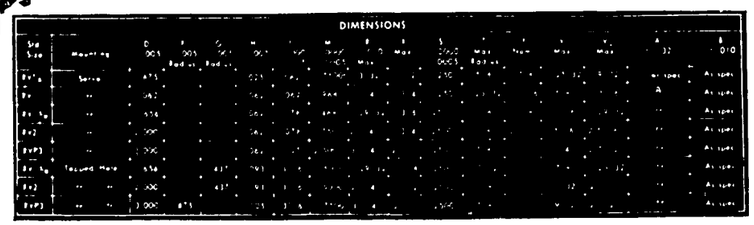
Technology Instrument Corporation potentiometers are designed for application in computing devices, instrumentation, electronic control and servo mechanisms — wherever extreme electrical and mechanical precision is an essential requirement.

As a result of years of custom manufacturing a complete line of standard sizes is available ranging from 7 inches in diameter to the sub-miniature 7/8" in diameter, providing optimum accuracy in minimum size.

Custom design both mechanical and electrical is a featured TIC service. Precision non-linear pots may be designed to meet customer's requirements from either empirical data or implicit functions. Taps and special winding angles anywhere up to 360° continuous winding can be incorporated into both linear and non-linear precision potentiometers.







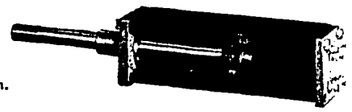
The type RVP3-S59 Sine-Cosine potentiometer, one of the many types standard with the Technology Instrument Corporation, performs two operations in a single potentiometer assembly . . . two wipers spaced 90 degrees apart yield both sine and cosine outputs.

1. Total resistance: 20,000 ohms plus or minus 5 per cent between terminals 1 and 3.
2. Accuracy: Plus or minus .5 per cent of the peak to peak amplitude.
3. Maximum voltage: Conservatively rated at 150 volts between terminal 1 and 3.
4. Life: Guaranteed for at least 500,000 complete cycles in either direction at 30 rpm.
5. Potentiometer base: 3" diameter, precision machined aluminum.
6. Resistance Element: Karma wire with temperature coefficient of .00002 parts per degree centigrade.

Type RVT TRANSLATORY POTENTIOMETER

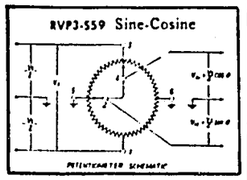
Specifications:

Resistance Range—100 to 100,000Ω for 2½ to 6" strokes.
Resistance Tolerance—±5% (Standard).
Independent Linearity—±1% of Total Resistance (Std.)
Silver Overtravel—5/32 inches at either end.
Power Dissipation—Approx. one watt/inch of stroke length.
Ambient Temperature Range—−55° to +80°C.
Temperature Coefficient—.00002 part per degree C.
Life—1,000,000 complete cycles at 30 strokes/min. or less.
Stroke Lengths—½ to 15 inches.



TRANSLATORY POTENTIOMETER provides output proportional to a linear displacement rather than a rotary motion of a shaft.

RVP3-559 Sine-Cosine



TECHNOLOGY INSTRUMENT CORP. PRECISION POTENTIOMETER CHARACTERISTICS

Style	Nominal resistance range	Resistance Tolerance Std	Resistance Tolerance Best	Independent Linearity Std	Independent Linearity Best	Power Rating	Electrical rotation angle Std	Electrical rotation angle Max*	Electrical Rotation Angle Tolerance Std	Electrical Rotation Angle Tolerance Best	TORQUE AT 25° C. sleeve bearing Std	TORQUE AT 25° C. sleeve bearing Min
RVP3	300 200 000Ω	±5%	±0.5%	±0.2%	above 5KΩ ±0.1%	6 Watts @ 25° C	320	358	±3	±0.5	1 oz in	5 oz in.
RV2	100 150 000Ω	±5%	±0.5%	±3%	above 5KΩ ±1%	4 Watts @ 25° C	320	358	±3	±0.5	1 oz in	5 oz in.
RV1 1/8	200 150 000Ω	±5%	±0.5%	±0.5%	above 10KΩ ±0%	3 watts @ 25° C	320	357	±3		1 oz in	5 oz in.
RV1	200 100 000Ω	±5%	±%	±%	above 5KΩ ±0.4%	2 Watts @ 25° C	320	355	±5	±2	1 oz in	3 oz in.
RV1/8	200 40,000 Ω	±5%	±%	±5%	above 1KΩ ±0.5%	2 Watts @ 25° C	320	350	Nom	±3	1 oz in	3 oz in.
RV3 8*	200 200 000Ω	±5%	±%	±%	above 5KΩ ±2%	8 Watts @ 25° C	3 5	356	±3		6 oz in	3 oz in.
RV3 12*	200 500 000Ω	±5%	±%	±%	above 5KΩ ±2%	12 Watts @ 25° C	3 5	358	±3		6 oz in	3 oz in.

*special bakelite Model
*Non Shorting. Units may also be provided with continuous winding over 360 electrical rotation
Dielectric strength 5 sec Types RVP3 RV2 RV1½ RV1 RV⅛ 900 V D C Types RV3 8 RV3 12 2000 V D C

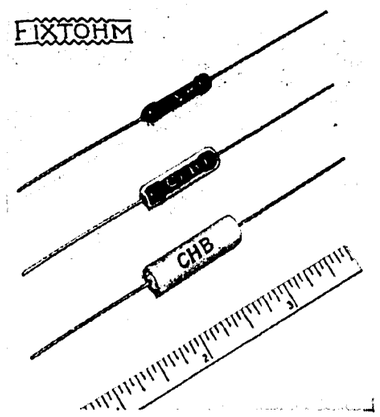
Technical Catalog — yours for the asking. Contains detailed information on all TIC Instruments, Potentiometers and other equipment. Get your copy without obligation — write today.

TECHNOLOGY INSTRUMENT CORP.

535 Main Street · Acton, Massachusetts · Telephone: ACton 3-7711

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RESISTORS



FIXED, ACCURATE NON-WIREWOUND

•

DEPOSITED CARBON RESISTORS
Western Electric Co. Licensee

•

Three finishes to meet varied applications and requirements

•

Three power ratings—
½, 1 & 2 watts

•

All have crystalline carbon film deposited on ceramic core

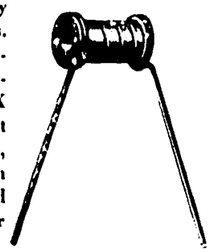
USE "FIXTOHM" BECAUSE . . .
ACCURACY: ± 1.0% standard
STABILITY: ± 0.3% average resistance change
H. F. CHARACTERISTICS ARE EXCELLENT
SMALL SIZE * * * LOW COST
TEMPERATURE COEFFICIENT: low, negative

WRITE FOR TECHNICAL DATA AND PRICES

CAMPBELL INDUSTRIES, INC.
ST. ELMO STATION CHATTANOOGA 9, TENN.

CONTINENTAL NOBLELOY RESISTORS

For initial accuracy and long life stability specify "Nobleloy" resistors for your critical circuits. The Nobleloy resistor is a metal film type resistor exhibiting excellent operating characteristics. The rugged construction of the X & PX styles offer trouble free operation under most severe conditions. They are available in ½, 1, 2 & 5 watt ratings in a resistance range of 1 ohm to 30 megohm, in tolerances of ½%, 1% and 5%. The size illustrated is a ½ watt resistor 5/8" long × 9/32" diameter.



A miniature type Nobleloy resistor is available in the ½ watt size as per illustration. A low cost, space saving resistor, the NF½ offers excellent operating characteristics. Designed to meet the requirements of government specification MIL-R-10509 for a fixed accurate nonwire wound resistor. The NF½ is available in a resistance range of 1 ohm to 1 megohm in tolerances of 1% and 5%.



WRITE FOR CATALOG AND PRICES

CONTINENTAL CARBON, INC.
13902 LORAIN AVE. CLEVELAND 11, OHIO CLEARWATER 1-6500

Resistors 49

(Continued from page 197)

Cutler-Hammer, Inc., Wis., 25
Dale Products, Inc., 1318-28th Ave., Columbus, Neb., 15, 30, 45, 50, Power
For details see ad on pages 452-453
Daven Co., N.J., 20, 25, 30, 35, 45, 50
DeJur-Amsco Corp., 45-01 Northern Blvd., Long Island City 1, N.Y., 20, 25, 40
For details see ad on pages 152, 168
Delta Electrical Instr. Co., Calif., 50
Eastern Specialty Co., Pa., 25
Electra Manufacturing Co., 2537 Madison Ave., Kansas City 8, Mo., 15
For details see ad on page 201
Electro-Mec Laboratory, 21-09 43 Ave., Long Island City 1, N.Y., 20, 40, 50
For details see ad on page 31
Electro-Temp., Inc., Mich., 40, 45, 50
Electron Radar Products, Ill., 30, 35
Electronic Associates, Inc., Long Branch Ave., Long Branch, N.J., Precision Sine-Cosine Pots
For details see ad on page 318
Electronic Designs, Inc., N.Y., 45, 50
Electronic Specialty Products, N.J., 50
Electronics of Colorado, Inc., Colo., Metal Film
Erie Resistor Corp., 644 W. 12 St., Erie, Pa., 5, 15
For details see ad on page 18
Fairchild Camera & Instrument Corp., Robbins Lane, Syosett, L.I., N.Y., 20
See complete catalog in last section
Federal Instrument Corp., N.Y., 50
Ford Engineering Co., Calif., 20
Fugle-Miller Laboratories, 398 Main St., Metuchen, N.J., 50
For details see ad on page 145
Globe Products Corp., Conn., 30
Gamewell Co., Mass., 20, Precision
General Electric Co., Mich., Thermistors
General Electric Co., N.Y., 25, 45
General Hermetic Sealing Corp., 99 E. Hawthorne Ave., Valley Stream, L.I., N.Y., 30
For details see ad on page 275
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 20, 25, 40, 45, 50
For details see ad on pages 380-381, Cover IV
Giannini & Co., Inc., G. M., Calif., 20, 25, 50
Girard-Hopkins, Calif., 5
Glenco Corp., 212 Durham Ave., Metuchen, N.J., 15
For details see ad on page 137
Gray Instrument Co., Pa., 45, 50
Gyromechanisms, N.Y., 20
Hardwick-Hindle, Inc., N.J., 20, 25, 40, 45
Helipot Corp., 916 S. Meridian Ave., South Pasadena, Calif., 20, 25, 40, 50
See complete catalog in last section
Hycor Co., Inc., Calif., 50
Instrument Resistors Co., N.J., 45, 50
Interelectronics Corp., N.Y., 5, 10, 20
International Resistance Co., Pa., 5, 10, 15, 20, 30, 35, 40, 45, 50
I-T-E Circuit Breaker Co., Pa., 40, 45, 50
Jarvis Electronics Corp. Ill., 20, 40
Jet Electronics, Inc., Mass., 20
K.-F Dev. Co., Calif., 20, 25, 40, 45, 50
Keystone Carbon Co., Pa., Thermistors
Knapp Radio Specialties, Inc., Mass., 20

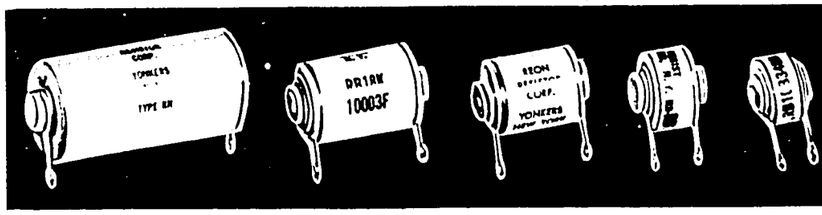
(Continued on page 201)

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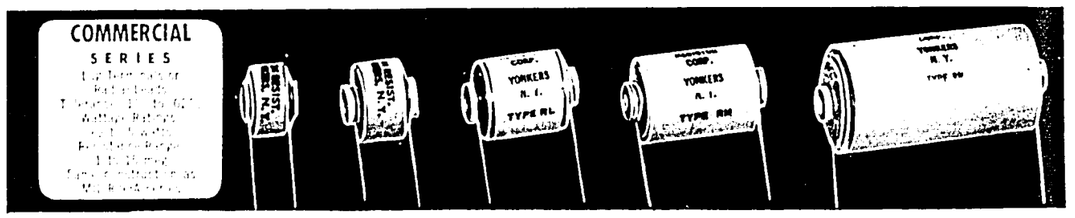
PROMPT DELIVERY...

of Precision Wire Wound Resistors

in sample or production quantities!



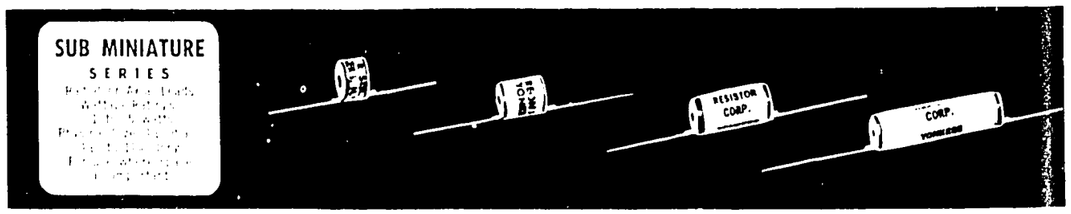
MIL-R-93A
SERIES
Lug Terminals
Wattage Ratings:
¼ to 1 watt
Tolerance: 1% to .02%
Resistance Range:
.1 ohm to 4 meg.
Exceed all MIL-R-93A specifications



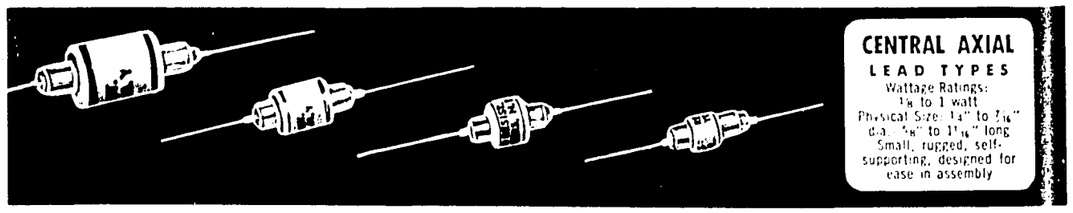
COMMERCIAL
SERIES



MINIATURE
SERIES
Radial or Axial Leads
Wattage Ratings:
.15 to 1.5 watts
Resistance Range:
1 ohms to 1.6 meg.
Physical Size: .3" dia. - ¼" to 1¾" long



SUB MINIATURE
SERIES



CENTRAL AXIAL
LEAD TYPES
Wattage Ratings:
⅛ to 1 watt
Physical Size: ¼" to 7/16" dia. ⅜" to 1 1/16" long
Small, rugged, self-supporting, designed for ease in assembly

Sub-Sub Miniature Series The smallest precision wire wound resistors. For use in tight spaces. Only 3/32" long by 7/16" diameter.

Hi-Temp Series For applications requiring resistors capable of withstanding severe thermal shock and extreme temperatures. Operate from −65 to 200 C. Available in all types shown.

Hi-Watt Series Available in all series shown. Wound with special low temperature coefficient wire to provide power dissipation ratings up to 10 watts.

Encapsulated Series Hermetically sealed resistors completely immune to immersion and humidity. Designed to exceed all MIL-R-93A requirements.

Our Engineering Staff welcomes the opportunity to help you with YOUR problems! For further details write for Bulletin E-6!

Only the finest material, workmanship and product control techniques are used in production of Reon Precision Wire Wound Resistors.

Where *quality* and *dependability* count...

Specify *Reon Precision Wire-Wound Resistors!*

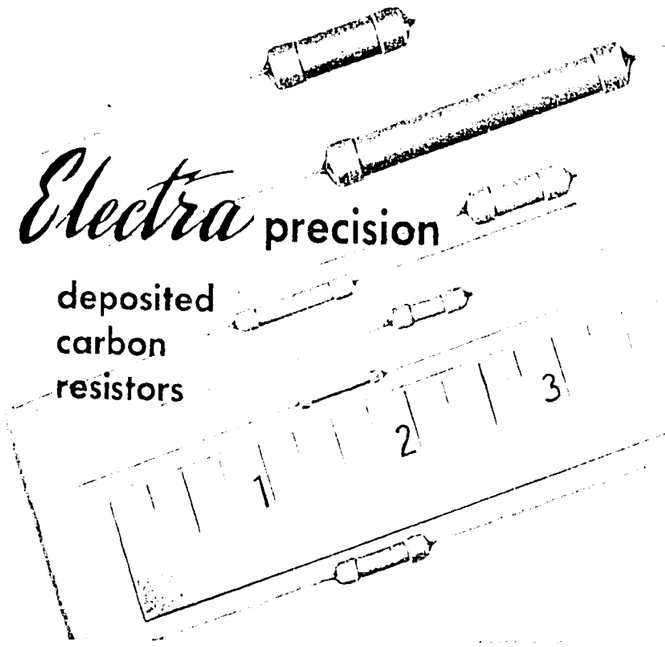
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Philadelphia	Phil Goldstein, H. L. Hoffman & Co., 1123 Western Saving Fund Bldg., Tel. Pe 5-9966
Cleveland, Ohio	Frank W. Bauer, 4144 Marvin Avenue
Chicago, Ill.	Ritter Sales Co., 612 North Michigan Ave., Tel. Su 7-7759
St. Paul, Minn.	Edward Hoffman, 1641 Scheffer Ave., Tel. Emerson 3371
Merriam, Kan.	Koenig Sales, 6359 Antioch Ave., Tel. Hedrick 3166
Dallas, Tex.	John B. Guenther, 7322 Marquette Ave., Tel. Emerson 6286
Albuquerque, N.M.	Neil Powell, Kittleson Co., 106A South Cornell, Tel. 7-9581
Los Angeles, Cal.	Harold A. Kittleson Co., 7614 Melrose Ave., Tel. Whitney 1167

REON RESISTOR CORP.

117 STANLEY AVENUE • YONKERS, N. Y.

YO 5-9850



Electra precision

deposited carbon resistors

8 sizes to meet circuit requirements of high stability, accuracy & low cost

Electra carbon coat resistors provide the precision, stability and accuracy to meet a variety of applications and requirements in advanced electronic circuits. Electra offers the benefits of low voltage coefficient, low capacitive and inductive characteristics in high frequency applications, in addition to small physical size and economy.

STABILITY — regardless of resistance tolerance, all Electra deposited carbon resistors are equally high in stability.

ACCURACY — ±1% is standard but resistance value tolerances of ±2%, ±5% and ±10% are available.

ECONOMY — When the advantages of stability, accuracy and small physical size are considered, Electra resistors are your most economical buy.

PART NUMBER	Wattage	Max. Oper. Rated Voltage	Resist. Range	DIMENSIONS Length A	Dia. B
DC ⅛	125	250	4 Ω 250 K Ω	9/32	5/64
DC ¼	25	300	5 Ω 1 Megs	17/32	3/32
DC ½	5	500	6 Ω 5 Megs	13/16	11/64
DC ½A	5	350	3 Ω 2.2 Megs	19/32	11/64
DC ½B	5	500	3 Ω 5 Megs	11/16	15/64
DC ½C	5	350	2 Ω 1.1 Megs	15/32	11/64
DC 1	1	500	3 Ω 10 Megs	15/16	9/32
DC 2	2	750	10 Ω 50 Megs	2 1/16	9/32

* Lead Length C — Lengths of leads for all resistors shown above are 1½ inches

Hermetically Sealed Resistors Are Available in 6 Sizes From ¼ Watt to 2 Watts.

Write for Bulletin E-1 for complete information -address

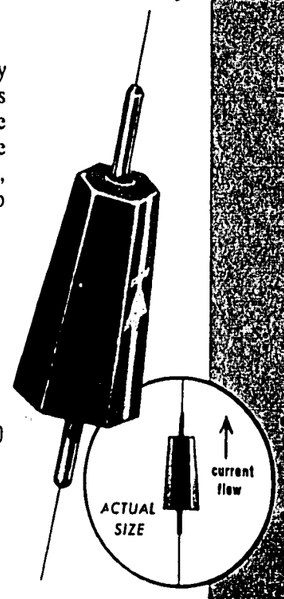
Electra carbon-coat PRECISION RESISTORS

Electra Manufacturing Co.
Resistor Division
2537 Madison Kansas City, Mo.

RR Germanium Diodes

FEATURING POLARITY AT A GLANCE!

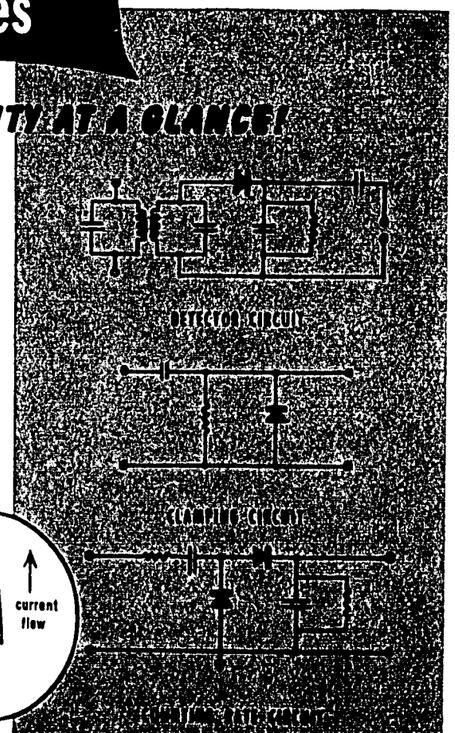
The taper of the diode case allows polarity identification at a glance or at a touch thus speeding up assembly and reducing the possibility of error in connecting the diode into the circuit. Taper also prevents rolling, especially when the leads are cut off to permit mounting the diode in clips!



TYPES AVAILABLE

1N34	1N55	*1N69
1N34A	1N55A	*1N70
1N38	1N58	1N72
1N38A	1N58A	1N75
1N48	1N63	*1N81
1N51	1N64	1N110
1N52	1N65	

*JAN type



RR Germanium Transistors

POINT CONTACT TRANSISTORS

Available in a variety of stable controlled types suitable for both fast and medium speed switching circuits and high frequency amplifiers. Advanced mechanical design for economical production. Heat conducting metal case, standard baking, choice of solder or plug in.

PHOTO TRANSISTORS

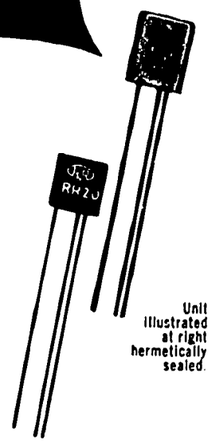
[illegible] power transducer [illegible] function [illegible] DC amplifier

JUNCTION POWER TRANSISTORS

For audio power up to 2 watts

PNP JUNCTION TRANSISTORS

Tiny, stable high gain units, most economical of power, may be soldered in place or socketed in a recommended RTMA transistor socket. They are suitable for audio amplifiers, servo amplifiers and transformer-coupled carrier amplifiers. Available in plastic or hermetically sealed in metal and glass.



Unit illustrated at right hermetically sealed.

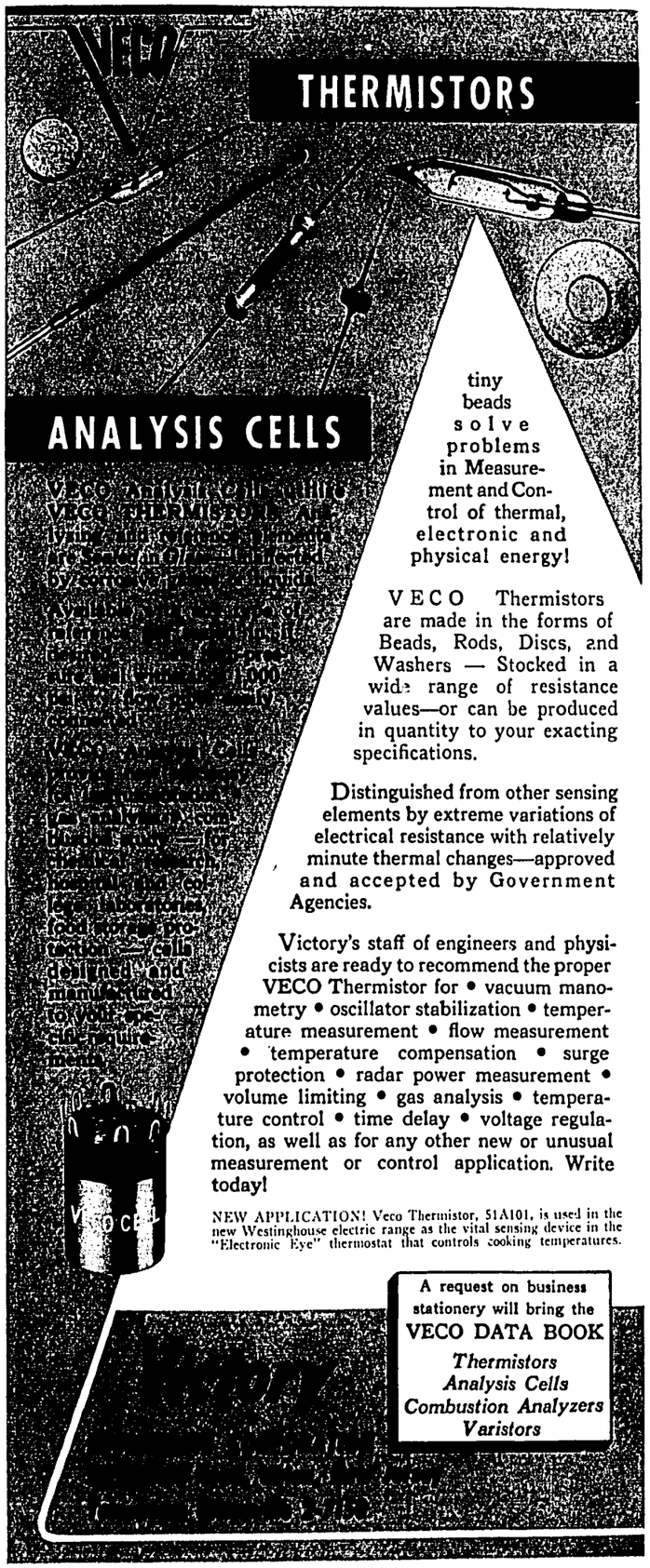
Our engineers will be glad to offer suggestions regarding your Germanium Diode and Transistor applications without obligation. Write to Dept. I

Selectron and Germanium Division

RADIO RECEPTOR COMPANY, INC.

RR Since 1922 in Radio and Electronics RR

Sales Dept 251 W 19th St, New York 11 N Y · Factory 84 N 9th St, Brooklyn 11 N Y

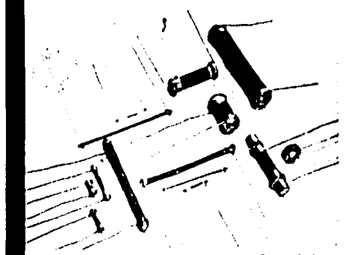


(Continued from page 201)

Sensitive Research Instrument Co., 9-11 Elm Ave., Mt. Vernon, N.Y., 50
For details see ad on page 307
Servotrol Co., Ill., 20
Shallcross Mfg. Co., 524 Pusey Ave., Collingdale, Pa., 15, 30, 45, 50
For details see ad on page 98
Specialties, Inc., N.Y., 20
Speer Carbon Co., Pa., 5
Sprague Electric Co., Mass., 15, 35, 45, 50
Stackpole Carbon Co., Tannery St., St. Marys, Pa., 5, 10, 20, 25
For details see ad on pages 442-443
States Co., Conn., Woven Non-Inductive
Summers Gyroscope Co., Calif., 50
Supreme, Inc., Miss., 45, 50
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 20
For details see ad on pages 417-420
Tech Laboratories, Inc., N.J., 40, 50
Technology Instrument Corp., 535 Main St., Acton, Mass., 20, 50, Precision Wire Wound
For details see ad on pages 198, 334
Telvision Laboratories, Inc., Ill., 50
Thwing-Albert Instrument Co., Pa., 20
Trans-Sonics, Inc., Mass., 20, Pressure Actuated
Vectron, Inc., 400 Main St., Waltham 54, Mass., 20, 25, 40
For details see ad on page 308
Victoreen Instr. Co., Ohio, 15, 30, 35
Victory Engineering Corp., Springfield Rd., Union, N.J., Thermistors
For details see ad on page 203

(Continued on page 205)

Stupakoff CERAMIC RESISTORS



Stupakoff Temperature Sensitive Resistors are used for the control of voltage, current, pressure, temperature, humidity, radio oscillation, resistance and resistance compensation. Stupakoff Insulcon units are used as an infra-red light source and as heating elements. Both are supplied in the form of rods, tubes, discs, bars, rings, etc., and complete with terminals.

STUPAKOFF CERAMIC & MFG. CO.

LATROBE, PENNSYLVANIA

Perfection born in an inferno



DIAMONDS AND "GROWN-JUNCTION" TRANSISTORS ARE CREATED AT WHITE-HOT TEMPERATURES IN ONE OPERATION. BOTH ARE... *PRODUCTS OF PERFECTION*

GERMANIUM PRODUCTS "GROWN JUNCTION" TRANSISTORS Are Transformed from Germanium Dust into a Superior Transistor, a Man-Made Diamond, at a Crucible Temperature over 900 C

ENDS TRANSISTOR UNCERTAINTIES. Engineers once plagued with transitorization uncertainties, about supply, engineering information, quality of transistors, etc., have learned that specifying Germanium Products Transistors, made by the "Grown Junction" method, eliminates these problems.

SUPERIOR CHARACTERISTICS. "Grown-Junction" transistors electronic characteristics are unmatched. They provide: The highest current multiplication factors to activate current operated devices. The highest collector resistance, and operating voltages for greatest battery efficiency—up to 50 volts. The highest frequency response usable in the R.F. spectrum.

ENGINEERING BACKING. A complete transitorization engineering service which can guide you to the solution of your circuitry and production problems.

ADEQUATE SUPPLIES. Ever increasing production facilities have kept output abreast of growing industry demand. Germanium Products Corp., the first in the industry to make junction transistors commercially available, is now supplying in production quantities many different NPN Grown-Junction Transistors.

	RD517	RD2520	RD2521	RD2525
Alpha	.90 minimum	.95 minimum	.95 minimum	.99 minimum
Alpha Cut-off Frequency	1.5 megacycles	3.0 megacycles	3.0 megacycles	5.0 megacycles
Collector Resistance	250,000 ohms average	500,000 ohms minimum	1.0 megohms average	200,000 ohms minimum
Maximum Collector	30V	40V	50V	30V

Federated

SEMI-CONDUCTOR CO.

EXCLUSIVE SALES AGENTS FOR GERMANIUM PRODUCTS CORP

56 Dey Street N Y 7 N Y

"INDUSTRIAL"
for
ELECTRONIC COMPONENTS



Precision engineered electronic components and connecting devices for all your needs.

- LAMINATED TUBE SOCKETS
- TERMINAL STRIPS
- WIRE ASSEMBLIES
- BAKELITE STAMPINGS
- TERMINAL BOARD ASSEMBLIES

—NEW ITEMS—

- TUNER STRIPS, SOCKETS and BRACKETS for UHF

Our extensive design and production facilities are available for developing your special requirements and applications. Representatives in principal cities throughout U.S.A. Call or write for samples and information. ORegon 7-1881, Dept. I.

INDUSTRIAL HARDWARE Mfg. Co., Inc.
109 PRINCE STREET • NEW YORK 12, N. Y.

Resistors

(Continued from page 205)

Vokar Corp., Mich., 45, 50
Vulcan Electric Co., Mass., 25
Ward Leonard Electric Co., N.Y., 20, 25, 40, 45
Wayne-Kerr Laboratories, Ltd., Sycamore Grove, New Malden, Surrey, England, 20, Precision, 50
For details see ad on page 316
Welch Mfg. Co., W. M., Ill., 10, 25
Western Electronic Enterprises, Calif., 5
Waters Manufacturing, Inc., Mass., 20, 40, 50
Waters, Inc., Robert A., Mass., 20
Westinghouse Electric Corp., Pa., 35
White Industrial Division, S. S., N.Y., 35
Wirt Co., Pa., 20, 25, 40, 45
Yonkers Industries, Inc., N.Y., 45, 50
Zenith Optical Laboratory, N.Y., 35

50. Semi-Conductors.

5. Germanium diodes 10. Transistors

American Machine & Foundry Co., Mass., 5, 10
Amperex Electronic Corp., N.Y., 5
Berkshire Laboratories, 584 Beaver Pond Rd., Lincoln, Mass., 5
For details see ad on page 315
Bomac Laboratories, Inc., Salem Road, Beverly, Mass., 5
For details see ad on pages 382-383
CBS-Hytron Div., Columbia Broadcasting System, Mass., 5, 10
Electron Radar Products, Ill., 5, 10

Semi-Conductors 49-51

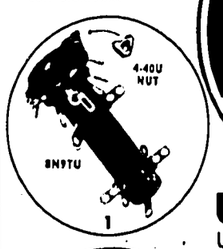
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5, 10
For details see ad on pages 368-373
Federated Semi-Conductor Co., N.Y., 10
General Electric Co., N.Y., 5, 10
Germanium Products Corp., N.J., 5, 10
Gudeman Co., 340 W. Huron St., Chicago 10, Ill., 5
For details see ad on page 22
Hughes Aircraft Co., Florence Ave., at Teale St., Culver City, Calif., 5
For details see ad on page 68
International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif., 5
For details see ad on page 188
Kearfott Co., Inc., 1150 McBride Ave., Little Falls, N.J., Galena Cells
For details see ad on page 53
Kemtron Electron Products, Inc., Mass., 5, 10, Silicon Diodes
Keystone Electronics Co., 114 Manhattan St., Stamford, Conn., 5, 10
For details see ad on page 162
Lansdale Tube Co., Pa., 5
Microwave Associates, Inc., Mass., Sicicon Diodes
National Union Radio Corp., Transistor Div., 237 Jacksonville Rd., Hatboro, Pa., 5, 10
For details see ad on page 46
Northern Electric Co., Ltd., Canada, 10
RCA Victor Div., Tube Dept., 415 S. 5th St., Harrison, N.J., 5, 10
For details see ad on pp. 88, 440-441
Radio Development & Research Corp., N.J., 5, 10
Radio Receptor Co., Inc., 251 W. 19th St., New York 11, N.Y., 5, 10
For details see ad on pages 190, 202
Raytheon Mfg. Co., Radio Receiving Tube Div., 55 Chapel St., Newton 58, Mass., 5, 10
For details see ad on page 228
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 5, 10
For details see ad on pages 417-420
Texas Instruments Inc., Tex., 10
Transistor Products, Inc., Snow & Union Sts., Brighton Sta., Boston 35, Mass., 10
For details see ad on page 206
Transitron Electronic Corp., Mass., 5, 10
Tung-Sol Electric, Inc., 95 Eighth Ave., Newark 4, N.J., 5, 10
For details see ad on page 94
Victory Engineering Corp., Springfield Rd., Union, N.J., Thermistors
For details see ad on page 203
Westinghouse Electric Corp., N.Y., 5, 10
Westinghouse Electric Corp., Pa., 10

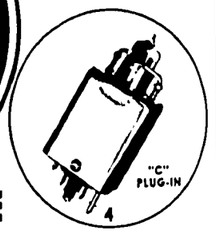
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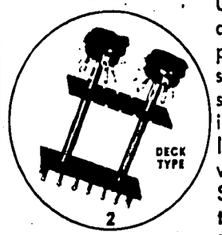
Socket-Turrets for most tube types will carry a wide variety of circuit elements.

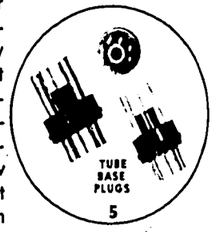
Vector
SOCKET-TURRETS

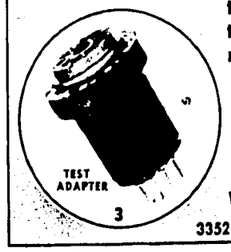
Plug-Ins of many sizes with sockets and plugs as desired provide great flexibility in circuitry.

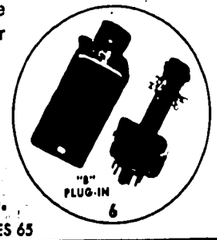












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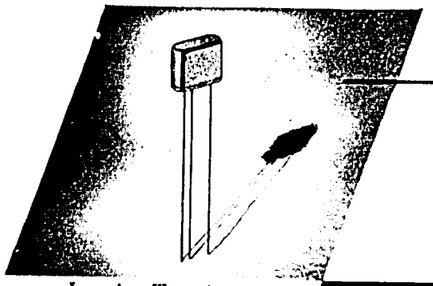
Vector Electronic Co.
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51. Sockets.

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10. Receiving tube
15. Transmitting tube
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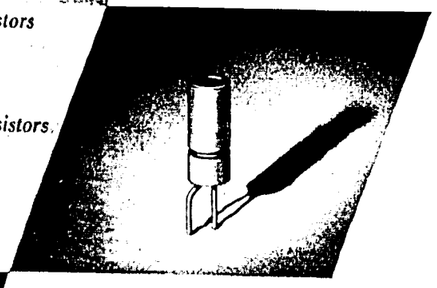
Accurate Electronics Corp., Ohio, 5, 10
Alden Products Co., 113 N. Main St., Brockton 64, Mass., 5, 10, 15, 20
For details see ad on pages 150-151
American Machine & Foundry Co., Mass., 5, 10, 15, 20
American Phenolic Corp., 1830 S. 54 Ave., Chicago 50, Ill., 5, 10, 15, 20
For details see ad on page 2
(Continued on page 207)

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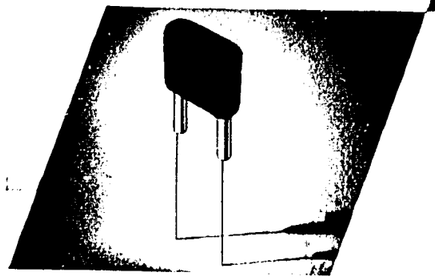


Junction Transistors

Point Contact Transistors

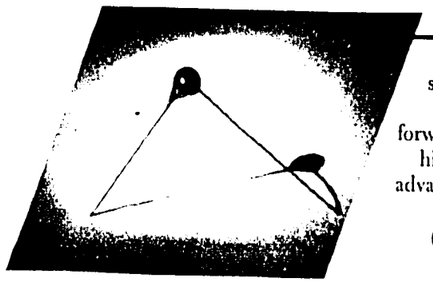


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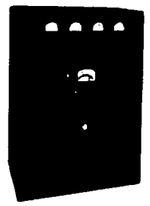
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(Continued from page 205)

American Radio Hardware Co., N.Y., 10, 15

Cinch Mfg. Corp., 1026 S. Homan Ave., Chicago 24, Ill., 20
For details see ad on pages 384-385

Eby, Inc., Hugh H., 4700 Stenton Ave., Philadelphia 44, Pa., 10, 15
For details see ad on page 207

Eitel-McCullough, Inc., 198 San Mateo Ave., San Bruno, Calif., 15
For details see ad on pages 402-403

Elco Corp., Pa., 10, 15, 20

Electronic Heating Corp., Mass., 15

Electronic Mechanics, Inc., 101 Clifton Blvd., Clifton, N.J., 10, 15
For details see ad on page 278

Erie Resistor Corp., 644 W. 12 St., Erie, Pa., 5
For details see ad on page 18

Friedman Co., N.Y., 10, 15

General Cement Mfg. Co., Ill., 10

General Electric Co., N.Y., 15, 20

General Laminated Prods. Co., Inc., Ill., 20

Industrial Hardware Mfg. Co., Inc., 109 Prince St., New York 12, N.Y., 10, 20
For details see ad on page 205

Insulation Products Co., Pa., 10, 15

Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 10
For details see ad on page 134

Johnson Co., E. F., Waseca, Minn., 10, 15
For details see ad on page 183

Jones Div., Howard B., Cinch Mfg. Corp., 1026 S. Homan Ave., Chicago 24, Ill., 20
For details see ad on pages 384-385

Knapp Radio Specialties, Inc., Mass., 10

Kulka Electric Mfg. Co., Inc., N.Y., 20

Malco Tool & Mfg. Co., 4023 W. Lake St., Chicago 24, Ill., Parts
For details see ad on page 272

Methode Manufacturing Corp., 2021 W. Churchill St., Chicago 47, Ill., 10
For details see ad on page 208

Millen Mfg., Co., Inc., James, 150 Exchange St., Malden 48, Mass., 10, 15
For details see ad on page 334

Mycalex Corp. of America, 125 Clifton Blvd., Clifton, N.J., 10
For details see ad on pages 430-431

Mycalex Tube Socket Corp., 30 Rockefeller Plaza, New York 20, N.Y., 10
For details see ad on pages 430-431

National Company, Inc., 61 Sherman St., Malden 48, Mass., 10, 15
For details see ad on pages 434-435

Philmore Mfg. Co., Inc., N.Y., 10

Plastic Mold & Engineering, R.I., 10

Radio Receptor Co., Inc., 251 W. 19 St., New York 11, N.Y., 15
For details see ad on pages 190, 202

Remler Co., Ltd., Calif., 10

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 10, 15, 20
For details see ad on pages 417-420

Ucinite Company, 459 Watertown St., Newtonville 60, Mass., 10
For details see ad on page 447

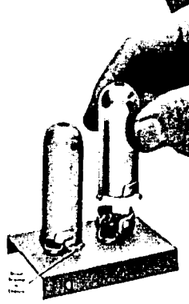
U. S. Gasket Co., 611 N. 10 St., Camden 1, N.J., 10, 15
For details see ad on pages 450-451

(Continued on page 208)

TUBE SOCKET "Firsts"

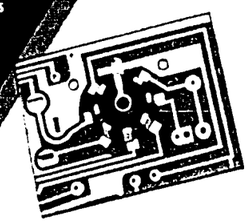
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For details see ad on page 156

52. Switches.

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A B Metal Products, Ltd., England, 15, 25, 40, 45, 65

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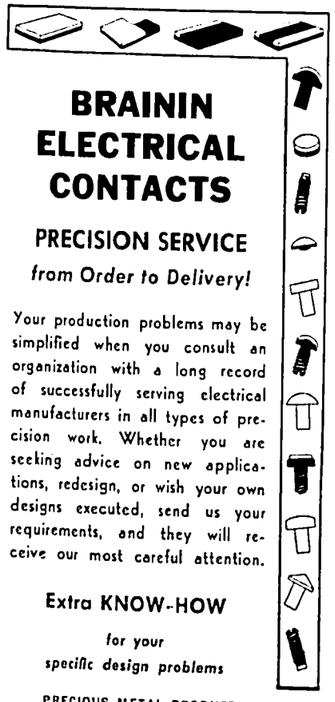
Allard Instrument Corp., N.Y. 40, 55, Solenoids

American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 65

American Radio Hardware Co., N.Y., 15, 45, 65

Applied Science Corp. of Princeton, P.O. Box 44, Princeton, N.J., 40
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Armstrong Co., A. T. R., Canada, 5, 20, 25, 30, 40, 45, 50



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For details see ad on page 408

Bendix Aviation Corp., Mich., 30

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For details see ad on pages 103, 248

Blonder-Tongue Laboratories, Inc., N.J., 55

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For details see ad on page 208

Bristol Co., Conn., 55

C and H Sales Co., Calif., 65

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Cannon Electric Co., 3209 Humboldt St., Los Angeles 31, Calif., Solenoid
For details see ad on page 148

Cardwell Mfg. Corp., Allen D., Conn., 5

Carling Electric, Inc., Conn., 40, 45, 50, 65

Carter Parts Co., Ill., 15, 25, 40, 65

Centralab., Div. Globe Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis., 5, 25, 30, 40, 45, 50, 65
See complete catalog in last section

Cherry Electrical Products Corp., Ill., 35

Chicago Telephone Supply Corp., 1142 W. Beardsley Ave., Elkhart, Ind., 5, 35, 40
For details see ad on pages 376-377

Circuit Controls Co., Ill., 15, 20, 35, 50, 65

Clare & Co., C. P., Ill., 15

Clarostat Mfg. Co., Inc., 1 Washington St., Dover, N.H., 40
For details see ad on pages 394-395

Coaxial Connector Co., 35 N. 2 Ave., Mt. Vernon, N.Y., 10
For details see ad on page 155

Cole Instrument Co., Calif., 5, 30, 40, 50

Comar Electric Co., 3349 W. Addison St., Chicago 18, Ill., 25, 35, AC Solenoids
For details see ad on page 195

Communication Products Co., Inc., Broadway & Clark St., Marlboro, N.J., 5, 35
For details see ad on page 286

Connecticut Telephone & Electric, Conn., 50, 65, Solenoids

Cook Electric Co., Ill., 55

Coral Designs Div., H. G. Dietz Co., N.Y., Air Flow

Cutler Hammer, Inc., Wis., 20, 25, 30, 35, 40, 45, 50, 65

Daven Co., N.J., 40, 50

Douglas Microwave Co., Inc., 338 E. 95 St., New York 28, N.Y., 10
For details see ad on page 324

Eastern Specialty Co., Pa., 40

Edison, Inc., Thomas A., Instrument Div., 62 Lakeside Ave., West Orange, N.J., 55
For details see ad on page 194

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Federal Anti-Capacity Switch Corp., N.Y., 15, Multi Circuit

Federal Electric Products Co., N.J., 30, 55, 65

Federal Screw Products, Inc., 224 W. Huron St., Chicago 10, Ill., 65
For details see ad on page 270

Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 35, 40
For details see ad on pages 368-373

Friedman Co., N.Y., 65

G-V Controls, Inc., N.Y., 55

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General Communication Co., 681 Beacon St., Boston 15, Mass., 10
For details see ad on page 210

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General Electric Co., Conn., 65

General Electric Co., N.Y., 20

General Electric Co., N.Y., 30, 65

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Grigsby-Allison Co., Inc., Ill., 5, 10, 25, 30, 40, 45, 50, 65

Guardian Electric Mfg. Co., 1621 W. Walnut St., Chicago 12, Ill., 30, 35
For details see ad on page 62

Hart Manufacturing Co., Conn., 25, 40, 65

Heinemann Electric Co., N.J., Circuit Breakers

Industrial Products Co., Conn. 10

Industrial Timer Corp., N.J., Time

Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 45, 65
For details see ad on page 134

J. B. T. Instruments, Inc., Conn., 5, 40, 50, 65

JFD Mfg. Co., Inc., 6101 16 Ave., Brooklyn 4, N.Y., 15, 45, 65
For details see ad on pages 140, 242

Jennings Radio Mfg. Co., 970 McLaughlin Ave., San Jose 8, Calif., 30 Vacuum
For details see ad on pages 390-392

Kellogg Switchboard & Supply Co., Dept. 69, 79 W. Monroe St., Chicago 3, Ill., 15
For details see ad on page 106

Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 10, 40
For details see ad on pages 414-415

Knapp Radio Specialties, Inc., Mass., 40

Kriser Corp., N.Y., Foot

Kulka Electric Mfg. Co., Inc., N.Y., 25, 50, 55, 65

Leland, Inc., G. H., Ohio, 40, Circuit Selector

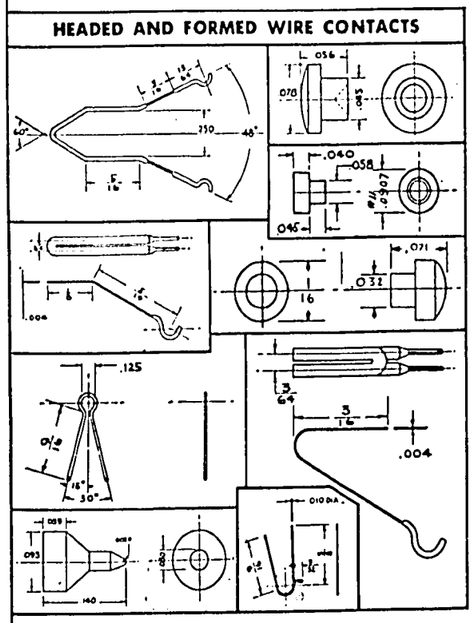
Lesa, S. P. A., Italy, 40

(Continued on page 210)

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REMOTE CONTROL, 28 VDC TYPES — Weight: 25 oz. (average). Size: 4½" x 3" Diameter (average).

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REMOTE CONTROL, 115 VAC TYPES

Spring Return — Parallel connector configuration. Single circuit, 2 positions. Optional manual control. Switching Time: 27 milliseconds. Switching Rate: 45 cpm. Weight: 3½ lbs. Size: 5⅜" x 6¼" x 4" overall.

and our latest model:

Radial connector configuration — Single circuit, 2 to 6 positions. Switching Time: 0.3 second (average). Switching Rate: 20 cpm (continuous). Weight: 24 to 28 oz. depending upon connectors. Size: 4½" x 3" Diameter.

MANUAL CONTROL TYPES

Radial connector configuration — Single circuit, 2 to 6 positions. Weight: 8 to 16 oz. (depending upon connectors). Size: 3⅛" x 3" Diameter.

Parallel connector configuration — Single circuit, 2 to 6 positions. Weight: 21 to 25 oz. (depending upon connectors). Size: 4" x 3" Diameter.

X BAND TEST EQUIPMENT

Test sets BHX and CBX are portable microwave signal generators, designed for testing and adjusting beacon equipment and radar systems.

The frequency range of these test sets is 8500 mc to 9600 mc. They can measure external signals or supply a known output signal. Frequency is measured by a precision meter with calibrated dial. Power is measured by means of a calibrated RF attenuator and a thermister bridge type wattmeter.

GENERAL COMMUNICATION COMPANY

Linemaster Switch Corp., Bald Hill, Woodstock, Conn., Foot
For details see ad on page 211
Littelfuse, Inc., 1865 Miner St., Des Plaines, Ill., 20
For details see ad on page 58
Loge Sound Engineers, J. M., Calif., 15
Mallory & Co., Inc., P. R., Ind., 5, 30, 40, 65, Timer
Maxson Corp., The W. L., N.Y., 35
May, Donald M., Calif., Solenoids
Mercoid Corp., Ill., 20
Micro, Div. M-H Regulator Co., Ill., 20, 25, 35, 40, 65
Minneapolis-Honeywell Regulator, Minn., 20
Molded Insulation Co., Pa., 35, 65
Mossman, Inc., Donald P., Ill., 15, 25, 30, 40, 50, 65
Muirhead & Co., Ltd., England, 15, 40
Muter Co., Ill., 45
Mycalex Electronics Corp., 30 Rockefeller Pl., New York 20, N.Y., Telemeter
For details see ad on pages 430-431
National Inter-Communications, Ill., 65
Neptune Electronics Co., N.Y., 65
Network Manufacturing Corp., N.J., 65
Ney Co., The J. M., 171 Elm St., Hartford 1, Conn., Contacts
For details see ad on page 209
North Electric Manufacturing Co., Ohio, 15, 25, 40, 65
Oak Mfg. Co., Ill., 5, 40, 45, 50, 65

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for DC Circuits



Pickering engineering service is available for special applications where Pickering standard Solenoids do not apply

PICKERING & CO., Inc.

Manufacturers of the world's most accurate phonograph motor speed and drive equipment

Oceanside, L. I., New York

For details and literature address Department T

Ohmite Manufacturing Co., Ill., 5, 30, 40
Painton and Company, Ltd., England, 40, 65
Penta Laboratories, Inc., Calif., Vacuum Enclosed
Permo, Inc., Ill., Circuit Breakers
Phaostron Co., 151 Pasadena Ave., South Pasadena, Calif., 65
For details see ad on page 175
Phillips Control Corp., Ill., Solenoids
Philmore Mfg. Co., Inc., N.Y., 65
Powell Co., Harold H., Pa., 40, 65
Radio Components, Ltd., Canada, 5, 25, 40, 45, 50, 65
Reynolds Electric Co., Ill., 25, 40, 55
Roller-Smith Corp., Pa., 40
Rubicon Co., Pa., 40
Rupps Assembling & Mfg. Works, Ill., 65
Schott Co., Walter D., Calif., 25, 45, 65
Sessions Clock Co., Conn., 35
Shallcross Mfg. Co., 524 Pusey Ave., Collingdale, Pa., 40, 50, 65
For details see ad on page 98
Sherman Ind. Electronics Co., N.J., Foot
Smith, Inc., Herman H., 436 18 St., Brooklyn 15, N.Y., 25, 30, 45, 65
See complete catalog in last section
Smith Mfg. Co., Nathan R., Calif., 50
Smith & Stone, Ltd., Canada, 20, 65
Soreng Mfg. Corp., Ill., 35, 50, 65
Stackpole Carbon Co., Tannery St., St. Marys, Pa., 25, 45, 50
For details see ad on pages 442-443
Stevens Manufacturing Co., 69 S. Walnut St., Mansfield, Ohio, 55
For details see ad on page 213
Sunvic Controls, Ltd., England, 55
Switchcraft, Inc., 1340 N. Halsted St., Chicago 22, Ill., 15, 25, 40, 50, 65
For details see ad on page 104
Tech Laboratories, Inc., N.J., 5, 15, 30, 35, 40, 50, 65
Technical Advisory Associates, N.Y., 40, 55
Thomson Products, Inc., Ohio, 10
Transco Products, Inc., Calif., 35
Ulanet Co., George, 419 Market St., Newark 5, N.J., 55
For details see ad on page 211
Ultrasonic Corp., Mass., 30
Unimax Switch Div., W. L. Maxson Corp., N.Y., 35
Vokar Corp., Mich., 5, 35, 40, 55
Western Electronic Enterprises, Calif., 10
Westinghouse Electric Corp., Pa., 30
Wilson Co., The H. A., N.J., Contacts Only
Winslow Company, Inc., N.J., 25, 40, 65
Wirt Company, Pa., 40, 45

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In addition to listings for Switches, see also Thermostats on page 213, and Contacts, subheading #17 under Hardware, page 267.

53. Telegraph Keys.

5. Manual
10. Mechanical
high speed
15. Semi-automatic

Alden Products Co., 113 N. Main St., Brockton 64, Mass., 5
For details see ad on pages 150-151
American Radio Hardware Co., N.Y., 5
Boehme, Inc., H. O., N.Y., 10
Clarke Instr. Div., National Elc. Mach. Shops, Md., 5
Codetyper Laboratories, N.Y., Code Typewriter
Corona Engineering Service, N.Y., 5
Eldico of New York, Inc., 44-31 Douglaston Pkwy., Douglaston, L.I., N.Y., 10, 15
For details see ad on page 257
Electro-Medical Laboratory, Inc., Vt., 15
Harnett Electric Corp., N.Y., 10, 15, 30
Illinois Transformer Co., Ill., 10, 20, 35
Industrial Specialties Corp., N.Y., 10, 15, 20, 30, 35
Jefferson Electric Co., Ill., 10, 15, 20
Johnson Co., E. F., Waseca, Minn., 5, 15
For details see ad on page 183
Molded Insulation Co., Pa., 5
Vibroflex Co., Inc., N.Y., 15

Visit Components Avenue at the 1954 Radio Engineering Show March 22-25, 1954 Kingsbridge Armory, New York City



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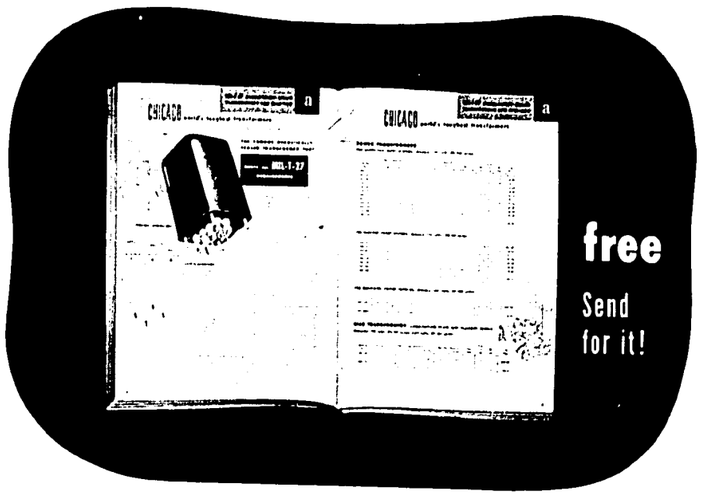
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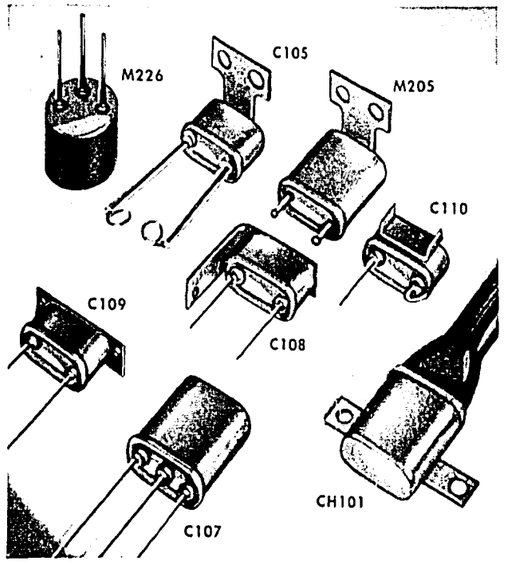
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at the following distributors:

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BURBANK	Fred S. Dean Co.
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OAKLAND	W. D. Brill Co.
PASADENA	Electronic Supply Corp.
SACRAMENTO	Dunlap Whlse. Radio, Inc.
SAN DIEGO	Shanks & Wright
STOCKTON	Dunlap Whlse. Radio, Inc.
D. C. WASHINGTON	Electronic Wholesalers
ILL. CHICAGO	Allied Radio Corp. Lukko Sales Corp. Newark Electric Co.
LA. NEW ORLEANS	Electronic Supply Corp.
MD. BALTIMORE	Wholesale Radio Parts
MASS. BOSTON	Radio Shack Corp.
MICH. ANN ARBOR	Wedemeyer Electronic Supply Co.
MINN. MINNEAPOLIS	Electronic Center, Inc. Gopher Electronics
N. J. NEWARK	Continental Sales Co. Federated Purchaser, Inc.
N. Y. BINGHAMTON	Federal Radio Supply
BUFFALO	Dymac, Inc.
HEMPSTEAD	Davis Electronics Corp.
N. Y. CITY	Harrison Radio Corp. Harvey Radio Inc. Hudson Radio & TV Milo Radio & Electronics Radio Wire Tel., Inc. Terminal Radio Corp.
ROCHESTER	Masline Radio & Elect.
SYRACUSE	S. W. Smith, Inc.
N. C. RALEIGH	Southwestern Radio Supply Co.
OKLA. OKLA CITY	Dulaney's
TULSA	Electronic Supplies
PA. PHILADELPHIA	Herbach & Rademan, Inc. Harold H. Powell
S. C. CHARLESTON	Wholesale Radio Supply Co.
TENN. NASHVILLE	Electra Distr. Co.
TEX. BEAUMONT	The Reed Co.
DALLAS	Adleta Co. Industrial & Electronic Supply Co.
EL PASO	Reeves Radio Supply
FT WORTH	H. & L. Radio
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WIS. MILWAUKEE	Electronic Expeditors Co.

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STEVENS* hermetically sealed THERMOSTATS



Bright plated or dull black finish. Terminals to customer specification. Thermostats shown approximately ¾ size.

Stevens Hermetically Sealed Thermostats—specially engineered for precision control of devices or equipment subjected to dust, moisture or corrosive atmospheres—are tightly, permanently sealed in corrosion-resistant metal cans. Some models have neoprene covered terminals. Virtually any type mounting bracket available.

Stevens Hermetically Sealed Thermostats are available in two basic styles: Type M bimetal disc for high-current circuits; Type C bimetal strip for low-current circuits, or for use in conjunction with disc types. *Both models feature a bimetal thermal element that eliminates artificial cycling or life-shortening "jitters."*

If your problem involves fast, accurate control of temperature under rugged atmospheric conditions, specify Stevens Hermetically Sealed Thermostats—they add to the life and sales of your product.

***Stevens also makes a complete line of standard bimetal disc and strip thermostats. Write for data.** A-4650

Type M thermostat patented; Type C, patent applied for

STEVENS

manufacturing company, inc.
MANSFIELD, OHIO

53X. Thermostats. 53X-54

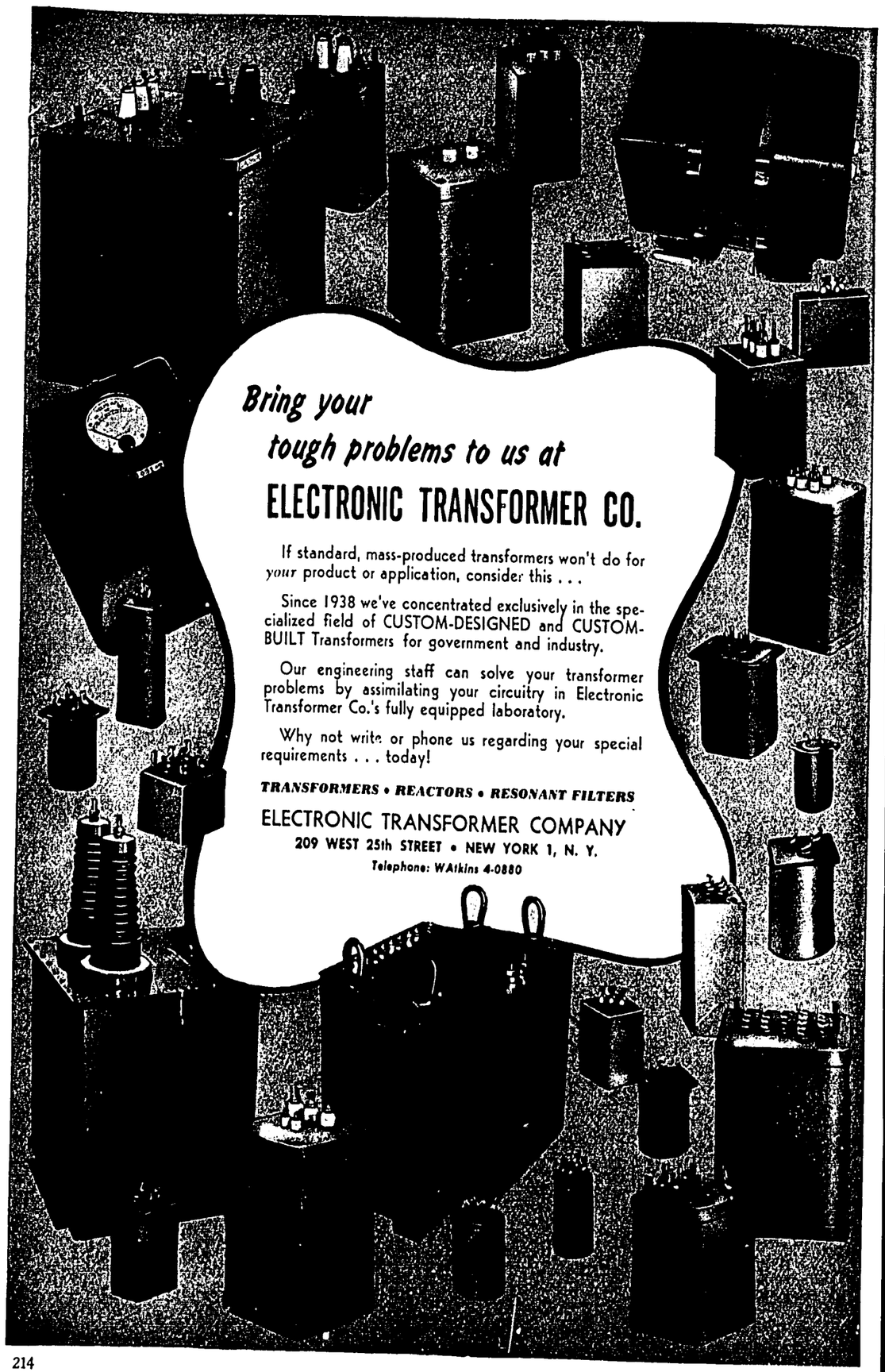
Aero Manufacturing Co., Ohio
American General Thermostat Corp., N.Y.
Barber-Colman Co., Ill.
Bristol Co., Conn.
Edison Inc., Thomas A., Instrument Div., 62 Lakeside Ave., West Orange, N.J.
For details see ad on page 194
Engineering Development, Neb.
Fenwal Inc., Mass.
G-V Controls, Inc., N.J.
Hart Mfg. Co., Conn.
Mechanical Industries Production Co., Ohio
Mercoid Corp., Ill.
Norgetne Electronics Co., N.Y.
Robertshaw Thermostat Div., Robertshaw Fulton Controls Co., Pa.
Spencer Thermostat Div., Metals & Controls Corp., Mass.
Stevens Mfg. Co., Inc., 69 S. Walnut St., Mansfield, Ohio
For details see ad on page 213
Still Man Co., N.Y.
Sunvic Controls, Ltd., England
Therm-O-Disc, Inc., Ohio
Ulanet Co., George, 419 Market St., Newark 5, N.J.
For details see ad on page 211
Valverde Labs., N.Y.
Vulcan Electric Co., Mass.
Westinghouse Electric Corp., Pa.

54. Transformers.

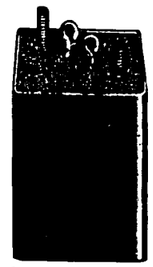
5. Audio
10. Hermetically sealed
15. Horizontal output & flyback
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25. Pulse
30. Radio Frequency
35. Voltage regulating

A. J. E. Industries, Inc., N.Y., 10, 20, 25
Ace Coil & Electronics Co., 914 Middlesex Ave., Metuchen, N.J., 30
For details see ad on page 143
Acme Electric Corp., 44 Water St., Cuba, N.Y., 10, 15, 20, 30, 35
For details see ad on page 215
Acro Products Co., Pa., 5, 10, 20, 25
Acro Transformer & Mfg. Corp., N.Y., 5, 10, 20
Aerovox Corp., 740 Belleville Ave., New Bedford, Mass., 5
For details see ad on pages 362-363
Air Associates, Inc., N.J., 30
Aircraft Armaments, Inc., Md., 25
Aircraft Transformer Corp., West & Willow Aves., Long Branch, N.J., 5, 10, 15, 20, 25, 35
For details see ad on page 1
Airdesign, Inc., Pa., 10, 25, 30, 35
Airpax Products Co., Md., 5, 10, 20, 25
Alcar Instruments, Inc., N.J., 30
Alden Products Co., 113 N. Main St., Brockton 64, Mass., 25
For details see ad on pages 150-151
Alpha Electronics, Inc., N.J. 30, Air Core
American Machine & Foundry Co., Mass., 5, 10, 20, 25, 30, 35
Amplifier Corp. of America, N.Y., 5, 35
Annis Co., R. B., Ind., Split Core
Ardente Acoustic Labs., Ltd., England, 5
Associated Research, Inc., Ill., Instrument Current
Audio Development Co., Minn., 5, 10, 20

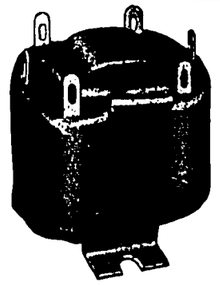
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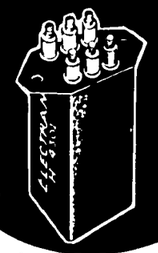


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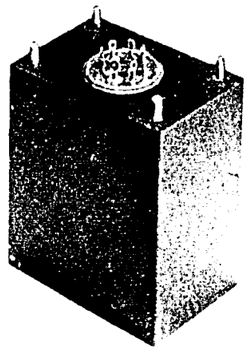
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Transformers

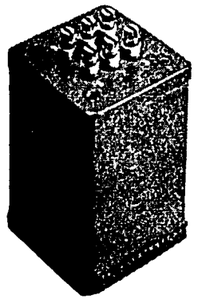
(Continued from page 213)

Auto Test, Inc., Ill., 20
Automatic Manufacturing Corp., N.J., 15
Ballastran Corp., Ind., 5, 20
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 10, 25, 30
For details see ad on page 408
Bellaire Electronics, Inc., N.Y., 30
Berkshire Laboratories, 584 Beaver Pond Rd., Lincoln, Mass., 25
For details see ad on page 315
Berkshire Transformer Corp., Conn., 5, 10, 20
Best Mfg. Co., Inc., N.J., 5, 10
Bittermann Electric, Conn., 10, 20, 30
Blonder-Tongue Laboratories, Inc., N.J., Line Matching
Burroughs Corp., New Products Div., 511 N. Broad St., Philadelphia 23, Pa., 25
See complete catalog in last section
Cambridge Thermionic Corp., 440 Concord Ave., Cambridge 38, Mass., 30
For details see ad on page 254
Campbell Co., Colin, Conn., 5, 10, 20, 25
Canadian Westinghouse Co., Ltd., Canada, 5, 10, 15, 20, 25, 35
Central Transformer Co., Ill., 5, 10, 20, 25, 30, 35
Chicago Electronic Eng. Co., Ill., 10, 15, 20, 35
Chicago Transformer Div., Essex Wire Corp., 3501 W. Addison St., Chicago 18, Ill. 5, 10, 15, 20, 25, 30, 35
For details see ad on page 212
Cinaudagraph Speakers, Ill., 5, 10, 15, 20
Coil Engineering Mfg. Co., Ind., 5, 20
Coil Winders, Inc., N.Y., 10, 30
Coilcraft, Inc., Ill., 15, 30
Cole Instrument Co., Calif., Instrument
Comar Electric Co., 3349 W. Addison St., Chicago 18, Ill., 20
For details see ad on page 195
Communication Accessories Co., 110 St. & Hillcrest, Hickman Mills, Mo., 25
For details see ad on page 144
Communication Parts, Ill., 30
Component Manufacturers, Inc., N.Y., 15, 25, 30
Consolidated Radio Products Co., Ill., 5, 10, 15, 20
Constantine Engineering Labs., Co., N.J., 5, 10, 15, 20, 25, 30, 35
Control Corp., Minn., 20
Copper Wire Products, Canada, 5, 10, 20
Crest Laboratories, N.Y., 5, 10, 20, 25
Crest Transformer Corp., Ill., 5, 10, 20
Cycle Electronic Labs., N.J., 10, 20
DX Radio Products Co., Ill., 10, 20, 30
Danbury Transformer Corp., Conn., 10, 20
Dietz Design & Mfg. Co., Grandview, Mo., 10, 20, 30
For details see ad on page 27
Dinion Coil Co., Inc., N.Y., 5, 10, 20, 25
Dit-Mco, Inc., Mo., 5, 10, 20
Dormeyer Industries, Ill., 5, 20, Vertical Output
Dormitzer Electric & Mfg. Co., Inc., Mass., 5, 10, 20, 25
Elastic Stop Nut Corp. of America, 2330 Vaux Hall Rd., Union, N.J., 10
For details see ad on page 36
Electran Mfg. Co., 1901 Clybourn Ave., Chicago 14, Ill., 5, 10, 20, Saturable Reactors
For details see ad on page 215

(Continued on page 217)



AIRCRAFT TRANSFORMERS



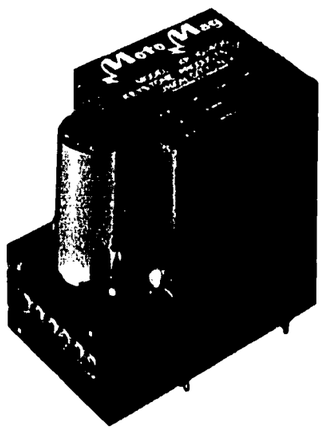
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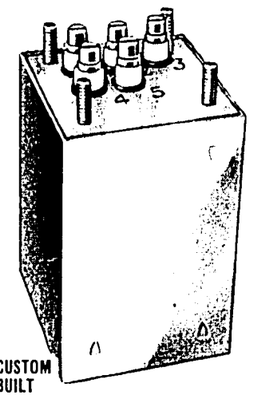
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Continued from page 212

Electrical Windings, Ill., 5, 10, 20, 35
Electricoil Transformer Corp., N.Y., 5, 10, 20, 25
Electro Eng. Wks., Calif., 10, 20, 25, 35
Electrometric, Inc., Ill., 15, 25, 30
Electronic Components Corp., Ill., 5, 20
Electronic Computer Div., Underwood Corp., N.Y., 25
Electronic Heating Corp., Mass., 20
Electronic Instrs., Ltd., England, 35
Electronic Specialty Products, N.J., 30
Electronic Systems Co., N.Y., 10, 30
Electronic Transformer Co., Inc., 209 W. 25, New York 1, N.Y., 5, 10, 20, 25, 30
For details see ad on page 214
Elf Rad Mfg. Co., Ill., 15, 30
Emerald Mfg. Co., Ill., 25, 30
Empire Coil Co., N.Y., 5, 10, 15, 20, 25, 30
Engineered Instruments, Inc., Calif.,
Engineering Research Assoc., Minn., 25
Epco Products, Inc., 2500 Atlantic Ave., Brooklyn 7, N.Y., 5, 10, 20, 25
For details see ad on page 217
Espey Manufacturing Co., Inc., N.Y., 5, 10, 15, 20, 25, 30, 35
Essex Electronics, N.J., 30
Essex Wire Corp., Pa., 5, 10, 20, 25
Farley, Ltd., T. S., Canada, 15, 30, HF
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5, 10
For details see ad on pages 368-373
Feldman & Co., Henry, Calif., 15
Ferranti Electric, N.Y., 5, 10, 20, 25, 35
Forbes & Wagner, Inc., N.Y., 15, 25, 30
Foster Transformer, Ohio, 5, 10, 20, 25
Franklin TV Laboratories, Inc., N.Y., 15
Freed Transformer Co., Inc., 1718 Weirfield St., Brooklyn 27, N.Y., 5, 10, 20, 25
See complete catalog in last section
Galbraith & Son Electric Co., C. C., 450 Ave. of the Americas, New York 11, N.Y., 5, 10, 20
For details see ad on page 104
Gates Radio Co., Ill., 5, 10, 20, 30
General Electric, Ind., 5, 10, 15, 20, 25, 35
General Electric, N.Y., 5, 10, 20, 25, 30, 35
General Magnetics, Inc., N.J., 35
General Precision Lab., Inc., 63 Bedford Rd., Pleasantville, N.Y., 5, 10, 20, 25
For details see ad on page 116
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 5
For details see ad on pages 380-381, Cover IV
General Transformer Co., Ill., 5, 10, 20, 35
Goslin Elec. & Mfg., Calif., 5, 10, 20, 25
Gramer Transformer Corp., Ill., 5, 10, 15, 20, 25, 35, Hearing Aid
Gutkman & Co., Inc., Edwin I., Ill., 15
Hadley Co., Robert, Calif., 10, 20, 25, 35
Halldorson Transformer Co., Ill., 5, 15, 20, 35
Hammond Manufacturing Co., Ltd., Canada, 5, 10, 15, 20, 25, 35
Harnett Electric Corp., 138 Haven Ave., Port Washington, N.Y., 10, 15, 25, 30
For details see ad on page 264
Hartley Co., H. A., N.Y., 5, 20
Heppner Mfg. Co., Box 1207, Round Lake, Ill., 15
For details see ad on page 64
Highland Engineering Co., Main & Urban, Westbury, N.Y., 5, 10, 20, 25
For details see ad on pages 217, 283

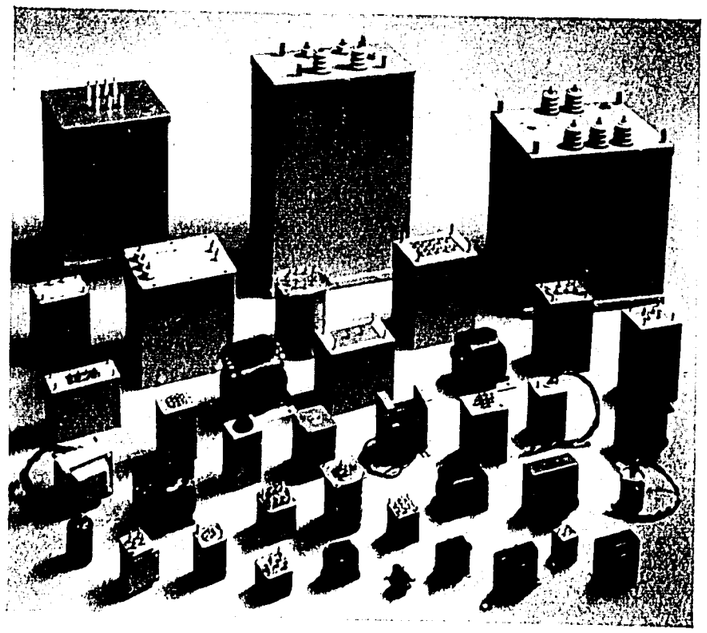
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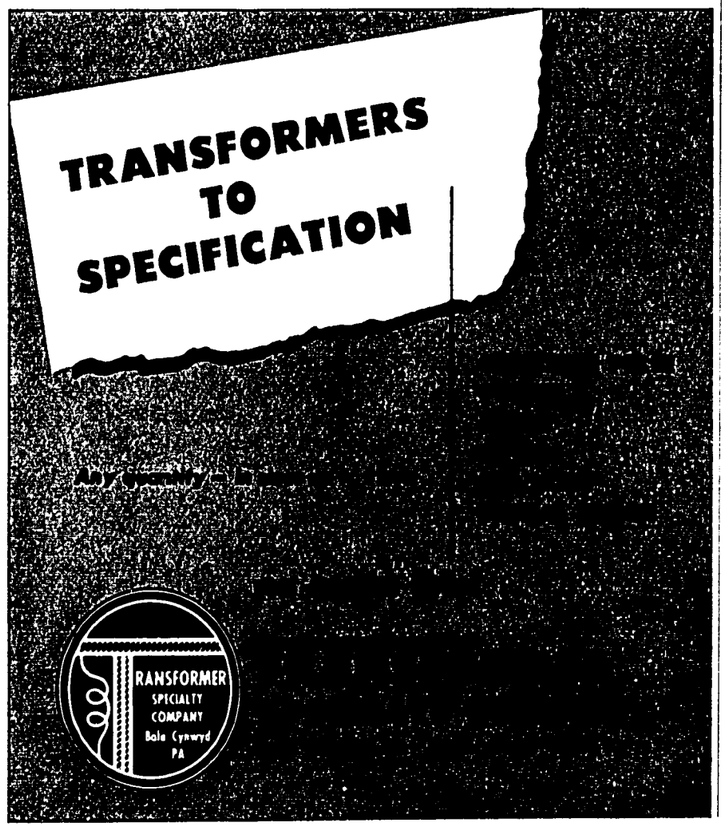
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Hindle Transformer Co., Inc., N.J., 5, 10, 20, 30
Houlihan Co., T. J., Ill., 30
Hycor Co., Inc., Calif., 5, 10
Jacobs Instrument Co., Md., 25
Jensen Manufacturing Co., Ill., 10
Joyner Corp., Ind., 15, 30
K-V Transformer Corp., Conn., 5, 10, 20, 25, 30, 35
Kenyon Transformer Co., Inc., 840 Barry St., New York 59, N.Y., 5, 10, 20, 25
For details see ad on pages 406-407
Keystone Products Co., 904 23 St., Union City, N.J., Custom
For details see ad on page 216
Kinetix Instrument Co., Inc., N.Y., Overload
Langevin Manufacturing Corp., 37 W. 65 St., New York 23, N.Y., 5, 10, 20, 25, 35
For details see ad on page 218
La Rose & Associates, Inc., W. T., N.Y., 20
Lectroman, Inc., N.Y., 20
Lehigh Valley Electr. Engr. & Mfg., Pa., 30
Leonard Electric Products Co., N.Y., 5, 10, 20, 25, 30
Lesa, S. P. A., Italy, 20
Lindberg Engineering Co., Ill., 20, Plate & Filament
Lytle Engineering & Mfg. Co., Ill., 30
Magnatran, Inc., N.J., 20, 35
Magnavox Co., 2131 Bueter Rd., Ft. Wayne 4, Ind., 5, 10, 30
For details see ad on page 138
Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N.Y., 5, 10, 20, 35, Saturable
For details see ad on page 167
Magnetic Metals Co., N.J., Laminations
Magnetic Research Corp., Calif., 25, 35
Magnetics Research Co., N.Y., 25
Magnex Corp., N.Y., 5, 10, 15, 20, 25
Mark Electronics, Inc., N.J., 15
May, Donald M., Calif., 5, 10, 25
Measurements Corp., Intervale Rd., Boonton, N.J., 30
For details see ad on pages 284, 422-423
Melco Products, Inc., Minn., 5, 10, 20, 25, 35
Mercury Electronic Labs., Inc., Ill., 30
Merit Transformer & Coil Corp., Ill., 5, 10, 15, 20, 30, 35
Michel Manufacturing Co., Wis., 30
Microtran Co., N.Y., 5, 10, 20, 25
Mid-West Coil & Transformer Co., Ill., 5, 10, 20, 25, 35
Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass., 30
For details see ad on page 334
Miller Co., J. W., Calif., 30
Miller Instruments, Wm., Calif., 5, 10, 25, 30, 35
Moloney Electric Co., Mo., 10, 20
Motordyne, Inc., Calif., 20
Muirhead & Co., Ltd., England, 5
Mullard Overseas, Ltd., England, 15
Munston Mfg. & Service, Inc., N.Y., 5, 10, 20
Muter Co., Ill., 30

National Company, Inc., 61 Sherman St., Malden 48, Mass., 30
For details see ad on pages 434-435
New York Transformer Co., Inc., N.J., 10, 20
Northern Electric Co., Ltd., Canada, 5, 10, 20
Nothelfer Winding Labs., N.J., 20
Omega Manufacturing, Inc., N.Y., 20, 35
Ontario Industries, Inc., N.Y., 5, 10, 15, 20, 25, 30, 35
Ortho Filter Corp., 196 Albion Ave., Paterson 2, N.J., 5, 10, 20
For details see ad on page 101
Osborne Transformer Corp., Mich., 20
Oxford Electric Corp., Ill., 5
P. C. A. Electronics, Inc., Calif., 5, 10, 15, 20, 25, 30, 35
Partridge Transformers, Ltd., England, 5, 10, 15, 20, 25, 30, 35
Peerless Electrical Products, Calif., 5, 10, 20, 25
Permoflux Corp., Ill., 5, 10, 25
Polyphase Instrument Co., Pa., 10, 25
Polytronics Co., Canada, 35
Porter Manufacturing Co., Ill., 10, 15, 20, 30, 35
Powell Co., Harold H., Pa., 10
Power Transformer Co., Inc., N.J., 20, 35
Presto Electric Co., Inc., N.J., 35
Q. L. C. Corp., N.J., 30
Quam-Nichols Co., Ill., 5
Qutronic Transformer Corp., N.Y., 5, 10, 20, 35
R-K Manufacturing Co., Ill., 5, 10, 20, 25
RCA Victor Div., Tube Dept., 415 S. Fifth St., Harrison, N.J., 5, 15, 20, 25, 30
For details see ad on pages 88, 440-441
Radio Components, Ltd., Canada, 30
Radio Engineering Products, Canada, 5, 10, 20
Radio Industries, Inc., Ill., 25, 30
Radio Sonic Corp., N.Y., 10, 20
Ram Electronics, Inc., N.Y., 15
Randall, Inc., Douglas, R.I., 20
Raypar, Inc., 7800 W. Addison St., Chicago 34, Ill., 15, 25, 30
For details see ad on page 220
Raytheon Manufacturing Co., Equipment Sales Div., 138 River St., Waltham 54, Mass., 5, 10, 20, 25, 35
For details see ad on page 228
Redman Electronics Corp., Conn., 15, 25, 30
Reflectone Corp., Conn., 20
Rich Electronics, Inc., Fla., 30
Rola Company, Inc., Ohio, 10, 15
Rollins Corp., Del., 5, 10, 20, 25
Ross Manufacturing Co., Ill., 15
S. N. C. Manufacturing Co., Inc., Wis., 5, 10, 20
Sickles Co., F. W., Div. General Instrument Corp., Chicopee, Mass., 15, 30
For details see ad on page 421
Sierra Electronic Corp., Calif., 30
Smith Mfg. Co., Nathan R., Calif., 5, 20, 25



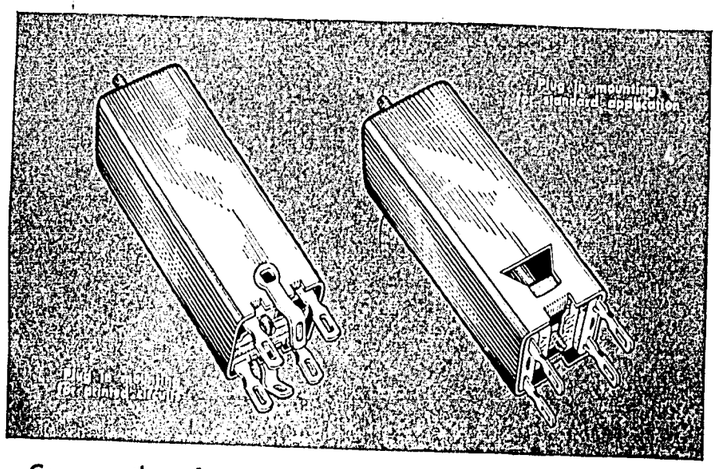
Sola Electric Co., 4633 W. 16 St., Chicago 50, Ill., 35
For details see ad on page 225
Sondyna, A. G., Switzerland, 30
Specialties, Inc., N.Y., 10, 30
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 10, 30
See complete catalog in last section
Square Root Manufacturing Corp., N.Y., 10, 15, 20, 30
Standard Coil Products Co., Inc., Ill., 15, 30
Standard Electrical Products Co., Ohio, 5, 10, 20, 35
Standard Electronic Research, N.Y., 10
Standard Transformer Corp., Ill., 5, 10, 20, 25, 30, 35
Stanwyck Winding Co., Inc., N.Y., 15, 30
Sterling Transformer Corp., N.Y., 5, 10, 20, 25, 30, 35
Summit Coil Co., N.J., 30
Superex Electronics Corp., N.Y., 5, 10, 30
Superior Electric Co., 83 Laurel St., Bristol, Conn., 35, Variable DC & AC
See complete catalog in last section
Superior Transformer Corp., Ill., 5, 10, 20, 25
Syntronic Instruments, Inc., Ill., 15
Technitrol Engineering Co., 2751 N. 4 St., Philadelphia 33, Pa., 25
For details see ad on page 221
Telechrome, Inc., 88 Merrick Rd., Amityville, L.I., N.Y., 15, 25
For details see ad on pages 120, 285
Teleradio Engineering Corp., N.Y., 10, 20
Telescreen Corp., Conn., 35
Telvision Laboratories, Inc., Ill., 5, 15
Tetrad Co., Inc., Calif., 5, 10, 15, 20
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Todd Products Co., Inc., N.Y., 5, 10, 15, 20
Torwico Electronics, Inc., 961 Frelinghuysen Ave., Newark 5, N.J., 5, 10, Toroidal
For details see ad on page 149
Transformer & Electronic Specialty Co., 3826 Terrace St., Philadelphia 28, Pa., 5, 10, 20, 25
For details see ad on page 221
Transformer Engineers, Calif., 5, 15
Transformer Specialty Co., Inc., 328 Rockhill Rd., Bala Cynwyd, Pa., 5, 10, 20, 25, 35
For details see ad on page 219
Transformers, Inc., N.Y., 5, 10, 20, 25
Transvision, Inc., N.Y., 5, 10, 20, 25, 30
Trenton Transformer Corp., N.J., 5, 10, 20, 35
Triad Transformer Corp., 4055 Redwood Ave., Venice, Calif., 5, 10, 15, 20, 25
For details see ad on page 89
Tri-Dex Electronics, Calif., 30
Union Spring & Mfg. Co., N.J., 5, 10, 15, 20, 25, 30, 35
U. S. Electronics Corp., N.J., 10, 15, 25, 30
United Transformer Co., 150 Varick St., New York 13, N.Y., 5, 10, 15, 20, 25, 30, 35
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(Continued on page 221)

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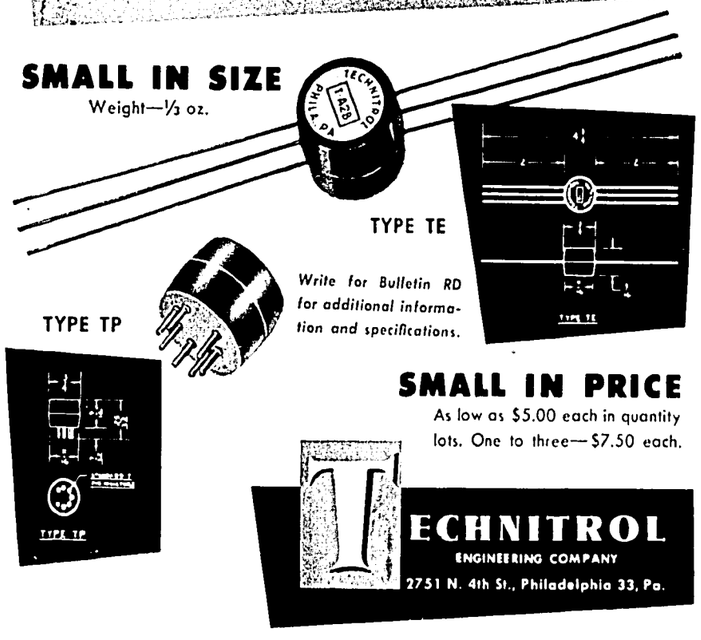
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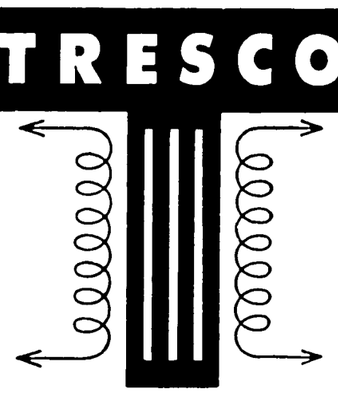


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(Continued from page 214)

West Coast Electronics Co., Calif., 25
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White Industries, Inc., N.Y., 5, 10, 20, 30
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55. Vacuum Tubes, Receiving

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Amglo Corp., Ill., 25, Strobes
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For details see ad on page 226
Baker Co., George W., Conn., 5, 20
Bendix Aviation Corp., Research Lab. Div., Fisher Bldg., Detroit 2, Mich., 10, 15
For details see ad on pages 176, 366-367
CBS-Hytron Div., Columbia Broadcasting System, Mass., 5, 10, 15
Canadian Westinghouse Co., Ltd., Canada, 5, 10, 15, 20
Cathodeon, Ltd., England, 5
Chatham Electronics Corp., 630 W. Mt. Pleasant Ave., Newark 2, N.J., 10, 20
For details see ad on pages 404-405
DuMont Labs., Inc., Allen B., Instrument Div., 760 Bloomfield Ave., Clifton, N.J., 5, Industrial
For details see ad on page 29
DuMont Labs., Inc., Allen B., Cathode-Ray Tube Div., 750 Bloomfield Ave., Clifton, N.J., 5, TV Picture
For details see ad on page 29
Eitel-McCulloch, Inc., 198 San Mateo Ave., San Bruno, Calif., 5, TV
For details see ad on pages 402-403
Electrical Device Mfg. Co., N.J., 5
Electronic Tube Corp., Pa., 5
English Electric Valve Co., Ltd., England, 5
Eureka Television & Tube Corp., N.J., 5
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5, 20
For details see ad on pages 368-373
Fidelity Tube Corp., N.J., 5
General Electric Co., N.Y., 5, 10, 15, 20
General Electronics, Inc., N.J., 5
Haydu Brothers, N.J., 5, 10
International Electronics Corp., N.Y., 5, 10, 15, 20
Kip Electronics Corp., N.Y., 5
Lansdale Tube Co., Pa., 5, 10, 20
Marconi's Wireless Telegraph Co., Ltd., England, 10, 15
Martin & Co., H. S., Ill., 5
Mullard Overseas, Ltd., England, 5, 10, 15, 20
Multi-Tron Laboratory, Ill., 5, 10, 20
National Union Radio Corp., 237 Jacksonville Road, Hatboro, Pa., 5, 10, 15
For details see ad on page 46
National Video Corp., Ill., 5
North American Philips Co., N.Y., 5
Northern Electronic & Vacuum Ind., Canada, 5

(Continued on page 223)

MACHLETT ELECTRON TUBES *for* Broadcasting and Industry

TRANSMITTING TUBES

TYPE	CATHODE VOLTS	CATHODE AMPS	MU	MAXIMUM ANODE RATING VOLTS	ANODE AMPS	INPUT WATTS	DISS. WATTS	FULL INPUT FREQ. MCS.	COOLING
ML-2C39A	6.3	1.0	100	1000	0.125	125	100	2500	Forced-Air
ML-207	22.0	51.0	20	15000	2.0	30000	10000	1.6	Water
ML-212E	14.0	6.0	16	3000	.350	—	275	1.5	Convection
ML-220C	21.5	41.0	40	15000	1.5	—	10000	4	Water
ML-220CA	21.5	41.0	40	15000	1.5	—	5000	4	Forced-Air
ML-228A	21.5	41.0	16	6000	1.5	—	5000	3	Water
ML-232B	20.0	60.0	40	20000	3.0	—	25000	3	Water
ML-240B	21.5	41.0	40	12000	1.7	—	10000	20	Water
ML-241B	14.0	6.0	16	3000	.350	—	275	7.5	Convection
ML-242C	10.0	3.25	12.5	1250	.150	186	100	6	Convection
ML-279A	10.0	21.0	10	3000	.800	—	1200	20	Convection
ML-298A	27	225	32	20000	11.0	—	100000	4	Water
ML-298B	27	225	57.5	20000	11.0	—	100000	4	Water
ML-342A	20.0	67	40	20000	2.5	—	25000	4	Water
ML-343A	21.5	57.5	40	18000	2.0	—	10000	4	Water
ML-343AA	21.5	57.5	40	18000	1.5	—	5000	4	Forced-Air
ML-356	7.5	170	20	12500	6.0	60000	22500	25	Water
ML-357B	10.0	10	30	4000	0.5	1600	400	110	Convection
ML-379A	10.0	21.0	10	3000	.800	—	1200	20	Convection
ML-381	6.3	1.0	100	3500	0.01*	35*	35*	3000	Forced-Air
ML-450TH	7.5	12.0	38	6000	0.6	—	450	40	Convection
ML-833A	10.0	10.0	35	4000	0.50	1800	400	20	Forced-Air
ML-880	12.6	315	20	10500	6.0	60000	20000	25	Water
ML-889A	11.0	120	21	8500	2.0	16000	5000	50	Water
ML-889RA	11.0	120	21	8500	2.0	16000	5000	40	Forced-Air
ML-891	22.0	60	8.5	12000	2.0	18000	6000	1.6	Water
ML-891R	22.0	60	8.5	10000	2.0	15000	4000	1.6	Forced-Air
ML-892	22.0	60	50	15000	2.0	30000	10000	1.6	Water
ML-892R	22.0	60	50	12500	2.0	18000	4000	1.6	Forced-Air
ML-893A	20.0	183	35	20000	4.0	70000	20000	5	Water
ML-893AR	20.0	183	35	20000	4.0	70000	20000	5	Forced-Air
ML-5530	5.0	55	26	5000	1.75	8750	3000	110	Forced-Air
ML-5531	6.3	92	22	10000	3.75	30000	10000	30	Forced-Air
ML-5541	7.5	57	26	8500	2.75	23000	10000	110	Forced-Air
ML-5604	11.0	176	19.5	12500	3.0	32500	10000	22.5	Forced-Air
ML-5606	22.0	60	50	15000	2.0	30000	10000	1.6	Water
ML-5619	11.0	176	19.5	12500	3.0	32500	20000	22.5	Water
ML-5658	12.0	310	20	12500	5.0	60000	20000	20	Water
ML-5666	11.0	120	21	10000	2.0	20000	12500	22.5	Water
ML-5667	11.0	120	21	10000	2.0	20000	7500	22.5	Forced-Air
ML-5668	22.0	60	50	14000	2.0	28000	20000	5	Water
ML-5669	22.0	60	50	14000	2.0	28000	10000	5	Forced-Air
ML-5681	12.0	220	25	15000	12.0	150000	75000	30	Water
ML-5682	16.5	325	32	16000	20.0	300000	100000	30	Water
ML-6256	12.6	27	21	5500	1.5	7000	5000	110	Water
ML-6257	12.6	27	21	5500	1.5	7000	5000	110	Water
ML-6258	12.6	27	21	5500	1.5	7000	3000	110	Forced-Air

*Duty cycle: 0.0033

HIGH-VOLTAGE RECTIFIERS

TYPE	CATHODE VOLTS	CATHODE AMPS	ANODE RATINGS INV. PKV	ANODE RATINGS PEAK MA	INSULATION	COOLING
ML-102	20	19.0	75	750	Air	Convection
ML-103	10	11.5	125	78	Oil	Convection
ML-108	13	12.5	140	200	Oil	Convection
ML-110	10	11.5	140	78	Air	Convection
ML-115	10	11.5	125	100	Air	Convection
ML-120	13	12.5	140	200	Air	Convection
ML-121	10	11.5	140	100	Oil	Convection
ML-126	13	12.5	150	200	Air	Convection
ML-170	13	12.5	200	200	Air	Convection
ML-180	13	12.5	200	200	Oil	Convection
ML-199	12	23	110	10000	Air	Convection
ML-222A	21.5	41	25	5000	Air	Water
ML-5575/100	20	24	150	1000	Air	Convection
ML-5576/200	20	32	150	2500	Air	Convection

MERCURY VAPOR RECTIFIERS

TYPE	CATHODE VOLTS	CATHODE AMPS	TUBE VOLT. DROP	FIL. EXCIT.	COOLING	ANODE RATINGS INV. PKV	ANODE RATINGS PEAK AMPS	ANODE RATINGS AV. AMPS
ML-255B	5.0	19	15	Quad.	Forced-Air	20	20.0	5.0
ML-266B	5.0	42	15	Quad.	Forced-Air	20	40.0	10.0
ML-267B	5.0	6.75	10	Quad.	Convection	7.5	8.0	2.0
ML-315A	5.0	10	15	Quad.	Convection	12.5	8.0	2.0
ML-575A	5.0	10	10	In-Ph.	Convection	15	6.0	1.5
ML-673A	5.0	10	10	In-Ph.	Convection	15	6.0	1.5
ML-857B	5.0	30	15	Quad.	Forced-Air	22	40.0	10.0
ML-866A	2.5	5.0	15	In-Ph.	Convection	10	1.0	0.25
ML-869B	5.0	19	15	Quad.	Forced-Air	15	20.0	5.0
ML-872A	5.0	7.5	10	In-Ph.	Convection	10	5.0	1.25
ML-8008	5.0	7.5	10	In-Ph.	Convection	10	5.0	1.25

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Note: For complete additional technical data or prices, write to Machlett Laboratories, Inc., Springdale, Conn., or contact your nearest Graybar, Westrex or Dominion Sound Equipment office.

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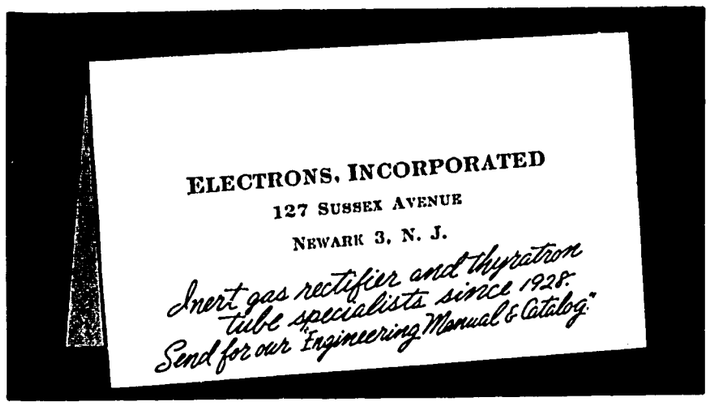
Philco Corp., Pa., 10
Pioneer Electronics Corp., Calif., 5
RCA Victor Div., Tube Dept., 415 S. 5 St., Harrison, N.J., 5, 10, 15, 20
For details see ad on pages 88, 440-441
Radio Valve Co. of Canada, Ltd., Canada, 5, 10, 15, 20
Rauland Corp., Ill., 5
Raytheon Manufacturing Co., Radio Receiving Tube Div., 55 Chapel St., Newton 58, Mass., 5, 10, 15, 20
For details see ad on page 228
Sheldon Electric Co., N.J., 5, 10, 15
Societe Des Lampes Fotos Grammont, France, 10, 15
Sonotone Corp., N.Y., 10, 20
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y. 5, 10, 15, 20
For details see ad on pages 417-420
Tel-O-Tube Corp. of America, N.J., 5
Thomas Electronics, Inc., N.J., 5
Transvision, Inc., N.Y., 5
Tube Service Corp., N.J., 5
Tung-Sol Electric, Inc., 95 8th Ave., Newark 4, N.J., 5, 10, 15, 20
For details see ad on page 94
Vacuum Tube Products, Calif., 5
Victoreen Instrument Co., Ohio, 10, 20
Waterman Products Co., Inc., 2445-63 Emerald St., Philadelphia 25, Pa., 5
For details see ad on pages 386-387
Westinghouse Electric Corp., N.Y., 5, 10, 15
Westinghouse Electric Corp., Pa., 5, 10, 15, 20

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10. Geiger-Mueller
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American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35, 40, 45, 50
Amperex Electronic Corp., N.Y., 10, 15, 20, 35, 45, 50, X-Ray

Amperite Co., Inc., 561 Broadway, New York 12, N.Y., 50
For details see ad on page 193
Anton Electronic Labs., Inc., 1226 Flushing Ave., Brooklyn 17, N.Y., 10, 25, 50
For details see ad on page 226
Atomic Instrument Co., 84 Massachusetts Ave., Cambridge 39, Mass., 10
For details see ad on page 229
Baker Co., George W., Conn., 35
Bendix Aviation Corp., Research Lab., Fisher Bldg., Detroit 2, Mich., 10, 15, 35, 40, 50
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Red Bank Div., Eatontown, N.J., 10, 35, 40, 45, 50
For details see ad on page 176
Bomac Laboratories, Inc., Salem Rd., Beverly, Mass., 35
For details see ad on pages 382-383
CBS-Hytron Div., Columbia Broadcasting System, Mass., 40, 50
Calbest Engineering & Electronics, Calif., 5, 10, 15, 20, 30, 35, 45
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Central Sales & Mfg. Corp., N.J., Ionization Gauge
Chatham Electronics Corp., 630 W. Mt. Pleasant Ave., Newark 2, N.J., 15, 20, 35, 40, 45, 50
For details see ad on pages 404-405
Consolidated Vacuum Corp., N.Y., 30
Continental Electric Co., Ill., 15, 20, 25
Cyclotron Specialties Co., Calif., 10
Dollar Co., Robert, Calif., 45
DuMont Labs., Inc., Allen B., Instrument Div., 760 Bloomfield Ave., Clifton, N.J., 25, 30
For details see ad on page 29
Eitel-McCullough, Inc., 198 San Mateo Ave., San Bruno, Calif., 20, 45
For details see ad on pages 402-403
Electronic Products Co., N.Y., 5, 10, 50
Electron Radar Products, Ill., 25, 30
Electrons, Inc., 127 Sussex Ave., Newark 3, N.J., 15, 35, 40, 45
For details see ad on page 223
English Electric Valve Co., Ltd., England, 20, 35, 50
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 20, 45, 50
For details see ad on pages 368-373
General Electric Co., N.Y., 5, 10, 15, 20, 25, 30, 35, 40, 45, 50
General Electric Co. N.Y., 15, 20
General Electronics, Inc., N.J., 15, 20, 35, 45
General Precision Lab., Inc., 63 Bedford Rd., Pleasantville, N.Y., 25
For details see ad on page 116
Georator Corp., Va., 10
Haydu Brothers, N.J., 40, 45
Hewson Co., John, N.Y., 40, 45
International Electronics Corp., N.Y., 15, 20, 25, 35, 40, 45, 50
Kemlite Laboratories, Ill., 25
Kip Electronics Corp., N.Y., 35, 50
Kuthe Laboratories, Inc., N.J., 15, 35
Lectro Max, Inc., Ill., 25
Lewis and Kaufman, Ltd., Calif., 20, 40, 45
Machlett Laboratories, Inc., 1063 Hope St., Springdale, Conn., 20, 35, 45
For details see ad on page 222
Manhattan Research Labs., N.Y., 10
Marconi's Wireless Telegraph Co., Ltd., England, 20, 35, 40, 45, 50
Martin & Co., H. S., Ill., X-Ray & Spectrometer
Microwave Associates, Inc., Mass., TR & ATR
Mullard Overseas, Ltd., England, 5, 10, 15, 20, 25, 35, 40, 45, 50
Multi-Tron Laboratory, Ill., 10, 15, 30, 35, 40, 45, 50
National Electronics, Inc., Ill., 15, 20, 35
National Union Radio Corp., 237 Jacksonville Rd., Hatboro, Pa., 40, 45
For details see ad on page 46
National Union Radio Corp., Pa., 40, 45
Northern Electronic & Vacuum Ind., Canada 25, 30
Nuclear Development Laboratory, Mo., 10
Nuclear Instrument & Chemical, Ill., 10
Nucleonic Co. of America, N.Y., 10
Penta Laboratories, Inc., Calif., 35, 45
Philco Corp., Pa., 40, 45
Pioneer Electronics Corp., Calif., 15, 20, 35
Power Equipment Co., Mich., 50
Professional Electronics Co., Calif., 30
Radiation Counter Labs., Inc., Ill., 10
RCA Victor Div., Tube Dept., 415 S. 5th St., Harrison, N.J., 20, 25, 30, 35, 40, 45
For details see ad on pages 88, 440-441
Radio Valve Co. of Canada, Ltd., Canada, 40
Rauland Corp., Ill., 35
Raytheon Manufacturing Co., Radio Receiving Tube Div., 55 Chapel St., Newton 58, Mass., 5, 10, 40, 45, 50
For details see ad on page 228
Sheldon Electric Co., N.J., 20, 40
Skiatron Electronics & TV Corp., N.Y., Dark Trace
Societe Des Lampes Fotos Grammont, France, 15, 20, 35, 40, 45, 50
Sunvic Controls Ltd., England, 30
Sylvania Electric Products Inc., Electronics Div., 100 Sylvan Rd., Woburn, Mass., 30, 35, TR & ATR
For details see ad on pages 417-420
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 30, 35, 40, 50
For details see ad on pages 417-420
(Continued on page 225)



VOLTAGE REGULATED POWER SUPPLIES

For Industrial and Research Use

by KEPCO

VOLTS	CURRENT	REGULATION	RIPPLE	6.3 V.† AC. CT.	MODEL
0-1500	0-200 Ma.	0.5%	20 Mv.		1520
0-1200	0-20 Ma.	0.1%	10 Mv.	10 Amp.	1220
0-1000	0-500 Ma.	0.5%	20 Mv.		1350
200-1000	0-500 Ma.	0.5%	20 Mv.		1250
0-1000	0-50 Ma.	0.1%	10 Mv.	10 Amp.	1020
0-600	0-3 Amp.	0.5%	10 Mv.		780
0-600	0-2.25 Amp.	0.5%	10 Mv.		770
0-600	0-1.5 Amp.	0.5%	10 Mv.		760
0-600	0-750 Ma.	0.5%	10 Mv.		750
0-600 0-150 Bias	0-300 Ma. 0-5 Ma.	0.5% *	5 Mv. 5 Mv.	10 Amp.	615
0-600	0-300 Ma.	0.5%	5 Mv.	10 Amp.	500R
#1 0-600 #2 0-600	0-200 Ma. 0-200 Ma.	0.5% 0.5%	5 Mv. 5 Mv.	10 Amp. 10 Amp.	800
0-600 0-150 Bias	0-200 Ma. 0-5 Ma.	0.5% *	5 Mv. 5 Mv.	10 Amp.	815
#1 200-500 #2 200-500	0-200 Ma. 0-200 Ma.	0.5% 0.5%	5 Mv. 5 Mv.	6 Amp. 6 Amp.	510
200-500	0-200 Ma.	0.5%	5 Mv.	6 Amp.	245
0-400 0-150	0-150 Ma. 0-5 Ma.	0.5% *	5 Mv. 5 Mv.	10 Amp.	400
100-400	0-150 Ma.	0.5%	5 Mv.	10 Amp.	141
100-400	0-150 Ma.	0.01%	1 Mv.	10 Amp.	2000
0-350	0-3 Amp.	0.5%	10 Mv.		730
0-350	0-2.25 Amp.	0.5%	10 Mv.		720
0-350	0-1.5 Amp.	0.5%	10 Mv.		710
0-350	0-750 Ma.	0.5%	10 Mv.		700
100-325 0-150 Bias	0-150 Ma. 0-5 Ma.	0.5% *	5 Mv. 5 Mv.	10 Amp.	131
0-300 0-150 Bias	0-150 Ma. 0-5 Ma.	0.5% *	5 Mv. 5 Mv.	5 Amp.	315
0-150	0-50 Ma.	0.5%	5 Mv.		150
3-30	0-30 Amp.	0.5%	0.1%		3030
1-13	0-10 Amp.	0.5%	10 Mv.		3200
0.3-3	0-100 Ma.	5 Mv.	1 Mv.		3100

Kepco Voltage Regulated Power Supplies are conservatively rated. The regulation specified for each unit is available under all line and load conditions within the range of the instrument.

Write for complete specifications.

DC POWER SUPPLY SPECIFICATIONS

REGULATION: As shown in table for both line fluctuations from 105-125 volts and load variation from minimum to maximum current.

*Regulation Bias Supplies: 10 millivolts for line 105-125 volts. ½% for load at 150 volts.

†All AC Voltages are unregulated.

All units are metered except Models 131, 315 and 3100.

All units are designed for relay rack mounting or bench use.

WORKMANSHIP

Workmanship is of a quality with the highest existing production standards and best instrument electronic practices consistent with the intended use of the item as a continuous duty voltage regulated power supply. Oil filled paper condensers and resistor-board construction are included in the design.

MANUFACTURERS OF ELECTRONIC EQUIPMENT • RESEARCH • DEVELOPMENT

KEPCO LABORATORIES

131-38 SANFORD AVENUE • FLUSHING 55, NEW YORK

Taylor Tubes, Inc., Ill., 15, 20, 35, 45
Tung-Sol Electric, Inc., 95 8th Ave., Newark 4, N.J., 25, 40
For details see ad on page 94
United Electronics Co., N.J., 15, 20, 35, 45
Universal X-Ray Prod., Inc., Ill., X-Ray
Vacuum Tube Products, Calif., 15, 20, 30, 35, 45
Victoreen Instrument Co., Ohio, 5, 10, 50
Victory Engineering Corp., Springfield Rd., Union, N.J., Cells, Gas Analysis
For details see ad on page 203
Weltronic Co., Mich., 40, 45
Westinghouse Electric Corp., N.Y., 10, 15, 20, 25, 35, 40, 45, 50
Westinghouse Electric Corp., Pa., 20, 50
Winslow Company, Inc., N.J., 30

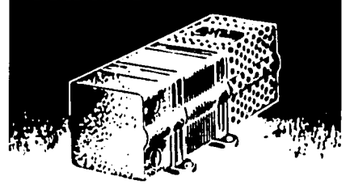
57. Vacuum Tubes, Transmitting.

5. Air-cooled power tubes
10. Iconscopes
15. Image orthicons
20. Klystrons
25. Magnetrons
30. Monoscope tubes
35. Water-cooled power tubes

American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35
Amperex Electronic Corp., N.Y., 5, 25, 35
Bendix Aviation Corp., Research Lab., Fisher Bldg., Detroit 2, Mich., 20, 25
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Red Bank Div., Eatontown, N.J. 20
For details see ad on page 176
Bomac Laboratories, Inc., Salem Rd., Beverly, Mass., 25
For details see ad on pages 382-383
CBS-Hytron Div., Columbia Broadcasting System, Mass., 5
Calbest Engineering & Electronics, Calif. 5, 10, 15, 30, 35
Canadian Westinghouse Co., Ltd., Canada, 5, 35
Cathodeon Ltd., England, 10, 30
Central Sales & Mfg. Corp., N.J., 5, 35
Dollar Co., Robert, Calif., 5
Eitel-McCullough, Inc., 198 San Mateo Ave., San Bruno, Calif., 5, 20, 35
For details see ad on pages 402-403
English Electric Valve Co., Ltd., England, 5, 15, 20, 35
Federal Electric Mfg. Co., Ltd., Canada, 5
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5, 25, 35
For details see ad on pages 368-373
Freeland Products Co., La., 5, 35
General Electric Co., N.Y., 5, 10, 15, 20, 25, 35
General Electronics, Inc., N.J., 5
International Electronics Corp., N.Y., 5, 15
Lewis and Kaufman, Ltd., Calif., 5
Litton Industries, Calif., 20, 25
Machlett Laboratories, Inc., 1063 Hope St., Springdale, Conn., 5, 35
For details see ad on page 222
Marconi's Wireless Telegraph Co., Ltd., England, 5, 15, 20, 25
Microwave Associates, Inc., Mass., 25

Mullard Overseas Ltd., England, 5, 20, 30
Multi-Tron Laboratory, Ill., 5, 20, 25, 35
National Union Radio Corp., Pa., 237 Jacksonville Rd., Hatboro, Pa., 5
For details see ad on page 46
Penta Laboratories, Inc., Calif., 5
Philco Corp., Pa., 5, 10
Pioneer Electronics Corp., Calif., 5, 20, 25, 30
RCA Victor Div., Tube Dept., 415 S. 5th St., Harrison, N.J., 5, 10, 15, 25, 30, 35
For details see ad on pages 88, 440-441
Raytheon Mfg. Co., Power Tube Div., 190 Willow St., Waltham 54, Mass., 5, 20, 25
For details see ad on page 228
Sanders Associates, Inc., 137 Canal St., Nashua, N.H., 20, 25
For details see ad on page 42
Societe Des Lampes Fotos, France, 5
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 20
See complete catalog in last section
Sylvania Electric Products Inc., Electronics Div., 100 Sylvan Rd., Woburn, Mass., 20
For details see ad on pages 417-420
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 20, 25
For details see ad on pages 417-420
Taylor Tubes, Inc., Ill., 5
United Electronics Co., N.J., 5
Vacuum Tube Products, Calif., 5, 30, 35
Varian Associates, 661 Hansen Way, Palo Alto, Calif., 20
For details see ad on pages 454-455
Westinghouse Electric Corp., N.Y., 5, 25, 35

VOLTAGE REGULATING TRANSFORMERS



Patented SOLA Constant Voltage Transformers provide the following advantages: Automatic, instantaneous regulation within ±1% regardless of primary variations of 30%. No moving or expendable parts . . . no manual adjustments or maintenance . . . self-protecting against short circuit . . . available in a complete range of capacities and special types.

Write for Bulletin KK-CV-142. We welcome any inquiries regarding specific applications to your requirements.

Constant Voltage **SOLA TRANSFORMERS**

SOLA ELECTRIC CO.

4633 W. 16th Street, Chicago 50, Illinois

58. Voltage Regulators.

5. Automatic
10. Manually operated
15. Varistors

American Machine & Foundry Co., Mass., 5, 10, 15
Amplifier Corp. of America, N.Y., 5
Anton Electronic Labs., Inc., 1226 Flushing Ave., Brooklyn 17, N.Y., 5
For details see ad on page 226
Applegate & Co., C. J., Colo., 5
Avimo, Ltd., England, 80
Avion Instrument Corp., N.J., 5
Bendix Aviation Corp., Research Labs., Fisher Bldg., Detroit 2, Mich., 5
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Eclipse-Pioneer Div., Teterboro, N.J., 5
For details see ad on pages 366-367
Bogue Electric Manufacturing Co., 52 Iowa Ave., Paterson 3, N.J., 5, 10
For details see ad on page 13
Brownthorn Electronics, Inc., N.Y., 5
Burlington Instrument Co., 203 N 3rd St., Burlington, Iowa, 5, 10
For details see ad on page 173
Canadian Research Institute, Canada, 5, 10

(Continued on page 226)

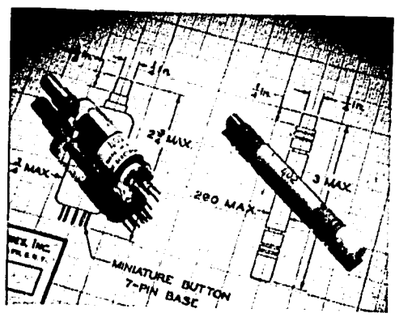
Information at high speed! "Data the way an engineer thinks" is the key to IRE DIRECTORY classifications. All products are divided into 10 fundamental groups, many of which parallel professional group organization. The grouping plan makes this the fastest working directory you ever used! No components are mixed with test equipment—you turn right to a section where each item belongs.

Yet good engineering detail is maintained. 99 basic classes of products under these ten sectional product directories keep listings from becoming cumbersome, but clearly define products.

Completeness is insured! Most firms make many products in a single classification. Wasteful, eye-confusing relisting of the same firms over and over is quite sensibly solved by using a system of codes under the 99 basic headings which actually provide 489 separate classifications. The result is a more complete picture of each firm's full line, but you travel through fewer listings.

Your "Regulated High Voltage"
Problems can be Economically
Solved . . . NOW!

ANTON



JAN APPROVED

AEL has produced and supplied over 100,000 JAN 5962/BS-101 Corona Discharge Voltage Regulator Tubes (equivalent to 401 shown here) to the U. S. Navy—Signal Corps and prime contractors like Admiral, Westinghouse, Kelly-Koett and Hoffman. Because of the experience gained by the mass manufacture of these tubes, AEL is able—now—to furnish Corona Discharge V-R Tubes, both fixed and variable, to suit a wide range of voltage and current applications.

Corona Discharge V-R Tubes
New Freedom for Circuit Designers

SALIENT FEATURES

- Stabilized Voltages from 300 to 4000 Volts
- Currents up to 2 milliamperes
- Low Dynamic Resistance
- No hot cathodes
- Unlimited Life
- Weight—less than an ounce
- Size—smaller than a pen

TYPICAL APPLICATIONS

- Cathode Ray Oscilloscopes
- Airborne Radar Power Supplies
- TV receivers and monitors
- Voltage Reference Tubes
- Radiac Equipment
- X-ray Equipment
- Electron Microscopes

Refer to this Buyers' Guide for our Geiger Counter Tubes and allied radioactivity detection equipment listings.

CATALOG — free upon request on your letter-head. Please send us the specifications of your individual requirements. Write care of Dept. IR.

ANTON ELECTRONIC LABORATORIES, INC.

1226 Flushing Avenue, Brooklyn 37, N. Y.

Voltage Regulators

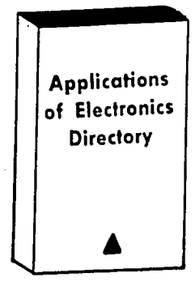
(Continued from page 225)

Cole Instrument Co., Calif., 5
Coleman Instruments, Inc., Ill., 5
Control Corp., Minn., 5
Curtiss-Wright Corp., N.J., 5
Electric Regulator Corp., Conn., 5
Electro Engineering Works, Calif., 5
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5
For details see ad on pages 368-373
Gavco Corp., N.Y., 5
General Communications, Wis., 5
General Electric Co., Ind., 5
General Electric Co., N.Y., 5, 10, 15
General Magnetics, Inc., N.J., 5
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 10
For details see ad on pages 380-381, Cover IV
Germanium Products Corp., N.J., 15
Gramer Transformer Corp., Ill., 10
Hammond Manufacturing Co., Ltd., Canada, 10
Hanson, Gorrill, Brian, Inc., N.Y., 5, 10
Kepco Laboratories, Inc., 131-38 Sanford Ave., Flushing 55, N.Y., 5
For details see ad on page 224
Lear, Inc., Calif., 5
Magne Pulse Corp., N.Y., 5
Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N.Y., 5, 10
For details see ad on page 167
Magnetic Research Corp., Calif., 5
Maxson Corp., W. L., 460 W. 34th St., New York 1, N.Y., 5
For details see ad on page 122
Northern Electric Co., Ltd., Canada, 15
Omega Manufacturing, Inc., N.Y., 5, 10
Partridge Transformers, Ltd., England, 10
Polytronics Co., Canada, 5
Precision Measurement Co., N.Y., 5
Qutronic Transformer Corp., N.Y., 5
Radio Development & Research Corp., N.J., 15
Radio Engineering Products, Canada, 15
Raytheon Manufacturing Co., Equipment Sales Div., 138 River St., Waltham 54, Mass., 5
For details see ad on page 228
Rockwell Engineering Co., Ind., 5
Sola Electric Co., 4633 W. 16 St., Chicago 50, Ill., 5
For details see ad on page 225
Sorensen & Co., Inc., Conn., 5
Spilsbury & Tindall, Ltd., Canada, 10
Standard Electrical Products Co., Ohio, 5, 10
Superior Electric Company, 83 Laurel St., Bristol, Conn., 5
See complete catalog in last section
Sylvania Electric Products Inc., Mass., 15
Tarzian, Inc., Sarkes, Ind., 15
Telechrome, Inc., 88 Merrick Rd., Amityville, L.I., N.Y., 5, 10
For details see ad on pages 120, 285
United Transformer Co., 150 Varick St., New York 13, N.Y., 5, 10
See complete catalog in last section
Varo Mfg. Co., Inc., Tex., 5
Vickers Electric Div., Mo., 5, 10
Weltronic Co., Mich., 5
Western Sound & Elec. Labs., Inc., Wis., 5
Westinghouse Electric Corp., Pa., 5

A Directory of

5. Applications of Electronics

Industrial, Medical & Military



8 Major Groups

32 Products

Organized by functions for Engineers

59 Computers & Counters.
05 Analog to digital converters
10 Computers, analog
15 Computers, digital
20 Counters, continuous
25 Counters, pre-set

60 Electronic Control Equipment.
05 Burglar-alarm & protective systems
10 Combustion & smoke-nuisance controls
15 Production control, counting & sorting equipment
20 Variable speed controls

61 Geophysical Apparatus.
05 Amplifiers
10 Complete exploration equipment
15 Control equipment
20 Microphones
25 Recording galvanometers
30 Transformers

62 Induction Heating Equipment.
05 Brazing, soldering & welding
10 Di-electric heating
15 Induction heating

63 Medical Equipment.
05 Cardiographs 10 Diathermy
15 Electronic cauterizing
20 Electro-encephalographs
25 Stimulators

64 Nuclear Equipment.
05 Pulse count integrators
10 Radiation detectors 15 Scalers

65 Servo-Mechanisms.
05 Servo amplifiers
10 Gears, gear-trains, etc.
15 Servo motors & generators

66 Telemetering Equipment.
05 Data Recorders
10 FM/FM Modulators
15 Data storage mechanisms

The products and services of the Radio-Electronics industry have been organized into ten basic directories following closely the organization of the IRE Professional Groups. But 100 major product groups are numbered consecutively throughout.

Always consult the pink pages at the start of the Directory of firms, for a terminology cross-index, or to find products by name. The pink pages list more than 500 products by name, as well as under the product groups. Page numbers are given for speed.

59. Computers & Counters.

5. Analog to digital converters
10. Computers, analog
15. Computers, digital
20. Counters, continuous
25. Counters, pre-set

Aero Electronics Co., Ill., 10
Ahrendt Instrument Co., Md., 5
Aircraft Armaments, Inc., Md., 5, 10, 15, 20, 25
Airmec, Ltd., England, 20, 25
Airplane & Marine Instruments, Pa., 10
Alden Products Co., 113 N. Main St., Brockton 64, Mass., Flip Flops
For details see ad on pages 150-151
American Hydromath Corp., N.Y., 10
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25
Anelex Corp., N.H., 5, 10, 15
Arma Corp., N.Y., 10
Atlantic Electronics Corp., N.Y., 10
Atomic Instrument Co., 84 Massachusetts Ave., Cambridge 39, Mass., 5, 25
For details see ad on page 229
Austin Co., N.Y., 5, 10, 15
Automatic Temperature Control, Pa., 25
Avion Instrument Corp., N.J., 5, 10
Bailey Meter Co., Ohio, 10
Beckman Instruments, Inc., Calif., 10, 15
Belock Instrument Corp., N.Y., 10, 15
Bendix Aviation Corp., Research Labs., Fisher Bldg., Detroit 2, Mich., 5, 10, 15, 20
For details see ad on pages 176, 366-367
Berkeley, Div. Beckman Instruments, Inc., 2200 Wright Ave., Richmond, Calif., 5, 10, 20, 25
For details see ad on page 8
Berkeley and Assoc., Edmund C., N.Y., 15
Burroughs Corp., New Products Div., 511 N. Broad St., Philadelphia 23, Pa., 15, 20
See complete catalog in last section
Canadian Research Institute, Canada, 20
Canadian Westinghouse Co., Ltd., Canada, 10
Capehart-Farnsworth Corp., Ind., 10, 15
Clary Multiplier Corp., Calif., 5, 15, 20, 25
Cole Instrument Co., Calif., 20, 25
Computer Corp., of America, N.Y., 10
Computer Research Corp., Calif., 15, 20, Flip Flops
Computing Devices of Can., Ltd., Canada, 5, 10, 15, 20, 25
Consolidated Engineering Corp., Calif., 5, 10, 15
Control Instrument Co., Inc., N.Y., 15, 20
Curtiss-Wright Corp., N.J., 10
Dalmo Victor, Inc., 1414 El Camino Real, San Carlos, Calif., 10
For details see ad on page 26
Davies Laboratories, Inc., Md., 10
Decade Instrument Co., P.O. Box 153, Caldwell, N.J., 20
For details see ad on page 321
Detectron Co., Calif., 20, 25
De Wald Radio Mfg. Corp., N.Y., 20
Digital Instrument Co., Inc., Fla., 5, 10, 15, 20 25
Electronic Associates, Inc., Long Branch, N.J., 10, Digital to Analog Converters
For details see ad on page 318
Eder Engineering Co., Wis., 10
Electronic Computer Div., Underwood Corp., N.Y., 15
Electronic Control Corp., Mich., 20
Electronic Engineering Co. of Calif., Calif., 5, 10, 15, 20
Elliott Brothers London, Ltd., England, 10, 15
El-Tronics, Inc., Pa., 20, 25
Engineering Research Associates, Minn., 15
Engineering Development, Neb., 20
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 10, 25
For details see ad on pages 368-373
Ferranti Electric, Inc., N.Y., 15
Ferranti Electric, Ltd., Canada, 5, 10, 15, 20, 25
Ford Instrument Div., Sperry Corp., 31-10 Thomson Ave., Long Island City 1, N.Y., 5, 10, 15
For details see ad on page 235
Gates Radio Co., Ill., 20, 25
General Electric Co., N.Y., 10
Gertsch Products, Inc., Calif., 5, 10, 15
Giannini & Co., Inc., G. M., Calif., 5
Goodyear Aircraft Corp., Ohio, 10
Grason Stadler Co., Mass., 25
Haledy Electronics Co., N.Y., 20, 25
Haller, Raymond and Brown, Inc., Pa., 15
Hanson, Gorrill, Brian, Inc., N.Y., 5, 10
Hathaway Instrument Co., Colo., 10
Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif., 20
See complete catalog in last section

(Continued on page 229)

IT TAKES MANY MINDS TO MAKE AN "ELECTRONIC BRAIN"

RAYTHEON AUTOMATIC DIGITAL COMPUTER developed for the Office of Naval Research and used at the Naval Air Missile Test Center, Point Magu, California.



Just trying to grasp the concept of a high speed digital computer staggers the imagination. Designing and building one is a job for a corps of highly trained specialists.

Few companies are equipped with the diversity of talent, the technical background or the production facilities necessary to venture into this extremely complex field. Raytheon is unique in having under its many roofs not only the kind of people but the products and production facilities required to bring analog and digital computers into practical being.

On its staff, Raytheon has many of the comparatively few scientists, mathematicians and engineering specialists capable of designing, building and applying electronic computers. Its many divisions contribute the special tubes, transistors, diodes, toroids, magnetic amplifiers, and other components used in great numbers in such equipment . . . and the broad experience in miniaturization, circuitry, packaging and other electronic techniques necessary to reduce a houseful of parts to practical proportions.

It goes without saying that "Excellence in Electronics" is a prime ingredient of all Raytheon products . . . radar, sonar, communications and other types of equipment of vital importance to the Armed Services.

RAYTHEON

Excellence in Electronics

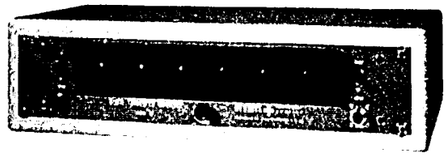
RAYTHEON MANUFACTURING COMPANY

WALTHAM 54, MASSACHUSETTS

INSTRUMENTS

FOR COUNTING AND CONTROL

GLOW TRANSFER COUNTER



Model 162A may be used as a counter or as a fast push-button resettable register or as a slow scaler. This self-indicating counter has a maximum capacity of 1,000,000 counts and maximum speed of 5,000 CPS. Accepts positive or negative pulses, 4 to 60 volts. Resetting is by manual push-button or remote control. (See tube description below.)

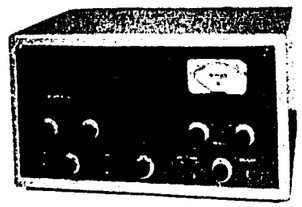


PRE-SET COUNTER (Glow Transfer)

Model 164 is used for batch or operational counting and recording at any pre-set count from 0 to 9,999. Maximum counting speed is 4,000 CPS; pre-set operation totalizer count —0 to 999,999, indicated by electro-mechanical register. Counting units and relay are plug-in type for easy removal or replacement. Register has plug-in type connection. Prototype shown at left.

SCALERS

The Ten-Ten Series combines a variety of optional features with basic elements to provide "custom" scalers without "custom" costs. After selection of the basic scaler model, according to major features, modifications are selected from the list of options to "customize" the scaler for your specific requirements. All Ten-Ten Scalers are available with choice of binary or decade scaling and with optional (5 or 1 microsecond) resolving time. Model 1050A shown.





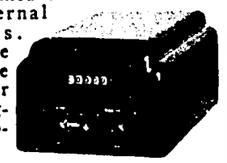
GLOW TRANSFER COUNTING TUBES*

For use in totalizers, batch counters, and where capabilities of mechanical registers are exceeded, these tubes offer comparatively high speed, lack of moving parts, and silent operation. Self-indicating, with low current drain; tubes may be cascaded, reset by push-button. Decade or scale of 12 tubes with counting speeds to 2,000 CPS now available; higher speeds available soon.

* Ericsson Telephones, Ltd., (Etelco) tubes are distributed solely in the U.S. and Canada by Atomic.

ELECTRICAL RESET REGISTERS

Model 1238B used singly or in multiples (with selective resetting) serves as production control, time element registers, and many other purposes. The electrically actuated six-digit register may be reset by panel switch, remotely by push-button, or by wired connection to counting units. Another model, #1248B, has predetermined count for controlling external circuits. Models are available uncased for use in original equipment.



A request on your letterhead will bring the new Atomic catalog.

ATOMIC INSTRUMENT COMPANY

84 MASSACHUSETTS AVE. CAMBRIDGE 39, MASS.

Linear Amplifiers, Scalers, High Voltage Supplies, Scintillation Counters, Count Rate Meters, Coincidence and Anticoincidence Instruments, Differential Pulse Height analyzers, Accessories.

Write for name of Sales Representative in your area.

Computers and Counters

(Continued from page 227)

Hogan Laboratories, Inc., 155 Perry St., New York 14, N.Y., 15
For details see ad on page 283
Industrial Electronic Engineers, Calif., 10, 15
Jacobs Instrument Co., Md., 5, 15
Kearfott Co., Inc., 1150 McBride Ave., Little Falls, N.J., 10, 20, 25
For details see ad on page 53
Kelk & Co., G. F., Canada, 10
Kellogg Switchboard & Supply Co., Dept. 69, 79 W. Monroe St., Chicago 3, Ill., Counter, Magnetic Impulse
For details see ad on page 106
Laboratory for Electronics, Inc., 75 Pitts St., Boston 15, Mass., 10, 15, 20
For details see ad on pages 432-433
Landis & Gyr, Inc., N.Y., 20
Lawton Products Company, Inc., N.Y., 15
Leupold and Stevens Instruments, Ore., 5
Link Aviation, Inc., N.Y., 10
Little, Inc., Arthur D., Mass., 5, 20
Logistics Research, Inc., Calif., 5, 15
MacDonald Co., Inc., W. S., Mass., 15
Magne Pulse Corp., N.Y., 5, 10
Magnetics Research Co., N.Y., 15, 20
Maxson Corp., W. L., 460 W. 34 St., New York 1, N.Y., 10, 15
For details see ad on page 122
Melpar, Inc., Va., 10, 15
Metrotype Corp., Ill., 5
Miller Instruments, Inc., William, Calif., 10
Minnesota Electronics Corp., Minn., Components
Missouri Research Labs., Inc., Mo., 10
North American Philips Co., Inc., N.Y., 10, Scaler Printer
Nuclear Instrument & Chemical, Ill., 20, 25
Photoswitch Inc., Mass., 20
Philbrick Researches, Inc., Mass., 10
Potter Instrument Co., N.Y., 15, 20, 25
Racker Co., Joseph, N.Y., 10, 15
Radiation, Inc., Fla., 5
Radiation Counter Labs., Inc., Ill., 25
Radio Corp. of America, RCA Victor Div., Camden, N.J., 15
For details see ad on pages 88, 440-441
Reeves Instrument Corp., N.Y., 10
Remington Rand, Inc., Pa., 15
Rich Electronics, Inc., Fla., 10
Rich-Roth Laboratories, Conn., 10
Rutherford Electronics Co., Calif., 20, 25
Servo Corporation of America, 20-20 Jericho Turnpike, New Hyde Park, L.I., N.Y., 10, 15
For details see ad on pages 438-439
Servomechanisms, Inc., Post & Stewart Aves., Westbury, L.I., N.Y., 10
For details see ad on page 237
Skiatron Electronics & TV Corp., N.Y., 10, 15
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 10, 15
See complete catalog in last section

(Continued on page 230)

Let **WANG**
STATIC MAGNETIC DEVICES
serve you in your electronic system as:

- Digital to analog converter
- Sequence pulse generator
- Pulse count converter
- Output display device
- Data manipulator
- Pulse generator
- Precision timer
- Number storage
- Shift register
- Pulse counter
- Synchronizer
- Rate meter

WANG LABORATORIES
296 Columbus Ave., Boston 16, Mass.
KEnmore 6-0624

Computers and Counters

(Continued from page 229)

Standard Electric Time Co., 73 Logan St., Springfield 2, Mass., 20, 25
For details see ad on page 325
Streeter-Amet Co., Ill., 5, 20
Sunvic Controls, Ltd., England, 5, 10, 15, 20, 25
Sylvania Electric Products Inc., Mass., 15
Taller & Cooper, N.Y., 5, 20, 25
Technitrol Engineering Co., 2751 N. 4th St., Philadelphia 33, Pa., 15
For details see ad on page 221
Telecomputing Corp., Calif., 15, In & Output Equip.
Teleregister Corp., N.Y., 5, 10, 15
Tranducer Corp., Mass., 10, 15
Transmitter Equipment Mfg., N.Y., 10, 15
Ultrasonic Corp., Mass., 5, 10, 15
Vectron, Inc., 400 Main St., Waltham 54, Mass., 5, 10, 15
For details see ad on page 308
Walkirt Co., Calif., 5, 15, 20, 25
Wallind-Pierce Corp., Calif., 5
Wang Laboratories, 296 Columbus Ave., Boston 16, Mass., 25
For details see ad on page 230
Wright Engineering Co., Calif., 15

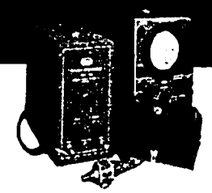
For
FAST PRODUCT REFERENCE
consult the alphabetical product index in the pink section preceding the alphabetical directory

60. Electronic Control Equipment.

5. Burglar-alarm & protective systems
10. Combustion & smoke-nuisance controls
15. Production control, counting & sorting equipment
20. Variable speed controls

A. R. F. Products, Inc., Ill., Remote Controls
Aero Electronics Co., Ill., 15, 20
Air Associates, Inc., N.J., 15, 20
Air-O-Tronics, Calif., 5
Alertronic Protective Corp. of America, N.Y., 5
American Encaustic Tiling Co., Inc., Pa., 10
American Hydromath Corp., N.Y., 15
American Machine & Foundry Co., Mass., 15, 20
Ampex Electric Corp., 934 Charter St., Redwood City, Calif., 15
For details see ad on pages 364-365
Atlantic Electronics Corp., N.Y., 15, 20
Atlas Metal Stamping Co., Pa., 20
Atomic Instrument Co., 84 Massachusetts Ave., Cambridge 39, Mass., 15
For details see ad on page 229
Audio Corp. of America, N.J., 15, 20
Austin Co., N.Y., 15
Automatic Temperature Control, Pa., 10, 15
Bailey Meter Co., Ohio, 10
Belock Instrument Corp., N.Y., 20
Berkeley, Div. Beckman Instruments, Inc., 2200 Wright Ave., Richmond, Calif., 15
For details see ad on page 8
Berkshire Laboratories, 584 Beaver Pond Rd., Lincoln, Mass., 15
For details see ad on page 315
Bliss-Warren Electronic Corp., N.J., 15
Blonder-Tongue Laboratories, Inc., N.J., Remote Control
Bogue Electric Manufacturing Co., 52 Iowa Ave., Paterson 3, N.J., 20
For details see ad on page 13
Bristol Co., Conn., 10, 15, 20
Browning Laboratories, Inc., 750 Main St., Winchester, Mass., 5
For details see ad on page 326
Brownthorn Electronics, Inc., N.Y., 20
Canadian Research Institute, Canada, 15
Canadian Westinghouse Co., Ltd., Canada, 10, 15, 20
Cardwell Mfg. Corp., The Allen D., 20
Central Rediffusion Services, England, 5
Chicago Electronic Eng. Co., Ill., 10, 15, 20
Cole Instrument Co., Calif., 15, 20
Combustion Control Corp., Mass., 10
Computing Devices of Can., Ltd., Canada, 15
Connecticut Telephone & Electric, Conn., 5
Curtiss-Wright Corp., N.J., 10, 20
Dage Electronics Corp., Ind., 10, 15
Deltron Associates, Inc., Ill., 15, 20
Denrad Mfg. Co., Inc., Tex., 5
Devol Research Co., Conn., 20
Eder Engineering Co., 5, 15
Electric Eye Equipment Co., Ill., 15
Electrical Device Mfg. Co., N.J., 5, 10, 15, 20
Electro Devices, Inc., N.J., 20
Electro Products Laboratories, Inc., 4501 N. Ravenswood Ave., Chicago 40, Ill., 15
For details see ad on page 231
Electrodyne Co., Mass., 15
Electronic Control Corp., Mich., 5, 10, 15
Electronic Industries, Inc., Minn., 5
Electronic Products Co., Ill., 5, 10
Electron Radar Products, Ill., 5, 10, 15, 20
Elliott Brothers London, Ltd., England, 20
El-Mec Laboratories, Inc., N.J., 15
El-Tronics, Inc., Pa., 5
Engineering Development, Neb., 15
Engineering Research Associates, Minn., 15
Engineering Research & Development, Ill., 5, 15, 20
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 10, 15, Magnetic
For details see ad on pages 368-373
Ferranti Electric, Ltd., Canada, 15
Fieldin Div., Robertshaw-Fulton Controls Co., Pa., 5, 15
Fischer-Smith, Inc., N.J., Heat Controls
Fleetwood Labs., N.Y., 15
Franklin Electronics, Inc., Pa., 15
Gamewell Co., Mass., 5
General Electric Co., N.Y., 15, 20
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 20
For details see ad on pages 380-381, Cover IV
Graham Transmissions, Inc., Wis., 20
Hammarlund Mfg. Co., Inc., 460 W. 34 St., New York 1, N.Y., Remote Controls
For details see ad on pages 424-427
Hansen Co., Wm., Mich., 5, 15
Hanson, Gorrill, Brian, Inc., N.Y., 15, 20
Harmon Electronics Co., Mo., 5
Hartman Engineering Co., Mass., 5
Heller Co., Gerald K., Md., 20
Industrial Chromium Corp., Mass., Electro Plating
Industrial Control Co., N.Y., 20
Industrial Electronic Engineers, Calif., 15
Industrial Electronics, Inc., Mich., 5, 15
Industrial Electro of Can., Ltd., Canada, 5, 15, 20
Industrial Instruments, Inc., N.J., 15
Industrial Nucleonics Corp., Ohio, Nuclear Applications
Instrument Development Labs., Inc., Mass., Photo Elec.
International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif., Photo Electric
For details see ad on page 188
Kahn & Co., Inc., Conn., 15
Kidde & Company, Inc., Walter N.J., 10
Lear, Inc., Calif., 5, 15, 20
Lectroman, Inc., N.Y., Flash
Lektra Laboratories, Inc., N.Y., 15
Lord-Taber Co., Inc., N.Y., 10
Lumenite Electronic Co., Ill., 10
Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N.Y., 5, 10, 15, 20
For details see ad on page 167

MEASURE to .0001" without contact

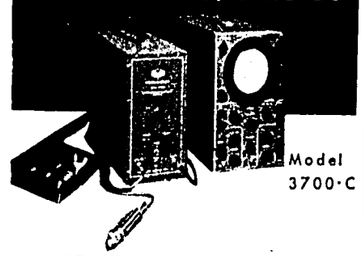


Model 3600-A

EPL DYNAMIC MICROMETER

Measures, records dynamic or static displacement, vibration or movement of any metal body. Measures axial vibration, eccentricity, radial whip, bearing clearance, radial expansion with acceleration and reciprocating movement. Calibration of sensing unit permits direct reading. *Request Bulletin DM 1250 for details.*

MEASURE and record PRESSURE in AIR, GASES, LIQUIDS



Model 3700-C

EPL PRESSUREGRAPH

Measures, records dynamic or transient pressure phenomena for engine studies, carburetor development, injector pressure studies, fuel research, hydraulic valve lifts, oil pump and compressor development, explosions, atomic power development. .5 to over 5,000 PSI. 200,000 separate measurements/sec. *Request Bulletin LPG 551.*

INDICATE RATE of MOTION at ALL SPEEDS without "loading"



Model 3010-A

EPL IMPULSE GENERATOR

Small low cost electromagnetic pick-up generates voltages proportional to object's rate of speed. Requires no external magnet, can be actuated by any magnetic material on a moving part. For precision ignition timing, acceleration and velocity studies, RPM, operations, angular or linear motion. Produces voltages at speeds in excess of 3"/sec. *Request Bulletin MP 592 for details.*

Sales Engineers in Principal Cities

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ELECTRO PRODUCTS LABORATORIES
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Canada: Atlas Radio Corporation, Ltd., Toronto

Marsh-Theiss, Inc., N.Y., 15
Maxson Corp., W. L., 460 W. 34 St., New York 1, N.Y., 20
For details see ad on page 122
McNeal, J. D., Conn., 15
Mittelmann, Eugene, Minn., 15
Moseley Co., F. L., Calif., 20
Mullard Overseas, Ltd., England, 15
Northern Electronic & Vacuum Ind., Canada, 5, 10
Opad-Green Co., N.Y., 20
Pantek Co., Calif., 15
Photobell Co., N.Y., 5, 10, 15,
Photoswitch Inc., Mass., 5, 10, 15
Penntronics, Pa., 10, 15
Pioneer Electric & Research Corp., Ill., Remote Controls
Polytronics Co., Canada, 5
Potter Instrument Co., N.Y., 15
Presto Elec. Co., Inc., N.J., 5
Professional Electronics Co., Calif., 15
Raytheon Manufacturing Co., Equipment Sales Div., 138 River St., Waltham 54, Mass., 20
For details see ad on page 228
Reliance Electric & Engineering Co., Ohio, 20
Resdel Engineering, Calif., 5, 10
Research Electronics, Pa., 5, 15
Rich Electronics, Inc., Fla., 15, 20
Rich-Roth Laboratories, Conn., 15
Ripley Co., Inc., Middletown, Conn., 5, 20
For details see ad on page 131
Robinette Co., W.C., Calif., 20
Rockwell Engineering Co., Ind., 15, 20
Rowe Industries, Ohio, 15
Schottland, Frederic D., N.Y., 10
Scott, Inc., H. H., Mass., 15
Servo Corporation of America, 20-20 Jericho Turnpike, New Hyde Park, L.I., N.Y., 20
For details see ad on pages 438-439
Servomechanisms, Inc., Post & Stewart Aves., Westbury, L.I., N.Y., 20
For details see ad on page 237
Servo-Tek Products Co., Inc., N.J., 5, 20
Simmonds Aerocessories, Inc., N.Y., Fuel Gauge System
Sondyna, A. G., Switzerland, 5, 15
Special Instruments Lab., Inc., Tenn., 15
Square Root Manufacturing Corp., N.Y., 20
Standard Electric Time Co., 73 Logan St., Springfield 2, Mass., 15
For details see ad on page 325
Standard Electronic Research, N.Y., 15
Standard Piezo Co., 265 E. Pomfret St., P.O. Box 278, Carlisle, Pa., Photo Cells
For details see ad on page 92
Sunvic Controls, Ltd., England, 15
Syncnro Start Products, Inc., Ill., Motor Controls
Taller & Cooper, N.Y., 10
Telescreen Corp., Conn., 10
Teletronics Laboratory, Inc., N.Y., 15
Televiso Corp., Ill., 20
Thermo Instruments Co., Calif., Liquid Level
Tranducer Corp., Mass., 15
Virginia Electronics Co., D.C., 15
Weltronic Co., Mich., 20, Resistance Welding
Waters Manufacturing, Inc., Mass., 10
Waters, Inc., Robert A., Mass., 10
Western Sound & Elec. Labs., Inc., Wis., 20
Westinghouse Electric Corp., Pa., 20
Winters Engineer, T. Starling, N.J., 20
Worner Electronic Devices, Ill. 5, 10, 15
Wright Engineering Co., Calif., 15, 20
Yellow Springs Instrument Co., Ohio, 15

61. Geophysical Apparatus.

5. Amplifiers
10. Complete exploration equipment
15. Control equipment
20. Microphones
25. Recording galvanometers
30. Transformers

Aero Electronics Co., Ill., 5
Air Associates, Inc., N.J., 15
Allegany Instrument Co., Md., 5
Ampex Electric Corp., 934 Charter St., Redwood City, Calif., Recorders
For details see ad on pages 364-365
Associated Research, Inc., Ill., Ground Resistance
Atomic Instrument Co., 84 Massachusetts Ave., Cambridge 39, Mass., 5
For details see ad on page 229
Automatic Temperature Control, Pa., 15
Avion Instrument Corp., N.J., 5
Ballastran Corp., Ind., 30
Borden Engineering Co., N.J., 10
Brush Development Co., Ohio, 5, 25
Brush Electronics, Ohio, 20
Canadian Research Institute, Canada, 5, 10, 15
Century Geophysical Corp., Okla., 5, 10, 25
Constantine Engineering Labs., N.J., 30
Crest Laboratories, Inc., N.Y., 30
Dalmo Victor, Inc., 1414 El Camino Real, San Carlos, Calif., 25
For details see ad on page 26
Danbury Transformer Corp., Conn., 30
Edin Company, Inc., Mass., 5, 25
Electran Mfg. Co., 1901 Clybourn Ave., Chicago 14, Ill., 30
For details see ad on page 215
Electronic Engineering Co. of Calif., Calif., 5
Electronic Research Associates, Inc., P.O. Box 29, Caldwell, N.J., 5
For details see ad on pages 180, 335
Engineering Research Associates, Minn., 5
Epco Products, Inc., 2500 Atlantic Ave., Brooklyn 7, N.Y., 30
For details see ad on page 217
Ferranti Electric, Inc., N.Y., 30
Fisher Research Lab., Inc., Calif., 10
Gates Radio Co., Ill., 5, 30
Geotechnical Corp., Tex., 5, 10, 15, 20, 25
Georator Corp., Va., 10
Hadley Co., Robert M., Calif., 30
Halldorson Transformer Co., Ill., 30
Hastings Instrument Co., Inc., Va., 10
Hathaway Instrument Co., Colo., 25

(Continued on page 233)

Heiland
DENVER

dependable instruments

- Recording oscillographs
- galvanometers
- amplifier systems
- bridge balances
- associate equipment

7009 Multi-Channel Recording Oscillograph

The only oscillograph using up to 12" recording media that can be conveniently mounted in a standard 19" relay rack.

- Operation, control and loading from one surface.
- Designed for rack or table mounting.
- Direct monitoring of galvanometer light spots while recording.
- Up to 36 channels.



Sensitive . . . Rugged Galvanometers

Outstanding features are high sensitivities and ruggedness of construction. Simple and rapid adjustment in vertical and horizontal planes.

- Solid case construction . . . completely dustproof.
- New, convenient connector terminals.
- Rotational limit stop.
- Low zero drift.



500B Portable Recording Oscillograph

Compact and lightweight providing maximum portability and versatility where it is desired to record up to 12 phenomena.

- Direct monitoring while recording.
- Right angle monitoring hood.
- Automatic aperture adjustment.



Galvanometer Assembly

The arrangement of galvanometers side by side in a common magnetic field makes possible the use of a maximum number of channels in an oscillograph of minimum dimensions. Permanent magnet assemblies are available for mounting two or six Heiland Galvanometers or multiples of six.

- Overall dimensions of six trace bank with galvanometers: 5⅞" (H) x 3" (D) x 17⅛" (W)



A-401 Portable Recording Oscillograph

Optional 8 volt battery pack provides self contained power source affording complete portability and flexibility of application.

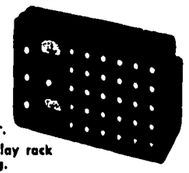
- Completely portable . . . optional 8 volt battery supply.
- Direct monitoring while recording.
- Compact: 7" x 12¼" x 9" Lightweight: 39 lbs.



"82-6" Bridge Balance and Strain Indicator

The "82-6" provides a simple, accurate means of calibrating static and dynamic output from resistive type transducers, or strain gages, before feeding these phenomena into a recording oscillograph. Static and slowly changing phenomena may be read directly on the sensitive output meter.

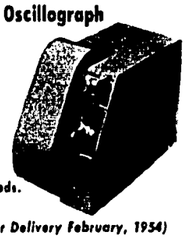
- One panel operation permits standard relay rack mounting or two-position table mounting.
- Individual channel control for coarse and fine voltage, balance, calibration and attenuation.



New, Miniature 35mm Recording Oscillograph

Designed and developed to meet an increasing demand for a small, lightweight oscillograph with accuracy of amplitudes and timing, uses 35 or 50mm paper of film.

- All operating controls on one surface.
- Compact: 10⅛" x 6" x 4¼" Weight: 15 lbs.
- Remote speed control . . . 8 recording speeds.
- Up to 12 galvanometers.



(For Delivery February, 1954)

Amplifier System

Carrier linear/integrating amplifier system. Flat response 1,000 cycle with carrier amplifier. Flat response beyond 2,000 cycles with linear/integrating amplifier. High output power. Small . . . compact . . . designed for rack or table mounting.

(For delivery October 1st)

Write for complete catalog of Heiland equipment

HEILAND RESEARCH CORPORATION

130 EAST FIFTH AVE., DENVER, COLORADO

Geophysical Apparatus

(Continued from page 231)

Heiland Research Corp., 130 E. 5 Ave., Denver 9, Colo., 25
For details see ad on page 232
Highland Engineering Co., Main & Urban, Westbury 21, L.I., N.Y., 30
For details see ad on pages 217, 283
Hycor Co., Inc., Calif., 30
Illinois Transformer Co., Ill., 30
Industrial Control Co., N.Y., 15
Lipps, Edwin A., Calif., 25
Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N.Y., 5, 15, 30
For details see ad on page 167
Magnex Corp., N.Y., 5, 30
McPhar Engineering Co. of Can., Ltd., Canada, 5, 10
Microtran Co., N.Y., 30
Midwestern Geophysical Lab., Okla., 5, 25
Miller Instruments, Inc., William, Calif., 5, 25
Molded Insulation Co., Pa., 20
Ortho Filter Corp., 196 Albion Ave., Paterson 2, N.J., 5, 30
For details see ad on page 101
Orthon Corp., 196 Albion Ave., Paterson 2, N.J., 5, 30
For details see ad on page 117
P. C. A. Electronics Inc., Calif., 30
P. S. C. Applied Research Ltd., Canada, 10
Perkin-Elmer Corp., Conn., 5
Petty Laboratories, Inc., Tex., 5, 10, 15, 25
Plastics & Electronics Corp., P.O. Box 38, Station J, Buffalo 8, N.Y., 5
For details see ad on page 99
Precision Radiation Instruments, Calif., 10
Qutronic Transformer Corp., N.Y., 15, 30
Rahm Instruments, Inc., N.Y., 5
Resdel Engineering, Calif., 10
Rich Electronics, Inc., Fla., 5, 15
Rowe Industries, Ohio, 5
Sanborn Co., 39 Osborn St., Cambridge 39, Mass., 5, 25
For details see ad on page 320
Seismograph Service Corp., Okla., 5, 10, 15, 25
Servomechanisms, Inc., Post & Stewart Aves., Westbury, L.I., N.Y., 15
For details see ad on page 237
Special Instruments Lab., Inc., Tenn., 10
Stephens Manufacturing Corp., Calif., 20
Telex, Inc., Minn., 5, 10, 25
Transformer Engineers, Calif., 30
Triad Transformer Corp., 4055 Redwood Ave., Venice, Calif., 30
For details see ad on page 89
Ultrasonic Corp., Mass., 15
United Transformer Co., 150 Varick St., New York 13, N.Y., 30
See complete catalog in last section
Universal X-Ray Prod., Inc., Ill., 25
Wheeler Insulated Wire Co., Conn., 30
Yellow Springs Instrument Co., Ohio, 5

62. Induction Heating Equipment.

5. Brazing, soldering & welding
10. Di-electric heating
15. Induction heating

Air Associates, Inc., N.J., 10, 15
Airmec, Ltd., England, 5, 15
American Machine & Foundry Co., Mass., 5, 10, 15
Blackstone Electric Co., Ill., 5, 15
Canadian Research Institute, Canada, 5, 10, 15
Canadian Westinghouse Co., Ltd., Canada, 5, 10, 15
Central Rediffusion Services, England, 10, 15
Chatham Electronics Corp., 630 W. Mt. Pleasant Ave., Newark 2, N.J., 15
For details see ad on pages 404-405
Constable Engineering Co., J. M., N.Y., 15
Eder Engineering Co., Wis., 10
Electrical Device Mfg. Co., N.J., 5, 10, 15
Electronic Heating Corp., Mass., 5, 10, 15
Electronic Processes Corp., Calif., 10
Engineering Research & Development, Ill., 5, 10, 15
General Electric Co., N.Y., 5, 10, 15
Guild Electronics, Inc., N.Y., 10, 15
Induction Heating Corp., N.Y., 5, 10, 15
Industrial Electronic Engineers, Calif., 10, 15
Industrial Electro. of Can., Ltd., Canada, 10, 15
Kabar Mfg. Corp., N.Y., 10, 15
Lamagna Mfg. Co., Inc., N.J., 15
La Rose & Associates, Inc., W. T., N.Y., 10
Lepel High Frequency Labs., Inc., N.Y., 5, 15
Marion Electrical Instrument Co., 400 Canal St., Manchester, N.H., 5, 15
For details see ad on page 234
McNeal, J. D., Conn., 10, 15
Mittelmann, Eugene, Minn., 10, 15
New Rochelle Tool Corp., N.Y., 5, 10, 15
Northern Electric Co., Ltd., Canada, 5, 15
Northern Electronic & Vacuum Ind., Canada, 15
Parker, Inc., G. L., R.I., 5, 10, 15
Pecco Corp., Calif., 10
Progressive Electronics Co., Inc., N.J., 10, 15
Radio Receptor Co., Inc., 251 W. 19 St., New York 11, N.Y., 10, 15
For details see ad on pages 190, 202
Redifon, Ltd., England, 5, 10, 15
Reeve Electronics, Inc., Ill., 5, 10, 15
Resdel Engineering, Calif., 10, 15
Rich Electronics, Inc., Fla., 10
Richardson Labs., Kenneth, N.Y., 10
Scientific Electric, N.J., 5, 10, 15
Sherman Ind. Electronics Co., N.J., 5, 10, 15
Suckle Electronics Co., N.J., 5
Teletronics Laboratory, Inc., N.Y., 5
Wall Mfg. Co., P., Pa., 5
Weltronic Co., Mich., 5, 15
Westinghouse Electric Corp., Pa., 10, 15
Woodwelding, Inc., Calif., 5, 10, 15

63. Medical Equipment.

5. Cardiographs
10. Diatnermy
15. Electronic cauterizing
20. Electro-encephalographs
25. Stimulators

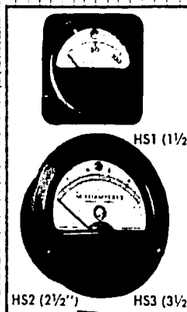
Aerolux Light Corp., N.Y., 25
American Electronic Labs., Inc., Pa., 25
Applegate & Co., C. J., Colo., 15, 25
Biophysical Instruments, Pa., 5, 15, 25
Brush Development Co., Ohio, 5, 20
Canadian Res. Inst., Canada, 10, 25
Crest Laboratories, Inc., N.Y., 25
Dallons Laboratories, Calif., 10, 15, 25
Edin Company, Inc., Mass., 5, 20, 25
Electrical and Physical Instr., N.Y., 25
Electro Medical Laboratory, Vt., 20, 25
Electrodyne Co., Mass., 25
Fischer & Co., H. G., Ill., 10, 15
General Electric Co., Wis., 5, 10, 15, 25
Glenco Corp., 212 Durham Ave., Metuchen, N.J., 5
For details see ad on page 137
Gorrell & Gorrell, N.J., 25
Grason-Stadler Co., Mass., 20, 25
Grass Instrument Co., Mass., 20, 25
Gulton Mfg. Corp., N.J., 5
Hathaway Instrument Co., Colo., 5, 20
Health Therapy Research Tr., N.Y., 10
Industrial Control Co., N.Y., 25
Indus. Electro. of Can., Ltd., Canada, 10
Interelectronics Corp., 2432 Grand Concourse, New York 58, N.Y., Audiometers
For details see ad on page 51
Lektra Laboratories, Inc., N.Y., 25
Liebel-Flarsheim Co., Ohio, 10, 15
Lackenbach & Co., Inc., Paul, N.Y., 10, 15, 25
Marconi Instruments, Ltd., N.Y., 5, 20
Master Appliances, Inc., Ind., 10, Long Wave
Medcraft Electronic Corp., N.Y., 20, 25
Metal Products Co., Tenn., 25
Offner Electronics, Inc., Ill., 20, 25
Optionic Research, Inc., Mass., Blood Cell Counter Machine
Ortho Filter Corp., 196 Albion Ave., Paterson 2, N.J., 25
For details see ad on page 101
Paravox, Inc., Ohio, Hearing Aids
Parker, Inc., G. L., R.I., 10
Penntronics, Pa., 20, 25
Petty Laboratories, Inc., Tex., 20
Process & Instruments, N.Y., 25
Professional Electronics Co., Calif., 5, 15, 20, 25
Rahm Instruments, Inc., N.Y., 20, 25
Raytheon Mfg. Co., Power Tube Div., 190 Willow St., Waltham 54, Mass., 10
For details see ad on page 228
Resdel Engineering, Calif., 25
Richardson Labs., Kenneth, N.Y., 25
Sanborn Co., 39 Osborn St., Cambridge 39, Mass., 5
For details see ad on page 320
Skiatron Electr. & TV Corp., N.Y., 25
Smith & Stone, Ltd., Canada, 5, 25
Summit Electronics, Inc., N.J., Electro Therapy
Teca Corp., N.Y., 25
Victory Engineering Corp., Springfield Rd., Union, N.J., Thermometry
For details see ad on page 203
Wappler, Inc., N.Y., 10, 15, 25
Waters-Conley Co., Minn., Cardiotachometers
Yellow Springs Instrument Co., Ohio, 5, Cardiotachometer

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

Marion

ELECTRICAL INDICATING INSTRUMENTS

RUGGEDIZED METERS



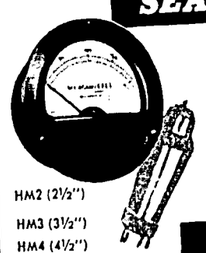
HS1 (1½")

HS2 (2½") HS3 (3½")

HS Series
HERMETICALLY SEALED

Exceptionally accurate and sensitive even under extreme conditions of shock, vibration, mechanical stress or strain, weather and climate. Outstanding performance in any application. 2½" and 3½" types have standard A.S.A. dimensions.

HERMETICALLY SEALED METERS



HM2 (2½")
HM3 (3½")
HM4 (4½")

HM Series

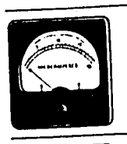
Marion true glass-to-metal hermetic sealing . . . long accurate life under adverse conditions of humidity, dust and hazardous atmospheres. Magnetically shielded.

MARION "REGULARS"

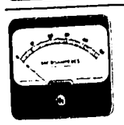
phenolic and metal cases — designed for commercial application where hermetic sealing or ruggedization is not required. All Alnico construction. Reliable high torque performance in moderate price range.



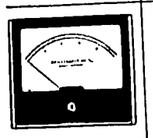
MODEL 52N Series 52
Accurate dependable service in smallest practical form. Model 52N (JAN MR24, MR25) 2½" round phenolic case. 52S, 2½" rectangular phenolic case. Model 52 RM, narrow flange brass case. Also available in brass case without flange, 52RMS.



MODEL 53SN Series 53
Standard 3" commercial rectangular type (Model 53SN). Also available in 3½" round phenolic case (Model 53RN) (JAN MR34, MR35).



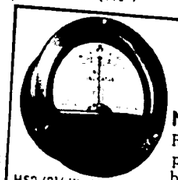
MODEL 55
Large 4⅝" x 4⅛". Critical readability on 100° scale. Extremely accurate. Most popular case style in test equipment field.



MODEL 56
6½" x 5¼" phenolic case. Large open face with 100° scale in 5½" arc.

MODEL 57
8½" x 7" open face, extra long scale. More than a mere overgrown 3" meter. Enlarged pole shoes — higher torque movement — higher damping factor. Accurate within 1%.

RELATED PRODUCTS



HS2 (2½") HS3 (3½")

NULL INDICATORS
Ruggedized, Hermetically Sealed. Used primarily as bridge and potentiometer balance indicators and where an instrument with very high sensitivity about the zero or balance point is desired. Sensitivity at this point is 1 ua per mm. or higher; the meter's shaded pole face and shielded core construction give sharply logarithmic attenuation as it departs from null point and provides ample overload protection.



HM2ET (2½")



HM3ET (3½")

ELAPSED TIME INDICATORS
Two sizes, 2½" and 3½", standard JAN dimensions for panel mounting. Operating range −55°C to +85°C. Hermetically sealed. Magnetically shielded. Registers in 1/10 hour steps to 9999.9 or hour steps to 99999. Durable, self-starting synchronous motor. Available for 110-125, 220-250 volts, 50 or 60 cycles A.C.

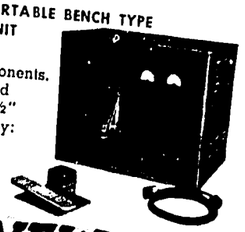


M-2

MULTI-RANGE METER TESTER
The only instrument of its type available today. Used for production inspection and calibration of electrical indicating instruments and to maintain high measuring standards in the laboratory. It is also used as a precise production limit bridge permitting acceptance tolerances to be set for any value from ±½% to ±20%. Overall accuracy for current measurements better than ¼ of 1%. Resistance range 0-5000 ohms. Power source 115V AC 60 cycles. Complete, no accessories required.

MARION MODEL PM: PORTABLE BENCH TYPE INDUCTION SOLDERING UNIT

Improves and speeds up production of small components. Low cost, low powered and portable. Size: 15¾" x 21½" x 15". 150 lbs. Power supply: 115 volts 60 cycles. Draws 775 watts full load, 100 watts standby.



NEW CONFUSION-PROOF MARION MULTI-DIALER



A multi-scale instrument which exposes only one scale to view at a time. At the same time, it automatically switches the appropriate internal or external circuitry associated with that scale. Five self-contained ranges in volts, milliamperes, microamperes and amperes. Ideal for panel, bench or field.

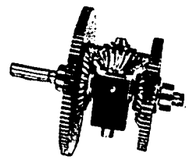
marion

ELECTRICAL INSTRUMENT COMPANY

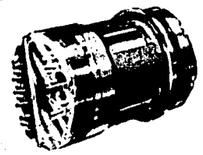
407 Canal Street, Manchester, New Hampshire, U. S. A.

FORD INSTRUMENT COMPONENTS

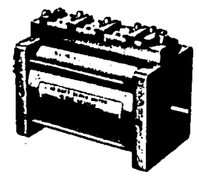
Ford Instrument Company makes the finest precision instruments and mechanisms for industry and the armed forces.



FORD MECHANICAL DIFFERENTIALS with single spider gear—available in 3/16," 1/4" and 5/16" shaft diameters —high accuracy, low friction.



FORD TELESYN UNITS are available in wide selection of sizes—proved precision accuracy, corrosion and fungus resistance mean better synchros when you specify Telesyn.



FORD SERVO MOTORS (60 and 400 cycles) for extremely low inertia and high frequency response. 1/5; ½; 1½; 2½; 5; 10-watt models in both low and high voltage, including magnetic amplifier controlled types.



FORD ELECTRICAL RESOLVERS available in sizes 23 and 31—interchangeability, temperature compensation —60°F to +160°F, highest accuracy, adaptability, 400 cycle frequency.

Ford Instrument also makes magnetic amplifier systems, computers, converters, mechanical integrators and other instruments and equipment. Write for more details.



11

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Division of The Sperry Corporation
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5. Pulse count integrators
10. Radiation detectors
15. Scalers

Airmec, Ltd., England, 10
American Machine & Foundry Co., Mass., 5, 10, 15
Anton Electronic Labs., Inc., 1226 Flushing Ave., Brooklyn 37, N.Y., 5, 10, 15
For details see ad on page 226
Atomic Instrument Co., 84 Massachusetts Ave., Cambridge 39, Mass., 10, 15
For details see ad on page 229
Austin Co., N.Y., 5, 10, 15
Beckman Instruments, Inc., Calif., 10
Bendix Aviation Corp., Research Labs., Fisher Bldg., Detroit 2, Mich., 10, 15
For details see ad on pages 176, 366-367
Berkeley, Div. Beckman Instruments, Inc., 2200 Wright Ave., Richmond, Calif., 5, 10, 15
For details see ad on page 8
Biophysical Instruments, Inc., Pa., 5
Chatham Electronics Corp., 630 W. Mt. Pleasant Ave., Newark 2, N.J., 10
For details see ad on pages 404-405
Clary Multiplier Corp., Calif., 15
Cole Instrument Co., Calif., 5, 10
Computer Research Corp., Calif., 15
Consolidated Engineering Corp., Calif., 10
Consultable Engineering Co., J. M., N.Y., 5, 10
Control Instrument Co., Inc., N.Y., 5
Cyclotron Specialties Co., Calif., 15
Decimeter, Inc., Colo., 15
Detectron Co., Calif., 5, 10, 15
De Wald Radio Mfg. Corp., N.Y., 10, 15
Douglas Instrument Labs., Mass., 5, 10, 15
Douglas Radio Labs., Mass., 5, 10, 15
Electronic Products Co., N.Y., 10
El-Tronics, Inc., Pa., 5, 10, 15
Emerson Radio and Phonograph, N.Y., 10
Fisher Research Lab., Inc., Calif., 10
Franklin Electronics, Inc., Pa., 5
Freed Electronics & Controls Corp., N.Y., 10
General Electric Co., N.Y., 5, 10, 15
Halross Instruments Corp., Canada, 10
Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif., 15
See complete catalog in last section
MacDonald Co., Inc., W. S., Mass., 10
Magnex Corp., N.Y., 5, 10
Manhattan Research Labs., N.Y., 10
Manufacturers Eng. & Equip. Corp., Pa., 10
McPhar Engineering Co. of Can., Ltd., Canada, 10
Menlo Research Lab., Calif., 10
Michigan Electronics, Inc., Ill., 10
Multi-Tron Laboratory, Ill., 10
New London Instrument Co., Conn., 10
Northern Electronic & Vacuum Ind., Canada, 10
Nuclear Development Laboratory, Mo., 5, 10
Nuclear Instrument & Chemical, Ill., 5, 10, 15
Nuclear Research Corp., Pa., 5, 10, 15
Nuclear Research & Development, Mo., 5, 10, 15
Nucleonic Co. of America, N.Y., 5, 10, 15
Ohmart Corp., Ohio, 10
Pickard & Burns, Inc., 240 Highland Ave., Needham 94, Mass., 15
For details see ad on pages 113, 284
Polarad Electronics Corp., N.Y., 10
Potter Instrument Co., N.Y., 15
Precision Radiation Instruments, Calif., 5, 10
Professional Electronics Co., Calif., 10
R. C. Scientific Instrument Co., Calif., 5, 10, 15
Radiation Counter Labs., Inc., Ill., 5, 10, 15
Radio Corp. of America, N.J., 10, 15
Radioactive Products, Inc., Mich., 5, 10, 15
Riedel Engineering, Calif., 5, 10, 15
Special Instruments Lab., Inc., Tenn., 10
Specialty Assem. & Packing Co., N.Y., 5, 10
Standard Electronic Research, N.Y., 10
Streeter-Amet Co., Ill., 5
Teletronics Laboratory, Inc., N.Y., 5
Tracerlab, Inc., Mass., 5, 10, 15, Scintillation Crystals
U. S. Radium Corp., N.Y., Isotopes
Victoreen Instrument Co., Ohio, 5, 10, 15
Walkirt Co., Calif., 15
Wang Laboratories, 296 Columbus Ave., Boston 16, Mass., 5, 15
For details see ad on page 230
Wayne-Kerr Laboratories, Ltd., Sycamore Grove, New Malden, Surrey, England, 10
For details see ad on page 316
Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N.J., 10
For details see ad on page 172
Wood Counter Laboratory, N., Ill., 10
Wright Engineering Co., Calif., 15

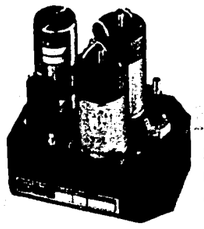
65. Servo-Mechanisms.

5. Servo amplifiers
10. Gears, gear-trains, etc.
15. Servo motors & generators

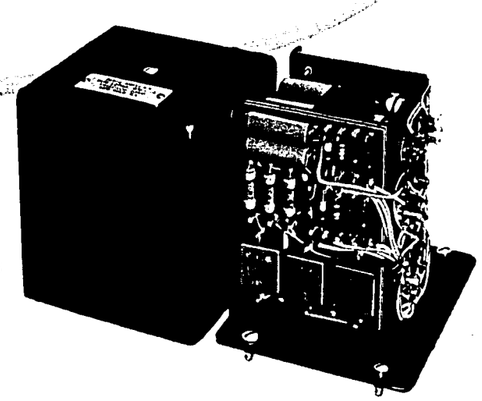
Aero Electronics Co., Ill., 5, 10
Aeroflex Research, Inc., N.Y., 5
Ahrendt Instrument Co., Md., 5, 10
Aircraft Armaments, Inc., Md., 5
Air Marine Motors, Inc., 2183 Jackson Ave., Seaford, L.I., N.Y., 15
For details see ad on page 177
Airplane & Marine Instruments, Pa., 5, 10
Allard Instrument Corp., N.Y., 15
American Machine & Foundry Co., Mass., 5, 10, 15
Arma Corp., N.Y., 5, 10, 15
Askania Regulator Co., Ill., 5
Atlantic Electronics Corp., N.Y., 5
Atlas Metal Stamping Co., Pa., 10
Audio-Tone Oscillator Co., Conn., 5
Austin Co., N.Y., 5, 10
Automatic Temperature Control, Pa., 5
Avion Instrument Corp., N.J., 5
Bailey Meter Co., Ohio, 5
Barnes & Reinecke, Inc., Ill., 10, 15
Beckman Instruments, Inc., Calif., 5
Belock Instrument Corp., N.Y., 5, 10
Bendix Aviation Corp., Research Labs., Fisher Bldg., Detroit 2, Mich., 5, 15
For details see ad on pages 176, 366-367

(Continued on page 237)

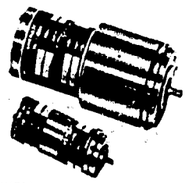
PRECISION *Servo Systems* AND COMPONENTS



MOTOR-DRIVEN INDUCTION GENERATOR, GEAR TRAIN & SYNCHRO COMBINATIONS



SERVO AMPLIFIERS



MOTOR-DRIVEN INDUCTION GENERATORS

Transicoil servo systems feature integrated design—every component is made to match all the others . . . coordinated to insure maximum efficiency and top performance.

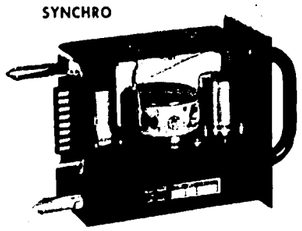
For systems of your own design, Transicoil can supply precision components designed to meet your requirements . . . their effectiveness limited only by the restrictions you impose.

Complete data will be sent on request.



MINIATURE CONTROL MOTORS

PLUG-IN ASSEMBLIES OF CONTROL MOTOR, GEAR TRAIN, POTENTIOMETER & SYNCHRO



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CORPORATION

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PACKAGED ELECTRONIC COMPONENTS

for design and production

ECONOMY



SERVO AMPLIFIERS



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POWER SUPPLIES



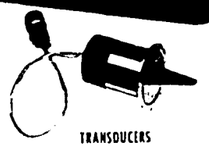
MODULATORS



POSITIONING MECHANISMS



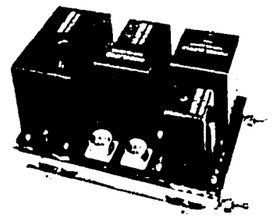
MINIATURE SERVO MOTORS



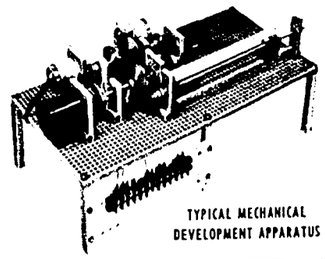
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Servomechanisms, Inc., pioneers in the "packaged function" technique, offers the economy-minded designer and manufacturer of electronic and electromechanical control systems, outstanding savings in development and production costs through the use of plug-in electronic components. These standard plug-in components may be used immediately in the laboratory breadboard stage or in quantity production, thus relieving the user of design and production problems and reducing the electronic plug-in components to a purchased parts status.

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A TYPICAL ANALOG COMPUTER



TYPICAL MECHANICAL DEVELOPMENT APPARATUS

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PLUG-IN COMPONENTS ARE AVAILABLE FOR 60 CYCLE AND 400 CYCLE APPLICATIONS.

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EL SEGUNDO DIVISION.....316 WASHINGTON ST., EL SEGUNDO, CALIF.

Servo-Mechanisms

(Continued from page 235)

Bendix Aviation Corp., Eclipse-Pioneer Div., Teterboro, N.J., 5, 15
For details see ad on pages 366-367
Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, North Hollywood, Calif., 5, 15
For details see ad on pages 176, 366-367
Bowmar Instrument Corp., Ind., 10
Brevel Products Corp., N.Y., 10, 15
Bristol Co., Conn., 5
C and H Sales Co., Calif., 5, 10, 15
Canadian Westinghouse Co., Ltd., Canada, 5, 10
Canoga Corp., Calif., 10
Capehart-Farnsworth Corp., Ind., 5
Cardwell Mfg. Corp., The Allen D., Conn., 10
Clifton Precision Products Co., Pa., 15
Communicating Systems, Inc., N.Y., 5
Computing Devices of Can., Ltd., Canada, 5
Controlectric, N.Y., 5
Curtiss-Wright Corp., N.J., 5, 10, 15
Custom Gear Co., 120 E. Sample St., South Bend 18, Ind., 10
For details see ad on page 25
Dalmo Victor, Inc., 1414 El Camino Real, San Carlos, Calif., 5, 10
For details see ad on page 26
De Coursey Eng. Labs., Calif., 5
Diehl Manufacturing Co., N.J., 15
Doelcam Corp., Mass., 5, 15
Duncan & Bayley Div., N.Y., 5, Actuators
Eder Engineering Co., Wis., 10
Electro Devices, Inc., N.J., 5
Electrodyne Co., Mass., 5
Electronic Associates, Inc., Long Branch Ave., Long Branch, N.J., 5
For details see ad on page 318
El-Tronics, Inc., Pa., 5
Empire State Laboratories, N.Y., 5, 10
Erwood, Inc., Ill., 10
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5
For details see ad on pages 368-373
Ferranti Electric, Ltd., Canada, 5
Ford Instrument Co., Div. of Sperry Corp., 31-10 Thomson Ave., Long Island City 1, N.Y., 10, 15
For details see ad on page 235
G. M. Laboratories, Inc., Ill., 15
General Electric Co., N.Y., 15
General Magnetics, Inc., N.J., 5
Gilfillan Bros., Inc., Calif., 10
Gleason-Avery, Inc., N.Y., 15
Gorrell & Gorrell, N.J., 10
Gries Reproducer Corp., N.Y., 10
Hanson, Gorrill, Brian, Inc., N.Y., 5, 10
Hertner Electric Co., Ohio, 15
Howard Industries, Inc., 1760 State St., Racine, Wis., 10, 15
For details see ad on page 179
Hycon Mfg. Co., Calif., 5, 10
Induction Motors Corp., 570 Main St., Westbury, L.I., N.Y., 10, 15
For details see ad on page 180
Industrial Control Co., N.Y., 5
Industrial Electronic Engineers, Calif., 5
Industrial Scientific Co., N.Y., 5

(Continued on page 239)

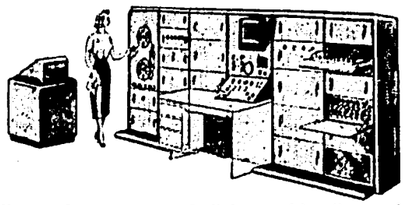
ASCOP

PRECISION ENGINEERING IN ELECTRONICS

Telemetering and Data Handling Equipment

Special Components

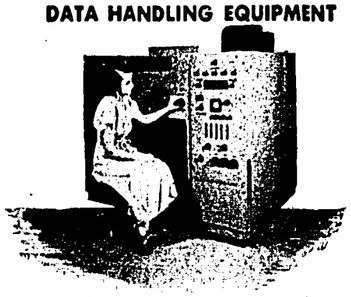
GROUND STATION EQUIPMENT



Installations for reception and all forms of handling and reduction of data from pulse width and FM/FM radio telemetering systems • Custom-engineered and custom-built to hold equipment to a minimum consistent with accuracy, operation ease, reliability • Functional mounting of components assures servicing ease – and flexibility for ready unit expansion with any of the following:

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- *Magnetic tape field storage and playback*
- *Regenerative integrator for PM signals*
- *Channel selector for PW systems with automatic zero and channel sensitivity adjustments, and automatic missing pulse insertion.*
- *Oscillographic film reader, with line center finder*
- *Tabulated numerical output*
- *Punched card output*
- *Graphical output*

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Automatic or semi-automatic devices for marked reduction of time, expense, man-power usually required to place volumes of recorded data in final usable form • Input data – film records, varying DC voltages, magnetic tape recordings, etc.– processed point by point, at high rates, with automatic correction for zero drift, scale factor, and measuring system non-linearities • Outputs available as continuous plots on film or paper, with scale and time coordinates, as DC voltages, as pulse coded signals for remote transmission, or as electrical indications for existing tabulating and card punching devices • All systems custom-designed for accuracy and economy; custom-assembled from special purpose components devised in continuous engineering of data handling systems.

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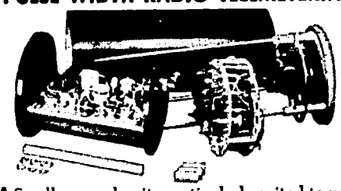
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Applied Science Corp. of Princeton

P. O. Box 44, Princeton, N. J. Plainsboro 3-4141

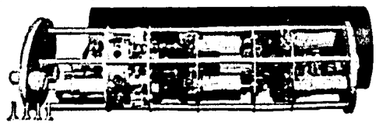
PULSE WIDTH RADIO TELEMETERING



PW/PM Small, rugged units particularly suited to vehicular use where many different variables must be continuously transmitted.

- 30 data channels
- 215-235 mc Carrier-crystal controlled
- Based on RDB telemetering standards
- 4 watt RF power output
- 30 cps sampling rate
- 1% system accuracy
- ½% linearity
- 0-5 volt DC inputs
- 60 g sustained acceleration
- −40° to +60°C
- Vibration –⅛ in. at 60 cps
- Single or two package form
- 3¼ in. diam.; 17 in. length; 7 lbs. weight
- Primary power 28 volts, 3.5 amps

Note: Also available without dynamotor. Transmitters available separately. Integral subcommutator if more channels are desired



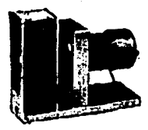
PW/FM For higher power output, with space no factor. Stable, highly reliable over long distances. Components readily accessible for replacement to extend unit life.

- Based on RDB telemetering standards
- 215-235 mc Carrier
- Max. drift – .04%
- 10 watt RF power output
- 30 data channels
- 30 cps sampling rate
- 1% system accuracy
- ½% linearity
- 0-5 volt DC inputs
- 60 g sustained acceleration
- Vibration: ⅛ in. at 60 cps
- 10 kc oscillator supply for AC pickups included
- 4¼ in. diam.; 30 in. combined length; 17 lbs. combined weight
- Primary power 28 volts at 5.7 amps.

Note: Model PAD-1 Power Amplifier-Dynamotor unit may be added to increase transmitter power to 40-50 watts. Transmitter of Transmitter-Dynamotor packages available separately.

HIGH-SPEED ROTARY SAMPLING SWITCHES

ASCOP designs and manufactures switches to your most difficult and exacting requirements. Here are a few typical examples



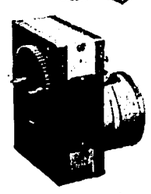
TYPE F Built to withstand vibration, shock, temperature and altitude extremes. Switching designed for airborne radio telemetering systems. DC motors for 27, 12, and 6 volts. Up to 4 poles, each with 30 contacts. Sampling speeds from 0.1 to 20 rps.



TYPE U Custom-designed for limited space applications. Complete with DC drive motor, yet only 1 in. in diameter. A single pole samples 32 fixed contacts at the rate of 100 rps.



TYPE L For high performance with space secondary. Single pole samples 120 fixed contacts at rates up to 30 rps. Connection to external drive through ¼ in. steel shaft running in sealed ball bearings. Special contact material for long service-free life.



TYPE V For precision in sampling speed plus long life. Synchronous drive motor permits selection of single pole sampling of 60 fixed contacts at many rates from 1 rps. to 1 rev. per day. Adaptable, through variety of mountings and terminals, for use as a component of industrial instrumentation systems.

Servo-Mechanisms

(Continued from page 237)

Kalbfell Laboratories, Inc., 1090 Morena Blvd., San Diego 10, Calif., 5
For details see ad on page 257
Kearfott Co., Inc., 1150 McBride Ave., Little Falls, N.J., 5, 10, 15
For details see ad on page 53
Ketay Mfg. Corp., N.Y., 5, 15
Kinetix Instrument Co., Inc., N.Y., 15
Kollsman Instrument Corp., Div. Standard Coil Products, 80-08 45 Ave., Elmhurst, L.I., N.Y., 15
For details see ad on page 43
Lear, Inc., Calif., 5, 10, 15
Link Aviation, Inc., N.Y., 5, 10
Loral Electronics Corp., N.Y., 5
Lytle Engineering & Mfg. Co., Ill., 5
Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N.Y., 5
For details see ad on page 167
Magnetic Research, Calif., 5
Magnetics, Inc., P.O. Box 230, Butler, Pa., 5
For details see ad on page 160
Marsh-Theiss, Inc., N.Y., 5, 10
Maxson Corp., W. L., 460 W. 34 St., New York 1, N.Y., 5, 10
For details see ad on page 122
Midwestern Geophysical Lab., Okla., 5
Minneapolis-Honeywell Regulator, Pa., 5, 15
Mission Electric Mfg. Co., Inc., Calif., 5
Mission Western Engineers, Inc., Calif., 10
Missouri Research Labs., Inc., Mo., 5, 10, 15
Moseley Co., F. L., Calif., 5, 10
Muirhead & Co., Ltd., England, 15
Ortho Filter Corp., 196 Albion Ave., Paterson 2, N.J., 5
For details see ad on page 101
Oster Manufacturing Co., John, 1 Main St., Racine, Wis., 15
For details see ad on page 181
P. S. C. Applied Research, Ltd., Canada, 5, 10
Plastics & Electronics Corp., P.O. Box 38, Station J, Buffalo 8, N.Y., 5
For details see ad on page 99
Reeves Instrument Corp., N.Y., 5, 10
Reflectone Corp., Conn., 5, 10, 15
Regulator Equipment Corp., N.J., 5
Research Instrument Co., N.Y., 10
Robinette Co., W. C., Calif., 5, Complete Systems
Rockwell Engineering Co., Ind., 5, 10
Sanborn Co., 39 Osborn St., Cambridge 39, Mass., 5
For details see ad on page 320
Sanders Associates, Inc., 137 Canal St., Nashua, N.H., 5, 15
For details see ad on page 42
Servo Corporation of America, 20-20 Jericho Tnpke., New Hyde Park, L.I., N.Y., 5, 10
For details see ad on pages 438-439
Servomechanisms, Inc., Post & Stewart Aves., Westbury, L.I., N.Y., 5, 10, 15
For details see ad on page 237
Servo-Tek Products Co., Inc., N.J., 5, 15
Skiatron Electronics & TV Corp., N.Y., 5
Standard Coil Products Co., Inc., Ill., 15
Standard Electronic Research, N.Y., 5
Summers Gyroscope Co., Calif., 5, 10, 15
Superex Electronics Corp., N.Y., 5
T. L. G. Electric Corp., N.Y., 5
Taller & Cooper, N.Y., Custom
Technical Advisory Associates, N.Y., 15
Televiso Corp., Ill., 5, 15
Transducer Corp., Mass., 10
Transicoil Corp., 107 Grand St., New York 13, N.Y., 5, 10, 15
For details see ad on page 236
Transmitter Equip. Mfg. Co., N.Y., 5
Trans-Sonics, Inc., Mass., 5, 15
Ultrasonic Corp., Mass., 5, 10
Vectron, Inc., 400 Main St., Waltham 54, Mass., 5, 10
For details see ad on page 308
Winters, Engineer, T. Starling, N.J., 5

66. Telemetering Equipment.

5. Data Recorders
10. FM/FM Modulators
15. Data storage mechanisms

Air Associates, Inc., N.J., 5, 10
American Machine & Foundry Co., Mass., 5, 10, 15
Ampex Electric Corp., 934 Charter St., Redwood City, Calif., 5
For details see ad on pages 364-365
Anelex Corp., N.H., 5
Applied Science Corp. of Princeton, P.O. Box 44, Princeton, N.J., 5, 15
For details see ad on page 238
Atomic Instrument Co., 84 Massachusetts Ave., Cambridge 39, Mass., 5
For details see ad on page 229
Austin Co., N.Y., 5
Avion Instrument Corp., N.J., 15
Bailey Meter Co., Ohio
Bendix Aviation Corp., Research Labs., Fisher Bldg., Detroit 2, Mich., 5, 10, 15
For details see ad on pages 176, 366-367

Advertisements

in this book will furnish you with the specific information you need to complete the data given in the listings. For specifications, model numbers, descriptions, and illustrations of the products manufactured by a firm, always look up the ad when you consult a listing.

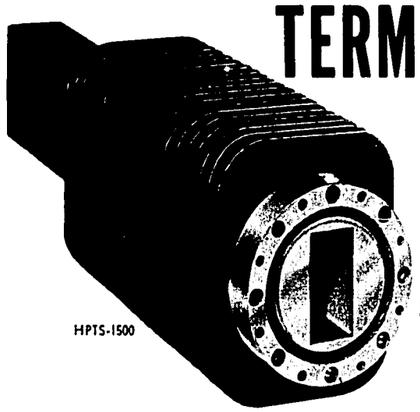
For example, see . . .

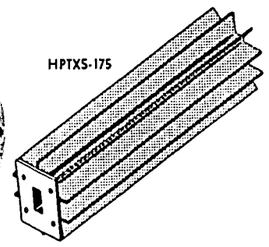
Marion Electrical Instrument Company advertisement on page 234.

Telemetering Equipment

Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, North Hollywood, Calif., 10
For details see ad on pages 176, 366-367
Bristol Co., Conn., 5
C. G. S. Laboratories, Inc., Conn., 10
Computer Research Corp., Calif., 15
Consolidated Eng. Corp., Calif., 5
Control Corp., Minn., Remote
Crown Engineering, N.M., 10
Dage Electronics Corp., Ind., 15
Davies Laboratories, Inc., Md., 5
Electro Mechanical Research, Inc., Conn., 10
Electrodyne Co., Mass., 5
Emerson Radio and Phonograph, N.Y.,
Fairchild Recording Equipment Corp., N.Y., 5
Ferranti Electric, Ltd., Canada, 15
Franklin Electronics, Inc., Pa., 5, 10
Freed Electronics & Controls Corp., N.Y., 5
General Electric Co., N.Y., 10, 15
Gertsch Products, Inc., Calif., 5, 15
Harmon Electronics Co., Mo., 10
Heiland Research Corp., 130 E. Fifth Ave., Denver 9, Colo., 5
For details see ad on page 232
Hogan Laboratories, Inc., 155 Perry St., New York 14, N.Y., 5
For details see ad on page 283
Industrial Electronic Engineers, Calif.
Leupold and Stevens Instruments, Ore., 5
Little, Inc., Arthur D., Mass., 5
Lynch Carrier Systems, Inc., Calif., 10
Magne-Pulse Corp., N.Y., 15
Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N.Y., 15
For details see ad on page 167
Marconi Instruments, Ltd., N.Y., 10
Melpar, Inc., Va.
Metrotype Corp., Ill., 5
Midwestern Geophysical Lab., Okla., 5
Miller Instruments, Wm., Calif., 15
Motorola, Inc., Ill., 10
Motorola Research Laboratory, Ariz.
Phelco, Inc., Md., 10
Potter Instrument Co., N.Y., 5
Professional Electronics Co., Calif.
Radiation, Inc., Fla., 5, 15
Radio Engineering Products, Canada, 10
Ribet Desjardins, France, 10
Rogers Majestic Electronics, Ltd., Canada
Rosen Engineering Prod., Raymond, Pa., 10, 15
Servomechanisms, Inc., Post & Stewart Aves., Westbury, L.I., N.Y., 5
For details see ad on page 237
Shepard Laboratories, N.J., Decoder & Printer
Streeter-Amet Co., Ill., 5
Taller & Cooper, N.Y., 5
Teleregister Corp., N.Y., 5, 15
Ultrasonic Corp., Mass., 5
Vectron, Inc., 400 Main St., Waltham 54, Mass., 15
For details see ad on page 308
Wang Laboratories, 296 Columbus Ave., Boston 16, Mass., 15
For details see ad on page 230

HIGH POWER Waveguide TERMINATIONS





"Eilex", a new ceramic lossy material, is now available in waveguide, high power terminations and attenuators from Electro Impulse Laboratory.

This new material is extremely durable, provides a strong adhesive bond to waveguide walls, withstands temperatures up to 2000° F, and handles the thermal shock efficiently.

Eilex is stable up to 2000° F (does not emit steam or water, characteristic of dummy loads using a Portland cement and graphite mixture for the lossy material).

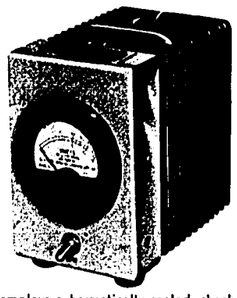
The waveguide loads use walls that are poor conductors, which means a more efficient removal of the heat generated in the load, and less tendency toward pulsepower breakdown (arcing) as may occur in designs which use filling material in the waveguide.

HPTS-1500 is an S Band, waveguide termination capable of 1500 watts dissipation in still-air, and has a V.S.W.R. of less than 1.1 over the range of 2700 to 3400 mc. **PRICE $185.00**

HPTXS-175 is an X Band, waveguide termination, capable of 200 watts dissipation in still air. V.S.W.R. will not exceed 1.1 over the range of 8500 to 10,000 mc. **PRICE $55.00**

Many other standard terminations and attenuators available, non-standard terminations made to specifications.

UHF POWER METER

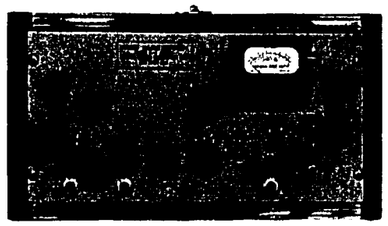


The UHF Power Meter, Model PM-10, is a completely self-contained, portable-field or laboratory test instrument which consists of a line termination capable of 90 watts dissipation, and a power measuring circuit which may be calibrated from 1 to 60 watts full scale.

This unit employs an oil filled, air cooled line termination which has a V.S.W.R. of less than 1.3 in the range of 0 to 1200 mc. V.S.W.R. over the power measuring range of 20 to 600 mc does not exceed 1.1. The power measuring circuit employs a resistive voltage divider, is free from spurious responses and has negligible error from response to harmonics over the range of 20 to 600 mc. The unit employs two scales, 0 to 15 and 0 to 60 watts, but may be calibrated for any full scale reading from 1 to 60 watts. R.F. connector is located at rear of instrument, facilitating direct connection to transmitter.

The power measuring circuit employs a standard silicon crystal, (diode) which requires no special selection. The unit may be readily recalibrated using accurately known 60 cps voltage when change of crystals or special operating conditions require. The power meter employs a hermetically sealed, shock mounted, 200 microampere meter. All components are fully shielded from the effects of strong R.F. fields.

The meter housing is detachable from the main housing assembly, and is connected by a self storing 25 ft. cable, for use when it is desired to use the line termination at a remote location. **PRICE $135.00.**



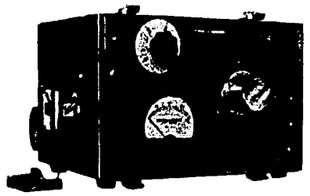
TUNED V.S.W.R. AMPLIFIER, MODEL A-12

The model A-12 Tuned V.S.W.R. Amplifier contains a sensitive, highly stable bridged amplifier of improved design, which may be tuned over the range from 500 to 10,000 cps, or used as a wide band amplifier. When used as a tuned amplifier for V.S.W.R. measurements, interference and random noise will not give false V.S.W.R. indications.

The scale is graduated to read V.S.W.R. from 1 to 4 on one range, and power standing wave ratio from 0 to 30 db, on three ranges. Input may be either from a bolometer or a crystal source, and output may be indicated on the self-contained meter, or on an external meter.

This instrument may also be used to measure R.F. attenuation in conjunction with a suitable bolometer.

PRICE $250.00.



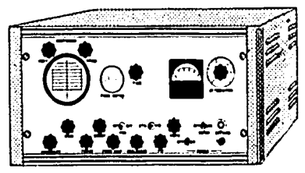
X BAND FREQUENCY POWER METER FPM-3

The Electro Impulse Laboratory Frequency Power Meter FPM-3 is a portable, completely self-contained instrument capable of frequency and power measurements over the range of 8500 to 9600 megacycles. It employs a direct reading type of frequency meter with an absolute accuracy of ± 4 mc and a relative accuracy of ± 1 mc on frequency differences of up to 60 mc.

Power measurements are accurate to ± .1 db on power levels of 0-1 milliwatt and ± 1 db on power levels of 1-1000 milliwatts. A crystal detector circuit is also incorporated to allow the wave shape of the signal to be observed on an external scope.

Provisions for coupling to RG 51/U or RG 52/U waveguide or to coaxial source are provided.

PRICE $275.00.



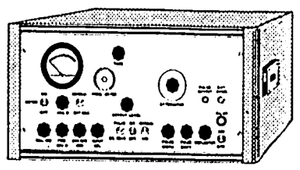
X BAND SPECTRUM ANALYZER

The model 6X Spectrum Analyzer uses a sensitive supertrodyne receiver circuit, electronically regulated power supply and a cathode ray tube for visual presentation of information.

Its frequency meter circuit is of the direct reading type with an absolute accuracy of ± 4 mc over the range of 8500 to 9600 mc. It employs a directly calibrated attenuator capable of 0-30 db attenuation. Either coaxial or waveguide input may be used.

This instrument may also be used as a signal generator, and has provisions for external modulation of the R.F. oscillator for this service.

PRICE $950.00.



X BAND TEST SET MODEL X-12

The Model X-12 Test Set is a portable X Band Signal Generator, with a self-contained wavemeter and power monitor. It will generate either pulsed or CW, RF power. Basically the unit consists of a 2K25 Klystron oscillator and associated "plumbing," a pulser for the oscillator which permits triggered or self-synchronous operation, a direct reading Thermistor bridge for power measurements, a metallized glass, RF attenuator calibrated in decibels below 1 milliwatt, a direct reading, reaction type wavemeter, and a regulated power supply.

The Thermistor and wavemeter are so designed that they may be used to measure the frequency and power of R.F. signals from an external source. On such measurements the attenuator is calibrated in db above 1 milliwatt, giving a power range of .1 to 1000 milliwatts, in the frequency band of 8500 to 9700 mc. V.S.W.R. will not exceed 1.35 at any attenuator setting within the frequency range.

PRICE $700.00.

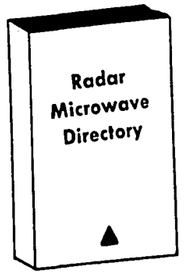
ELECTRO IMPULSE Laboratory

62 WHITE STREET • RED BANK, N. J.

RED BANK 6-0404

A Directory of

6. Radar, Microwave, UHF Equipment



4 Major Groups

17 Products

Organized by functions for Engineers

The Ultra-Highs have brought into being a set of equipment, mostly used for military purposes. In this particular directory we list both equipment and components which belong specially to this area of the spectrum.

Of all our groups, this one promises to expand the most in the future. The reader is also referred to basic groups 2, 3, & 5.

The products and services of the Radio-Electronics industry have been organized into ten basic directories following closely the organization of the IRE Professional Groups. But 100 major product groups are numbered consecutively throughout.

67 Antennas.
- 05 Feed systems
- 10 Receiving
- 15 Reflectors
- 20 Rotating mechanisms
- 25 Transmitting

68 Receivers.
- 05 Microwave relay
- 10 Position indicators
- 15 Radar

69 Transmitters.
- 05 Microwave
- 10 Microwave relay
- 15 Radar

70 Waveguides & Accessories.
- 05 Couplings 10 Delay lines, etc.
- 15 Flexible waveguides
- 20 Rigid waveguides
- 25 Sampling lines, reflectors, etc.
- 30 Switches

Always consult the pink pages at the start of the Directory of firms, for a terminology cross-index, or to find products by name. The pink pages list more than 500 products by name, as well as under the product groups. Page numbers are given for speed.

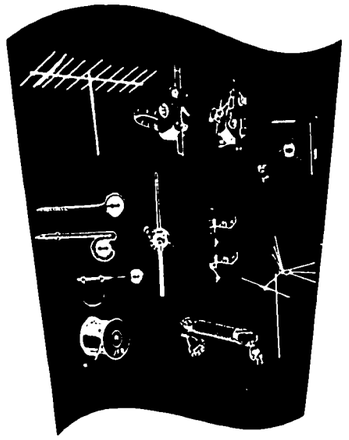
67. Antennas.

5. Feed systems
10. Receiving
15. Reflectors
20. Rotating mechanisms
25. Transmitting

Aircraft Armaments, Inc., Md., 5, 10, 15, 20, 25
Alliance Manufacturing Co., Ohio, 20
Alliance Tool & Motor Co., Ltd., Canada, 20
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25
American Phenolic Corp., 1830 S. 54 Ave., Chicago 50, Ill., 5, 10, 15
For details see ad on page 2
Andrew Corp., Ill., 10, 15, 25
Atlas Metal Stamping Co., Pa., 20
Avion Instrument Corp., N.J., 20
Bart Laboratories Co., Inc., 227 Main St., Belleville, N.J., 10
For details see ad on page 259
Bendix Aviation Corp., Research Labs., Fisher Bldg., Detroit 2, Mich., 5, 10, 15, 20, 25
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Eclipse-Pioneer Div., Teterboro, N.J., 20
For details see ad on pages 366-367
Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, North Hollywood, Calif., 25
For details see ad on pages 167, 366-367
Blaw-Knox Co., Pa., 25
Bludworth Marine Div., National-Simplex Bludworth, Inc., 25
Bogart Mfg. Co., N.Y., 5, 10, 15, 20, 25
Bone Engineering Corp., Calif., 5, 10, 15, 20, 25
Borg Equip. Div., Geo. W. Borg Corp., Wis., 20
Brooks & Perkins, Inc., Mich., 15
Budelman Radio Corp., Conn., 10, 25
C and H Sales Co., Calif., 20
Canadian General Electric Co., Canada, 5, 10, 15, 20, 25
Canoga Corp., Calif., 5, 10, 15, 20, 25
Capehart-Farnsworth Corp., Ind., 5, 10, 15, 25
Cardwell Mfg. Corp., The Allen D., Conn., 15
Century Electronics, Div. Century Metalcraft Corp., 14806 Oxnard St., Van Nuys, Calif., 5, 10, 15, 20, 25
For details see ad on page 329
Channel Master Corp., N.Y., 10, 15
Clear Beam TV Antennas, Calif., 10
Coaxial Connector Co., 35 N. Second Ave., Mount Vernon, N.Y., 20
For details see ad on page 155
Collins Radio Co., 855 35 St. N.E., Cedar Rapids, Iowa, 10, 25
For details see ad on pages 428-429
Craig Machine, Inc., Mass., 20
Cubic Corp., Scott & Canon Sts., San Diego 6, Calif., 5, 10, 25
For details see ad on page 327
Dalmo Victor, Inc., 1414 El Camino Real, San Carlos, Calif., 5, 10, 15, 20, 25
For details see ad on page 26
Davis Electronics, Calif., 10
DeMornay-Bonardi, Calif., 10, 20, 25
Dorne and Margolin, 30 Sylvester St., Westbury, L.I., N.Y., 5, 10, 15, 20, 25
For details see ad on page 130
Douglas Microwave Co., Inc., 338 E. 95 St., New York 28, N.Y., 5, 10, 25
For details see ad on page 324
DuMont Labs., Inc., Allen B., Television Transmitter Div., 1500 Main Ave., Clifton, N.J., 10, 15, 25
For details see ad on page 29
Duncan & Bayley Div., N.Y., 20
Electro Craft Industries, Inc., Conn., 10
Electro Impulse Laboratory, 62 White St., Red Bank, N.J., 10, 25
For details see ad on page 240
Electron Radar Products, Ill., 10, 25
Test Antennas
Emerson & Cuming, Inc., Mass., 15
F-R Machine Works, Inc., 44-14 Astoria Blvd., Long Island City 3, N.Y., 5, 10, 20, 25
For details see ad on page 283
Federal Telecommunication Labs., Inc., N.J., 15
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 10, 15, 25
For details see ad on pages 368-373
Fretco, Inc., Pa., 5, 10, 15, 20, 25
General Electrosonics, Inc., N.Y., 5, 10, 15, 25
Gilfillan Bros., Inc., Calif., 5, 10, 15, 20, 25
Hycon Mfg. Co., Calif., 5, 10, 15, 20, 25

(Continued on page 242)

27 years of Engineering Experience



JFD offers the World's largest selection of quality Radio and Television antennas, accessories, boosters and electronic components. Over 27 years of engineering experience and production skill are behind every JFD product—each a challenge to the field with outstanding design features!

Write today for complete JFD Radio and Television Catalogs.

JFD Electronics

JFD Mfg. Co. Brooklyn 4, N.Y.
BEnsonhurst 6-9200

World's Largest Manufacturer of Television Antennas & Accessories

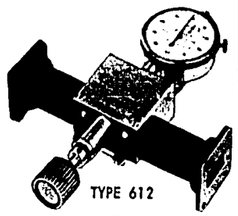
Antennas

(Continued from page 241)

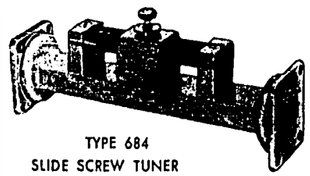
Hy Lite Antennae, Inc., N.Y., 10
I-T-E Circuit Breaker Co., 1924 Hamilton St., Philadelphia 30, Pa., 10
For details see ad on page 146
Imperial Radar & Wire Corp., N.Y., 10
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 10
For details see ad on page 134
JFD Mfg. Co., Inc., 6101-16th Ave., Brooklyn 19, N.Y., 10
For details see ad on pages 140, 242
Kearfott Co., Inc., 1150 McBride Ave., Little Falls, N.J., 20
For details see ad on page 53
Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 10
For details see ad on pages 414-415
Kings Microwave Co., Inc., N.Y., 5, 10, 15, 25
Lamagna Mfg. Co., Inc., N.J., 10, 25
Lavoie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N.J., 10, 20, 25
For details see ad on page 328
Lee Laboratories, P.O. Box 200, Genesee, Pa., 5, 10, 15, 20, 25
For details see ad on page 284
Lerner Instrument & Electronics, N.Y., 5, 15, 20
Magnex Corp., N.Y., 10
Makepeace Co., D.E., Pine & Dunham Sts., Attleboro, Mass., 5
For details see ad on page 80
Mark Products Co., Ill., 5, 10, 15, 20, 25
Master Mobile Mounts, Inc., Calif., 5, 10
Maxson Corp., W. L., 460 W. 34 St., New York 11, N.Y., 5, 10, 15, 20, 25
For details see ad on page 122
McCarter Radio & TV Co., Canada, 5, 10, 25
Melpar, Inc., Va., 10, 25
Microlab, N.J., 5
Microwave Development Labs., Inc., 220 Grove St., Waltham 54, Mass., 5, 10
For details see ad on page 284
Missouri Research Labs., Inc., Mo., 20
Molded Insulation Co., Pa., 10, 25
Motorola Research Laboratory, Ariz., 5, 10, 15, 25
N. R. K. Mfg. & Engineering Co., 4601 W. Addison St., Chicago 41, Ill., 5, 15, 20, 25
For details see ad on page 65
Nassau Research and Development Assoc., Inc., 66 Main St., Mineola, L.I., N.Y., 5, 10, 15, 20, 25
For details see ad on page 243
National Electric Products Corp., Pa., 10
Northern Electric Co., Ltd., Canada, 5, 10, 15, 25
Peerless Products Industries, Ill., 10
Phaostron Co., 151 Pasadena Ave., South Pasadena, Calif., 10
For details see ad on page 175
Philson Mfg. Co., Inc., N.Y., 10
Polarad Electronics Corp., N.Y., 10, 20
Polytron Corp., N.Y., 10
Polydoroff & Associates, W. J., D.C., 10
Prodelin, Inc., N.J., 5, 15, 25

MICROWAVE INSTRUMENTS

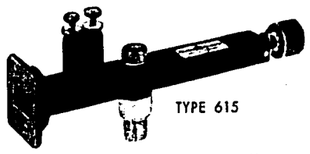
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1,000 MCS To 26,500 MCS.



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CALIBRATED VARIABLE ATTENUATOR
8,200 to 12,400 Mcs.



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TYPE 615
TUNABLE CRYSTAL AND BOLOMETER MOUNT
8,500 to 9,600 Mcs.

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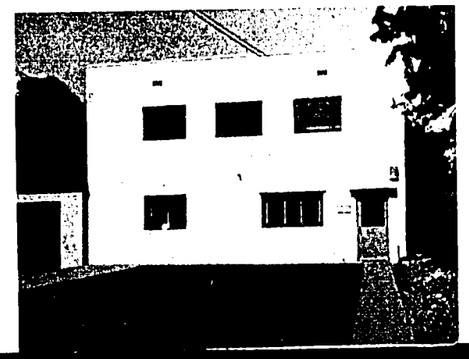
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Formerly: MICROWAVE EQUIPMENT CO.

68. Receivers.

5. Microwave relay **15. Radar**
10. Position indicators

A. R. F. Products, Inc., Ill., 15
Adler Communications Labs., N.Y., 15
Aircraft Armaments, Inc., Md., 5, 10, 15
Air Associates, Inc., N.J., 5
American Machine & Foundry Co., Mass., 5, 10, 15
Bendix Aviation Corp., Bendix Radio Div., Baltimore 4, Md., 15
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Research Labs., Fisher Bldg., Detroit 2, Mich., 5, 15
For details see ad on pages 176, 366-367



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Engineering, Manufacturing, Design, Testing

Write for Catalog and for Data and Prices on the following

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Garden City 3-3570
A Subsidiary of Peerless Instrument Company, Inc., Elmhurst, N.Y.

Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, North Hollywood, Calif., 15
For details see ad on pages 176, 366-367
Bludworth Marine Div., National-Simplex Bludworth, Inc., N.Y., 15
Budelman Radio Corp., Conn., 5
Canadian General Electric Co., Canada, 5, 10, 15
Canadian Westinghouse Co., Ltd., Canada, 5, 15
Capehart-Farnsworth Corp., Ind., 15
Cardwell Mfg. Corp., The Allen D., Conn., 15
Century Electronics, Div. Century Metalcraft Corp., 14808 Oxnard St., Van Nuys, Calif., 5, 15
For details see ad on page 329
Collins Radio Co., 855 35 St. N.E., Cedar Rapids, Iowa, 5
For details see ad on pages 428-429
Connecticut Telephone & Electric, Conn., 5
Crown Engineering, N.M. 10
Cubic Corp., Scott & Canon Sts., San Diego 6, Calif., 15
For details see ad on page 327
DeMornay-Bonardi, Calif., 5, 15
De Wald Radio Mfg. Corp., N.Y., 15
DuMont Labs., Inc., Allen B., Television Transmitter Div., 1500 Main Ave., Clifton, N.J., 5
For details see ad on page 29
Edo Corp., N.Y., Sonar
Electronic Designs, Inc., N.Y., Converters
Emerson Radio and Phonograph, N.Y., 5, 10, 15
F-R Machine Works, Inc., 44-14 Astoria Blvd., Long Island City 3, N.Y., 5, 15
For details see ad on page 283
Federal Electric Mfg. Co., Ltd., Canada, 5
Federal Mfg. & Engineering Corp., N.Y., 15
Federal Telecommunication Labs., Inc., N.J., 5
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5, 10
For details see ad on pages 368-373
Freed Electronics & Controls Corp., N.Y., 10, 15
Gilfillan Bros., Inc., Calif., 10, 15
Harman-Kardon, Inc., N.Y., 15
Hastings Instrument Co., Inc., Va., 10
Hoffman Radio Corp., Calif., 15
Hycon Mfg. Co., Calif., 5, 10, 15
Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 5, 15
For details see ad on pages 414-415
Korb Engineering & Mfg. Co., Mich., 15
Laboratory for Electronics, Inc., 75 Pitts St., Boston 14, Mass., 5, 10, 15
For details see ad on pages 432-433
Lee Laboratories, P.O. Box 200, Genesee, Pa., 15
For details see ad on page 284
Leonard Electric Products Co., N.Y., 5
Loral Electronics Corp., N.Y., 15
Lytle Engineering & Mfg. Co., Ill., 15
Magnex Corp., N.Y., 10, 15
Maxson Corp., W. L., 460 W. 34 St., New York 1, N.Y., 15
For details see ad on page 122

(Continued on page 244)

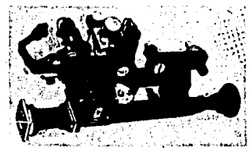
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A complete line; compact, rugged, suitable for military usage; VSWR less than 1.10; crosstalk greater than 50 Db; operation 24 v. DC, 110 v. AC; may be specially designed to meet switching problems.



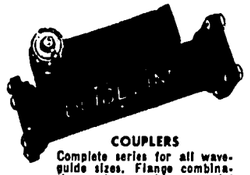


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Precision-built to closest tolerances; completely tested. Designed to meet your basic requirements, or produced from your blueprints.



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Pressure-tight; rugged enough to meet roughest requirements; VSWR less than 1.10; attenuation equal to brass rigid guide.



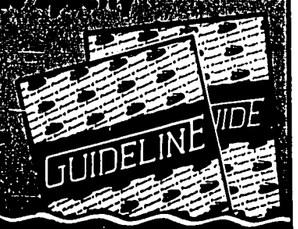
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Complete series for all waveguide sizes. Flange combination, and waveguide or coaxial outputs. Designed to meet your particular problems.

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GUIDELINE

For FLEXIBLE Waveguide Specify

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Airtron inc
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BRANCH OFFICES
DAYTON CHICAGO LOS ANGELES DALLAS
KANSAS CITY SEATTLE ALBUQUERQUE

Receivers

(Continued from page 243)

Melpar, Inc., Va., 5
Microlab, N.J., 5, 10, 15
Missouri Research Labs., Inc., Mo., 10, 15
Motorola, Inc., Ill., 5
Motorola Research Laboratory, Ariz., 5, 15
Nassau Research & Development Assoc., Inc., 66 Main St., Mineola, L.I., N.Y., 5, 15
For details see ad on page 243
PSC Applied Research, Ltd., Canada, 15
Phebco, Inc., Md., 15
Polarad Electronics Corp., N.Y., 5, 15
Radar Electronics, Inc., N.Y., 15
Radio Corp. of America, Engineering Products Div., Camden, N.J., 5, 15
For details see ad on pages 88, 440-441
Radio Engineering Labs., Inc., N.Y., 5
Radiomarine Corp. of America, N.Y., 10, 15
Raytheon Manufacturing Co., Equipment Sales Div., 138 River St., Waltham 54, Mass., 5
For details see ad on page 228
Reeves Instrument Corp., N.Y., 10, 15
Resdel Engineering, Calif., 5, 10, 15
Rogers Majestic Electronics, Ltd., Canada, 5
Rosen Engineering Prod., Raymond, Pa., 5
Sanders Associates, Inc., 137 Canal St., Nashua, N.H., 15
For details see ad on page 42
Specialty Assembly & Packing Co., N.Y., 15
Stewart Warner Electric, Ill., 15
Superex Electronics Corp., N.Y., 15
Sylvania Electric Products Inc., Mass., 15
Syntronic Instruments, Inc., Ill., 10
Tarzian, Inc., Sarkes, Ind., 5
Telechrome, Inc., 88 Merrick Rd., Amityville, L.I., N.Y., 5, UHF
For details see ad on pages 120, 285
Telescreen Corp., Conn., 15
Transco Products, Inc., Calif., 15
Transmitter Equipment Mfg. Co., N.Y., 5, 10, 15
Ultrasonic Corp., Mass., 10
Video Corp. of America, N.Y., 15
Wheeler Laboratories, Inc., 122 Cutter Mill Rd., Great Neck, L.I., N.Y., 15
For details see ad on page 259

69. Transmitters.

5. Microwave
10. Microwave relay
15. Radar

Air Associates, Inc., N.J., 5
Aircraft Armament, Inc., Md., 5, 10, 15
American Electroneering Corp., Calif., 5, 15
American Machine & Foundry Co., Mass., 5, 10, 15
Automatic Electric Company, Ill., 5, 10
Bendix Aviation Corp., Bendix Radio Div., Baltimore 4, Md., 15
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Research Labs., Fisher Bldg., Detroit 2, Mich., 5, 10, 15
For details see ad on pages 176, 366-367

Transmitters

Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, North Hollywood, Calif., 15
For details see ad on pages 176, 366-367
Bludworth Marine Div., National-Simplex Bludworth, Inc., N.Y., 15
Budelman Radio Corp., Conn., 5, 10
C. G. S. Laboratories, Conn., 5
Canadian General Electric Co., Canada, 5, 10, 15
Canadian Westinghouse, Ltd., Canada, 5, 10, 15
Canoga Corp., Calif., 5, 15
Capehart-Farnsworth Corp., Ind., 5, 15
Cardwell Mfg. Corp., The Allen D., Conn., 15
Century Electronics, Div. Century Metalcraft Corp., 14808 Oxnard St., Van Nuys, Calif., 5, 10, 15
For details see ad on page 329
Collins Radio Co., 855 35 St. N.E., Cedar Rapids, Iowa, 5
For details see ad on pages 428-429
Connecticut Telephone & Elec., Conn., 5
Cossor Canada, Ltd., Canada, 15
Cubic Corp., Scott & Canon Sts., San Diego 6, Calif., 5, 15
For details see ad on page 327
Cutler-Hammer, Inc., Wis.
DeMornay-Bonardi, Calif., 5
DuMont Labs., Inc., Allen B., Television Transmitter Div., 1500 Main Ave., Clifton, N.J., 5, 10
For details see ad on page 29
Edo Corp., N.Y., Sonar
Electro Impulse Laboratory, 62 White St., Red Bank, N.J., 5
For details see ad on page 240
Electronic Designs, Inc., N.Y., Boosters
Emerson Radio & Phono., N.Y., 5, 10, 15
F-R Machine Works, Inc., 44-14 Astoria Blvd., Long Island City 3, N.Y., 5, 10, 15
For details see ad on page 283
Federal Electric Mfg. Co., Ltd., Canada, 5, 10, 15
Federal Telecommunication Labs., Inc., N.J., 5, 10
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5, 10
For details see ad on pages 368-373
Gates Radio Co., Ill., 5, 10
Gilfillan Bros., Inc., Calif., 5, 15
Hoffman Radio Corp., Calif., 15
Hycon Mfg. Co., Calif., 5, 10, 15
Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 5, 10, 15
For details see ad on pages 414-415
Korb Engineering & Mfg. Co., Mich., 15
Laboratory for Electronics, Inc., 75 Pitts St., Boston 14, Mass., 5, 10, 15
For details see ad on pages 432-433
Lee Laboratories, P.O. Box 200, Geneseo, Pa., 15
For details see ad on page 284
Leonard Electric Products Co., N.Y., 10
Mackenzie Products Co., Conn., 15
Man on Laboratories, Conn., 15
Maxson Corp., W. L., 460 W. 34 St., New York 1, N.Y., 5
For details see ad on page 122
Melpar, Inc., Va., 5, 10
Microlab, N.J., 5, 10, 15
Missouri Research Labs., Inc., Mo., 5
Motorola, Inc., Ill., 5, 10
Motorola Research Lab., Ariz., 5, 10, 15
Nassau Research & Development Assoc., Inc., 66 Main St., Mineola, L.I., N.Y., 5, 10, 15
For details see ad on page 243
Northern Electric Co., Ltd., Canada, 15
PSC Applied Research, Ltd., Canada, 15
Radar Electronics, Inc., N.Y., 15
Radio Corp. of America, Engineering Products Div., Camden, N.J., 5, 10, 15
For details see ad on pages 88, 440-441
Radio Engineering Labs., N.Y., 5, 10, 15
Radio Industries Corp., N.Y., 5, 10, 15
Radiomarine Corp. of America, N.Y., 15
Raytheon Mfg. Co., Equipment Sales Div., 138 River St., Waltham 54, Mass., 10
For details see ad on page 228
Reeves Instrument Corp., N.Y., 15
Resdel Engineering, Calif., 5, 10, 15
Rogers Majestic Electronics, Ltd., Canada, 5, 10
Rosen Eng. Prod., Raymond, Pa., 5, 10
Sanders Associates, Inc., 137 Canal St., Nashua, N.H., 15
For details see ad on page 42
Servo Corporation of America, 20-20 Jericho Tnpke, Mineola, L.I., N.Y., 5
For details see ad on pages 438-439
Sierra Electronic Corp., Calif., 5
Specialty Assem. & Packing, N.Y., 15
Stewart-Warner Electric, Ill., 15
Sylvania Electric Products, Mass., 15
Tarzian, Inc., Sarkes, Ind., 5, 10
Telechrome, Inc., 88 Merrick Rd., Amityville, L.I., N.Y., 10, UHF
For details see ad on pages 120, 285
Telescreen Corp., Conn., 15
Transco Products, Inc., Calif., 15
Transmitter Equipment Mfg. Co., N.Y., 5, 10, 15
Video Corp. of America, N.Y., 15

high impedance
DELAY CABLES
with magnetic core

- **LINEAR PHASE CHARACTERISTIC.**
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Delay (μsec/ft)	0.075	0.110	0.61
Impedance (ohms)	1600	2200	2400
Attenuation (db/μsec) 1 mc	1.0	0.2	0.6
Attenuation (db/μsec) 4 mc	2.3	0.5	1.3
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Cable O.D.	0.405	0.405	0.25

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5 East 57th Street, New York 22, N. Y.

70. Waveguides & Accessories.

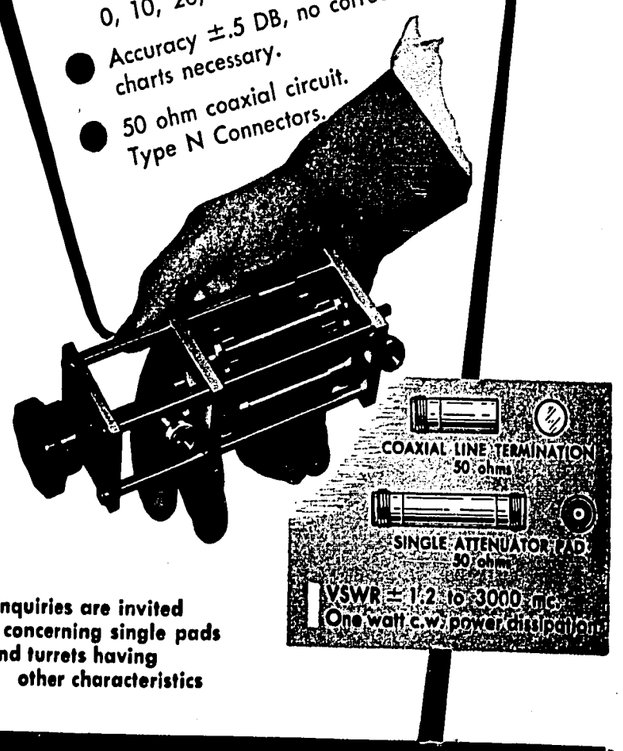
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25. Sampling lines, reflectors, etc.
30. Switches

Airtron, Inc., 101 Elizabeth Ave., Linden, N.J., 5, 10, 15, 20, 25, 30
For details see ad on page 244
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30
Andersen Laboratories, Inc., Conn., 10
Andrew Corp., Ill., 20
Arenberg Ultrasonic Lab., Mass., 10
Bart Laboratories Co., Inc., 227 Main St., Belleville, N.J., 5, 20
For details see ad on page 259
Bliley Electric Co., 227 Union Station Bldg., Erie, Pa., 10
For details see ad on page 12
Bogart Mfg. Co., N.Y., 5, 10, 20, 25, 30
Bone Engineering Corp., Calif., 5, 20
Brew & Co., Inc., Richard D., Mass., 10
Burnell & Co., 45 Warburton Ave., Yonkers 2, N.Y., 10
For details see ad on page 16
Canoga Corp., Calif., 20, 25, 30

(Continued on page 247)

Precision ATTENUATION to 3000 mc!

- VSWR less than 1.2 at all frequencies to **3000 mc.**
- **TURRET ATTENUATOR** featuring **"Pull - Turn - Push"** action with 0, 10, 20, 30, 40, 50 DB steps.
- Accuracy ±.5 DB, no correction charts necessary.
- 50 ohm coaxial circuit. Type N Connectors.



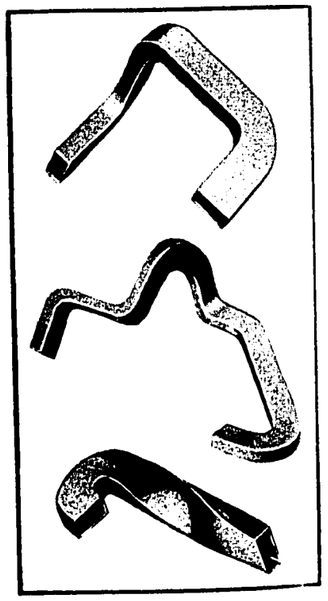
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6644-C SANTA MONICA BLVD HOLLYWOOD 38 CALIFORNIA
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Specialists in Forming Waveguide Tubes



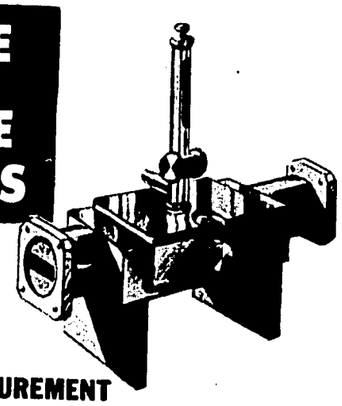
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KENT

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COMPANY

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Century Electronics, Div. Century Metalcraft Corp., 14808 Oxnard St., Van Nuys, Calif., 5, 20, 25, 30
For details see ad on page 329
Coaxial Connector Co., 35 N. 2nd Ave., Mt. Vernon, N.Y., 5, 20, 25
For details see ad on page 155
Columbia Technical Corp., 5 East 57th St., New York 22, N.Y., 10
For details see ad on page 245
Communication Products Co., Broadway & Clark St., Marlboro, N.J., 10
For details see ad on page 286
Control Instrument Co., Inc., N.Y., 10
Corning Glass Works, N.Y., 10
Corona Engineering Service, N.Y., 10
Corson Electric Mfg. Corp., N.J., 10
Cubic Corp., Scott & Canon Sts., San Diego 6, Calif., 5, 20
For details see ad on page 327
Cutler-Hammer, Inc., Wis., 30
Dallons Laboratories, Calif., 10
Dalmo Victor, Inc., 1414 El Camino Real, San Carlos, Calif., 5, 20, 25, 30
For details see ad on page 26
DeMornay-Bonardi, Inc., Calif., 5, 10, 20, 25, 30
Deutschmann Corp., Tobe, Mass., 10
Douglas Microwave Co., Inc., 338 E. 95th St., New York, N.Y., 5, 20, 25, 30
For details see ad on page 324
ESC Corp., N.Y., 10
Electro Impulse Laboratory, 62 White St., Red Bank, N.J., 20, 25
For details see ad on page 240
Electro Precision Products, Inc., N.Y., 5, 20
Electronic Computer Div., Underwood Corp., N.Y., 10
Electronic Systems Co., N.Y., 10
Elliott Brothers, Ltd., England, 5, 10
Empire State Laboratories, N.Y., 10
Erie Resistor Corp., 644 W. 12th St., Erie, Pa., 10
For details see ad on page 18
Essex Electronics, N.J., 10
F-R Machine Works, Inc., 44-14 Astoria Blvd., Long Island City 3, N.Y., 5, 20, 25, 30
For details see ad on page 283
G. W. Associates, Calif., 25
Gates Radio Co., Ill., 25, 30
General Chem. Div., Allied Chem. & Dye Corp., N.Y., 5, 10, 15, 20, 25, 30
General Electric Co., N.Y., 10
General Plate Div., Metals & Controls Corp., Mass., Tubing
General Precision Lab., 63 Bedford Rd., Pleasantville, N.Y., 5, 20, 25, 30
For details see ad on page 116
General R-F Fittings Co., 702 Beacon St., Boston 15, Mass., 5
For details see ad on page 151
Gilfillan Bros., Calif., 5, 10, 15, 20, 25
Gombos Co., Inc., John, 103-109 Montgomery Ave., Irvington 11, N.J., 5, 20
For details see ad on page 154

WAVEGUIDE and MICROWAVE COMPONENTS



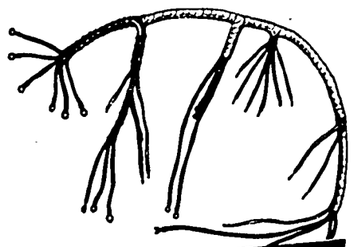
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- **SIGNAL SOURCE**
- **IMPEDANCE MEASUREMENT**
- **FREQUENCY MEASUREMENT**
- **TRANSMISSION LINE COMPONENTS**
- **DETECTION and POWER MEASUREMENT**

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Our engineering staff will cooperate in making custom components to your specifications write now for complete information to:

UNIVERSAL MANUFACTURING COMPANY, INC.
• *MICROWAVE DIVISION* •
410 Hillside Avenue HILLSIDE, NEW JERSEY

Graham Mfg. Co., Inc., R.I., 5, 20
Grigsby-Allison Co., Inc., Ill., 30
Harnett Electric Corp., 138 Haven Ave., Port Washington, L.I., N.Y., 10
For details see ad on page 264
Hycon Mfg. Co., Calif., 5, 10, 20, 25, 30
Imperial Radar & Wire Corp., N.Y., 25
Industrial Products Co., Conn., 5
Jacobs Instrument Co., Md., 10
Kellogg Switchboard & Supply Co., Dept. 69, 79 W. Monroe St., Chicago 3, Ill., Telephone Terminating Equip.
For details see ad on page 106
Kent Co., F. C., 64 Howard St., Irvington 11, N.J., 20
For details see ad on page 246
Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 5, 20, 30
For details see ad on pages 414-415
Kings Microwave Co., Inc., N.Y., 5, 20, 25
Kinney Co., Joseph, Pa., Components
Kulka Electric Mfg. Co., Inc., N.Y., 30
Lavoie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N.J., 30
For details see ad on page 328
Lee Laboratories, P.O. Box 200, Genessee, Pa., 10, 25, 30
For details see ad on page 284
Lerner Instrument & Electronics, N.Y., 5, 20, 25
Litton Engineering Laboratories, Calif., Phase Changers
Loral Electronics Corp., N.Y., 30
Luhrs & Co., C. H., N.J., 30
Lytle Engineering & Mfg. Co., Ill., 10
Mackenzie Products Co., Conn., 5, 10
Makepeace Co., D. E., Pine & Dunham Sts., Attleboro, Mass., 20
For details see ad on page 80
Mark Products Co., Ill., 20
May, Donald M., Calif., 10
Metal Fabricators Corp., 73 Pond St., Waltham 54, Mass., 20, Custom
For details see ad on page 141
Microwave Development Labs., Inc., 220 Grove St., Waltham 54, Mass., 5, 20, 25, 30
For details see ad on page 284
Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass., 10
For details see ad on page 336
Micro, Div. M-H Regulator Co., Ill., 30
N. R. K. Mfg. & Engineering Co., 4601 W. Addison St., Chicago 41, Ill., 5, 10, 20, 25, 30
For details see ad on page 65
Nassau Research & Dev. Assoc., 66 Main St., Mineola, L.I., N.Y., 5, 20, 25, 30
For details see ad on page 243
Northern Electric Co., Ltd., Canada, 20
PCA Electronics, Inc., Calif., 10
Photobell Co., N.Y., 10, 15
Poinsettia, Inc., N.J., 20
Polytechnic Research & Dev. Co., 55 Johnson St., Brooklyn 1, N.Y., 5, 20, 25
For details see ad on pages 374-375
Premier Instrument Corp., N.Y., 20
Prodelin, Inc., N.J., 20
Product Development Co., Inc., N.J., 20
Radio Components, Ltd., Canada, 30
Radio Industries, Inc., Ill., 10
Rollins Co., Calif., 25
Schweber Electronics, 122 Herricks Rd., Mineola, L.I., N.Y., 5, 10 (Jobber)
See complete catalog in last section
(Continued on page 248)



WIRING HARNESSES
Cut Assembly Costs

We make all types for manufacturers of many diversified products including RADIO and TV and HOUSEHOLD APPLIANCES.

Our specialized knowledge, volume raw material buying and modern equipment assure precision workmanship at low cost.

Write Dept. 53RE today for a quotation!

Cherry-Channer
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To the man who "specs" WIRE

THE COMPREHENSIVE ADVANCE LINE

will meet your most exacting specifications for performance and design. If you have a unique or special problem, we are prepared to engineer new designs and produce in practically any quantity.

All ADVANCE products are rigidly inspected and guaranteed, assuring you superior performance.

Immediate Delivery of

- JAN-C-76 Hook-Up Wire
- 80 degrees to 105 degrees Hook-Up Wire, U.L. Approved
- Coaxial Cable, RG Types
- Television Lead In Cable
- Rotary Antenna Lead Wire
- Flexible Cords
- Shielded Wire & Cable
- Thermostat Cables
- TW Building & Fixture Wire

Let ADVANCE Solve Your Wire Problem, Today

ADVANCE Insulated Wire & Cable Co., Inc.
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Plainfield 6-1552

BIRNBACH
Electronic
WIRE & CABLE
For All Your Wiring Needs!

GOVT. SPEC. HOOKUP WIRE

- JAN-C-76 SRIR-SRHV PLASTIC Solid Colors or Spiral Markings
- WL-EXTRUDED NYLON JACKET Solid Colors or Spiral Markings
- AIRCRAFT WIRE-NYLON JACKET MIL-W-5086 (Supersedes AN-J-C-48a)
- 105° C. U.L. APPROVED Thermoplastic Hookup Wire
- JAN-C-76 WL-GLASS BRAID Solid or Tracer Colors
- MULTICONDUCTOR, SHIELDED CABLES To Meet Govt. Spec. #71-4945

COMPLETE WAREHOUSE STOCKS

- Vinyl Extruded and Radio Grade Tubing
- Multiconductor Rubber Covered Cables
- Tinned & Bare Wire
- Magnet Wire
- Formvar Wire
- Shielded Wires
- Insulated Hardware
- Plugs, Jacks, Sockets
- Test Leads, Switches
- Insulators, Steatite, Ceramic
- Terminal Strips

Quality Products for the Electronics Industries since 1923

BIRNBACH RADIO CO. INC.
145 HUDSON STREET
NEW YORK 13, N. Y.

BIRNBACH
WRITE FOR CATALOG 54-I

Waveguides & Accessories

(Continued from page 247)

Sightmaster Corp., N.Y., 5, 10, 15, 20, 25
Sivers Lab., Sweden, 5, 25, 30
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 5
See complete catalog in last section
Standard Coil Products Co., Inc., Ill., 10
Stoddart Aircraft Radio Co., Inc., 6644 Santa Monica Blvd., Hollywood 38, Calif., Attenuators, Coaxial
For details see ad on page 246
Suckle Electronics Co., N.J., 5
Suffolk Products Corp., N.Y., 20
Technicraft Laboratories, Inc., Conn., 5, 10, 15, 20, 25
Technitrol Engineering Co., Inc., 2751 N. 4th St., Philadelphia 33, Pa., 10
For details see ad on page 221
Telechrome, Inc., 88 Merrick Rd., Amityville, L.I., N.Y., 10, 20
For details see ad on pages 120, 285
Titeflex, Inc., N.J., 5, 10, 15, 20, 25
Union Plate & Wire Co., Mass., 20
Universal Mfg. Co., Inc., 404 Hillside Ave., Hillside, N.J., 5, 20
For details see ad on pages 149, 247
Victory Engineering Corp., Springfield Road, Union, N.J., Thermistors
For details see ad on page 203
Waveline, Inc., P.O. Box 470, North Caldwell, N.J., 5, 10, 20, 25
For details see ad on page 242
Wayne-Kerr Laboratories, Ltd., Sycamore Grove, New Malden, Surrey, England, 5, 10, 20
For details see ad on page 316

(Continued on page 249, bottom of column 1)

A Directory of 7. Services and Raw Materials

Services & Raw Materials Directory ▲

To the engineer with a manufacturing problem, this section provides a special listing of the services and products which are basic to production. Separate from actual components, these are the base sources of manufacture, ranging from the research functions of Consulting Engineers, to subcontracting assemblers, and from basic raw materials such as ceramics, metals and staples, like wire, to such specialties as the parts for vacuum tubes, and printed circuits. Here is a useful section, well illumined by informative advertising, which will serve you well, and often.

17 Product and Service groups give detail on 108 items the production engineer and designer may need.

The products and services of the Radio-Electronics industry have been organized into ten basic directories following closely the organization of the IRE Professional Groups. But 100 major product groups are numbered consecutively throughout.

Always consult the pink pages at the start of the Directory of firms, for a terminology cross-index, or to find products by name. The pink pages list more than 500 products by name, as well as under the product groups. Page numbers are given for speed.

71 Cable & Wire.
72 Ceramics.
73 Consulting Engineers.
74 Core Materials.
75 Fabricators & Services.
76 Gasses & Vapors.
77 Hardware, Findings, & Manufacturing Aids.
78 Hermetic Seals.
79 Insulating Materials.
80 Laboratories & Custom Builders.
81 Lacquers, Paints, Compounds & Waxes.
82 Machinery & Tools.
83 Metals.
84 Moulded Products.
85 Plastics.
86 Solder.
87 Vacuum Tube Parts.

71. Cable & Wire.

5. Aluminum
10. Co-axial cables
15. Copper, bare
20. Low-loss, high-frequency types
25. Precious & rare metals wire
30. Pre-formed wire harnesses
35. Rubber insulated
40. Shielded
45. Synthetic insulated
50. Woven wire braid

AK Manufacturing Co., Inc., Ill., 10, 20, 30, 35, 40, 45, 50
Accurate Insulated Wire Corp., Conn., 10, 35, 40, 45
Acme Wire Co., Conn., Magnet
Advance Insulated Wire & Cable Co., 8 Tingley Lane, Irvington 11, N.J., 10, 20, 40, 45
For details see ad on page 248
Alden Products Co., 113 N. Main St., Brockton 64, Mass., 30, 40, 50
For details see ad on pages 150-151
Alpha Wire Corp., N.Y., 10, 15, 20, 35, 40, 45, 50
American Electric Cable Co., Mass., 10, 15, 30, 40, Lead In
American Electro Metal Corp., N.Y., 25
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35, 40, 45, 50
American Phenolic Corp., 1830 S. 54th Ave., Chicago 50, Ill., 10, 20, 40, 45, 50
For details see ad on page 2
American Platinum Works, N.J., 25
Anaconda Wire & Cable Co., N.Y., 5, 10, 15, 20, 35, 40, 45, 50
Andrew Corp., Ill., 10, 20
Ansonia Wire & Cable, Conn., 10, 40, 45
Arey Machine Co., N.J., 30
Belden Mfg. Co., 4647 West Van Buren St., Chicago 44, Ill., 5, 10, 15, 20, 30, 35, 40, 45, 50, Moly
For details see ad on Cover II
Birnbach Radio Co., Inc., 145 Hudson St., New York 13, N.Y., 5, 10, 15, 20, 35, 40, 45, 50
For details see ad on pages 103, 248
Bliss-Warren Electronic Corp., N.J., 30
Boston Insulated Wire & Cable, Mass., 10, 20, 35, 40, 45
Brand and Co., Inc., William, North & Valley Sts., Willamantic, Conn., 10, 20, 30, 40, 45
For details see ad on page 15
Cadre Industries Corp., N.Y., 30
Canada Wire & Cable Co., Ltd., Canada, 5, 10, 15, 20, 35, 40, 45, 50
Chase Brass & Copper Co., Conn., 10, 15, 35, 40, 50
Cherry-Channer Corp., 1488 Skokie Blvd., Highland Park, Ill., 30
For details see ad on page 248
Chester Cable Corp., P.O. Box 316, Chester, N.Y., 5, 10, 15, 20, 25, 40, 45, 50
For details see ad on page 20
Clear Beam TV Antennas, Calif., Antenna Hook Up
Cohn Corp., Sigmund, N.Y., 25
Coleman & Sons, D., Ill., 10, 15, 20, 30, 35, 40, 45, 50
Columbia Technical Corp., 5 E. 57th St., New York 22, N.Y., 10, 20, 35, 40, 45
For details see ad on page 245
Columbia Wire and Supply Co., Ill., 5, 10, 15, 20, 30, 35, 40, 45, 50
Commercial Radio Sound, N.Y., 10, 40
Communication Products Co., Inc., Broadway & Clark, Marlboro, N.J., 10
For details see ad on page 286
Consolidated Wire & Assoc., Cos., Ill., 10, 15, 20, 35, 40, 45, 50
Copperweld Steel Co., Pa., Copper Covered Steel
Cornish Wire Co., Inc., N.Y., 30, 35, 40, 45, 50
Cossor (Canada), Ltd., Canada, 10
Crescent Company, R.I., 30, 35, 40, 45
Daystrom Electric Corp., N.Y., 30
Diamond Wire, Ill., 30, 35, 40, 45, 50
Driver Harris Co., N.J., Heat Resisting
Driver Co., Wilbur B., 150 Riverside Ave., Newark 4, N.J., Ribbon & Strip, Bare Enameled and Silk Covered Nickel Chromium Wire, Resistance Wire, Filament Wire, Nickel Ribbon
For details see ad on page 32

(Continued on page 251)

Waveguides & Accessories

(Continued from page 248)

West Coast Electronics Co., Calif., 10
Western Electronics Enterprises, Calif., 5
Wheeler Labs., Inc., 122 Cutter Mill Rd., Great Neck, L.I., N.Y., 5, 25, 30
For details see ad on page 259
Workshop Associates Div., Gabriel Co., Endicott St., Norwood, Mass., 5, 20
For details see ad on page 112

electronic wire and cables for standard and special applications

Whether your particular requirements are for standard or special application, choose *LENZ* for the *finest* in precision-manufactured electronic wire and cable.

GOVERNMENT PURPOSE RADIO AND INSTRUMENT HOOK-UP WIRE,
plastic or braided type, conforming to Government Specification JAN-C-76, etc., for radio and instruments. Solid or flexible conductors, in a variety of sizes and colors.





SPECIAL HARNESSES,
cords and cables, conforming to Government and civilian requirements.

RADIO AND INSTRUMENT HOOK-UP WIRE,
Underwriters Approved, for 80° C., 90° C. and 105° C. temperature requirements. Plastic insulated, with or without braids.





SHIELDED JACKETED MICROPHONE CABLE
Conductors: Multiple—2 to 7 or more conductors of stranded tinned copper. Insulation: extruded color-coded plastic. Closely braided tinned copper shield. Tough, durable jacket overall.

RF CIRCUIT HOOK-UP AND LEAD WIRE
for VHF and UHF, AM, FM and TV high frequency circuits. LENZ Low-Loss RF wire, solid or stranded tinned copper conductors, braided, with color-coded insulation, waxed impregnation.

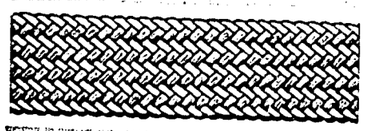




JACKETED MICROPHONE CABLE
Conductors: Extra-flexible tinned copper. Polythene insulation. Shield: #36 tinned copper, closely braided, with tough durable jacket overall. Capacity per foot: 29MMF.

SHIELDED MULTIPLE CONDUCTOR CABLES
Conductors: Multiple—2 to 7 or more of flexible tinned copper. Insulation: extruded color-coded plastic. Closely braided tinned copper shield. For: Auto radio, indoor PA systems and sound recording equipment.





TINNED COPPER SHIELDING AND BONDING BRAIDS
Construction: #34 tinned copper braid, flattened to various widths. Bonding Braids conforming to Federal Spec. QQ-B-575 or Air Force Spec. 94-40229.

SHIELDED COTTON BRAIDED CABLES
Conductors: Multiple—2 to 7 or more of flexible tinned copper. Insulation: extruded color-coded plastic. Cable concentrically formed. Closely braided tinned copper shield plus brown overall cotton braid.





PA AND INTERCOMMUNICATION CABLE
Conductors: #22 stranded tinned copper. Insulation: textile or plastic insulated conductors. Cable formed of Twisted Pairs, color-coded. Cotton braid or plastic jacket overall. Furnished in 2, 5, 7, 13 and 25 paired, or to specific requirements.

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Lenz Electric Manufacturing Co.
1751 N. Western Ave., Chicago 47, Illinois
Our 48th Year in Business

cords, cable and wire for radio ◆ p. a. ◆ test instruments ◆ component parts

"SILVERCOTE"®
BERYLLIUM COPPER
BRONZES • ALUMINUM
COPPERWELD • SILVER PLATED WIRES
OTHER NON-FERROUS
ROUND **WIRE** FLAT
for
★ SPRINGS
★ FORMS
★ ELECTRONICS
★ SPECIAL PURPOSES
LITTLE FALLS ALLOYS
INCORPORATED
189 Caldwell Ave. • Paterson 1, N. J.

Cable & Wire

(Continued from page 249)

Electronic Manufacturing Co., 20 Orange St., Newark 2, N.J., 50
For details see ad on page 303
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 10, 20, 40
For details see ad on pages 368-373
Flexonics Corp., Ill., Conduit Armor
Foote Mineral Co., Inc., Pa., 25
Fretco, Inc., Pa., 5, 15, 20, 25
Gates Radio Co., Ill., 10
Gavitt Mfg. Co., Mass., 30, 35, 40, 45
General Cable Corp., N.Y., 5, 10, 15, 20, 35, 40, 45
General Cement Mfg. Co., Ill., 5
General Chem. Div., Allied Chem. & Dye Corp., N.Y., 10
General Electric Co., Wiring Devices Dept. 0-9, 95 Hathaway St., Providence 7, R.I., 30
For details see ad on page 41
General Insulated Wire Works, R.I., 10, 20, 35, 40, 45
General Plate Div., Metals & Controls Corp., Mass., 25
General Precision Lab., Inc., 63 Bedford Rd., Pleasantville, N.Y., 10
For details see ad on page 116
General R-F Fittings Co., 702 Beacon St., Boston 15, Mass., 10, Assemblies
For details see ad on page 151
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 10
For details see ad on pages 380-381, Cover IV
Handy & Harman, N.Y., 25
Hindle Transformer Co., Inc., N.J., 30
Hitemp Wires, N.Y., 45, Magnet Wire
Holyoke Wire & Cable Corp., Mass., 10, 30, 35, 40, 45, 50
Hudson Wire Co., Conn., 45, Enamel Nylon
IE Manufacturing, Ill., 5
Imperial Radar & Wire Corp., N.Y., 5, 10, 15, 20, 25, 30, 35, 40, 45, 50
Instrument Wire Co., Conn., Enamel Magnet
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, New York, 5, 10, 35, 40
For details see ad on page 134
Interstate Mfg. Corp., N.J., 30
JFD Mfg. Co., Inc., 6101 16th Ave., Brooklyn 19, N.Y., 10, 20
For details see ad on pages 140, 242
Joy Mfg. Co., Mo., 35
Kay Woff Products Co., Neb., 45
Kupfrian Mfg. Co., N.Y., 30
Lenz Electric Manufacturing Co., 1751 North Western Ave., Chicago 47, Ill., 20, 30, 40, 45, 50
For details see ad on page 250
Littelfuse, Inc., 1865 Miner St., Des Plaines, Ill., 30
For details see ad on page 58
Little Falls Alloys, Inc., 189 Caldwell Ave., Paterson 1, N.J., 5, 15, 20, 25
For details see ad on page 251
Macleod & Hanopol, Inc., Mass., 30
Makepeace Co., D. E., Pine & Dunham Sts., Attleboro, Mass., 25
For details see ad on page 80

(Continued on page 253)

Now...First *Styroflex Coaxial Cable* with Polyethylene Sheath



Styroflex Coaxial Cable is now available with a thin covering of polyethylene over outer aluminum sheath for positive protection, where direct burial in the ground is indicated or where salt spray or corrosive conditions exist.

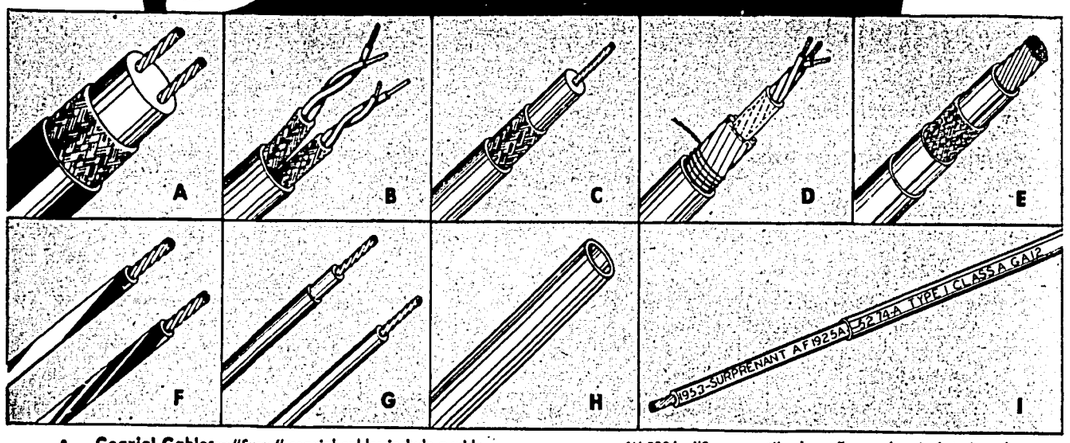
Available in all sizes and impedances for AM, FM, TV, Community Antenna and Microwave frequencies. The many applications include sampling lines, interwiring and main transmission lines. Full information on request.

PHELPS DODGE COPPER PRODUCTS CORPORATION
40 WALL STREET, NEW YORK 5, N. Y.
MILLS: Bayway, N. J., Yonkers, N. Y., Fort Wayne, Ind., Los Angeles, Calif.

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

Surco WIRE · CABLES · TUBING

OPERATING TEMPERATURES FROM [illegible]



A **Coaxial Cables**—"Surco" coaxial cables include a wide variety of types, such as low capacity, extra flexibility, small diameter, microphone 2 conductor, and high temperature "Teflon". Conform to Military Spec. Jan-C-17A: Many special designs. If you have a coaxial cable problem consult us.

B **Miniature Wire & Cable**—"Surco" miniature wire and cables are made in conductor sizes down to No. 32 AWG in stranded and solid. Close control in manufacturing permits small finished diameters on both single and multi-conductor cable. Available in standard colors with and without nylon jacket or shielding in the various vinyl or polyethylene compounds.

C **"Surflene" Insulated Hook-up Wire**—"Surflene", extruded monochlorotrifluoro-ethylene, has excellent resistance to heat, abrasion, and most chemicals, including nitric acid. Having high dielectric strength and insulation resistance, it is especially useful in totally enclosed applications with continuous temperatures up to 135°C. "Surflene" is available in 15 solid colors and wall thicknesses down to 0.008". "Spiralon" colors presently under development.

D **Multi-Conductor Cables**—"Surprenant" multi-conductor cables are available with conductor sizes from No. 32 AWG and larger, with or without nylon jacket or shielding and can be made to specification for special design and applications. Close tolerances permit unusually small overall diameters and "Spiralon" color coding permits easy identification even when hundreds of conductors are involved.

E **New Improved Aircraft Wire**—Surprenant new lightweight, smaller diameter MD wire-(vinyl-glass braid-nylon) and the standard Surprenant sandwich construction (vinyl-glass braid-vinyl-nylon) give excellent overload safety, high and low temperature performance, good electrical properties and have a nylon jacket giving greater resistance to abrasion, fungus, moisture, hydraulic and other oils (nylon braided jacket on sizes 10 AWG and larger for greater flexibility) and are made to conform to MIL-W-5086. "Surprenant" also offers nylon jacketed–polyvinyl-chloride construction made to conform to Military Spec. AN-J-C-48A.

F **"Spiralon"**—"Surco-Spiralon" color coding is available on all vinyl, polyethylene, and nylon insulated wires, with or without nylon jackets. One, two, or three color stripes are available in the standard Nema colors providing almost unlimited color identifications.

Solid color insulation is also available in the 10 standard Nema colors.

G **"Surco" A-10 For (105°C) Hook-up Wire**—A-10 is an unusually high grade vinyl insulating compound developed in our own laboratories for a better hook-up wire. It has excellent resistance to deformation, soldering, high temperature, low temperature and aging; high electrical properties; Underwriters Lab. approved for continuous operation to 105°C without fibrous covering. A-10 insulated wire made to conform to MIL-W-16878.

JAN-C-76 Hook-up Wire—Made to conform to Military Spec. (WL-SRIR-SRHV-SRRF) in all sizes. WL available with nylon jacket or glass braid. The nylon jacket has greater abrasion resistance and high surface resistivity under adverse conditions. SRIR-SRHV-SRRF available with primary insulation only or with the addition of a glass braided covering. All standard colors including "Spiralon" spiral striping.

H **"Surco" Tubing**—"Surco" vinyl tubing is available in special formulations to provide low temperature (–65°C), high temperature (U.L. approved for 105°C), high dielectric strength, flexibility and colors. Standard compounds are carried in stock in regular sizes. Polyethylene and nylon tubing are also available and are carried in stock in natural color, limited sizes.

I **MIL-W-5274A Radar & Electronic Hook-up Wire**—Made to conform to Air Forces Spec., this wire offers excellent low temperature performance. Nylon jacketed, it has high abrasion resistance and superior surface resistivity even under adverse humidity conditions, making it very adaptable for high impedance circuits.

Extruded THIN-WALL Teflon INSULATED (210°C) HOOK-UP WIRE

Extruded Thin-Wall Teflon Insulated (210°C) Hook-Up Wire—Continuously operable over the range from –90°C to 210°C without appreciable deterioration, extruded "Teflon" (polytetrafluoroethylene) is now available in walls as thin as 0.010" (type WTE) and 0.015" (type RTE). Teflon combines non-flammability, chemical and solvent resistance, high volume and surface resistivity with extremely low electrical losses. This wire is available in all flexible strandings from AWG 30 to AWG 10 and conforms to performance requirements of Mil-W-16878. Colors conform to MIL-STD-104.

Surprenant MFG. CO.

"Engineered Wire and Cable for the Electronic and Aircraft Industries"

199 WASHINGTON ST. BOSTON 8, MASS. Plant CLINTON, MASS.

FINE WIRE

to .001

in all Standard Metals—or to Specifications

What are your Fine Wire needs? Depend on NESOR to meet your requirements to the closest tolerance—with *uniformity, economy,* and on *schedule!*

Now—leading the field in the production of

WHISKER WIRE for TRANSISTORS

and DIODES

in 10% Ruthenium Platinum and Gallium Gold.

Also specializing in *Pure Iron Mandrel Wire for BALLASTS,* and other types, notably:

- Aluminum Wire
- Bare and Tinned Copper Wire
- Gallium Gold Wire
- Fine Wire Specialties
- Phosphor Bronze Wire
- Platinum Wire
- Copper Coated Steel Wire
- Shielded Wire
- Silver Plated Wire
- Stainless Steel Wire

Consultation, Samples, and Quotations without obligation. *Write attention Dept. EBG-3*

The **NESOR ALLOY PRODUCTS CO.**

Mfr. of Wire and Strip—Braid and Strand

282 HALSEY STREET NEWARK 2, N. J.

Tensolite

MINIATURE SUPER-FLEXIBLE

PLASTIC INSULATED WIRE and CABLE

TENSOLON HOOK-UP WIRE

Teflon insulated for continuous use up to 250°C, "Tensolon" is available in 14 solid colors and features a free-stripping, thin wall covering with high dielectric strength.

TENSOLEX JAN-C-76 HOOK-UP WIRE

Types WL, SRIR, and SRHV available in small wire sizes in all standard colors including spiral striping. Nylon jackets can also be supplied for greater resistance to abrasion.

SUB-MINIATURE WIRE AND CABLE

Thin wall vinyl insulation over flexible stranded conductors (AWG sizes down to #40) meets many requirements for small space factor. Available in all standard colors with or without wire braid shields.

SUPER-FLEXIBLE CABLES

Tensolite super-flexible cables, featuring the patented tensulation process, solve many problems calling for limpness and long flex life. Phonograph pick-up cables, hearing aid cordage, and telephone tinsels are regularly being supplied.

TENSOLITE WIRE KITS

For laboratory and prototype requirements, the following convenient desk size wire kits are now available from stock: Teflon Kit, SRIR Kit, Sub-miniature "1482" Kit, Flexible Cable Assortment.

SPECIAL CONSTRUCTIONS

Tensolite's engineering and development facilities are also available for collaboration in the solution of many special cable problems. Simple or complex, Tensolite will welcome an opportunity to estimate on your requirements.

WRITE FOR OUR COMPLETE CATALOG

TENSOLITE INSULATED WIRE COMPANY · INC

(Continued from page 251)

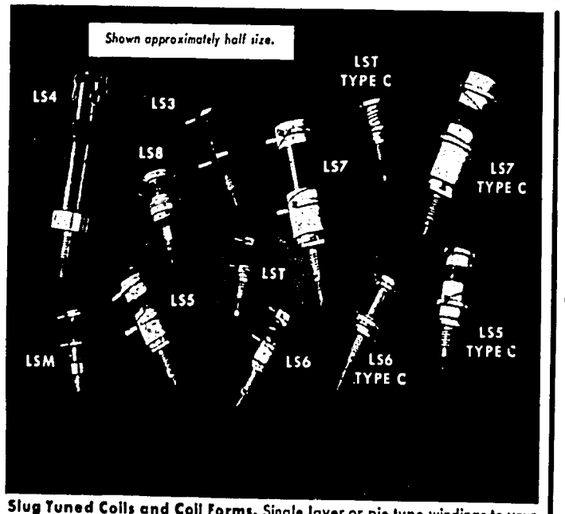
Marco Industries Co., Calif., Flexible Conduit
McNeal, J. D., Conn., 30
Metal Textile Corp., 647 E. First Ave., Roselle, N.J., 50
For details see ad on page 279
Modelectric Products Corp., N.J., 30
National Elec. Prod. Corp., Pa., 20, 35
Nesor Alloy Products Co., 282 Halsey St., Newark 2, N.J., 5, 15, 25, 40, 50, Gold, Platinum, and Tinned Copper Alloys
For details see ad on page 253
Nonotuck Manufacturing Co., Mass., 15
North American Philips, N.Y., 5, 15, 25
North Electric Mfg. Co., Ohio, 30
Northern Electric Co., Ltd., Canada, 15, 35, 40, 45, 50
Okonite Co., N.J., 5, 10, 20, 35, 40, 45, 50
Pilot International Corp., N.Y., 30
Phalo Plastics Corp., Mass., 10, 20, 30, 40, 45
Phelps-Dodge Copper Prods. Corp., 40 Wall St., New York 5, N.Y., 10, 15, 20, 35, 40, 45
For details see ad on page 251
Plastic Wire & Cable Corp., Conn., 10, 40, 45, 50
Plastoid Corp., 42-61 24th St., Long Island City 1, N.Y., 10, 40, 45
For details see ad on page 34
Porter Manufacturing Co., Ill., 5, 10, 15, 20, 25, 30, 35, 40
Powell Co., Harold H., Pa., 10
Precision Associates, Inc., N.Y., 30
Precision Tube Co., Inc., Pa., 10, 40
Prodelin, Inc., N.J., 10
Product Development Co., N.J., 10, 20
RCA Victor Div., Tube Dept., 415 S. 5th St., Harrison, N.J., 25
For details see ad on pages 88, 440-441
Radio Industries, Inc., Kan., 30
Radio Wire Mfg. Corp., Ind., 45
Rea Magnet Wire Co., Inc., Ind., 5, 45, Magnet Wire
Rex Corp., Hayward Road, West Acton, Mass., 10, 40, 45
For details see ad on page 280
Rhode Island Ins. Wire Co., R.I., 40, 45
Rockbestos Products Corp., Conn., 10, 20, 40, 45
Rowe Industries, Ohio, 10, 30
Runzel Cord & Wire Co., Ill., 30, 35, 40, 45, 50
Rupps Assembling & Mfg. Wks., Ill., 35
Samuel & Co., Inc., J. A., N.Y., 25
Schweber Electronics, 122 Herricks Rd., Mineola, L.I., N.Y., 10, 20 (Jobber)
See complete catalog in last section
Secon Metals Corp., 228 E. 45th St., New York 17, N.Y., 25
For details see ad on page 296
Sheffco Mfg. Co., N.J., Pigtails & Leads
Simplex Wire & Cable Co., Mass., 10, 35, 40, 45
Slepian & Co., Arthur, Conn., 15, 45 Magnet & Litz
Suburban Radio Co., N.J., 30
Summit Electronics, Inc., N.J., 30
Suprenant Mfg. Co., 172 Sterling St., Clinton, Mass., 5, 10, 20, 25, 40, 45, 50
For details see ad on page 252
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 25
For details see ad on pages 417-420

(Continued on page 255)

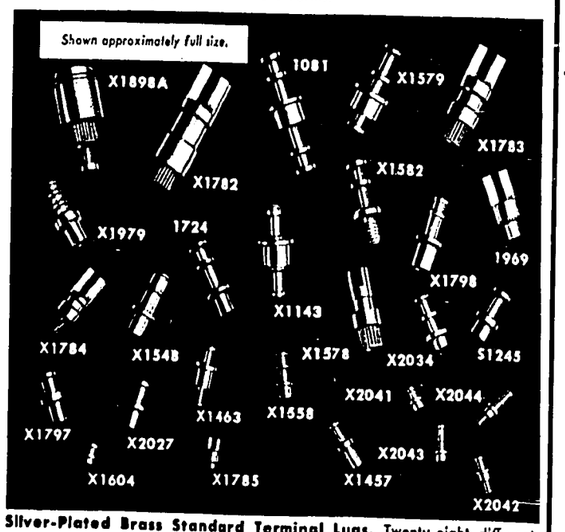
CTC

CUSTOM OR STANDARD ...The Guaranteed Components

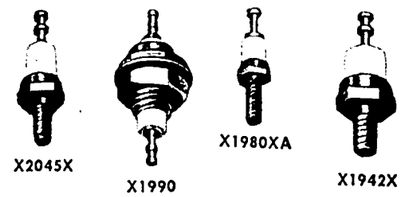
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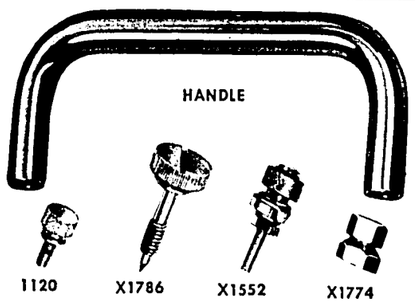
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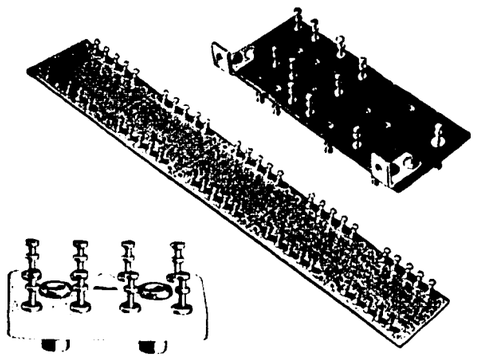
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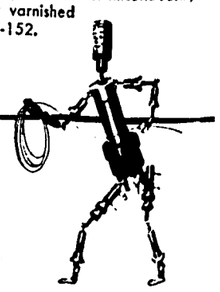
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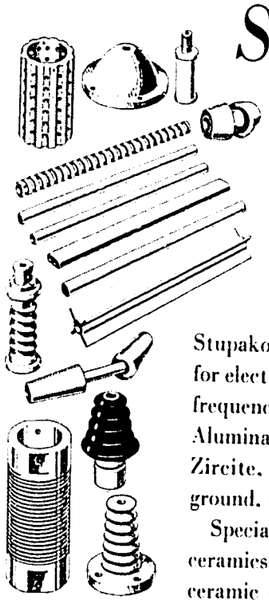
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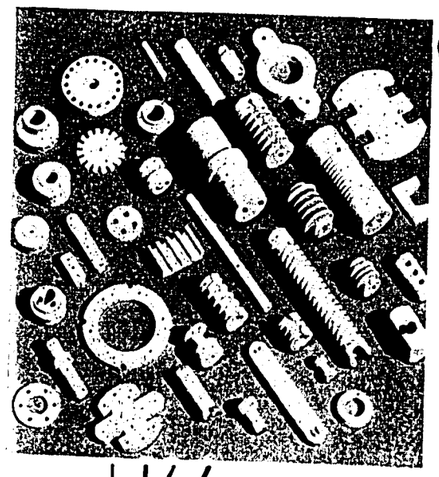
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For details see ad on page 253

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Tri-Dex Electronics, Calif., 30
Union Plate & Wire Co., Mass., 25
United States Rubber Co., N.Y., 5, 10, 20, 35, 40, 45
U. S. Wire & Cable Corp., N.J., 10, 15, 40, 45, 50
Virginia Electronics Co., D.C., 30
Vokar Corp., Mich., 30
Western Elec. Enterprises, Calif., 10
Warren Wire Co., Vt., 15, Magnet Wire
Western Gold & Platinum Works, Calif., 25
Wheeler Insulated Wire Co., Conn., 30, Magnet
Whitney-Blake Co., Conn., 10, 20, 35, 40, 45
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American Molded Products, Ill., 5
Audio Corp. of America, N.J., 10
Bendix Aviation Corp., Research Labs., Fisher Bldg., Detroit 2, Mich., 10
For details see ad on pages 176, 366-367

Birnbach Radio Co., Inc., 145 Hudson St., New York 13, N.Y., 15
For details see ad on pages 103, 248

Blackstone Electric Co., Ill., 5
Brush Electronics, Ohio, 10
Cambridge Thermionic Corp., 440 Concord Ave., Cambridge 38, Mass., 5, 15
For details see ad on page 254

Canadian Porcelain Co., Ltd., Canada, 15
Centralab, Div. Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis., 5, 10, 15, 20
See complete catalog in last section

Corning Glass Works, N.Y., 5, 15
Crowley & Co., Inc., Henry L., N.J., 5, 10, 15, 20
Electronic Mechanics, Inc., 101 Clifton Blvd., Clifton, N.J., 5, 10, 15, 20
For details see ad on page 278

Endevco Corp., Calif., 20
Franklin Fibre-Lamitex Corp., Del., 10, 15
Frenchtown Porcelain Co., N.J., 10, 15
General Ceramics & Steatite Corp., Crows Mill Rd., Keasbey, N.J., 5, 10, 15, 20
For details see ad on pages 52, 54, 349

Glenco Corp., 212 Durham Ave., Metuchen, N.J., 10
For details see ad on page 137

Gombos Co., Inc., John, 103-109 Montgomery Ave., Irvington 11, N.J., 10
For details see ad on page 154

(Continued on page 256)

Ceramics

(Continued from page 255)

Hansell, Inc., U., R.I., 10, Piezoelectric
Hermetite Corp., Mass., 15
I. E. Manufacturing, Ill., 15
Isolantite Mfg. Corp., N.J., 5, 10, 15
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 5, 15
For details see ad on page 134
Johnson, E. F., Waseca, Minn., 15
For details see ad on page 183
Kearfott Co., Inc., 1150 McBride Ave., Little Falls, N.J., 10
For details see ad on page 53
Kirchberger & Co., Inc., M., 1429 37 St., Brooklyn 18, N.Y., 5, 10, 15, 20
For details see ad on page 255
Lapp Insulator Co., Inc., N.Y., 10, 15
Louthan Mfg. Co., Ohio, 10
Mica Fabricating Co., N.J., 10, 15
Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass., 5, 15
For details see ad on page 336
Minerals & Insulation Co., N.J., 15
Mycalex Corp. of America, 125 Clifton Blvd., Clifton, N.J., 5, 10, 15, 20
For details see ad on pages 430-431
Mykroy, Inc., Ill., 5, 10, 15, 20
National Company, Inc., 61 Sherman St., Malden 48, Mass., 5, 15
For details see ad on pages 434-435
P. M. Industries, Inc., Conn., 10
Porcelain Products, Inc., Ohio, 15
Richardson, William E., Ore., 10, 20
Saxonburg Potteries, Pa., 5, 10, 15, 20
Shallcross Mfg. Co., 524 Pusey Ave., Collingdale, Pa., 5
For details see ad on page 98
Smith & Stone, Ltd., Canada, 10, 15, 20
Steward Mfg. Co., Tenn., 5, 10, 15, 20
Stupakoff Ceramic & Mfg. Co., Box 390, Hillview Ave., Latrobe, Pa., 5, 10, 15, 20
For details see ad on pages 139, 189, 203, 255, 265, 277, 295, 297, 303, 378-379
Superior Porcelain Co., W.Va., 15
Superior Steatite & Ceramic, N.Y., 5, 10, 15, 20
Telex, Inc., Minn., 5, 10
Thomas & Sons Co., Ohio, 5, 10, 15, 20
Thor Ceramics, Inc., 225 Belleville Ave., Bloomfield, N.J., 5, 10, 15, 20
For details see ad on page 256
Western Gold & Platinum Works, Calif., 10, 15, 20

73. Consulting Engineers.

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American Hydromath Corp., N.Y., 15



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Amy, Aceves & King, Inc., N.Y., 5, 10, 20
Applegate & Co., C. J., Colo., 10, 15
Applied Science Corp. of Princeton, P.O. Box 44, Princeton, N.J., 10
For details see ad on page 238
Ardente Acoustic Labs., Ltd., England, 5
Arenberg Ultrasonic Lab., Mass., 5
Associated Electronics Co., N.Y., 10, 15, 20
Associated Research, Inc., Ill., 10
Atlantic Electronics Corp., N.Y., 10
Audio Corp. of America, N.J., 10
Austin Co., N.Y., 10
Auto Test, Inc., Ill., 10
Avion Instr. Corp., N.J., 5, 10, 15, 20
Babillus, John, Iowa, 10, 15, 20
Balco Research Laboratories, N.J., 20
Baldwin Engineering Service, Calif., 10
Bardwell & McAlister, Calif., 10, 20
Barnes & Reinecke, Inc., Ill., 10, 15, 20
Battelle Memorial Institute, Ohio, 5, 10, 15, 20
Belock Instrument Corp., N.Y., 15
Berkshire Laboratories, 584 Beaver Pond Rd., Lincoln, Mass., 10
For details see ad on page 315
Berry Engineers, James S., Tenn., 10, 15
Bibbero, Robert J., N.Y., 10, 20
Bitter, A. R., Ohio, 20
Boesch Mfg. Co., Inc., Conn., 10, 15
Bolt, Beranek and Newman, Mass., 5
Brick Electronic Equipment Co., N.J., 5, 10, 15, 20
Brown, W. J., Conn., 10, 20
Brownthorn Electronics, Inc., N.Y., 10, 20
Burnett Radio Laboratory, Wm. W. L., Calif., 20
Busse & Schroeder, Pa., 10, 20
Camera Equipment Co., 1600 Broadway, New York 19, N.Y., TV Film Operations
For details see ad on page 119
Canadian General Electric Co., Canada, 10, 20
Canoga Corp., Calif., 10, 15
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For details see ad on page 256
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Cook Electric Co., Ill., 10, 15
Corona Engineering Service, N.Y., 10, 15, 20
Craig Machine, Inc., Mass., 10, 15
Craven, Lohnes and Culver, D.C., 20
Crosby Enterprises, Inc., Bing, Calif., 10, 20
Crosby Laboratories, Inc., Box 233, Robbins Lane, Hicksville, L.I., N.Y., 20
For details see ad on pages 114, 282
Cullum, Jr., A. Earl, Tex., 20
Customatic Div., Stamford Tool & Die Corp., Conn., 15
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For details see ad on page 26
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For details see ad on page 257
Deltron Associates, Inc., Ill., 15
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Deutschmann Corp., Tobe, Mass., 20
Devenco, Inc., N.Y., 10, 20
Devol Research Co., Conn., 10, 15
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For details see ad on page 257
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Electro-Search, 4337 N. 5 St., Philadelphia 40, Pa., 20
For details see ad on page 283
Electrodyne Co., Mass., 10, 15
Electronic Engineering Co. of Calif., Calif., 10, 15, 20
Electronic Industries, Inc., Minn., 5, 10, 15, 20
Electronic Research Associates, Inc., P.O. Box 29, Caldwell, N.J., 20
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Erwood, Inc., Ill., 15, 20
F. S. D. Laboratories, Conn., 10, 15, 20
Feiler Eng. & Mfg. Co., Ill., 10, 20
Finn & Co., Inc., T. R., 333 Jackson Ave., New York 54, N.Y., 5
For details see ad on page 37
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Gately Development Laboratory, N.J., 5, 10
Gautney, George E., D.C., 20
Geddes, L. A., Canada, 10, 20
General Electronsonics, Inc., N.Y., 20
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Gottschalk Engineering, N.Y., 10, 15
Graner, L. P., Inc., N.Y., 10, 20
Grason-Stadler Co., Mass., 5
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Hartman Engineering Co., Mass., 10, 15
Heffelfinger, John B., Mo., 20
Hogan Laboratories, Inc., 155 Perry St., New York 14, N.Y., 5, 10, 15, 20
For details see ad on page 283
Hoisington, David B., Calif., 20
Holland Electronics, N.Y., 10, 20
Howes, F. S., Canada, 5, 20
Huggins Laboratories, Calif., 10
Hutcheson, Guy C., Tex., 20
I. E. Manufacturing, Ill., 15
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Industrial Electronic Engineers, Calif., 10, 15, 20
Industrial Radio Labs., N.Y., 5, 10
Instrument Laboratories, Ill., 10, 15
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 10, 15
For details see ad on page 134
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Jarvis Electronics Corp., Ill., 10, 15, 20
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Kearfott Co., Inc., 1150 McBride Ave., Little Falls, N.J., 10, 15
For details see ad on page 53
Kean, Walter F., Ill., 20
Keim, Llewellyn Bates, N.Y., 5, 10, 20
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(Continued on page 258)

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Kleinberger, Richard C., N.Y., 20
Kramer, Ambrose W., D.C., 10, 20
Lear, Inc., Calif., 10, 15, 20
Lehigh Valley Electr. Engr. & Mfg., Pa., 10, 20
Lepores Laboratory, R.I., 5
Linear Equipment Labs., 295 W. Shore Dr., Massapequa, L.I., N.Y., 20
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For details see ad on page 258
Lucian Laboratories, Pa., 10, 15, 20
Lytle Engineering & Mfg. Co., Ill., 10, 15, 20
Mackinnon, Keith A., Canada, 20
Magne Pulse Corp., N.Y., 20
Magnex Corp., N.Y., 5, 10, 15, 20
Manhattan Research Labs., N.Y., 10, 15
Marine Electric Corp., N.Y., 10, 20
Mark Products Co., Ill., 20
Marsh-Theiss, Inc., N.Y., 10, 15, 20
Maxson Corp., W. L., 460 W. 34 St., New York 1, N.Y., 10, 15
For details see ad on page 122
May, Donald M., Calif., 10, 15
McNary, James C., D.C., 20
McNeal, J. D., Conn., 10
McPhar Engnrng. Co. of Can., Ltd., Canada, 10, 20
Measurements Corp., Intervale Rd., Boonton, N.J., 10, 15, 20
For details see ad on pages 284, 422-423
Medico Physical Laboratories, Canada, 10
Metal Fabricators Corp., 73 Pond St., Waltham 54, Mass., 15
For details see ad on page 141
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Meyers, James G., N.Y., 5, 20

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For details see ad on page 258
Miller Instruments, Wm., Calif., 10
Mission Western Engineers, Inc., Calif., 10, 15
Monument Eng. Co., Inc., Ind., 10, 15
Murray, Albert F., D.C., 20, Television
Nassau Research & Dev. Assoc., Inc., 66 Main St., Mineola, L.I., N.Y., 20
For details see ad on page 243
National Electronics Labs., Inc., D.C., 20
National Radio Research Labs., N.Y., 15, 20
Newton, Arnold, N.Y., 10, 20
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For details see ad on page 258
Oliver Electronics Co., Okla., 10, 20
P. M. Industries, Inc., Conn., 10, 15
Palo Alto Physicists, Calif., 5, 10, 15, 20
Pierce Consulting Engineer, F. W., Ill., 20
Penn, Wm. Donaldson, Tex., 5, 20
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Racker Co., Joseph, N.Y., 20
RCA Victor Div., Tube Dept., 415 S. Fifth St., Harrison, N.J., 20
For details see ad on pages 88, 440-441
Radio Engineering Co., N.Y., 10, 20
Radio Engineering Labs., Inc., N.Y., 20
Radio Eng. & Maintenance, Ky., 20
Radio Engineering Products, Canada, 15, 20
Radio Instrument Labs., N.J., 20
Radio Sonic Corp., N.Y., 5, 10, 20
Razdow, Dr. Adolph, N.Y., 10, 15
Reed Research, Inc., D.C., 5, 10, 15
Reeve Electronics, Inc., Ill., 10
Reevesound Co., Inc., N.Y., Sound Recording
Research Electronics, Pa., 10, 15
Research Instrument Co., N.Y., 10, 15
Rich Electronics, Inc., Fla., 10, 15, 20
Rich-Roth Laboratories, Conn., 5, 10
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For details see ad on page 90
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For details see ad on page 258
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Royalcall, Inc., Ohio, 5, 10, 15, 20
Sams & Co., Inc., Howard W., Ind., 20 & TV
Sanial Laboratories, N.Y., 5
Saville RaTeleNics Labs., Ky., 20
Schottland, Frederic D., N.Y., 20
Schwartz, Bernard, Ill., 15, 20
Seaboard Electric Co., N.Y., 10, 15
Sears Co., M. J., N.Y., 5
Sepmeyer, L. W., Calif., 5
Shallcross Mfg. Co., 524 Pusey Ave., Collingdale, Pa., 10, 15, 20
For details see ad on page 98
Shepard Laboratories, N.J., 10
Sherwood Co., Robert H., N.Y., 10, 15
Shultz and Associates, E. Pat, Calif., 5, 10, 15, 20
Sivers Lab., Sweden, 20
Smeby, Lynne C., D.C., 20, Practice Before FCC and Toploading Antenna
Stockman Electronics Research, Mass., 20
Specialty Assembly & Packing Co., N.Y., 10, 20
Spencer-Kennedy Laboratories, Inc., 186 Massachusetts Ave., Cambridge 39, Mass., 10, 20
For details see ad on page 306
Square Root Manufacturing Corp., N.Y., 10, 15, 20
Standard Electronic Research, N.Y., 10, 20
Star Fuse Co., Inc., N.Y., 10
Stern Co., Roger M., 93 Nassau St., New York 38, N.Y., 10, 15, 20
For details see ad on page 39
Stibitz, Ph.D., George R., Vt., 10, 20
Stockman Electronics Research, Mass., 5, 20
Strain Engineering Service, Ga., 20
Summit Electronics, Inc., N.J., 5
Superex Electronics Corp., N.Y., 10, 20
Swan Television Co., Ltd., Ernie, Canada, 20
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 10, 15, 20
For details see ad on pages 417-420
Taller & Cooper, N.Y., 10, 15
Technical Material Corp., N.Y., 20
Televiso Corp., Ill., 5, 10, 15, 20
Thompson Co., The H. I., Calif., 5

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Thompson, H. A., Colo., 10, 15
Toeppen Co., Calif., 10
Toth, Albert F., N.Y., 20

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

Trans Electro Products Corp., Pa., 10, 20
Transvision, Inc., N.Y., 20
Tucker & Co., N.Y., 10, 15, 20
Ultradyne Engineering Labs., Inc., N.M., 10
Universal Electronics Co., 2012 S. Sepulveda Blvd., Los Angeles 25, Calif., 10
For details see ad on page 186
Vectron, Inc., 400 Main St., Waltham 54, Mass., 10, 15
For details see ad on page 308
Vega Company, Mass., 5
Virginia Electronics Co., D.C., 20
Walker Electric Co., B., N.Y., 20
Wallind-Pierce Corp., Calif., 10, 20
Wang Laboratories, 296 Columbus Ave., Boston 16, Mass., 20
For details see ad on page 230
Waveforms, Inc., N.Y., 5
Washington Technological Assoc., D.C., 10, 15, 20

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Wheeler Laboratories, Inc., 122 Cutter Mill Rd., Great Neck, L.I., N.Y., 20
For details see ad on page 259
Williams, Everard M., Pa., 10, 20
Winters, Starling T., N.J., 10
Wright Engineering Co., Ind., 15, 20, 25
Yellow Springs Instr. Co., Ohio, 10

74. Core Materials.

5. Laminations 10. Metallic powders

73-75

Abalon Precision Mfg. Corp., 540 Casasova St., New York 59, N.Y., 5
For details see ad on page 140
Alden Products Co., 113 N. Main St., Brockton 64, Mass., 5
For details see ad on pages 150-151
Alliance Tool & Motor Co., Ltd., Canada, 5
American Machine & Foundry Co., Mass., 5, 10
Du Pont De Nemours & Co., Inc., E. I., Del., 10
General Dyestuff Corp., Antara Chemicals Div., 435 Hudson St., New York 14, N.Y., 10
For details see ad on page 56
Heldor Manufacturing Corp., 238 Lewis St., Paterson, N.J., 5
For details see ad on page 276
Houghton Laboratories, Inc., N.Y., 5
Interelectronics Corp., N.Y., 10
Irvington Varnish and Insulator, N.J., 5
Mackay, Inc., A. D., N.Y., 10
Magnetic Core Corp., N.Y., 10
Magnetic Metals Co., N.J., 5
Mica Fabricating Co., N.J., 5
Minerals & Insulation Co., N.J., 5
National Molcite Co., N.J., 10
North American Philips Co., N.Y., 10
National Radiator Co., Pa., 10
Polydoroff & Associates, W. J., D.C., 10
Quality Components, Inc., Pa., 10
Repath Co., Paul R., Calif., 5
Research Instrument Co., N.Y., 5
Richardson Co., Ill., 5
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 10
For details see ad on pages 417-420
Tempel Manufacturing Co., Ill., 5
Thomas & Skinner Steel Prod. Co., 1113 E. 23 St., Indianapolis 7, Ind., 5
For details see ad on page 169
Universal Aviation Equipment, N.Y., 5
Williams & Co., C. K., Ill., 10

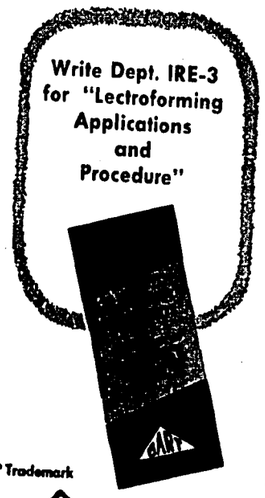
75. Fabricators & Services.

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Abalon Precision Mfg. Corp., 540 Casanova St., New York 59, N.Y., 5, 15, 25
For details see ad on page 140
Acromark Co., 9-13 Morrell St., Elizabeth 4, N.J., 30, Engraving & Marking Service
For details see ad on page 293
Accurate Electronics Corp., Ohio, 5, 30, 35
Advanced Vacuum Products, Inc., Conn., 20
Aero Electronics Co., Ill., 5
Aerolite Electronics Corp., 507 26th St., Union City, N.J., 5, 25, 30
For details see ad on page 103
Aeronautical Electric Co., 5103 W. Lawrence Ave., Chicago 30, Ill., 30, Bakelite
For details see ad on page 180
Ahrendt Instrument Co., Md., 5
Airborne Instruments Laboratory, N.Y., 5
Airflyte Electronics Co., 21 Cottage St., Bayonne, N.J., 20, Embedment & Potting
For details see ad on page 5
Airplane & Marine Instruments, Pa., 5, 10
Alden Products Co., 113 North Main St., Brockton 64, Mass., 5
For details see ad on pages 150-151
Allen Stevens Corp., N.Y., Die Casting
Alliance Tool & Motor Co., Ltd., Canada, 5, 25
Allied Allegri Machine Co., Inc., N.J., 5, 25
Alloy Metalsmiths, Inc., N.J., 5
American Brass Co., 414 Meadow St., Waterbury 20, Conn., 25
For details see ad on page 266
(Continued on page 261)

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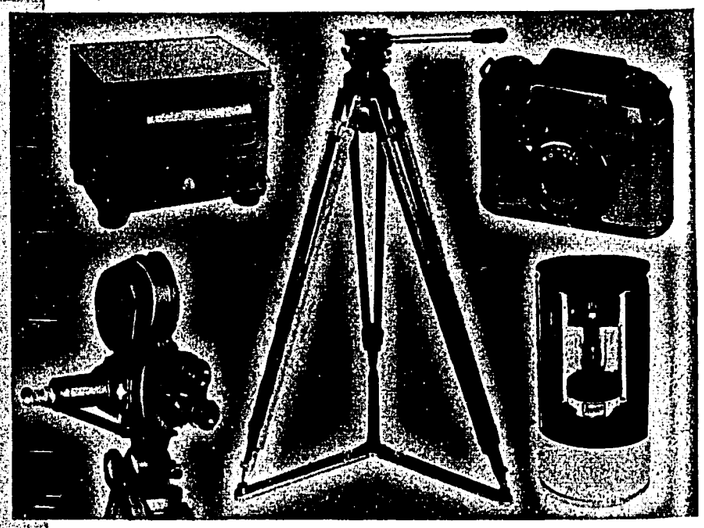
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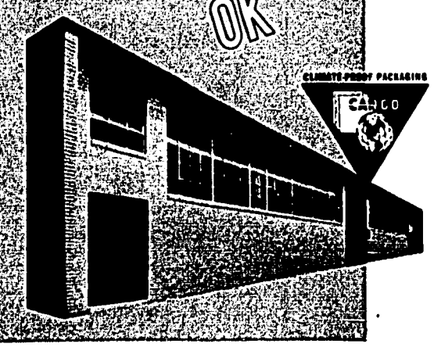


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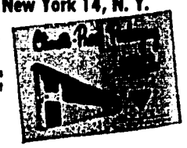
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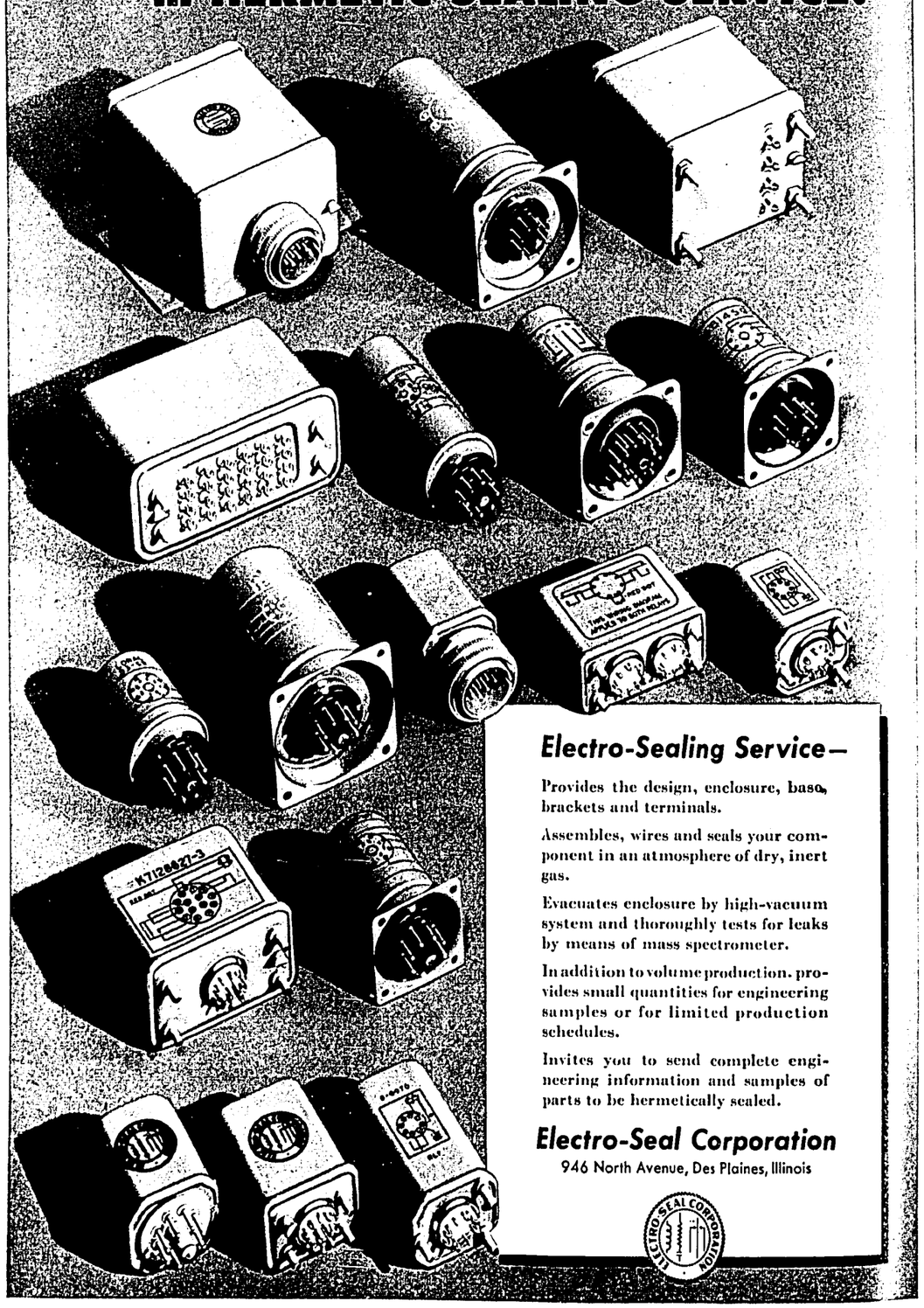
Fabricators & Services

(Continued from page 259)

American Encaustic Tiling Co., Inc., Pa., 5
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35
American Mica Insulation Co., N.J., 5, 30
American Phenolic Corp., 1830 S. 54 Ave., Chicago 50, Ill., 30, 35
For details see ad on page 2
American Radio Hardware Co., N.Y., 5
Amertronic, Inc., D.C., 5
Anchor Specialty Mfg. Co., N.J., 5, 30
Apahouser Corp. of N.E., Mass., 5, 30
Applegate & Co., C. J., Colo., 5
Applied Science Corp. of Princeton, P.O. Box 44, Princeton, N.J., 5
For details see ad on page 238
Arma Corp., N.Y., 5
Art Lloyd Metal Prods. Corp., N.Y., 25
Associated Electronics Co., N.Y., 5
Auburn Button Works, Inc., N.Y., 35
Audio Corp. of America, N.J., 30
Augat Bros., Inc., Mass., 5, 25
Austin Co., N.Y., 5
Auto Test, Inc., Ill., 5, 25
Baer Co., N. S., N.J., 30
Bart Laboratories Co., Inc., 227 Main St., Belleville, N.J., Electroforming
For details see ad on page 259
Blackstone Electric Co., Ill., 5
Bliss-Warren Electronic Corp., N.J., 5
Bodnar Industries, Inc., 19 Railroad Ave., New Rochelle, N.Y., 5, 30
For details see ad on page 269
Boehme, Inc., H. O., N.Y., 5
Boesch Mfg. Co., Inc., Conn., 5
Bone Engineering Corp., Calif., 5, 10, 25
Braun Tool & Instrument Co., Inc., H., 140 Fifth Ave., Hawthorne, N.J., 25
For details see ad on page 261
Brilhart Plastics Sales Corp., N.Y., 30, 35
Brofman Machine Corp., N.Y., 5
Brooks & Perkins, Inc., Mich., 5, 25
Buck Engineering Co., Inc., N.J., 5
Bud Radio, Inc., 2118 E. 55 St., Cleveland 3, Ohio, 5, 25
For details see ad on pages 267, 346
Cadre Industries Corp., N.Y., 5
Cambridge Thermionic Corp., 440 Concord Ave., Cambridge 38, Mass., 25, 30
For details see ad on page 254
Cargo Packers, Inc., 73 Rutledge St., Brooklyn 11, N.Y., Packing for Electronic Equip.
For details see ad on page 260
Cast Optics Corp., Conn., 30
Celomat Corp., N.Y., 30
Central Rediffusion Services, England, 30
Central Research Laboratories, Minn., 5
Central Stamping & Mfg. Co., Ill., 5, 10
Churchill Corp., Mass., 5
Citation Products Co., 233 E. 146 St., New York 51, N.Y., 25, 30
For details see ad on page 269
Clarke Instr. Div., National Ele. Mach. Shops, Md., 5
Clifton Precision Products Co., Pa., 5
Cohan-Epner Co., Inc., 142 W. 14 St., New York 11, N.Y., 10
For details see ad on page 263

(Continued on page 263)

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(Continued from page 261)

Cole Instrument Co., Calif., 5, 20
Coles Electronic Corp., Pa., 5
Commercial Plastics Co., Merchandise Mart, Chicago 54, Ill., 30, 35
For details see ad on page 298
Commercial Radio Sound Corp., N.Y., 5
Communicating Systems, Inc., N.Y., 5
Computer Corp. of America, N.Y., 5
Consolidated Molded Products, Pa., 35
Cook Electric Co., Ill., 15
Coral Design Div., H. G. Dietz, N.Y., 5
Cortland Industries, Inc., Ill., 30
Craig Machine, Inc., Mass., 5, 15, 25
Crane Packing Co., Ill., 30, 35
Crest Laboratories, Inc., N.Y., 20
Crown Engineering & Sales Co., N.J., 5, 10, 15, 25, 30, 35
Crystal Research Products, N.J., 5
Dale Products, Inc., 1318 28 Ave., Columbus, Neb., 5, 25, 30, 35
For details see ad on pages 452-453
Dallons Laboratories, Calif., 20
Davies Molding Co., Harry, Ill., 35
Daystrom Electric Corp., N.Y., 5, 10, 15
Deltron Associates, Inc., Ill., 5
Diamond Microwave Corp., Mass., 5
Dimco Gray Co., Ohio, 35
Duro Specialty Co., Inc., 8 Bennett St., Lynn, Mass., 5
For details see ad on page 29
Eastern Specialty Co., Pa., 5, 25
Eby, Inc., Hugh H., 4700 Stenton Ave., Philadelphia 44, Pa., 25, 35
For details see ad on page 207
Eder Engineering Co., Wis., 5
Electrical Products Corp., Calif., 5
Electro Craft Industries, Inc., Conn., 5, 25
Electro Physics Co., N.Y., 5, 10, 25
Electro-Seal Corp., 946 North Ave., Des Plaines, Ill., 5, 20
For details see ad on page 262
Electrochemical Inds., Inc., Mass., 10
Electrodyne Co., Mass., 5
Electronic Industries, Inc., Minn., 5
Electronic Manufacturing Co., 20 Orange St., Newark 2, N.J., 25
For details see ad on page 303
Electronic Parts Mfg. Co., 540 39 St., Union City, N.J., 5
For details see ad on page 33
Elin Laboratories, N.Y., 5
El Mec Laboratories, Inc., N.J., 5
El Rad Mfg. Co., Ill., 5
Emeloid Co., Inc., N.J., 5, 30, 35
Emerson & Cuming, Mass., 20, 30, 35
Engineering Co., N.J., 25
Engineering Development, Neb., 10
Erie Resistor Corp., 644 W. 12 St., Erie, Pa., 5, 35
For details see ad on page 18
Erwood, Inc., Ill., 5
F-R Machine Works, Inc., 44-14 Astoria Blvd., Long Island City, N.Y., 5
For details see ad on page 283
Falls Metal Works, Ltd., 414 Main St., Little Falls, N.J., 5
For details see ad on page 132
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., Encapsulation
For details see ad on pages 368-373
Federal Tool & Mfg. Co., Minn., 25, 30
Feiner & Sons, Inc., P., N.Y., 25
Felsenthal & Sons, Inc., G., Ill., 30, 35
Ferranti Electric, Inc., N.Y., 20
Ferro Co. Corp., N.Y., 5, 25
Fidelity Amplifier Co., Ill., 5
Formica Co., 4614 Spring Grove Ave., Cincinnati 32, Ohio, 30
For details see ad on page 48
Friedman Co., N.Y., 30, 35
Fryling Mfg. Co., Pa., 25
Galbraith & Son Electric Corp., C. C., 450 Avenue of the Americas, New York 11, N.Y., 5
For details see ad on page 104
Garde Manufacturing Co., 588 Eddy St., Providence 3, R.I., 35
For details see ad on page 270
Garlock Packing Co., N.Y., 30, 35
Garrett Co., Inc., George K., Pa., 25
General Cement Mfg. Co., Ill., 5, 25
General Electric Co., Mass., 35
General Electrosonics, Inc., N.Y., 5
General Hermetic Sealing Corp., 99 E. Hawthorn Ave., Valley Stream, L.I., N.Y., 5, 20
For details see ad on page 275
General Laminated Prods. Co., Inc., Ill., 5, 10, 30
General Plastics Corp., N.J., 30
Goldsmith Bros. Smelting & Refining, Ill., 10, Salts
Goodyear Aircraft Corp., Ohio, 30
Grayhill, Ill., 35
Gries Reproducer Corp., N.Y., 35
Grigsby-Allison Co., Inc., Ill., 5
Hadley Co., Robert M., Calif., 20
Hansen Co., Wm., Mich., 5
Harmon Electronics Co., Mo., 5, 20
Harnett Electric Corp., 138 Haven Ave., Port Washington, L.I., N.Y., 5
For details see ad on page 264
Hartman Engineering Co., Mass., 5
Hawley Products Co., 333-339 N. 6 St., St. Charles, Ill., 35
For details see ad on page 132
Haydu Brothers, N.J., 5, 25
Heldor Manufacturing Corp., 238 Lewis St., Paterson, N.J., 5, 10, 20, 25
For details see ad on page 276
Helko Products Co., Inc., N.Y., Engraving
Henry & Miller Industries, Inc., N.Y., 5, 10, 25
Hermaseal Co., Inc., 1101 Lafayette St., Elkhart, Ind., 20
For details see ad on page 277
Highland Engineering Co., Main & Urban, Westbury 21, L.I., N.Y., 5
For details see ad on pages 217, 283
Hopp Press, Inc., N.Y., 30, 35
Houghton Laboratories, Inc., N.Y., 5, 30, 35
Hudson Tool & Die Co., 118 S. 14 St., Newark, N.J., 25
For details see ad on page 30
I. E. Manufacturing, Ill., 5, 25
I-T-E Circuit Breaker Co., 1924 Hamilton St., Philadelphia 30, Pa., 5
For details see ad on page 146
Indiana Electr. & Television, Ind., 5
Industrial Devices, Inc., N.J., 35
Industrial Hardware Mfg. Co., Inc., 109 Prince St., New York 12, N.Y., 5, 25, 30
For details see ad on page 205
Industrial Television, Inc., N.J., 5
Instrument Corporation of America, Blacksburg, Va., 10
For details see ad on page 72
Insulation Products Co., Pa., 30, 35
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 5, 25
For details see ad on page 134
Ippolito & Co., Inc., James, 401 Concord Ave., New York 54, N.Y., 25
For details see ad on page 300
Jaco Products, Ohio, 30, 35
Johnson & Hoffman Mfg. Co., 35 E. 2nd St., Mineola, L.I., N.Y., 25
For details see ad on pages 397-400
Kahn & Co., Inc., Conn., 5
Kaupp Co., C. B., 32 Newark Way, Maplewood, N.J., 25, Deep Drawn Cases
For details see ad on page 74
Kent Co., F. C., 64 Howard St., Irvington 11, N.J., Waveguide Bending
For details see ad on page 246
Kenwood Mfg. Co., N.J., 5, 30, Kel-F
Keystone Electronics Corp., N.Y., 5, 30
King Laboratories, Inc., 127 Solar St., Syracuse 4, N.Y., 25
For details see ad on page 301
Kinney Co., Joseph, Pa., 25
Kirchberger & Co., Inc., M., 1425 37 St., Brooklyn 18, N.Y., 30
For details see ad on page 255
Kling Metal Spinning Co., N.Y., 25
Klise Mfg. Co., Mich., 30
Koehler Mfg. Co., Mass., 5, 25
Kolton Electric Mfg. Co., N.J., 5, 25
Korrol Products Corp., N.Y., 25
Kriser Corp., N.Y., 5, 30

(Continued on page 265)

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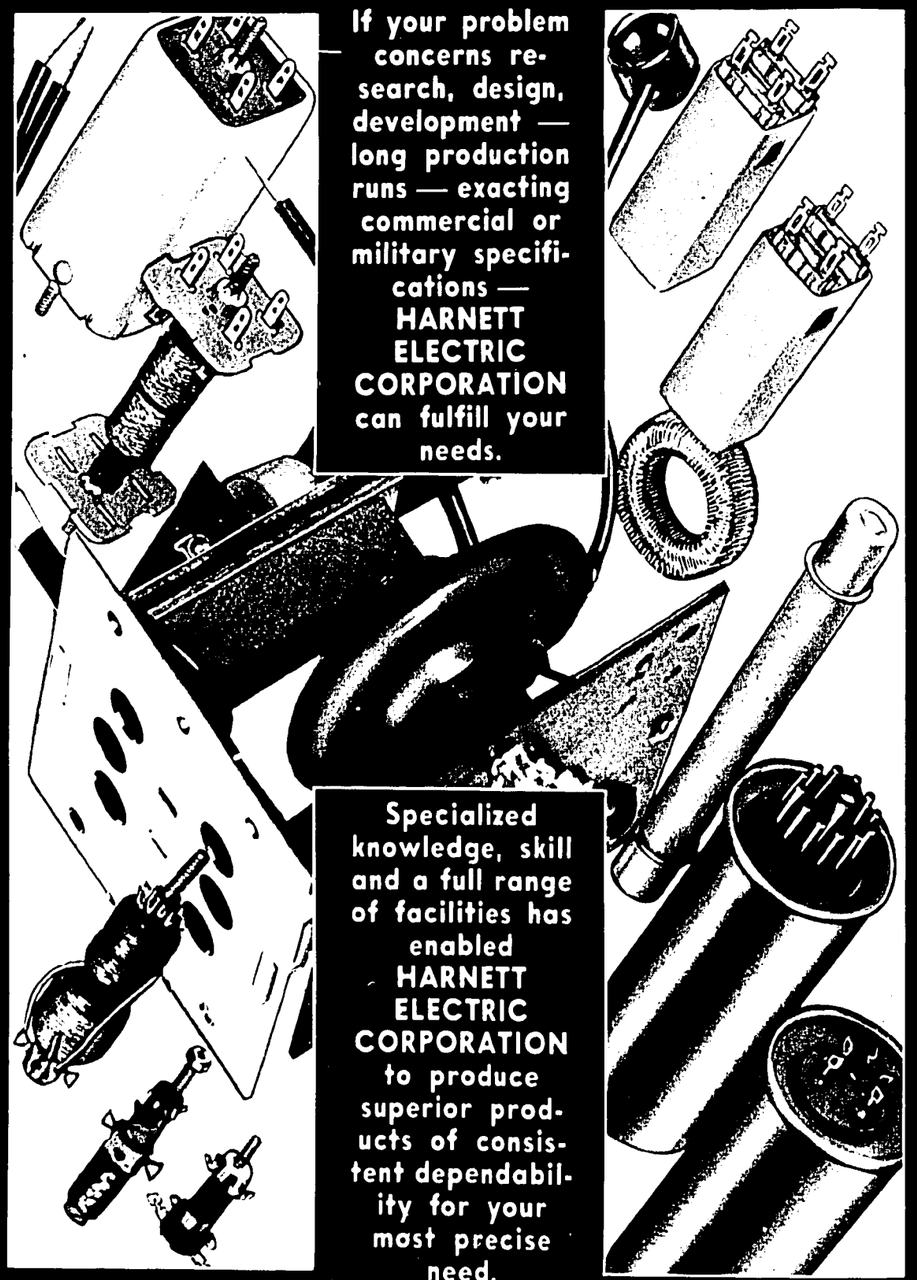
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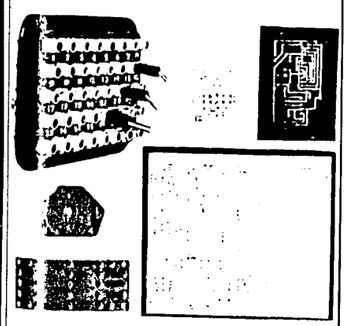
Lafayette Laboratories, Inc., N.Y., 5
Lake Co., Wis., 5
Lamagna Mfg. Co., Inc., N.J., 5, 25, 30
Lamoree, C. D., Calif., 30
Lear, Inc., Calif., 5, 35
Lee Laboratories, P.O. Box 200, Geneseo, Pa., 5
For details see ad on page 284
Lee Spring Company, Inc., N.Y., 25
Leprechaun Laboratory, R.I., 5
Lysco Mfg. Co., Inc., N.J., 5
Lytle Engineering & Mfg. Co., Ill., 5, 10
Magnex Corp., N.Y., 5
Makepeace Co., D. E., Pine & Dunham Sts., Attleboro, Mass., 5
For details see ad on page 80
Maigne Co., O. J., N.Y., 30, 35
Malco Tool & Mfg. Co., 4023 W. Lake St., Chicago 24, Ill., 25
For details see ad on page 272
Mansol Ceramics, 13 Valley St., Belleville, N.J. Custom Moulding
For details see ad on page 296
Mark Products Co., Ill., 30, 35
Martin & Co., H. S., Ill., 5
McNeal, J. D., Conn., 5
Mercury Electronic Labs., Inc., Ill., 5
Merit Plating Co., N.Y., 10
Metal Fabricators Corp., 73 Pond St., Waltham 54, Mass., 5
For details see ad on page 141
Metalace Corp. Electronics Div., N.Y., 25
Metals & Controls Corp., Mass., 25
Mica Fabricating Co., N.J., 30
Mica & Minerals Co., N.C., Mica
Mica Insulator Co., N.Y., 30
Micarta Fabricators, Inc., Ill., 5, 30
Michel Manufacturing Co., Wis., 5
Microtran Co., N.Y., 20
Milwaukee Stamping Co., Wis., 5, 10, 25
Minerals & Insulation Co., N.J., 30
Minute Man Products, Inc., N.Y., 5, 25
Missouri Research Labs., Inc., Mo., 5
Molded Insulation Co., Pa., 30, 35
Molding Specialists, Inc., N.Y., 35
Monument Eng. Co., Inc., Ind., 5, 25
Morse Co., Frank W., Mass., 25
Motson Co., J. Frank, 1717 Bethlehem Pike, Flowertown, Pa., Printing & Marking
For details see ad on page 265
Multi-Metal Wire Cloth Co., N.Y., 5
Munsten Mfg. & Service, Inc., N.Y., 5
Mycalex Corp. of America, 125 Clifton Blvd., Clifton, N.J., 30, 35
For details see ad on pages 430-431
Mykroy, Inc., Ill., 5, 30
N. R. K. Mfg. & Engineering Co., 4601 W. Addison St., Chicago 41, Ill., 5
For details see ad on page 65
National Radio Research Labs., N.Y., 5
National Tel-Tronics Corp., N.Y., 5
Ney Co., The J. M., 71 Elm St., Hartford 1, Conn., 5
For details see ad on page 209
North American Philips Co., N.Y., 10
Northern Electric Co., Ltd., Canada, 5, 25
Oregon Electronic Mfg. Co., Ore., 5
P. C. A. Electronics Inc., Calif., 5
P. M. Industries, Inc., Conn., 5, 30, 35
P. S. C. Applied Research, Ltd., Canada, 5
Parts Producing Corp., N.Y., 5, 20
Photo Chemical Products, Inc., 479 Walton Ave., New York 51, N.Y., 5
For details see ad on page 187
Pilot International Corp., N.Y., 5
Peerless Products Industries, Ill., 5, 25, 30
Pioneer Electric & Research Corp., Ill., 5
Pix Mfg. Co., Inc., N.J., 25
Plastic Accessories, Inc., N.Y., 5, 30
Plastic Mold & Eng., R.I., 35
Plasticraft Products Co., N.Y., 30
Polytronics Co., Canada, 5
Polymer Corp. of Pennsylvania, 125 N. 5 St., Reading, Pa., 5, 30, 35
For details see ad on page 278
Precision Associates, Inc., N.Y., 5
Precision Instrument Corp., N.Y., 5
Presto, Inc., N.Y., 5
Production Engineering Labs. Co., Inc., N.Y., 5
Production Gear, Ill., 25
Purdue Machine Co., Ill., 25
Quality Components, Inc., Pa., 35
RET Mfg. Corp., N.Y., 5
Radio Condenser Co., N.Y., 5, 30
Radio Engineering Co., N.Y., 5
Radio Industries, Inc., Ind., 5
Radio Switch Corp., N.Y., 5, 20, 25, 30
Rathbun Manufacturing Co., Pa., 35
Raymond Mfg. Co., Pa., 25
Reinke Co., Leo J., Calif., 35
Research Instrument Co., N.Y., 5, 25, 35, Casting
Resistoflex Corp., Belleville 9, N.J., 30, 35
For details see ad on page 281
Revere Copper & Brass, Inc., N.Y., 25
Rich Electronics, Inc., Pa., 5
Richardson Co., Inc., Ill., 30, 35
Rogan Brothers, Ill., 30, 35
Rohden Manufacturing Co., Ill., 35
Roller-Smith Corp., Pa., 5, 10, 20, 25, 35
Rowe Industries, Ohio, 5, 25
St. Regis Paper Co., N.Y., 30, 35
Schottland, Frederic D., N.Y., 5, 20
Scoville Mfg. Co., Conn., 25
Secon Metals Corp., 228 E. 45 St., New York 17, N.Y., 10
For details see ad on page 296
Sel-Rex Precious Metals, Inc., Belleville, N.J., 10
For details see ad on page 296
Semrow Products Co., Inc., Ill., 30
Shallcross Mfg. Co., 524 Pusey Ave., Collingdale, Pa., 20
For details see ad on page 98
Shaw Insulator Co., N.J., 35
Sheffco Mfg. Co., N.J., 25
Sherwood Co., Robert H., N.Y., 5, 30, 35
Shura-Tone Products, Inc., N.Y., 5
Smith Mfg. Co., Nathan R., Calif., 35
Smith & Stone, Ltd., Canada, 30, 35
South River Metal Prods. Co., Inc., N.J., 25
Sphere Co., Inc., P.O. Box 557B, Short Hills, N.J., 20
For details see ad on page 274
Spartan of Canada, Ltd., Canada, 5, 10, 25

(Continued on page 267)

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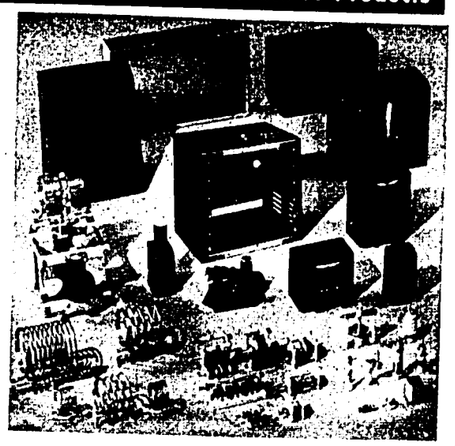
Stainless, Inc., Pa., 5
Square Root Manufacturing Corp., N.Y., 5, 20
Star Expansion Products Co., N.Y., 25
Stevens Prod., Inc., N.J., 30, 35
Stokes Molded Products, Inc., N.J., 35
Suburban Radio Co., N.J., 5
Suckle Electronics Co., N.J., 5, 10, 25
Superior Steatite & Ceramic, N.Y., 30
Taylor Fibre Co., Pa., 30
Roland-Teiner Company, Inc., Mass., 25
Teleradio Engineering Corp., N.Y., 5, 10, 25
Telescreen Corp., Conn., 5, 10, 20
Teletronics Laboratory, Inc., N.Y., 5
Thall Plastic Eng., Co., N.Y., 30
Thomas Clocks, Seth, Conn., 5
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 25, 30, 35
For details see ad on pages 417-420
Tranducer Corp., Mass., 5
Transformer Metal Products Corp., N.Y., 5, 25
Transformer Specialty Co., Inc., 328 Rockhill Rd., Bala-Cynwyd, Pa., 20, 35
For details see ad on page 219
Transradio, Ltd., England, 35
Tri-Dex Electronics, Calif., 5
Trimm, Inc., 400 W. Lake St., Libertyville, Ill., 15
For details see ad on page 107
Truelove & MacLean, Inc., Conn., 5, 25
Ultrasonic Corp., Mass., 5
Union Plate & Wire Co., Mass., 5
United Specialties Co., Pa., 5, 10, 25
United States Gasket Co., 611 N. 10 St., Camden 1, N.J., 30, 35
For details see ad on pages 450-451
United States Testing Co., N.J., 5
United Technical Laboratories, N.J., 5
Universal X-Ray Prod., Inc., Ill., 5
Vallorbs Jewel Co., Pa., 5
Vectron, Inc., 400 Main St., Waltham 54, Mass., 5
For details see ad on page 308
Vega Co., Mass., 5, 25
Virginia Electronics Co., D.C., 5
Volkert Metal Stampings, N.Y., 25
Walkirt Co., Calif., 5
Wall Mfg. Co., P., Pa., 25
Warwick Manufacturing Corp., Ill., 5
Wasserlein Mfg. Co., Inc., 126 W. Cass St., Joliet, Ill., 5
For details see ad on page 93
White Industries, Inc., N.Y., 5
Whitehead Stamping Co., Mich., 25
Whitso, Inc., Ill., 35
Wilmad Glass Co., Inc., Franklin & Flower Sts., Landisville, N.J., Glass Tubing
For details see ad on page 95
Wilmington Fibre Specialty Co., Del., 30
Winchester Electronics, Inc., 15 Crescent St., Glenbrook, Conn., 35
For details see ad on page 156
Witco Mfg. Co., Inc., Ohio, 5
Worcester Pressed Steel Co., Mass., 25
Wrought Washer Mfg. Co., Wis., 25
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Abalon Precision Mfg. Corp., 540 Casanova St., New York 59, N.Y., 15, 40
For details see ad on page 140
Accurate Electronics Corp., Ohio, 75
Acme Paper Box Co., N.Y., 30, Die Cut Cardboard
Acromark Co., 9-13 Morrell St., Elizabeth 4, N.J., 20
For details see ad on page 293
Aerolite Electronics Corp., 507 26th St., Union City, N.J., 75
For details see ad on page 103
Aeronautical Electric Co., 5103 W. Lawrence Ave., Chicago 30, Ill., 75, Strips
For details see ad on page 180
Affiliated Screw Products Co., Ill., 10, 35, 40
Airplane & Marine Instruments, Pa., 75
Airtron, Inc., N.J., 30
Akron Rubber Co., N.Y., 30, 35
Alden Products Co., 113 N. Main St., Brockton 64, Mass., 15, 65, 75
For details see ad on pages 150-151
Allen-Stevens Corp., N.Y., Power Cable Fittings
Allied Allegri Machine Co., Inc., N.J., 40, 65, 75
All Metal Screw Products Co., Inc., N.Y., 40, 50, 55, Stainless Steel
Alpha Metals, Inc., N.J., 30
American Brass Co., 414 Meadow St., Waterbury 20, Conn., 35, 70
For details see ad on page 266
American Hinge Corp., N.Y., 40, 50, 55, 65
American Laubscher Corp., N.Y., 40
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35, 40, 45
American Molded Products, Ill., 15
American Products Mfg. Co., Inc., La., 5
American Radio Hardware Co., N.Y., 10, 30, 35, 55, 65, 70, 75

(Continued on page 268)

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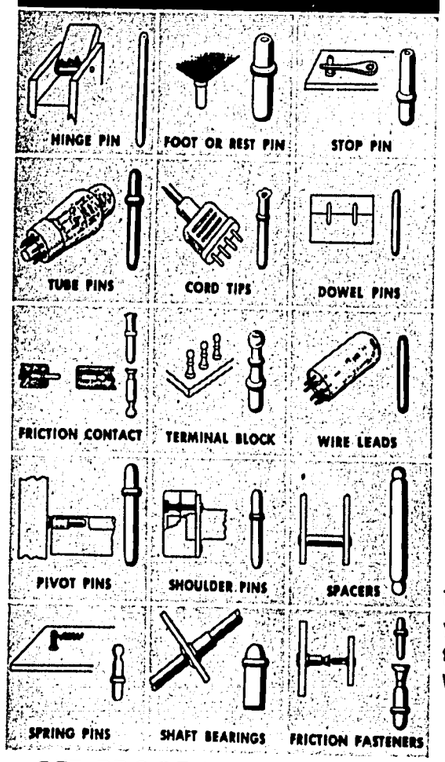


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(Continued from page 267)

American Screw Co., Conn., 55
Amplex Mfg. Co., Mich., 10
Apahouser Corp. of N.E., Mass., 20, 75
Armstrong Cork Co., Pa., 30, Adhesives
Atlantic India Rubber Works, Inc., 571 W. Polk St., Chicago 7, Ill., 30, 35, Rubber Only
For details see ad on page 9
Atlas E. E. Corp., Mass., Diode Clips
Atlas Electric Products Co., Pa., Heating Grids
Auburn Mfg. Co., Conn., 30, 35, 45, 55
Baer Co., N. S., N.J., 30, 35, 75
Baker Co., Inc., N.J., 17
Barry Corp., Mass., 80
Bead Chain Mfg. Co., 11 Mountain Grove St., Bridgeport 5, Conn., 65
For details see ad on page 268
Berkshire Laboratories, 584 Beaver Pond Rd., Lincoln, Mass., 15
For details see ad on page 315
Bishop Manufacturing Corp., N.J., 5
Bodnar Industries, Inc., 19 Railroad Ave., New Rochelle, N.Y. 20 Panels, Transilluminated
For details see ad on page 269
Brady Co., W. H., Wis., 5
Brainin Co., C. S., 320 Washington St., Mt. Vernon, N.Y., 17
For details see ad on page 208
Bristol Co., Conn., 55
Brofman Machine Corp., N.Y., 40
Brush Nail Expansion Bolt Co., Conn., Fasteners, Blind Inserts
Buchanan Electrical Products, Inc., N.J., 10, 70
Bud Radio, Inc., 2118 E. 55 St., Cleveland 3, Ohio, 25
For details see ad on pages 267, 345
Burndy Engineering Company, Inc., Conn., Nylon Cable Hanger
C & H Supply Co., Wash., Aluminum Name Plates
Cambridge Thermionic Corp., 440 Concord Ave., Cambridge 38, Mass., 40, 65, 75
For details see ad on page 254
Camloc Fastener Corp., N.Y., 35, 50, 55, Fasteners
Chase Brass & Copper Co., Conn., 30, 35, 50, 55
Chicago Rivet & Machine Co., 9600 W. Jackson Blvd., Bellwood, Ill., 50, 65
For details see ad on page 21
Cinch Mfg. Corp., 1026 S. Homan Ave., Chicago 24, Ill., 75
For details see ad on pages 384-385
Citation Products Co., 233 E. 146 St., New York 51, N.Y., 10, 20, 40, 65, 75
For details see ad on page 269
Communicating Systems, Inc., N.Y., 40
Condor Radio Mfg. Co., Ariz., Coolers
Connecticut Hard Rubber Co., Conn., 80
Constantin & Co., L. L., Route 46 & Franklin Ave., Lodi, N.J., Transistor Mount
For details see ad on page 393
Continental-Diamond Fibre Co., 16 Chapel St., Newark 48, Del., 30, 35
See complete catalog in last section
Continental Screw Co., Mass., 50, 55, 65
Cortland Industries, Inc., Ill., 45, 75
Cox & Co., Inc., N.Y., Heating Elements
Curtis Development & Mfg. Co., Wis., 75, Terminal Blocks, Terminal Strips
Dahlstrom Metallic Door Co., N.Y., 15
Davies Molding Co., Harry, Ill., 20
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Decimeter, Inc., Colo., 5
Dietz Co., Henry G., N.Y., Nameplates
Dimco-Gray Co., Ohio, 75
Duro Specialty Co., Inc., 8 Bennett St., Lynn, Mass., Pin Straightener
For details see ad on page 29
Dzus Fastener Co., Inc., N.Y., 35, 60, Fasteners
Eastern Specialty Co., Pa., 40
Eby, Inc., Hugh H., 4700 Stenton Ave., Philadelphia 44, Pa., 40, 75, 80
For details see ad on page 207
Elastic Stop Nut Corp. of America, 2330 Vaux Hall Rd., Union, N.J., 55
For details see ad on page 36
Electro Physics Co., N.Y., 30, 35
Electronic Mechanics, Inc., 101 Clifton Blvd., Clifton, N.J., 30, 35
For details see ad on page 278
Emeloid Co., Inc., N.J., 20, 30
Etched Products Corp., N.Y., 20 Panels
Fansteel Metallurgical Corp., Ill., 17
Federal Screw Products, Inc., 224 W. Huron St., Chicago 10, Ill., 10, 35, 40, 50, 55, 65, 70, 75
For details see ad on page 270
Federal Shock Mount Corp., N.Y., 80
Federal Tool & Mfg. Co., Minn., 15, 30, 35
Felsenthal & Sons, Inc., G., Ill., 20
Ferro Co., Corp., N.Y., Punched Metal Circuits
Fidelity Chemical Products Corp., N.J., Chemical Wire Stripper
Finn & Co., Inc., T. R., 333 Jackson Ave., New York 54, N.Y., 80
For details see ad on page 37
Flexilab Products Co., 2229 Bellaire St., Denver 7, Colo., 65
For details see ad on page 102
Frankel Connector Co., N.Y., Solderless Connectors
Franklin Fibre-Lamitex Corp., Del., 30, 40
Friedman Co., N.Y., 20, 75
Fryling Mfg. Co., Pa., 30, 35
Gair Co., Inc., Robert, N.Y., Cartons & Containers
Gancher Co., Louis, N.Y., 10, 40, 50, 55, 60, 65, 70, 75, 80
Garde Manufacturing Co., 588 Eddy St., Providence 3, R.I., 65, Plastic Coil Forms
For details see ad on page 270
Garlock Packing Co., N.Y., 30
Garrett Co., Inc., George K., 55, Washers
Gates Radio Co., Ill., 75
General Cement Mfg. Co., Ill., 10, 20, 35, 40, 50, 55, 65, 70, 75
General Laminated Prods. Co., Inc., Ill., 30, 35, 40, 65, 70, 75
General Radio Co., 275 Massachusetts, Cambridge 39, Mass., 20
For details see ad on pages 380-381, Cover IV
Gibson Electric Co., Pa., Contacts Only
Graphite Metallizing Corp., N.Y., 10
Great American Industries, Inc., Va., 30, 35, 80
Gries Reproducer Corp., N.Y., 45, 50, 55, Plastic
Gudebrod Bros. Silk Co., Inc., N.Y., Nylon Cord
Harmon Electronics Co., Mo., 15
Heldor Manufacturing Corp., 238 Lewis St., Paterson, N.J., 10, 15, 55, 65
For details see ad on page 276
Heli Coil Corp., Conn., 10
Helipot Corp., 916 S. Meridian Ave., South Pasadena, Calif., 20, Multi-Turn
See complete catalog in last section
Heller Co., Gerald K., Md., 75
Heminway & Bartlett Mfg. Co., 500-5th Ave., New York 36, N.Y., Nylon Lacing Cord
For details see ad on page 47
Henry & Miller Industries, Inc., N.Y., 15, 20, 40
Hermetic Seal Products Co., 29-37 S. 6 St., Newark 7, N.J., 70
For details see ad on page 66

(Continued on page 271)

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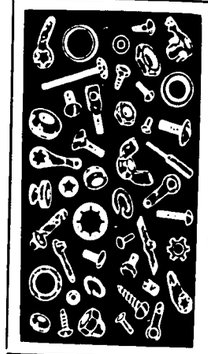


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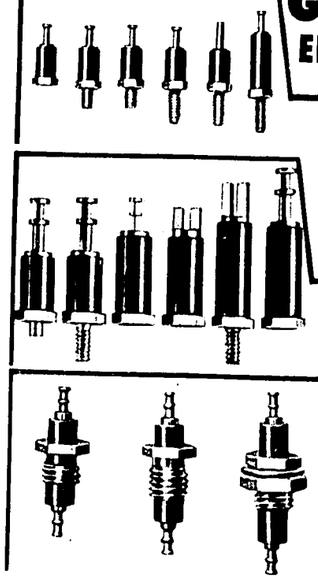
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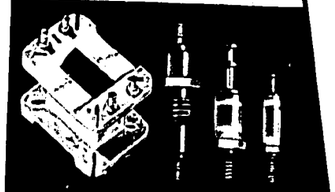
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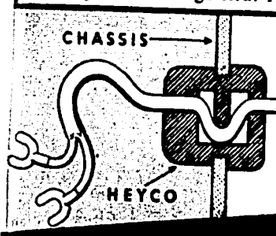
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(Continued from page 269)

Heyman Manufacturing Co., 300 Michigan Ave., Kenilworth, N.J., 10, Strain Reliefs
For details see ad on page 271

Hudson Tool & Die Co., 118 S. 14 St., Newark, N.J., 15
For details see ad on page 30

I. E. Manufacturing, Ill., 10, 20, 30, 40, 55, 60

Ideal Industries, Inc., Ill., 5

Industrial Devices, Inc., N.J., 65, 70

Industrial Hardware Mfg. Co., Inc., 109 Prince St., New York 12, N.Y., 40, 65, 75
For details see ad on page 205

Industrial Tape Corp., N.J., 5

Industrial Television, Inc., N.J., 20

Instrument Specialties Co., Inc., 160 Bergen Blvd., Little Falls, N.J., 60, Contact Strips & Rings
For details see ad on page 271

Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 20, 25, 35, 40, 50, 55, 75
For details see ad on page 134

Investment Casting Co., N.J., Castings

Ippolito & Co., Inc., James, 401 Concord Ave., New York 54, N.Y., 10, 40, 55, 75, Lock Nuts
For details see ad on page 300

Isolantite Manufacturing Corp., N.J., 75

JFD Mfg. Co., Inc., 6101 16 Ave., Brooklyn 4, N.Y., 25
For details see ad on pages 140, 242

Jaco Products, Ohio, 30, 40

Jiffy Clip Mfg. Co., N.Y., Test Probes

Johnson Co., E. F., Waseca, Minn., 10, 20
For details see ad on page 183

Johnson & Hoffman Mfg. Co., 31 E. 2nd St., Mineola, L.I., N.Y., 15, 35, 65
For details see ad on pages 397-400

Kaupp Co., C. B., 32 Newark Way, Maplewood, N.J., 15
For details see ad on page 74

Kay Woff Products Co., Neb., 30, 35, 80

Kearfott Co., Inc., 1150 McBride Ave., Little Falls, N.J., 10
For details see ad on page 53

Kenwood Mfg. Co., N.J., 10, 40

Keystone Carbon Co., Pa., 10

Keystone Electronics Corp., N.Y., 10, 40, 65, Test Probes

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Knapp Radio Specialties, Inc., Mass., 20, 35, 75

Kolton Electric Mfg. Co., N.J., 70, 75

Kulka Electric Mfg., Co., Inc., N.Y., 65, 70, 75

Kupfrian Mfg. Co., N.Y., 25

Lafayette Laboratories, Inc., N.Y., 40, 50, 55

Lamoree, C. D., Calif., 5, 30, 35, 75

Lamson & Sessions Co., Ohio, 40, 50, 55

Lee Spring Co., Inc., N.Y., 60

Lion Fastener, Inc., N.Y., Fastener

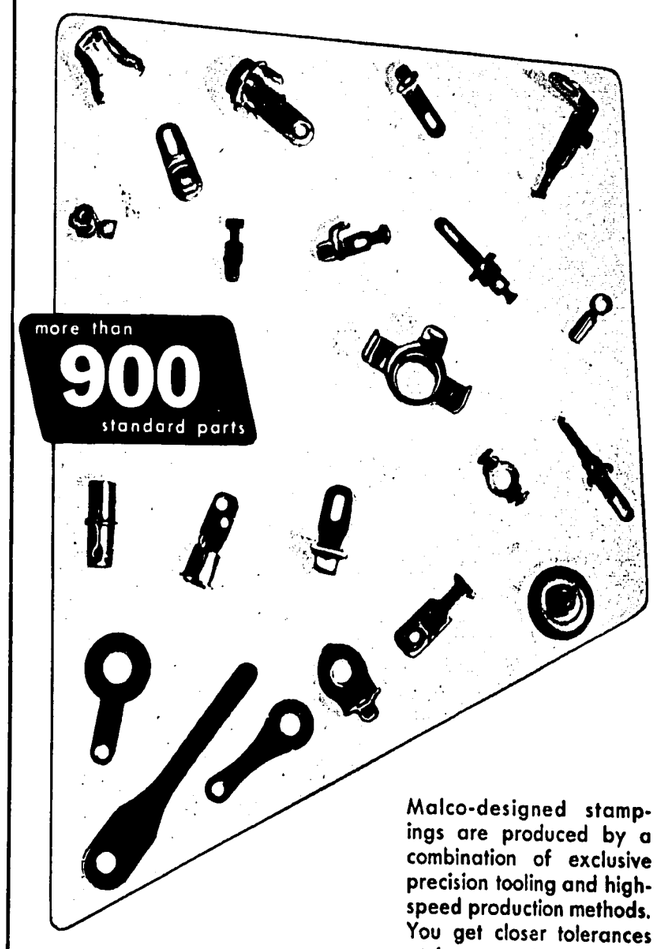
Littelfuse Inc., 1865 Miner St., Des Plaines, Ill., 75, Fuse Clips
For details see ad on page 58

(Continued on page 273)

Greater Precision

- SOLDER LUGS
- TERMINALS
- CORONA RINGS
- CONTACTS
- SMALL STAMPINGS

at lower cost!



Malco-designed stampings are produced by a combination of exclusive precision tooling and high-speed production methods. You get closer tolerances at lower cost, and at no sacrifice of quality.

Write today for our catalog, or send your exact requirements.

Malco TOOL & MFG. CO.

4023 W. LAKE ST. • CHICAGO 24, ILL.

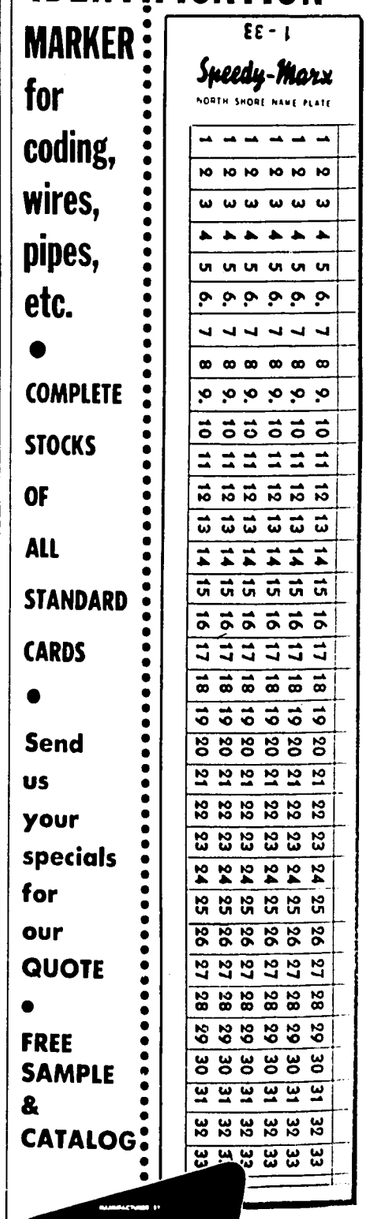
Announcing

the NEW Speedy MARX IMPROVED

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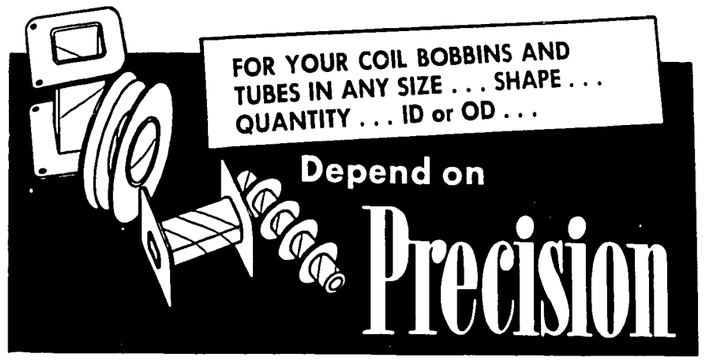
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- COMPLETE STOCKS OF ALL STANDARD CARDS
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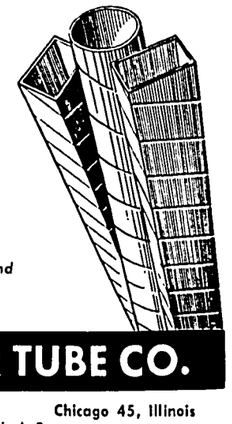
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PRECISION coil bobbins and tubes are manufactured to your exact specifications. Rigid production standards and quality materials are combined to insure greater strength, lighter weight, maximum insulation, more winding space, high moisture resistance and heat dissipation . . . at low unit cost.

Precision Bobbins and Tubes are available in kraft, fish paper, acetate, phenol impregnated or combinations. Coil flanges made to specifications—plain or fitted with leads, slots or holes—plain or embossed.

Send specifications for free sample. Request Bobbin Bulletin and Arbor List of over 2000 sizes.



PRECISION PAPER TUBE CO.

2052 W. Charleston St. Chicago 45, Illinois
Plant No. 2: 79 Chapel St., Hartford, Conn.



For
Simple more logical grouping of working units to insure quiet, smooth trouble-free operation.
For
More economical construction and lower maintenance cost.
For
A more direct alignment in remote control or power transmission around corners.

Write on your letterhead for "Flexible Shaft Assemblies"

F. W. STEWART MFG. CORP.

4311-13 RAVENSWOOD AVE., CHICAGO 13, ILL.

WEST COAST PLANT:
1638 So. FLOWER STREET . LOS ANGELES 15, CALIFORNIA

CIRCLE FESS

Hardware, Findings, & Manufacturing Aids

(Continued from page 271)

Lord Manufacturing Co., Pa., 80
Lynn Electronic Res. Co., 9 W. Magnolia Blvd., Burbank, Calif., 40, 65, 70, 75

For details see ad on page 59

M. B. Manufacturing Co., Inc., Conn., 80
Maigne Co., O. J., N.Y., 25, 30
Malco Tool & Mfg. Co., 4023 W. Lake St., Chicago 24, Ill., 65, 70

For details see ad on page 272

Mallory & Co., Inc., P.R., Ind., 17
Metal Textile Corp., 647 E. First Ave., Roselle, N.J., 30 (Shielding), 80

For details see ad on page 279

Mica Fabricating Co., N.J., 30
Mica Insulator Co., N.Y., 75
Micarta Fabricators, Inc., Ill., 75
Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass., 10, 15, 20, 75

For details see ad on page 336

Milwaukee Stamping Co., Wis., 40
Minerals & Insulation Co., N.J., 30
Miniature Precision Bearings, N.H., 10
Minnesota Mining & Mfg. Co., Minn., 5, Plastic
Molded Insulation Co., Pa., 20
Molding Specialists, Inc., N.Y., 10, Nylon Gears, Locknuts, Screws
Morse Co., Frank W., Mass., 70
Mueller Electric Co., Ohio, Test Clips
Multi-Tron Laboratory, Ill., 40
National Company, Inc., 61 Sherman St., Malden 48, Mass., 10, 15, 20, 25

For details see ad on pages 434-435

National Tel-Tronics Corp., N.Y., 75
Neo-Sil Corp., N.J., 30, 35, 65
New England Etching & Plating, Mass., 20, Panels, Name Plates
New Hampshire Ball Bearings, Inc., N.H., 10
Ney Company, The J. M., 71 Elm St., Hartford 1, Conn., 40

For details see ad on page 209

Noesting Pin Ticket Co., Inc., N.Y., 70
North Electric Manufacturing Co., Ohio, 75
Northshore Nameplate Co., Glenwood Landing, L.I., N.Y., 5

For details see ad on page 272

Olympic Metal Products Co., Inc., N.J., 15
Painton and Company, Ltd., England, 20
Palnut Co., N.J., 55
Patton-MacGuyer Co., R.I., 70
Pheoll Mfg. Co., Ill., 55, 60
Pix Mfg. Co., Inc., N.J., 30, 35, 65, 70
Penn Machine Cutting Co., Mass., 30
Polymer Corp. of Pennsylvania, 126 N. 5 St., Reading, Pa., 30, 35, 40, 50

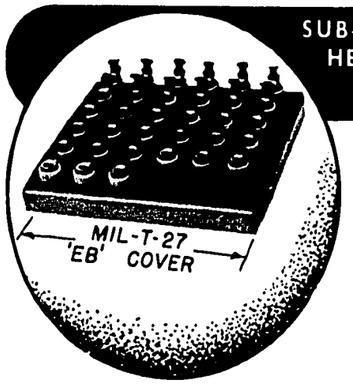
For details see ad on page 278

Precision Metal Products Co., Mass., 65, 75
Precision Paper Tube Co., 2062 W. Charleston St., Chicago 47, Ill., 45

For details see ad on page 273

Premier Metal Etching Co., N.Y., 20, Etched Panels
Printloid, Inc., N.Y., 20, 75
Protectoseal Co., Ill., 15
Radio Components, Ltd., Canada, 10, 20, 40, 75

(Continued on page 274)



SUB-MINIATURE
HERMETIC SEAL TERMINALS
by SPHERE

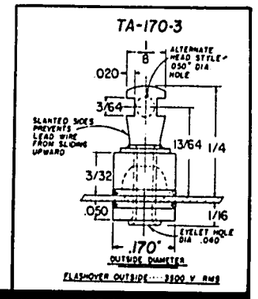
TEFLON COATED OUTER INSULATOR

- DOUBLE SEAL Provided By Specially Designed Sealator
- HIGH IR For Stringent MIL-T-27 Specifications
- PLAIN MOUNTING HOLES Makes Assembly Easy
- COLOR INDEXING Eliminates Hard To See Markings On Small Units
- TURRETHEAD and Solid Conductor Styles Also Available

TERMINAL ASSEMBLY SERVICE

is available upon receipt of your plain covers including:

- Hole Punching and Marking
- Weld Bolt and Insert Installation
- Centrifugal Hot Tin Finish and Electro-Plating
- Terminal Installation



WRITE TODAY FOR COMPLETE DESCRIPTIVE LITERATURE

PATENT PENDING

The SPHERE Company INC. P. O. BOX 557-B SHORT HILLS, N. J.

PROTECT YOUR PRODUCT

at point of strain

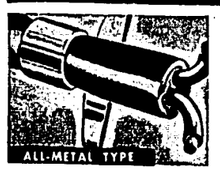
Protect product saleability too — by insuring long life for cords, cables and conductors. Genuine "GRIPMASTER" Strain Reliefs provide these vital features—

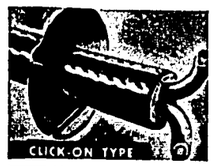
- ★ Anchor cords to housings
- ★ Eliminate taping or threading
- ★ Prevent unraveling
- ★ Prevent cord pull damage
- ★ All sizes and styles
- ★ Easy to apply
- ★ Inexpensive

Gripmaster Strain Reliefs are "tremendous trifles" that make good products better!

Ask for samples.

4 WAYS TO END ALL CORD AND CABLE SERVICE FAILURES *Economically*







GRIPMASTER STRAIN RELIEFS

Interruptions due to cable and cord connection failures are eliminated because they anchor the cord to the product at the point of strain. GRIPMASTER Strain Reliefs can withstand pulls up to 100 lbs., and are acceptable to Underwriters Laboratories. All types Reg. U. S. Pat. Off.

WIRE BINDING SLEEVES—Preventing fraying of cord ends, these specially-treated rubber tubes are available in five sizes to fit wires to .790



WRITE FOR SAMPLES AND LITERATURE TODAY!

GEORGE WALKER COMPANY

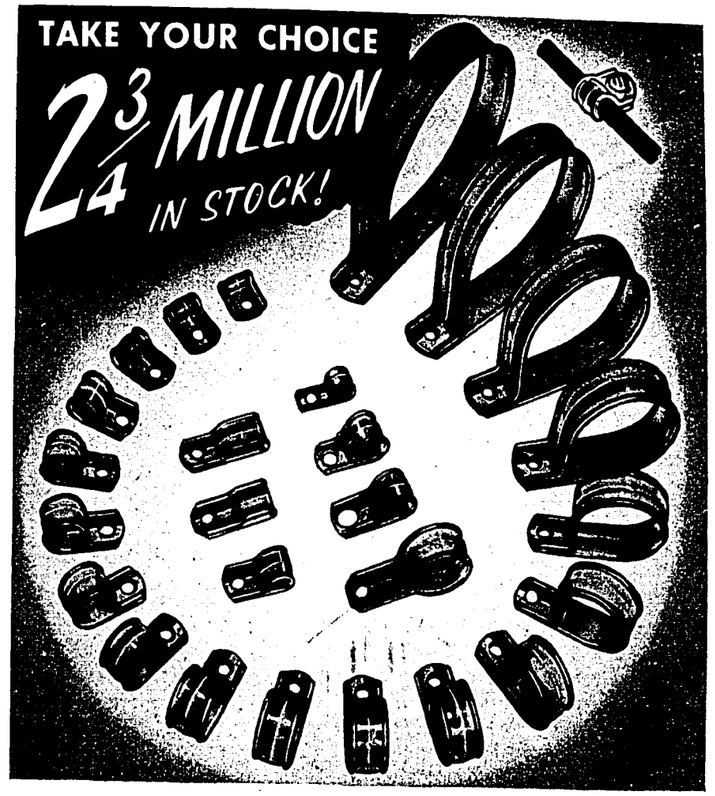
118 AMSTERDAM AVE., PASSAIC, NEW JERSEY

Hardware, Findings, & Manufacturing Aids

(Continued from page 273)

Radio Engineering Labs., Inc., N.Y., Self Seal Nuts
Raymond Mfg. Co., Pa., 60
Reed & Prince Mfg. Co., Mass., 40, 50, 55
Reliable Spring & Wire Forms, Ohio, 60
Remler Co., Ltd., Calif., 40
Repath Co., Paul R., Calif., 15
Research Instrument Co., N.Y., 10, 15, 20, 40, 75
Robinson Aviation, Inc., Teterboro Air Terminal, Teterboro, N.J., 80, Shock Vibration Trays & Racks
For details see ad on page 90
Rogers Corp., Conn., 30, 45, 75
Roller-Smith Corp., Pa., 40
St. Marys Carbon Co., Pa., 10
Sandvik Steel, Inc., N.Y., 60 Flat
Schott Co., Walter D., Calif., 35, 40
Scovill Mfg. Co., Conn., 15, 40, 65
Screw Corp. of America, N.Y., Weld Studs
Semrow Products Co., Inc., Ill., Grilles
Sexton Can. Co., Inc., Mass., 15
Shakeproof, Inc., Ill., 55, Fasteners
Sheffco Mfg. Co., N.J., 70, 75
Sherman Mfg. Co., H. B., Mich., 70
Simmons Fastener Corp., N.Y., 40, 50, 55, Fasteners
Smith, Inc., Herman H., 436 18 St., Brooklyn 15, N.Y., 10, 35, 40, 55, 65, 75
See complete catalog in last section
Sphere Co., Inc., P.O. Box 557B, Short Hills, N.J., 65
For details see ad on page 274
Standard Pressed Steel Co., Pa., 40, 55
Stewart Mfg. Corp., F. W., 4311-13 Ravenswood Ave., Chicago 13, Ill., 25
For details see ad on page 273
Sun Dial Corp., N.J., 20, And Panels
Superior Electric Co., 83 Laurel St., Bristol, Conn., Binding Posts
See complete catalog in last section
Swiss Jewel Co., Pa., 40 Jewels
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 75
For details see ad on pages 417-420
Taylor Fibre Co., Pa., 30, 80
Thomas Clocks, Seth, Conn., 40
Thor Ceramics, Inc., 225 Belleville Ave., Bloomfield, N.J., Plastic Resistor Forms
For details see ad on page 256
Tinnerman Products, Inc., Ohio, 55, Fasteners
Topflight Tape Co., Pa., 5
Torwico Electronics, Inc., 961 Frelinghuysen Ave., Newark 5, N.J., 15, 70, 75
For details see ad on page 149
Transformer Metal Products Corp., N.Y., 15
Trans-Gel Products, N.Y., 20, Panels
Transradio, Ltd., England, 20
Triad Transformer Corp., 4055 Redwood Ave., Venice, Calif., 15
For details see ad on page 89
Tri-Dex Electronics, Calif., 75
Truelove & MacLean, Inc., Conn., 5, 35

(Continued on page 275)



WHY USE THESE EthoLoc* CABLE CLIPS?

1. Made of tough, durable Ethyl Cellulose plastic—no danger of shorts or grounds
2. Flexible and easy to apply—no sharp edges
3. Light in weight
4. Low in cost

15% reduction in prices on many popular sizes.

We thank our customers for large volume that made price reductions possible.

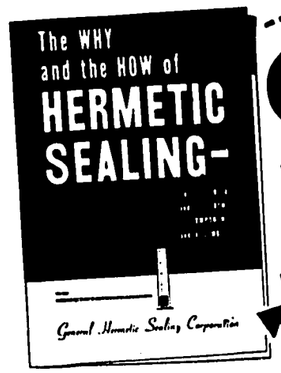
Write for sample and full information

WECKESSER COMPANY

5269 N. Avondale Ave. • Chicago 30, Ill.

ALSO MFRS. OF ALL NYLON CABLE CLIPS

The WHY and the HOW of HERMETIC SEALING—



HERMETICALLY SEALED ELECTRICAL and ELECTRONIC COMPONENTS and ASSEMBLIES

- Meet Military Specifications • Unexcelled High Altitude Operation
- Permanent Protection Against Corrosion, Oxidation, Dust
- Forever Free from Humidity Effects
- Explosion Proof and Fungus Proof
- All assemblies are evacuated, inert gas filled, and 100% Mass Spectrometer Leak tested

Write for folder—The HOW & WHY of Hermetic Sealing

GENERAL HERMETIC SEALING CORPORATION

99 East Hawthorne Ave., Valley Stream, N. Y.
Valley Stream 5-6363

Hardware, Findings, & Manufacturing Aids

(Continued from page 274)

Ucinite Co., 459 Watertown St., Newtonville 60, Mass., 65, 75, 80
For details see ad on page 447
United Carr-Fastener Corp., 31 Ames St., Cambridge 42, Mass., 35, 40, Fasteners
For details see ad on page 446
U. S. Engineering Co., 521 Commercial St., Glendale 3, Calif., 10, 40, 65, 75
For details see ad on page 91
U. S. Gasket Co., 611 N. 10 St., Camden 1, N.J., 10, 25, 30, 35, 40
For details see ad on pages 450-451
U. S. Radium Corp., N.Y., 20, Panels
United Technical Laboratories, N.J., Test Clips & Probes
Universal Aviation Equipment, N.Y., 20, Panels
Vaco Products Co., Ill., 70
Vallorbs Jewel Co., Pa., 40, 65
Vector Electronic Co., 3552 San Fernando Rd., Los Angeles 65, Calif., 15, 75
For details see ad on page 205
Virginia Electronics Co., D.C., 40, 70, 75, Teflon
Waldes-Kohinoor, Inc., N.Y., Retaining Rings
Walker Co., George, 118 Amsterdam Ave., Passaic, N.J., Strain Reliefs
For details see ad on page 274
Walker Turner Div., Kearney & Trecker Corp., N.J., 25
Wall Mfg. Co., P., Pa., 40
Weckesser Co., 5269 N. Avondale Ave., Chicago 30, Ill., Cable Clips & Clamps
For details see ad on page 275
Western Lithograph Co., Calif., 5
Westfield Metal Products Co., Inc., Mass., 55
White Industries, Inc., N.Y., 40
White Industrial Div., S. S., N.Y., 25
Whitehead Stamping Co., Mich., 55
Wilmington Fibre Specialty Co., Del., 10, 30, 35
Wilson Co., H. A., N.J., 17
Winchester Electronics, Inc., 15 Crescent St., Glenbrook, Conn., 65
For details see ad on page 156
Woodruff & Stokes Co., Inc., Mass., 40
Worcester Pressed Steel Co., Mass., 15
Wrought Washer Mfg. Co., Wis., 55
Zierick Mfg. Corp., N.Y., 65, 70

78. Hermetic Seals.

5. Complete headers 10. Ceramic to metal seals 15. Glass to metal seals

Advanced Vacuum Products, Inc., Conn., 10
American Lava Corp., Cherokee & Mfrs. Rd., Chattanooga 5, Tenn., 10
For details see ad on page 4
American Machine & Foundry Co., Mass., 5, 10, 15
Brew and Co., Inc., Richard D., Mass., 15
Cathodeon, Ltd., England, 5, 15
Centralab, Div. Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee 1, Wis., 10
See complete catalog in last section
Ceramaseal Co., N.Y., 10

(Continued on page 277)

Assembly service for hermetic sealing of electronic units



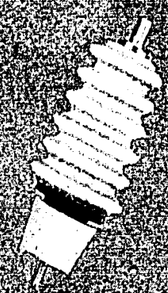
Specify Heldor!

cans and covers to mil-t-27 and commercial specifications





compression-type hermetic seal bushings and terminals



HELDOR's vast background and facilities as the leading manufacturers of components for hermetic sealing are now being used by producers of selenium rectifiers, oil-filled condensers, transformers and similar electronic units for the complete final assembly and the actual hermetic sealing. Heldor Assembly Service to them offers many advantages:

1 SAVE MONEY

As manufacturers of components (or hermetic sealing—cans, covers and terminals—HELDOR is in the unique position of being able to save money on the complete assembly of hermetically sealed electronic units. Several manufacturers, now using this Heldor Assembly Service, have eliminated their own hermetic sealing operations because this HELDOR service saved them substantial sums of money.

2 NO PARTS INVENTORY

When HELDOR does the complete assembly and sealing of your products, you no longer need an inventory of components. HELDOR maintains its own inventory of MIL-T-27 and NON-STANDARD cans and covers as well as compression-type terminals.

3 SPEEDY DELIVERY

HELDOR'S production facilities enable us to deliver completely assembled units—already hermetically sealed—much faster (and less costly) than you can do it in your own plant. Many manufacturers in your field have already discovered this fact . . . to their obvious advantage. Why not you?

4 NO HEADACHES

As one of the nation's leading specialists in hermetic sealing and its allied fields, HELDOR'S background and technical "know-how" is second-to-none. You can forget about the problems of hermetically sealing components when you use HELDOR Assembly Service.

5 MADE TO YOUR SPECIFICATIONS

HELDOR'S precision production and assembly service is geared to meet the most rigid of hermetic sealing specifications.

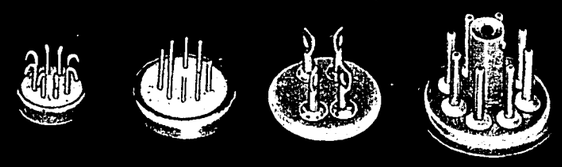
CALL HELDOR ON YOUR NEXT HERMETIC SEALING PROBLEM . . . SEND US YOUR SPECIFICATIONS

HELDOR MANUFACTURING CORPORATION

Heldor HELDOR BUSHING & TERMINAL CO., INC. Heldor

238 Lewis Street • Paterson, N. J.

BRING US YOUR HEADER PROBLEMS!



SIMPLE OR COMPLEX

— We make them all, ranging from 2- and 3-electrode crystal holder bases and standard octal headers, to 14- and 18-terminal headers for sealed Transformer and Relay applications — with a wide selection of styles and sizes in our series of basic designs.

SPECIAL DESIGNS

— We also manufacture Sealed Headers and Terminals to meet special requirements, and will be glad to quote upon receiving your specifications.

COMPLETE ASSEMBLIES

— We have facilities for handling the complete assembly of many units — including wiring, evacuating and pressure-filling enclosures.

NEW CATALOG

— Just off the press, a new Hermaseal catalog, with descriptions and specifications of some of our standard Sealed Headers and Terminals. Write for your copy today!

Hermaseal **THE HERMASEAL CO, Inc.** Elkhart 3, Indiana

Stupakoff

GLASS to METAL SEALS

Stupakoff Kovar-Glass Seals are made with hard glass, assuring the highest degree of protection against thermal shock and weathering.

Stupakoff Kovar-Glass Seals are *not* mechanical compression seals, but develop a permanent and impervious bond through chemical interaction of the oxide of Kovar fused with hard boro-silicate glass.

Kovar is the ideal metal for such seals because its expansion characteristics closely match those of hard glass.

Available in a wide variety of standard sizes and designs, and can be made in many special forms. We will gladly submit samples and quotations.

STUPAKOFF CERAMIC & MANUFACTURING CO.

LATROBE, PENNSYLVANIA

(Continued from page 275)

Centronics Co., 21-04 122 St., College Point, L.I., N.Y., 15
For details see ad on page 186

Constantin & Co., L. L., Route 46 & Franklin Ave., Lodi, N.J., 5, 15
For details see ad on page 393

Corning Glass Works, N.Y., 15

Dolinko & Wilkens, Inc., N.J., 15

Electrical Industries, Div. Amperex Electronic Corp., 44 Summer Ave., Newark 4, N.J., 5, 15
For details see ad on page 14

Electronic Mechanics, Inc., 101 Clifton Blvd., Clifton, N.J., 10
For details see ad on page 278

Electronic Products Co., N.Y., 15

Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5
For details see ad on pages 368-373

Fish-Schurman Corp., N.Y., 10, 15

Frenchtown Porcelain Co., N.J., 10

Fusite Corp., 6000 Fernview Ave., Cincinnati 13, Ohio, 5, 15
For details see ad on page 50

Globe Products Corp., Conn., 10

Garde Manufacturing Co., 588 Eddy St., Providence 3, R.I., Plastic to Metal
For details see ad on page 270

General Ceramics & Steatite Corp., Crows Mill Rd., Keasby, N.J., 10
For details see ad on pages 52, 54, 349

General Hermetic Sealing Corp., 99 E. Hawthorn Ave., Valley Stream, L.I., N.Y., 5, 10, 15
For details see ad on page 275

Heldor Manufacturing Corp., 238 Lewis St., Paterson, N.J., 5, 10
For details see ad on page 276

Heldor Bushing & Terminal Co., N.J., 5

Heller Co., Gerald K., Md.

Hermaseal Co., Inc., 1101 Lafayette St., Elkhart 3, Ind., 5, 15
For details see ad on page 277

Hermetic Seal Products Co., 29-37 S. 6 St., Newark 7, N.J., 5, 10, 15
For details see ad on page 66

Hermetite Corp., Mass., 5, 10, 15

Houghton Labs., Inc., N.Y., 10, 15

Industrial Devices, Inc., N.J., 5

International Resistance Co., Pa., 5

Isolantite Mfg. Corp., N.J., 10

Kemlite Laboratories, Ill., 15

Litton Engineering Labs., Calif., 15

Lundey Associates, Mass., Ceramic to Teflon

Martin & Co., H. S., Ill., 15

Multi-Tron Laboratory, Ill., 15

Mycalex Corp. of America, N.J., 10

Mykroy, Inc., Ill., 10, 15

Neo-Sil Corp., N.J., 5

Northern Electronic & Vacuum Ind., Canada, 15

Powell Co., Harold H., Pa., 15

Radiation Counter Labs., Inc., Ill., 15

Scientific Electronic Lab., N.J., 5, 10, 15

Sealtron Co., Ohio, 5, 10, 15, Sub. Assemblies

Sphere Co., Inc., P.O. Box 557B, Short Hills, N.J., 5, 10
For details see ad on page 274

Stupakoff Ceramic & Mfg. Co., Box 390, Hillview Ave., Latrobe, Pa., 5, 15
For details see ad on pages 139, 189, 203, 255, 265, 277, 295, 297, 303, 378-379

(Continued on page 279)

POLYPENCO TEFLON*

available for economical fabrication

ROD	Extruded .187" dia. to 2.0" dia. Tolerance +.002"—.000" up to 1" dia. Molded 2.25" dia. to 4.0" dia. Beading .030" to .187" dia.
TUBING	Extruded .50" to 2.0" O.D. 3/16" to 1.0" I.D. min. wall ⅛" Molded 1¼" to 8" O.D. at ¼" intervals Wall thickness ⅜"—2¾"
OTHER SHAPES	Strip thickness .002" to .060" Slab thickness ⅛" to 1½" Special extruded shapes to customer specifications

Outstanding properties of TEFLON

Advantage	
WIDE SERVICE TEMPERATURE RANGE	–100°F to +500°F
CHEMICALLY INERT	Resists all known acids, alkalies and commercial solvents over the service temperature range.
ZERO WATER ABSORPTION	Water will not wet the surface.
LOW POWER FACTOR	.05% p.f. constant over entire frequency spectrum.
STABLE DIELECTRIC CONSTANT	2.0 unchanged over entire spectrum.
TOUGHNESS AT LOW TEMPERATURE	Izod impact strength –70°F 2 ft. lbs./in.

also available to your specifications

*Teflon is a trademark of the DuPont Co.

MACHINED PARTS • MOLDED PARTS

POLYPENCO® / nylon teflon

Write for technical data and prices on Polypenco Teflon and Nylon

The POLYMER CORPORATION of Pennsylvania • Reading, Penna.

"Canadian Representative: C-H Engineering Company, Montreal, Toronto, Canada



These 3 insulating materials now available in the

BIGGEST SINGLE SHEETS *ever made*

King-sized TEFLON sheets, *60" x 72"*, prevent leakage and blow-through on large gaskets. Ideal for many uses.

•

5 foot KEL-F discs open vast new potentialities for this versatile thermoplastic. New size increases economy, eliminates waste.

•

It's no secret that the A. E. C. chose *4 foot* MYKROY rings to insulate its generator. There's a growing demand for this perfected glass bonded mica.

•

Sheets, rods — machined or molded to specification. Write today for our new TEFLON, KEL-F and MYKROY brochures.

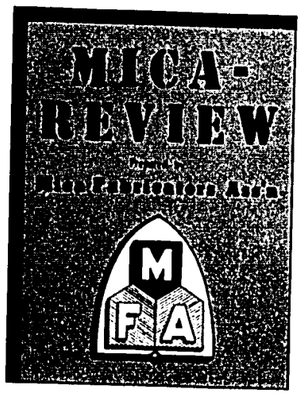
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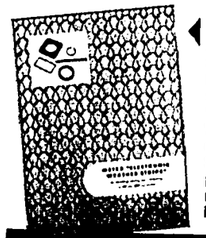
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Plan *now* to take full advantage of *Metex Electronic Weatherstripping's* unusual effectiveness in shielding all types of electronic equipment. Because it is made of *knitted* wire mesh, *Metex Electronic Weatherstripping* is both conductive and resilient. It assures positive metal-to-metal contact between all mating surfaces. And being resilient it accommodates itself positively to surface inequalities.

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Hermetic Seals 78-79

(Continued from page 277)

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 5, 15
For details see ad on pages 417-420
Thor Ceramics, Inc., 225 Belleville Ave., Bloomfield, N.J., 10
For details see ad on page 256
Torwico Electronics, Inc., 961 Frelinghuysen Ave., Newark 5, N.J., 5, 10
For details see ad on page 149
Triad Transformer Corp., 4055 Redwood Ave., Venice, Calif., 5
For details see ad on page 89
U. S. Components, Inc., 454-462 E. 148 St., New York 55, N.Y., 15
For details see ad on page 96
Virginia Electronics Company, D.C., 5
Vitroseal Corp., Ind., 5, 10, 15
Wakefield Industries, Inc., Ill., 15
Wheaton Company, T. C., N.J., 5, 15

79. Insulating Materials.

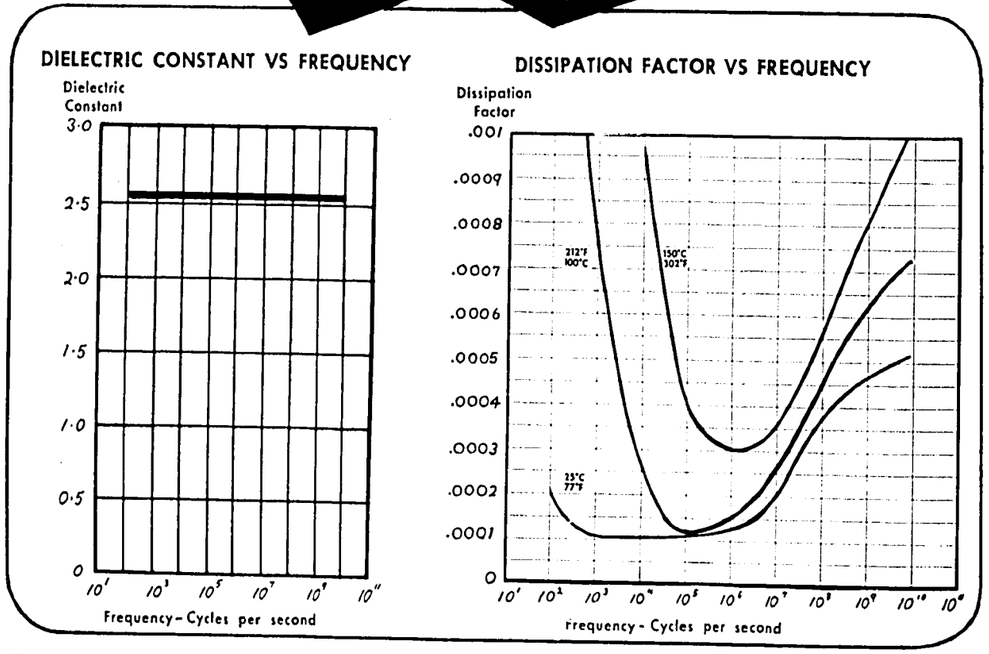
5. Cambric sheeting
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A. K. Manufacturing Co., Inc., Ill., 30
Acme Wire Co., Conn., 5
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30
American Mica Insulation Co., N.J., Mica
American Phenolic Corp., 1830 S. 54 Ave., Chicago 50, Ill., 30
For details see ad on page 2
Auburn Mfg. Co., Conn., 30
Bentley, Harris Mfg. Co., Pa., 10, 25
Bestcraft Products Co., Inc., N.Y., Fish Paper
Bishop Manufacturing Corp., N.J., 20, 30
Brand and Co., Inc., William, North & Valley St., Willimantic, Conn., 5, 10, 15, 20, 25, 30
For details see ad on page 15
Cast Optics Corp., Conn., 30
Chemical Development Corp., Mass., 30
Ciba Company, Inc., 627 Greenwich St., New York 14, N.Y., 30
For details see ad on page 24
Condor Radio Mfg. Co., Ariz., Coolers
Connecticut Hard Rubber Co., Conn., 20, 25, Rubber Coated
Continental Diamond Fibre Co., 16 Chapel St., Newark 48, Del., 20, 25, 30
See complete catalog in last section
Cottrell Paper Co., Inc., N.Y., Paper
Dielect, Inc., N.J., 30
Dow Corning Corp., Mich., 30
Electronic Mechanics, Inc., 101 Clifton Blvd., Clifton, N.J., 30
For details see ad on page 278
Ethylene Chemical Corp., N.J., 30
Formica Co., 4614 Spring Grove Ave., Cincinnati 32, Ohio, 25
For details see ad on page 48
Franklin Fibre-Lamitex Corp., Del., 5
Gaucher Co., Louis, N.Y., 10, 25, 30
General Cement Mfg. Co., Ill., 5, 10, 25
General Electric Co., Mass., 5
General Laminated Prods., Co., Inc., Ill., 5, 10, 15, 20, 25, 30
General Plastics Corp., N.J., 30
Glyco Products Co., Inc., N.Y., 30
Goodrich Chemical Co., B. F., Ohio, 30

(Continued on page 281)

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THE REMARKABLE PERFORMANCE of REXOLITE 1422



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This wonderful insulation performance coupled with a high heat distortion point (105°—113°C) and the resulting good machinability make Rexolite 1422 an amazing High Frequency insulation. It equals or excels all but a few of the fine qualities of the much more expensive fluorocarbons. Even in the "few" it is superb in its own right and very close to the fluorocarbons — as in the case of Dielectric Constant shown in the above chart.

Rexolite 1422 is a carefully controlled cross-linked polystyrene. Developed by two of the country's greatest laboratories and manufactured for 10 years, Rexolite 1422 is highly dependable in quality, uniformity and performance.

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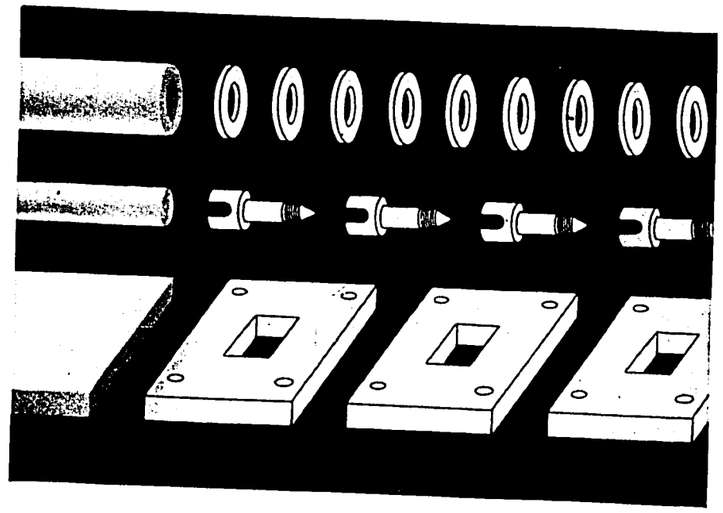
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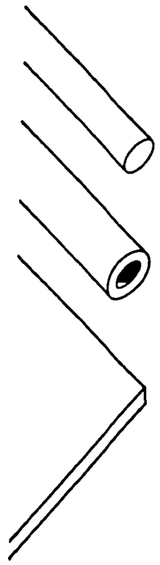
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this TEFLON* gives you uniform parts...

electrically...dimensionally



Non porous **FLUOROFLEX®-T** *assures electrical stability. It's stress relieved for uniform machinability.*



It's in the processing—not in the appearance—that the real difference in Teflon shows up. Natural discolorations don't mean a thing to performance. But variable *properties* do.

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All this means non absorbent insulators, for optimum UHF performance . . . and also uniform machining with fewer rejects. Why not specify Fluoroflex-T for *your* Teflon parts? For more information write for Bulletin FT-1.

*DuPont trade mark for its tetrafluoroethylene resin.
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Insulating Materials

(Continued from page 279)

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For details see ad on page 282
Houghton Laboratories, Inc., N.Y., 30
Industrial Tape Corp., N.J., 20
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 10
For details see ad on page 134
Irvington Varnish and Insulator, N.J., 5, 10, 15, 20, 25, 30
Johnston Foil Mfg. Co., Mo., Sheet Lead
Kenwood Mfg. Co., N.J., 30
Lamoree, C. D., Calif., 5, 10, 15, 20, 25, 30
Maigne Co., O. J., N.Y., 30
Mark Products Co., Ill., 25
Metal Textile Corp., 647 E. First Ave., Roselle, N.J., Knitted Wire Mesh
For details see ad on page 279
Mica Fabricating Co., N.J., 5, 10, 15, 20, 25, 30, Glass Bonded Mica
Mica Fabricators Association, 420 Lexington Ave., New York 17, N.Y., Mica
For details see ad on page 279
Mica & Minerals Co., N.C., Mica
Mica Insulator Co., N.Y., 5, 20
Minerals & Insulation Co., N.J., 5, 10, 15, 20, 25, 30
Mitchell Rand Insulation Co., N.Y., 5, 10, 15, 20, 25, 30
Molded Insulation Co., Pa., 25
Nukem Products Corp., N.Y., 30
Oppenheimer Corp., N.Y., 30
Penn Machine Cutting Co., Mass., Silicone Rubber
Polymer Corp. of Pennsylvania, 126 N. 5 St., Reading, Pa., 30
For details see ad on page 278
Printloid, Inc., N.Y., 30
Raybestos-Manhattan, Inc., Pa., 30
Resistoflex Corp., Belleville 9, N.J., 25, 30
For details see ad on page 281
Rex Corp., Hayward Rd., West Acton, Mass., 30, VHF Insulating Materials
For details see ad on page 280
Richardson Co., Ill., 30
Rogers Corp., Conn., 30
St. Regis Paper Co., N.Y., 30
Shawinigan Products Corp., N.Y., 30
Spruce Pine Mica Co., N.C., Mica
Taylor Fibre Co., Pa., 5
Thompson Co., The H. I., Calif., 20, 25
Sleeving Yarn Cloth
United States Gasket Co., 611 N. 10 St., Camden 1, N.J., 30
For details see ad on pages 450-451
Varflex Corp., N.Y., 10, 25, 30

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Advance Electronics Co., 451 Highland Ave., Passaic, N.J., 15
For details see ad on page 325
Aero Electronics Co., Ill., 5, 10, 15
Aeroflex Research, Inc., N.Y., 15, 20
Aeronautical Radio, Inc., D.C., 15
Airborne Instruments Laboratory, N.Y., 5, 10, 15

(Continued on page 282)

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Airtronix Development Corp., N.Y., 5
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Alertronic Prot. Corp. of America, N.Y., 5, 15
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American Radio & Television, Inc., Ark., 15
Anchor Specialty Mfg. Co., N.J., 5, 15
Anton Electronic Labs., Inc., 1226 Flushing Ave., Brooklyn 37, N.Y., 5, 10
For details see ad on page 226
Applegate & Co., C. J., Colo., 5, 15
Applied Science Corp. of Princeton, P.O. Box 44, Princeton, N.J., 5, 10, 15
For details see ad on page 238
Arc Equipment Co., N.J., 5, 10, 15
Ardente Acoustic Labs., Ltd., England, 5, 10, 15
Arenberg Ultrasonic Laboratory, Mass., 5, 15
Arma Corp., N.Y., 15
Associated Electronics Co., N.Y., 15
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For details see ad on page 282
Barnes & Reinecke, Inc., Ill., 5, 15
Baruch, Sydney N., N.Y., 15
Battelle Memorial Institute, Ohio, 15
Beckman Instruments, Inc., Calif., 15
Bell Telephone Laboratories, N.Y., 15
Berkshire Laboratories, 584 Beaver Pond Rd., Lincoln, Mass., 5, 15
For details see ad on page 315
Berry Engs., James S., Tenn., 15, 20
Bliss-Warren Electronic Corp., N.J., 5, 10
Boehme, Inc., H. O., N.Y., 5, 10
Bogue Electric Mfg. Co., 52 Iowa Ave., Paterson 3, N.J., 5, 15
For details see ad on page 13
Boyle Metalcraft Corp., 154 Sullivan St., Brooklyn 31, N.Y., 5
For details see ad on page 132
Brick Electronic Equipment Co., N.J., 5, 15
Brownthorn Electronics, Inc., N.Y., 5, 15
Buck Engineering Co., Inc., N.J., 5
Budelman Radio Corp., Conn., 5, 15
Buggie, Inc., H. H., 726 Stanton St., Toledo 1, Ohio, 5, 15
For details see ad on page 153
Burke Electric & X-Ray Co., Ltd., Canada, 5, 10
Burnett Radio Laboratory, Wm. W. L., Calif., 15
Burroughs Corp., New Products Div., 511 N. Broad St., Philadelphia 23, Pa., 15
See complete catalog in last section
C. G. S. Laboratories, Inc., Conn., 15
Camera Equipment Co., 1600 Broadway, New York 19, N.Y., 5
For details see ad on page 119
Canadian Radium & Uranium Corp., N.Y., 15
Canadian Research Institute, Canada, 5, 10, 15, 20
Canoga Corp., Calif., 15
Capehart-Farnsworth Corp., Ind., 15
Carolina Sound Equipment, N.C., 5, 15
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Communication Measurements Lab., Inc., 350 Leland Ave., Plainfield, N.J., 15
For details see ad on page 312
Computer Corp. of America, N.Y., 15
Computing Devices of Can., Ltd., Canada, 5, 15, 20
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Crystal Research Products, N.J., 5
Cubic Corp., Scott & Canon Sts., San Diego 6, Calif., 5, 10, 15
For details see ad on page 327
Custom Electronics, Inc., La., 15
Stamford Tool & Die Corp., Conn., 5, 10
D & R, Ltd., Calif., 15
DX Radio Products Co., Inc., Ill., 5, 15
Dade Brothers, Inc., N.Y., 5, 10, 15
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For details see ad on page 26
Daven Co., N.J., 5, 10, 15
Davies Laboratories, Inc., Md., 5, 15
Daystrom Electric Corp., N.Y., 15
Decimeter, Inc., Colo., 5, 15
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For details see ad on page 401
DuMont Labs., Inc., Allen B., TV Transmittor Div., 1500 Main Ave., Clifton, N.J., 5, 10, 15
For details see ad on page 29
DuMont Labs., Inc., Allen B., Instrument Div., 760 Bloomfield Ave., Clifton, N.J., 5, 15
For details see ad on page 29
ESC Corp., N.Y., 5
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Eldico of New York, Inc., 44-31 Douglaston Pkwy., Douglaston, L.I., N.Y., 5, 10, 15, 20, Certification of Interference Elimination
For details see ad on page 257
Electrical Device Mfg. Co., N.J., 5, 10, 15
Electrical and Physical Instruments, N.Y., 5, 15
Electronic Mfg. Co., 1901 Clybourn Ave., Chicago 14, Ill., Resistive Load Banks, Wired Assemblies
For details see ad on page 303
Electro-Craft Industries, Inc., Conn., 5, 10, 15
Electro-Physics Co., N.Y., 5, 15
Electro Products Labs., Inc., 4501 N. Ravenswood Ave., Chicago 40, Ill., 5, 15
For details see ad on page 231

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Electrodyne Co., Mass., 5, 10, 15
Electronic Associates, Inc., Long Branch Ave., Long Branch, N.J., 15
For details see ad on page 318
Electronic Computer Div., Underwood Corp., N.Y., 15
Electronic Control Corp., Mich., 15
Electronic Engineering Co. of Calif., Calif., 5, 10, 15
Electronic Industries, Inc., Minn., 5
Electronic Parts Mfg. Co., 540-39th St., Union City, N.J., 5
For details see ad on page 33
Electronic Research Associates, Inc., P.O. Box 29, Caldwell, N.J., 15
For details see ad on pages 180, 335
Electronics Research, Inc., Ind., 15
Electron Radar Products, Ill., 15
Elm Laboratories, N.Y., 5, 15
El-Mec Laboratories, Inc., N.J., 5, 10, 15
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For details see ad on page 283
F. S. D. Laboratories, Conn., 5, 10, 15
Feiler Engineering & Mfg., Co., Ill., 5, 10, 15
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For details see ad on page 283
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Gadgets, Inc., Ohio, 5, 10
Galbraith & Son Electric Corp., C. C., 450 Avenue of the Americas, New York 11, N.Y., 5
For details see ad on page 104
Gallant Engineering Co., D.C., 5
Gallay, Harris, 60 Perry St., Belleville 9, N.J., 5, 15, 20
For details see ad on page 257
Gates Radio Co., Ill., 5
Geddes Consulting Engineer, L. A., Canada, 5, 15
General Communications, Wis., 5, 15
General Electric Co., N.Y., 15
General Electric Co., N.Y., 15
General Electrosonics, Inc., N.Y., 5, 10, 15
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For details see ad on page 283
Hoisington, David B., Calif., 5, 15
Holland Electronics, N.Y., 5, 15
Houghton Laboratories, Inc., N.Y., 15
Huggins Laboratories, Calif., 15
Indiana Electronic & Television, Ind., 5
Industrial Devices, Inc., N.J., 15
Industrial Electronics, Inc., Mich., 5, 10, 15
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Jacobs Instrument Co., Md., 10, 15
Jerrell Electronic, Ohio, 5, 10, 15
Kahn Research Labs., N.Y., 15
Kallmann, Heinz E., N.Y., 15
Kelk & Co., G. F., Canada, 5, 15
Kent Engineering Co., Inc., Ill., 5, 15
Kepco Laboratories, Inc., 131-38 Sanford Ave., Flushing 55, N.Y., 5, 15
For details see ad on page 224
Key Electronics Corp., N.Y., 5
Keystone Products Co., 904 23rd St., Union City, N.J., 5
For details see ad on page 216
Kihchel Communications, Pa., 5
King, Inc., Albert D., Mass., 5, 15, 20
Kip Electronics Corp., N.Y., 15
Kramer, Ambrose W., D.C., 15
L. A. S. Lab., Md., 5, 15, 20
Laboratory for Electronics, Inc., 75 Pitts St., Boston 14, Mass., 5, 15
For details see ad on pages 432-433
Lafayette Laboratories, Inc., N.Y., 5
Lako Co., Wis., 5
Lavoie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N.J., 10
For details see ad on page 328
Lawton Products Company, Inc., N.Y., 5, 10, 15
Lear, Inc., Calif., 5, 15
Lectro Max, Inc., Ill., 15
Lectroman, Inc., N.Y., 5, 15
Lee Electronic Labs., Inc., Mass., 5
Lee Laboratories, P.O. Box 200, Geneseo, Pa., 15
For details see ad on page 284
Lehigh Valley Electr. Engr. & Mfg., Pa., 5, 10, 15
Lepores Laboratory, R.I., 5, 15
Linear Equipment Labs., 298 West Shore Drive, Massapequa, L.I., N.Y., 15
For details see ad on page 333

(Continued on page 284)

(Continued from page 283)

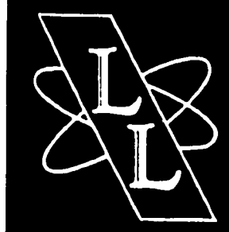
Little, Inc., Arthur D., Mass., 5, 15, 20
Long Engineering Co., Inc., N.C., 5
Lorain County Radio Corp., Ohio, 5, 15
Lubcke, Harry R., 2443 Creston Way, Hollywood 28, Calif., 15
For details see ad on page 258
Lucian Laboratories, Pa., 5, 10, 15
Lyman Electronic Corp., Mass., 5, 10
Lysco Mfg. Co., Inc., N.J., 5
Lytle Eng. & Mfg. Co., Ill., 10, 15
Mackenzie Products Co., Conn., 5, 15
MacLeod & Hanopol, Inc., Mass., 10
Magne Pulse Corp., N.Y., 15
Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N.Y., 15
For details see ad on page 167
Magnetics Res. Co., N.Y., 15
Magnex Corp., N.Y., 5, 10, 15
Manhattan Research Labs., N.Y., 5, 15
Manson Laboratories, Conn., 5
Marchand Electronic Labs., Conn., 5, 15
Marine Electric Corp., N.Y., 5, 10, 15
Mark Products Co., Ill., 15
Marsh-Theiss, Inc., N.Y., 5, 10, 15
Martin & Co., H. S., Ill., 5
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For details see ad on page 122
McDonnell Aircraft Corp., Mo., 15
McNeal, J. D., Conn., 5, 10, 15
Medico Physical Labs., Canada, 5, 15
Menlo Research Lab., Calif., 15
Mepco Labs., Inc., N.J., 15, 20
Metal Products Co., Tenn., 5, 10, 15
Meyers, James G., N.Y., 5, 15
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For details see ad on page 284
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Midwest Research Institute, Mo., 15
Missouri Research Labs., Inc., Mo., 5, 10, 15, 20
Mittelmann, Eugene, Minn., 15, 20
Molded Insulation Co., Pa., 5, 15
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For details see ad on page 243
National Electronics Labs., Inc., D.C., 15, 20
National Radio Research Labs., N.Y., 15
National Union Radio Corp., 237 Jacksonville Rd., Hatboro, Pa., 10, 15
For details see ad on page 46
National Union Radio Corp., Pa., 10, 15
New York Testing Labs., Inc., N.Y., 20
Newton Scientific Co., Mass., 5
Nilsson Electrical Labs., N.Y., 5, 20
Northern Electronic & Vacuum Ind., Canada, 15
Oberline, Ltd., Calif., 5
Oliver Electronics Co., Okla., 5, 15
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Oregon Electronic Mfg., Co., Ore., 5
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For details see ad on pages 113, 284
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Penntronics, Pa., 5
Pentron Corp., Ill., 10, 15
Perkin-Elmer Corp., Conn., 15
Petty Laboratories, Inc., Tex., 15
Phebco, Inc., Md., 10, 15
Pioneer Electric & Research Corp., Ill., 5, 10, 15
Plastics & Electronics Corp., P.O. Box 38, Station J, Buffalo 8, N.Y., 15
For details see ad on page 99
Polytronics Co., Canada, 5, 10, 15
Polydoroff & Associates, W. J., D.C., 15
Precise Measurements Co., 942 Kings Highway, Brooklyn 23, N.Y., 5, 15
For details see ad on page 294
Precision Associates, Inc., N.Y., 10
Precision Measurement Co., N.Y., 5, 10, 15, 20
Premier Instrument Corp., N.Y., 5, 20
Process & Instruments, N.Y., 5, 15
Production Research Corp., Thornwood, N.Y., 10, 15
For details see ad on page 285
Pulse Techniques, Inc., N.J., 5
R. M. S. Associates, Inc., N.Y., 5, 10, 15
Racker Co., Joseph, N.Y., 15
Radar Electronics, Inc., N.Y., 10, 15
Radiation Research Corp., Fla., 15
Radio Engineering Co., N.Y., 5, 10, 15, 20
Radio Engineering Products, Canada, 15
Radio Industries Corp., N.Y., 20
Radio Industries, Inc., Kan., Test
Radio Instrument Labs., N.J., 5, 15
Radio Recorders Equipment Co., Calif., 5, 15

Radio Sonic Corp., N.Y., 5, 10, 15, 20
Radiomarine Corp. of America, N.Y., 5, 15
Raytronic Laboratory, Inc., Ohio, 5, 10, 15
Reed Research, Inc., D.C., 5, 15
Reflectone Corp., Conn., 5, 10, 15, Simulation Devices
Research Electronics, Pa., 5, 15
Research, Inc., Minn., 5
Research Instrument Co., N.Y., 5, 10, 15
Rich Electronics, Inc., Fla., 5, 10, 15, 20
Rich-Roth Laboratories, Conn., 15
Robinette Co., W. C., Calif., 15
Rolab Studios, Conn., 15 Projection Apparatus
Rosenberg Associates, Paul, 100 Stevens Ave., Mt. Vernon, N.Y., 5, 15
For details see ad on page 258
Ruckelshaus Laboratories, John G., N.J., 15
Rutherford Electronics Co., Calif., 5, 10, 15
Rutishauser Corp., Calif., 15
Sams & Co., Inc., Howard W., Ind., 15, 20
Sanders Associates, Inc., 137 Canal St., Nashua, N.H., 15
For details see ad on page 42
Saville RaTeleNics Labs., Ky., 15
Schottland, Frederic D., N.Y., 5, 10, 15
Scientific Instrument Labs., N.Y., 5, 10, 15
Seaboard Electric Co., N.Y., 5, 10, 15
Sensitive Research Inst. Co., 19-11 Elm Ave., Mt. Vernon, N.Y., 5, 15, 20
For details see ad on page 307
Servo Corp. of America, 20-20 Jericho Turnpike, New Hyde Park, L.I., N.Y., 5, 15
For details see ad on pages 438-439
Servomechanisms, Inc., Post & Stewart Aves., Westbury, L.I., N.Y., 15
For details see ad on page 237
Shallcross Mfg. Co., 524 Pusey Ave., Collingdale, Pa., 5, 15
For details see ad on page 98
Sherwood Co., Robert H., N.Y., 5, 10, 15
Shores Laboratories, N.Y., 15, 20
Shultz and Associates, E. Pat, Calif., 5, 15, 20
Skiatron Electronics & TV Corp., N.Y., 5, 15
Sierra Electronic Corp., Calif., 5, 15
Sivers Lab., Sweden, 5, 15
Smith Mfg. Co., Nathan R., Calif., 5
Sondyna, A. G., Switzerland, 5, 15
Sparton of Canada, Ltd., Canada, 5
Specialty Assem. & Packing Co., N.Y., 10, 15
Spellman Television Co., Inc., 3029 Webster Ave., New York 67, N.Y., 5
For details see ad on page 185
Spencer-Kennedy Laboratories, Inc., 186 Massachusetts Ave., Cambridge 39, Mass., 15
For details see ad on page 306
Spera Electronics Labs., N.Y., 5, 10, 15
Square Root Manufacturing Corp., N.Y., 5, 10, 15
Standard Electronic Research, N.Y., 15, 20
Stavid Engineering, Inc., N.J., 5, 10, 15
Sterling Transformer Corp., N.Y., 10, 15
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Suckle Electronics Co., N.J., 5
Summit Electronics, Inc., N.J., Test Sets
Superex Electronics Corp., N.Y., 10
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 15
For details see ad on pages 417-420
Taffet Radio & Television Co., N.Y., 5, 15
Taller & Cooper, N.Y., 5
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Teleradio Engineering Corp., N.Y., 5
Teleregister Corp., N.Y., 5, 15
Telescreen Corp., Conn., 5, 15
Televiso Corp., Ill., 5, 10, 15, 20
Tensitron, Inc., Mass., 15
Toth Consulting Eng., Albert F., N.Y., 5, 15
Tracerlab, Inc., Mass., 5, 15
Transducer Corp., Mass., 5, 15
Trans Electro Products Corp., Pa., 5, 10, 15, 20
Transvision, Inc., N.Y., 5, 10, 15
Tri-Dex Electronics, Calif., 5, 10
Ultradyne Engineering Labs., Inc., N.M., 5, 15
Ultrasonic Corp., Mass., 5, 10, 15
United States Testing Co., Inc., N.J., 5, 15, 20
United Technical Laboratories, N.J., 5
Universal Electronics Co., 2012 S. Sepulveda Blvd., Los Angeles 25, Calif., 5
For details see ad on page 186
Vacuum-Electronic Engineering Co., 86-P Denton Ave., New Hyde Park, L.I., N.Y., 5
For details see ad on pages 294, 311
Van Deventer, Inc., H. R., N.Y., 15
Varian Associates, 661 Hansen Way, Palo Alto, Calif., 15
For details see ad on pages 454-455
Vectron, Inc., 400 Main St., Waltham 54, Mass., 5, 10, 15
For details see ad on page 308

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Wallind-Pierce Corp., Calif., 5, 15
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For details see ad on page 230
Waveforms, Inc., N.Y., 15
Westchester Research & Devlpmt. Labs., N.Y., 5, 15
Western Sound & Elec. Labs., Wis., 15
Westlab, N.Y., 5, 15
Wheeler Laboratories, Inc., 122 Cutter Mill Rd., Great Neck, L.I., N.Y., 5, 15
For details see ad on page 259
White Industries, Inc., N.Y., 5, 10
White & Son, James L., N.J., 5
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For details see ad on page 5
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35
American Phenolic Corp., 1830 S. 54th Ave., Chicago 50, Ill., 5, 35
For details see ad on page 2
American Products Mfg. Co., Inc., La., 15, 25
Armstrong Cork Co., Pa., 30
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For details see ad on page 9
Bishop Manufacturing Corp., N.J., 35

(Continued on page 287)

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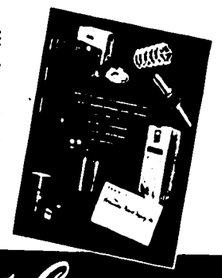
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Borthig Co., Inc., George C., N.J., 15, 20
Canadian Industries, Ltd., Canada, 5, 10, 15, 25
Chemical Dev. Corp., Mass., 10, 25, 30, 35
Ciba Company, Inc., 627 Greenwich St., New York 14, N.Y., 30
For details see ad on page 24
Communication Products Co., Inc., Broadway & Clark St., Marlboro, N.J. 15, 20
For details see ad on page 286
Dow Corning Corp., Mich., 30, 35
Du Pont De Nemours & Co., Inc., E. I., Del., 10, 15
Electrochemical Inds., Inc., Mass., 10
Emerson & Cuming, Inc., Mass., 10
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Hardman Co., Inc., H. V., N.J., 5, 25, 30
Hi Test Chemical Corp., N.Y., 25, 30
Horn Co., Inc., A. C., N.Y., 10, 15, 25, 35
Houghton Laboratories, Inc., N.Y., 15, 30
Insl-X Company, Inc., N.Y., 5, 15, 20, 25, 30
Interelectronics Corp., 2432 Grand Concourse, New York 58, N.Y., 10, 30
For details see ad on page 51
Irvington Varnish and Insulator, N.J., 15, 30, 35
Johns-Manville, N.Y., 30
Lamoree, C. D., Calif., 30, 35
Libbey-Owens-Ford Glass Co., Ohio, 35
Melpar, Inc., Va., 30
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For details see ad on page 287
Minnesota Mining & Mfg. Co., Minn., 20, 25, 30
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Neo-Sil Corp., N.J., 25
Paisley Products, Inc., Ill., Cements & Glue
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For details see ad on page 187
Production Engineering Corp., N.J., 15, 20, 25, 30, 35
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Schott Co., Walter D., Calif., 5, 10, 15, 20, 25
(Continued on page 289)

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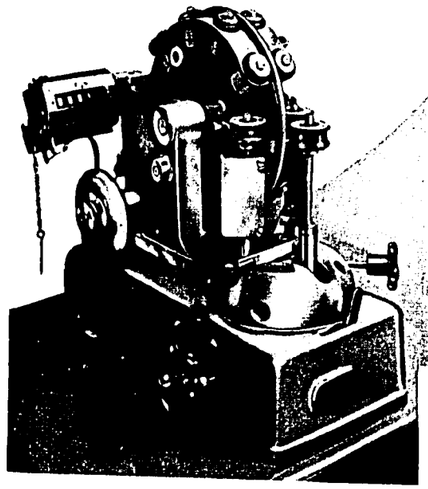
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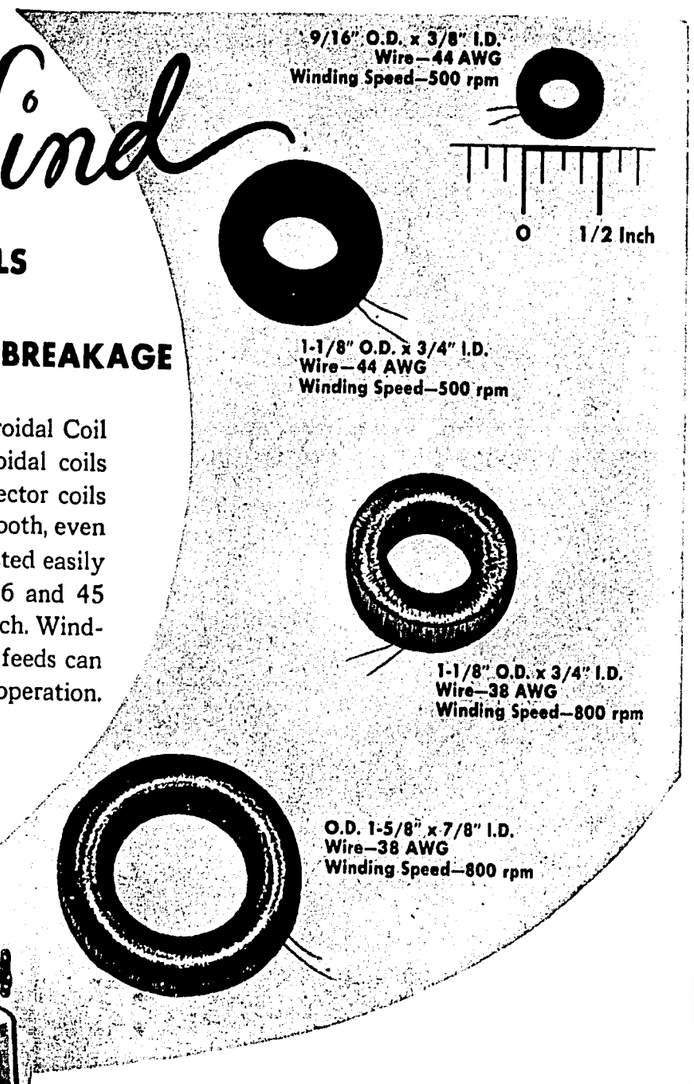
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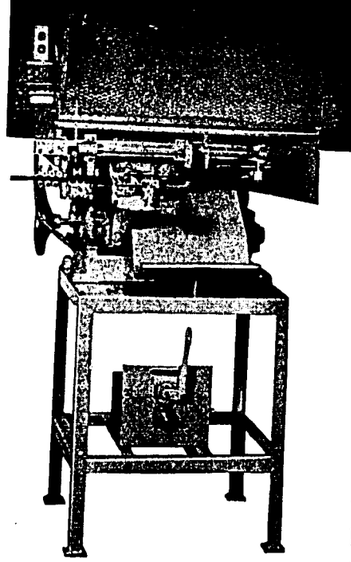
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(Continued from page 287)

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United Technical Laboratories, N.J., 15, 20, 25
Vorac Co., N.J., 10, 15, 20, 25
Wein, Samuel, N.Y., 10
Westfield Chemical Corp., Mass., 5, 15
Woodwelding, Inc., Calif., 20, 25
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Acro Electronics Co., Ill., 35
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Artos Engineering Co., 2735 S. 28th St., Milwaukee 46, Wis., 10, Automatic Strippers & Cutters
For details see ad on page 289
Baker Company, Inc., Me., Ball Bearing Tools
Boesch Mfg. Company, Inc., Conn., 5, 10
Bone Engineering Corp., Calif., 35
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For details see ad on page 286
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For details see ad on page 285
Cosmo Engineering Labs., Inc., N.J., 10
Cratex Mfg. Co., Calif., 10

(Continued on page 291)

KAHLE MACHINES

for Automatic Production of TRANSISTORS ELECTRONIC TUBES

from

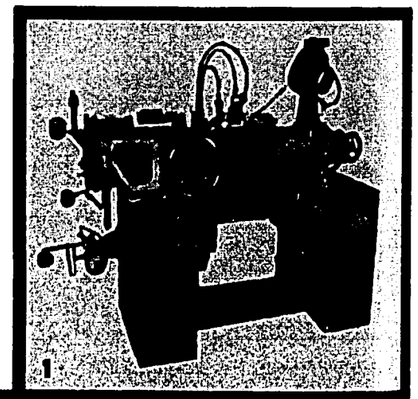
Sub-miniature to Cathode Ray

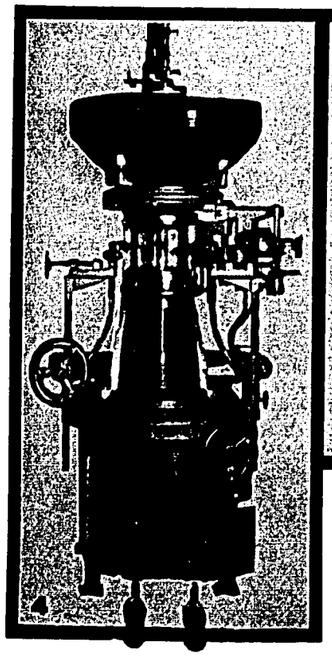


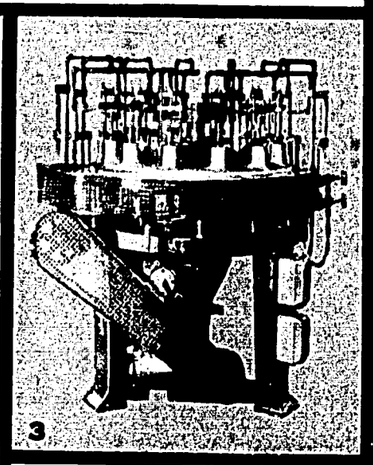
More than forty years of precision-engineering experience is built into the Kahle machines which are supplied to the electronics industry for general purpose or for special purpose. Hundreds of production problems have been presented to Kahle – in every case Kahle has designed and developed a machine to produce results as specified. Kahle specializes in equipment for manufacturing sub-miniature, miniature, standard, cathode ray, transmitting tubes and transistors . . . and other glass parts in limited quantity for laboratory needs or for maximum production runs.

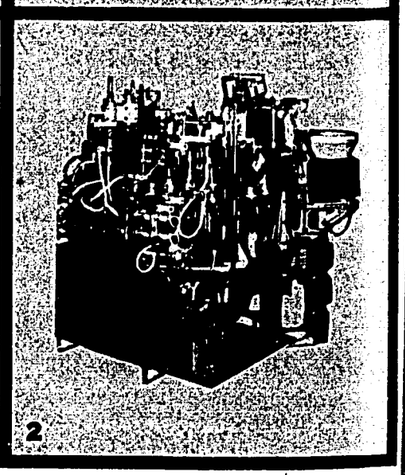
Illustrated at right and below are a few representative machines:

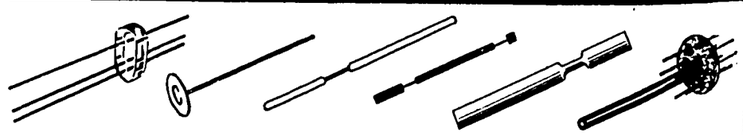
(1) MODEL 2148, *Automatic Lead Wire Welding Machine,* **(2) MODEL 2179,** *Automatic Button Stem Machine;* **(3) MODEL 1384,** *Sub-miniature Button Stem Machine;* **(4) MODEL 2185,** *CR Tube Combination Neck Cutting and Neck Splicing Machine*


1


4


3


2



Write Kahle now for full details

Kahle ENGINEERING COMPANY

1531 SEVENTH STREET NORTH BERGEN, N.J.

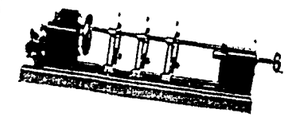
COIL WINDING EQUIPMENT ?...

for production & development

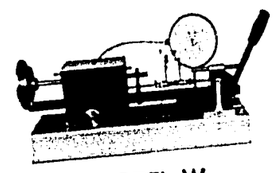
We have them all!

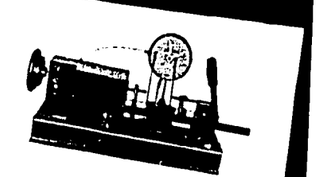
TRANSFORMER WINDERS


MODEL AL

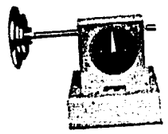

MODEL BM

LATTICE & PI WINDERS


MODEL W

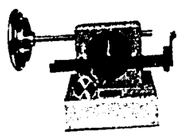

MODEL WX

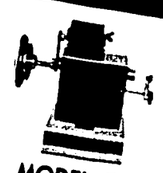
HAND WINDERS


MODEL A


MODEL L

SPACE AND BOBBIN WINDERS


MODEL B


MODEL CS

. . . Write today for complete catalog.

Coil Winding Equipment Co.

OYSTER BAY, NEW YORK · Telephone OYster Bay 6-1285

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

Machinery & Tools

(Continued from page 289)

Crescent Industries, Inc., Ill., Dies & Stamping
Dee Electric Co., Ill., Solder Pots
Deltron Associates, Inc., Ill., 10, 42
Drake Electric Works, Inc., Ill., 20
Driver Harris Co., N.J., 5
Electrical Device Mfg. Co., N.J., 25, 40
Endevco Corp., Calif., 35
Entwistle Co., James L., R.I., 10, 15, 25
Eraser Co., Inc., N.Y., 10, Wire Stripping
F & M Sales, Inc., Calif., 10
Federal Tool Engineering Co., N.J., 25, 40
Feldman & Co., Henry, Calif., 20
Frequency Standards, P.O. Box 504, Eatontown, N.J., Micrometer Heads

For details see ad on page 335

General Electric Co., N.Y., 20, 40
Green Instrument Co., Inc., Mass., 15
Greenlee Tool Co., Ill., Punches
Grieve-Hendry Co., Inc., Ill., Electric Ovens
Griffin Co., John, 2157 James Ave., St. Paul 5, Minn., Drafting Symbols

For details see ad on page 45

Harder Co., Donald C., Calif., 5
Haydu Brothers, N.J., 10, 25
Henry & Miller Industries, Inc., N.Y., 40
Hexacon Electric Co., N.J., 20
High Speed Hammer Co., Inc., N.Y., 10
Hoffman Co., P. R., Cherry St., Carlisle, Pa., Quartz Cutting Saw

For details see ad on page 163

Ideal Industries, Inc., Ill., 20, Wire Strippers
Industrial Electrical Works, Neb., Wire Reels
International Electronics Corp., N.Y., 20
International Pump & Mach. Works, Pump Div., 11-13 Governor St., Newark 2, N.J., 30

For details see ad on page 293

Kahle Engineering Co., 1531 North 7 St., Bergen, N.J., 25

For details see ad on page 290

Kelnor Manufacturing Corp., Calif., 20
Kemode Manufacturing Co., Inc., N.Y., 20
Kinney Mfg. Co., 3631 Washington St., Boston 30, Mass., 35

For details see ad on page 292

Kwikheat Mfg. Co., Calif., 20
L. A. B. Corp., N.J., 35
Lafayette Laboratories, Inc., N.Y., 10
Lear, Inc., Calif., 5
Lenk Mfg. Co., Mass., 20
Lepores Laboratory, R.I., 10
Linde Air Products Co., N.Y., 20, 40
Litton Engineering Laboratories, Calif., 25, 30, 40
London Chemical Co., Ill., Wire Strippers
Luma Electric Equip., Co., Ohio, 15, 20
Lyman Electronic Corp., Mass., 10, 40
MB Manufacturing Co., Inc., Conn., 35
Markem Machine Co., N.H., 15
Martin & Co., H. S., Ill., 30
Massa Laboratories, Inc., Mass., 35
McColpin-Christie Corp., Calif., Battery Chargers
McNeal, J. D., Conn., Heat Seal & Embedment

(Continued on page 293)

Kinney HIGH VACUUM PUMPS

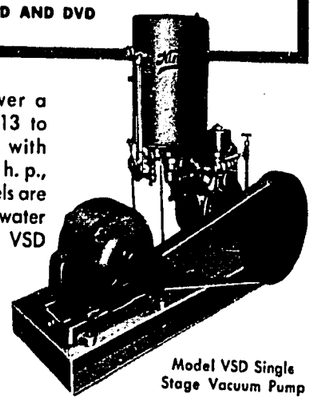
MECHANICAL, OIL SEALED

Almost without exception in the United States and in an increasing number of plants abroad, Kinney High Vacuum Pumps are standard equipment for exhausting lamps and tubes. They also provide low absolute pressures for sintering alloy metals, coating lenses, refining rare metals and producing blood plasma, penicillin and other drugs. They are used effectively wherever a high vacuum pump can be applied including cyclotron evacuation, atom smashing, and condenser vacuum service in power plants. Over 10,000 installations serve a wide variety of fields.

The plungers in Kinney Vacuum Pumps have no contact with cylinder surfaces due to the unique method of automatic lubrication, resulting in a no-clearance pump of extremely long life. Simple and efficient in design, these pumps have established an impressive record for dependability and low cost operation.

SINGLE STAGE VACUUM PUMP

MODELS VSD AND DVD

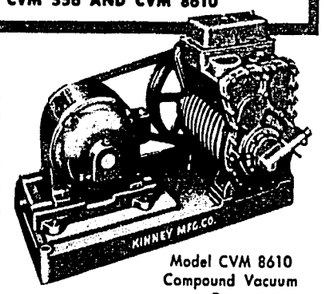


Model VSD Single Stage Vacuum Pump

Nine pump sizes cover a capacity range from 13 to 1800 cu. ft. per min. with motors from ½ to 75 h. p., respectively. VSD Models are furnished either air or water cooled (except Model VSD 556 — air cooled only). All DVD Models furnished water cooled only. Single Stage Pumps on a blank test produce low absolute pressures of 10 microns (.01 mm Hg.) or better.

COMPOUND VACUUM PUMP

MODELS CVM 556 AND CVM 8610

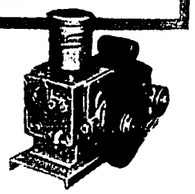


Model CVM 8610 Compound Vacuum Pump

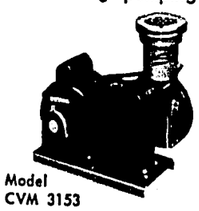
Four sizes of Compound Pumps are available in capacities of 2, 4.9, 15.2, and 46 cu. ft. per min., respectively. The working mechanism is similar to the Single Stage but the two cylinders are connected in series. The Compound Pump has an air cooled casing of unique design and special provision for oil sealing and lubricating the high vacuum working parts. These compound pumps test to low absolute pressures of 0.2 micron (.0002 mm Hg.) or better.

SMALL VACUUM PUMPS

MODELS CVM 3153 AND CVM 3534



Model CVM 3534



Model CVM 3153

These small Kinney Vacuum Pumps combine the advantages of small size and high pumping speed. Model CVM 3153 has a free air displacement of 2 cu. ft. per min. It weighs only 70 lbs., complete with its ¼ h.p. motor. Model CVM 3534 has a displacement of 4.9 cu. ft. per min. Its weight: 140 lbs. with ⅓ h.p. motor. Both pumps test to low absolute pressures of 0.2 micron (.0002 mm Hg.) or better.

KINNEY VACUUM VALVES — VACUUM OIL

Kinney Vacuum Tight Valves facilitate testing vacuum installations. Special metal bellows eliminate the leakage at the valve stem which occurs with ordinary valves having stuffing boxes. Three types of valves are available — steel, cast iron, and bronze. Write for Vacuum Tight Valves Bulletins.

The oil supplied with the Compound Pumps is carefully processed to insure low vapor pressure and suitable viscosity. It is available under the name "Kinney Super X Vacuum Dried Oil."

Ask for Kinney High Vacuum Pump Bulletin V51

KINNEY MANUFACTURING COMPANY

3631 WASHINGTON STREET, BOSTON 30, MASSACHUSETTS

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SUBSIDIARY OF THE NEW YORK AIR BRAKE CO.

Mico Instrument Co., 79 Trowbridge St., Cambridge 38, Mass., 5, 15
For details see ad on page 63

Milwaukee Stamping Co., Wis., 10, 20, 40

Miskella Infra-Red Co., Ohio Infra Red Heat Panels

Mitchell Industries, Inc., Tex., 20

Multi-Tron Laboratory, Ill., 10, 25, 40

National Research Corp., Mass., 25, 30, Crystal Coasters

New Hermes Engraving Machine, N.Y., 15

Northern Electronic & Vacuum Ind., Canada, 25, 30

Numberall Stamp & Tool Co., N.Y., 15

Olin Industries, Inc., Conn., Flashlights & Lanterns

Optical Film Engineering Co., 2737 N. 6th St., Philadelphia 33, Pa., 25, 30, TV Tube Illuminizers
For details see ad on page 69

Paragon Revolute Corp., N.Y., Blue Print & Allied Photo Equip.

Perkin Engineering Corp., Calif., Plating Units

Pioneer Machine Works, 6136 Adam St., West New York, N.J., 25
For details see ad on page 294

Pix Mfg. Co., Inc., N.J., 10

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PLASTIC PARTS METAL AND OTHER MATERIALS with—



ACROMARK MARKING and NUMBERING MACHINES



ENGRAVERS of metals, plastics, etc., equipment ranging from engraved dies to complete automatic marking and printing machines. Ask for new catalog of over 300 marking machines and tools.

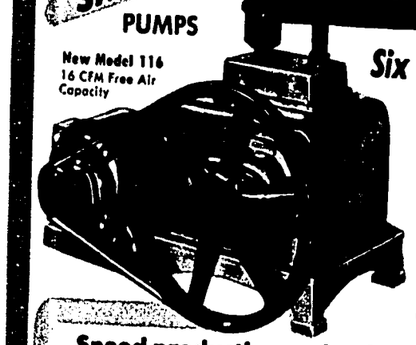
The ACROMARK Company

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ELIZABETH 4, N.J.

FOR FASTER PUMPING WITH SMALLER PUMPS

INTERNATIONAL HIGH VACUUM COMPOUND PUMPS

New Model 116
16 CFM Free Air Capacity



Six Ways a Better Pump:

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2. ROTARY VANE
3. AUTOMATIC LUBRICATION
4. HIGH EFFICIENCY
5. QUICK RECOVERY
6. RUGGEDLY BUILT

Speed production and reduce maintenance with these ready-to-operate, high efficiency vacuum pumps!

International rotary vane pumps are extremely compact and operate unusually quiet. Simplified construction and automatic lubrication assure trouble-free operation, long life and low-cost upkeep. Pump mechanisms are totally oil submerged, preventing atmosphere to vacuum leakage.

CAPACITIES UP TO 30 C.F.M. WRITE FOR LITERATURE TODAY

International Pump & Machine Works
PUMP DIVISION
11-13 GOVERNOR STREET
NEWARK 2, NEW JERSEY

SPECIALIST MANUFACTURERS OF INDUSTRIAL GLASS-WORKING MACHINERY AND HIGH VACUUM PUMPS FOR ELECTRONICS, NUCLEONICS AND RESEARCH FOR OVER A QUARTER CENTURY

Precise Measurements Co., 942 Kings Hwy., Brooklyn 23, N.Y., 15, Infra red Supplies
For details see ad on page 294

Precision Measurements Co., N.Y., 10, 15

Preis Engraving Mach. Co., H. P., 154 Industrial Branch, Hillside 5, N.J., 15, Engraving Machines, Dies and Accessories
For details see ad on page 73

Production Control Units, Inc., Ohio, 10

Production Tool & Fixture Co., 37 W. Main St., Oyster Bay, L.I., N.Y., 10
For details see ad on page 295

RCA Victor Division, Tube Dept., 415 S. 5th St., Harrison, N.J., 25
For details see ad on pp. 88, 440-441

Rapid Electroplating Process Inc., Ill., Portable Silver Platers

Reeve Electronics, Inc., Ill., Jigs, Fixtures

Research Instrument Co., N.Y., 40

Robinson, Inc., Edward E., N.J., Potting

Schott Co., Walter D., Calif., Alignment Tools

Scientific Electric, N.J., 40

Stokes Machine Co., F. J., Pa. 30

Stanley Works, Conn., 20 Hand Tools

Star Expansion Products Co., N.Y., Tube Pin Straighteners

Steiner Ives Co., N.J., 10, 25, Industrial Ovens

Stevens Mfg. Co., Geo., Pulaski Rd. at Peterson, Chicago 30, Ill., 5
For details see ad on page 83

Sturtevant Co., P. A., Ill., Torque Wrenches & Testing Fixtures

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 25
For details see ad on page 417-420

Tensitron, Inc., Mass., 10 Tension Controls

(Continued on page 295)

Ten Product Directories in one!

	Page
1. Audio Equipment	97
2. Broadcasting	113
3. Communications	121
4. Components	129
5. Electronic Applications	227
6. Radar-Microwave	241
7. Services, Materials and Consultants	249
8. Test Equipment	305
9. Educational	339
10. Distribution	343

The pink pages found between parts 1 and 2 give complete keys to codes, and product cross-references. By a short study of this section, you will be able to get facts and information faster in this Directory, and with more complete detail, than can be found in any other product reference.

****** MACHINERY FOR RADIO TUBES, CATHODE RAY TUBES, NEON TUBES, INCANDESCENT LAMPS, FLUORESCENT LAMPS**

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COAXIAL SEAL-IN HEADS, STRAIGHT LINE ANNEALERS and HOT CUT FLARE MACHINES

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6136 Adam Street — West New York, N.J.

Ribbons—Strips and Formed Pieces of

Pure Tungsten—Thoriated Tungsten Molybdenum and Tantalum

TUNGSTEN RIBBON

SIZES:
Thickness down to .001" at widths .004" to .125"
Thickness down to .0008" at widths up to .060"
Thickness down to .0005" at widths up to .015"
Thickness down to .0002" at widths up to .006"
Tungsten ribbon made to above sizes is manufactured from round, ductile wire.

CHEMICAL PURITY:
99.9% pure

FINISH:
Roll finish—black or cleaned

CAMBER:
Approximately 1/16" in 2' lengths

EDGES:
Slightly rounded and smooth

TOLERANCES:

Thicknesses:	.0005" to .001	± .00005"
	.002"	.0001"
	.003"	.00015"
	.004"	.0002"
	.005" to .006"	.00025"
	.007" to .010"	.00035"
	.011" to .030"	.0005"
	.031" to .040"	.001"
Widths:	.006" to .010"	± .0005"
	.011" to .020"	.001"
	.021" to .030"	.0015"
	.031" to .060"	.002"
	.061" to .093"	.033"
	.100" to .125"	.005"

Supplied to mg. wgt.—if required.

STRIP

Widths up to 1½" with thickness down to .001" in random lengths 6" and up. This is rolled from heavy strip. Larger sizes also available.

THORIATED

Widths up to .125" down to .001" thick
Widths up to ½" down to .002" thick

MOLYBDENUM RIBBON

SIZES:
Widths from .006" up to .250"
Thicknesses from .060" down to .0006"
Molybdenum Ribbon made to above sizes is manufactured from round, ductile wire.

CHEMICAL PURITY:
99.9% pure

FINISH:
Roll polished finish, cleaned

CAMBER:
Approximately 1/16" in 2' lengths

EDGES:
Slightly rounded and smooth

TOLERANCES:

Thicknesses:	.0006" to .001"	± .00004"
	.0011" to .010"	.00025"
	.011" to .030"	.0003"
	.031" to .060"	.0005"
Widths:	.066" to .010"	± .0005'
	.011" to .020"	.001"
	.021" to .030"	.0015"
	.031" to .090"	.002"
	.091" to .125"	.003"
	.126" to .160"	.0035"
	.161" to .250"	.005"

Supplied to mg. wgt.—if required.

STRIP

Widths up to 2" with thicknesses down to .001" in random lengths 6" and up. This is rolled from heavy strip. Larger sizes also available.

TANTALUM

Strip and ribbon available from .008" to 1½" wide at thickness from .001" down to .0004".

INQUIRIES on formed pieces made of tungsten or molybdenum ribbon and strip, thoriated tungsten, or tantalum will receive prompt attention.

Developed and Manufactured by

H. Cross Co.

15 Beekman Street — New York 38, N.Y.

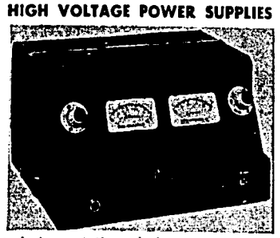
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SCALE PRINTING MACHINE

Prints single or many copies of scales and dials on metal-paper or plastics.

HIGH VOLTAGE POWER SUPPLIES

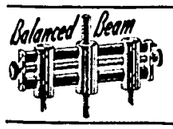


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LEAK DETECTORS AND HIGH VACUUM Equipment

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New Hyde Park, New York
GARDEN CITY 7-1161

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strong, durable

easy to use, available

The ideal alloy for glass sealing, Kovar matches the expansivity of certain hard glasses over the entire working temperature range. It resists mercury attack, has ample mechanical strength and seals readily with simple oxidation procedure.

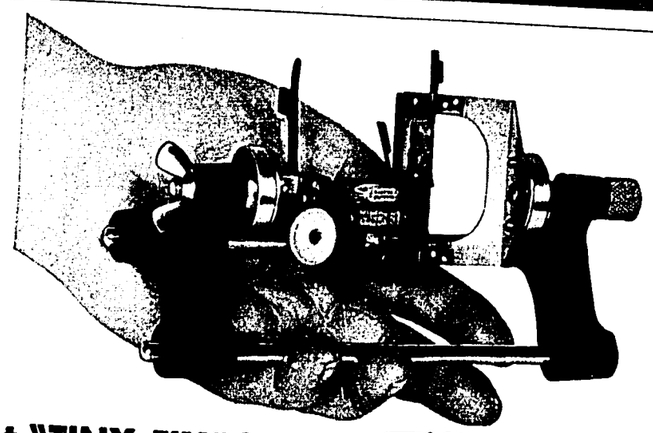
Kovar produces a permanent vacuum-tight seal, and is readily machined or fabricated to permit the use of small and intricate shapes. It is of controlled composition and processing to permit duplication of results. Usable in any thickness; no need to feather edge on tubular or intricate shapes, and is relatively inexpensive, eliminating restraints on sizes and capacity. Can be welded, soldered, and brazed to other metals.



Kovar is available as sheet, strip, foil, rod, tube, wire—or fabricated cups, eyelets, leads and other shapes.

STUPAKOFF CERAMIC & MANUFACTURING CO.

LATROBE, PENNSYLVANIA



Let "TINY-FIX" be your *THIRD HAND*

SEE TINY-FIX, your "THIRD HAND" for small wiring and assembling.

SEE TINY-FIX's "big brother" Assembly Fixtures—stocked in all sizes. Extra long base rods are available on request.

SEE PTF's Pin Straighteners, Masking Plugs, and Test Plugs stocked in standard sizes for immediate delivery.

SEE PTF's experienced Designers to discuss special production problems.

SEE PTF's new revolutionary, *universal* TV Fixture Adapter.

Call, write or wire for detailed information today.

PTF Co. PRODUCTION Tool & Fixture Co. 37 WEST MAIN ST. OYSTER BAY, N. Y. Phone: OYster Bay 6-0009

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

Machinery & Tools

(Continued from page 293)

Ungar Electric Tools, Inc., Calif., 20
U.S. Tool Company, Inc., N.J., Stamping & Forming
Universal Winding Co., R.I., 5
Universal X-Ray Prod., Inc., Ill., Mercury Diffussion Pumps
Utica Drop Forge & Tool Corp., N.Y., Pliers
Vacuum-Electronic Eng. Co., 86-P Denton Ave., New Hyde Park, L.I., N.Y., Vacuum Coaters
For details see ad on pages 294, 311
Vacuum Tube Prod., Calif., 40
Vulcan Electric Co., Mass., 20, Ovens
Wall Mfg. Co., P., Pa., 20
Walsh Press & Die Co., Ill., 10
Wasserlein Mfg. Co. Inc., 126 W. Cass St., Joliet, Ill., 20, 25
For details see ad on page 93
Welch Mfg. Co., W. M., Ill., 30
Weller Electric Corp., Pa., 20
Westinghouse Electric Corp., Pa., 40
White & Son, James L., N.J., 10
White Industrial Division, S. S., N.Y., 10, 15
Wilder Mfg. Co., Inc., N.Y., 10, Soldering Iron Holders & Trucks
Wilson & Co., G. C., N.J., Repeat Cycle Timer
Xcelite, Inc., N.Y., 10, Hand Tools

83. Metals.

5. Alloys
10. Copper
15. Ferrous
20. Non-ferrous, excluding copper
25. Powdered
30. Precious & rare

Allegheny Ludlum Steel Corp., Pa., 5, 15, 25
Alpha Metals, Inc., N.J., 5, 20
American Brass Co., 414 Meadow St., Waterbury 20, Conn., 5, 10
For details see ad on page 266
American Electro Metal Corp., N.Y., 25, 30, Brazing Compound
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30
American Platinum Works, N.J., 30
American Silver Co., Inc., N.Y., 5, 10, 15, 20, 30, Clad
American Smelting & Refining Co., N.Y., 5, 10, 20
Anchor Metal Co., N.Y., 5, 20, 25, 30
Armco Steel Corp., Ohio, 5, 15
Brainin Co., C. S., 320 Washington St., Mt. Vernon, N.Y., 30
For details see ad on page 208
Braun Tool & Instrument Co., Inc., H., 140 Fifth Ave., Hawthorne, N.J., 5, 10
For details see ad on page 261
Bridgeport Brass Co., Conn., 5, 10, 20
Canadian Radium & Uranium Corp., N.Y., 30
Carboloy Dept., General Electric Co., Mich., 25
Carpenter Steel Co., Pa., 15
Cohn Corp., Sigmund, N.Y., 30
Cross Co., H., 15 Beekman St., New York 38, N.Y., Molybdenum & Tantalum
For details see ad on page 294
Crucible Steel Co. of America, 405 Lexington Ave., New York 17, N.Y., 5
For details see ad on page 10
Division Lead Co., Ill., 5, 20

(Continued on page 297)

CUSTOM

Molded

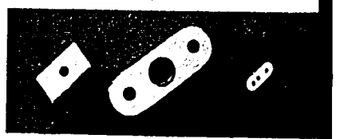
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WE CAN MOLD

ANY POWDER

INTO YOUR DESIRED SHAPE and SIZE

Send us your powder molding problems and let us help you solve them.



WE SPECIALIZE IN ALL TYPES OF

POWDERED GLASS

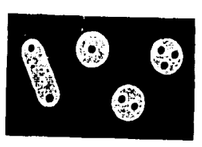


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Close tolerance maintained . . . the highest precision to satisfy your specifications.





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- Ceramic bodies
- Cold mold plastics

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13 VALLEY STREET

BELLEVILLE, NEW JERSEY

SPECIALISTS FOR THE TRADE

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Precious Metals *for* Plating

Pioneers in the Development of Modern Precious Metal Plating Processes

Outstanding developments by Sel-Rex in precious metals for plating have resulted in better quality at less cost for both decorative and industrial platers. Superior engineering skill and long experience in the plating field make Sel-Rex your best choice for all precious metal plating needs.

Sel-Rex BRIGHT GOLD PROCESS produces pore-free "mirror bright" deposits regardless of thickness. Eliminates need for scratch brushing or buffing. Gives excellent metal distribution and deposit is twice the hardness of conventional gold. Ideally suited for specification thickness in barrel or still plating.

Sel-Rex BRIGHT RHODIUM SOLUTIONS provide a brilliant, durable deposit that will withstand severe abrasion. The chemically stable solution is ideal for specification plating of protective coatings that will not corrode or tarnish in any atmosphere.

Sel-Rex SILVER SOL-U-SALT (Potassium Silver Cyanide) in pure crystalline form is completely soluble in water. Eliminates old fashioned mixing, calculating or filtering. Eliminates hazard of airborne dust—no insoluble particles in the bath to cause rough deposits.

Consult our engineers on any precious metal problem.
No obligation. Detailed literature available on request.

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229 Main Street • Belleville 9, N.J. Dept. IRE-53

Pioneers and developers of better gold, silver, nickel, copper, cadmium and rhodium salts and solutions.

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DEVELOPMENT and PRODUCTION METALLURGISTS

Fine wire and ribbon in base, rare, and precious metals, and alloys for new and highly engineered applications. In small units and sizes, and to close tolerances.

Further details on request.

SECON

SECON METALS CORPORATION

228 East 45th Street, N. Y. 17, N. Y., MU 7-1594

Driver-Harris Co., N.J., 5
Driver Co., Wilbur B., 150 Riverside Ave., Newark 4, N.J., 5, Stainless Steel
For details see ad on page 32
Eastern Brass & Copper Co., Inc., N.Y., 5, 10, 15, 20
Enthoven & Sons, Ltd., H. J., England, 25
Fansteel Metallurgical Corp., Ill., 20, 30
Foote Mineral Co., Inc., Pa., 30
General Dyestuff Corp., Antara Chemical Div., 435 Hudson St., New York 14, N.Y., 15, 25
For details see ad on page 56
General Plate Div., Metals & Controls Corp., Mass., 5, 10, 20, 30
Germanium Products Corp., N.J., 30
Glaser Lead Co., Inc., N.Y., 5, 20, 25
Goldsmith Bros., Smelting & Refining, Ill., 30, Silver
Handy & Harman, N.Y., 5, 30
International Nickel Co., Inc., N.Y., 5, Nickel, 20
Johnston Foil Mfg. Co., Mo., Foils, Sheet Lead
King Laboratories, Inc., 127 Solar St., Syracuse 4, N.Y., 5, 25, 30
For details see ad on page 301
Kinney Co., Joseph, Pa., Tubing
Mackay, Inc., A. D., N.Y., 5, 10, 15, 20, 25, 30
Makepeace Co., D. E., Pine & Dunham Sts., Attleboro, Mass., 30
For details see ad on page 80
Mallory & Co., Inc., P. R., Ind., 5, 25
Metal Hydrides, Inc., Mass., 25
Metals & Controls Corp., Mass., 5, 20, 30, Clad Metals
National Lead Co., N.Y., 20, 25
National Moldite Co., N.J., 25
Ney Co., J. M., 71 Elm St., Hartford 1, Conn., 30
For details see ad on page 209
North American Philips Co., N.Y., 10, 20, 25, 30
Northern Electronic & Vacuum Ind., Canada, 5, 20, Tungsten
Permo, Inc., Ill., 30
Phelps-Dodge Copper Prods. Corp., 40 Wall St., New York 5, N.Y., 10
For details see ad on page 251
Phosphor Bronze Corp., Conn., 5
National Radiator Co., Pa., 25
Precision Tube Co., Inc., Pa., 5, 10, 20, Tubing
Radio Development & Research Corp., N.J., 30
Republic Foil & Metal Mills, Inc., Conn., Aluminum Foil
Revere Copper & Brass, Inc., N.Y., 5, 10, 20
Samuel & Co., Inc., J. A., N.Y., 30
Scovill Mfg. Co., Conn., 20
Secon Metals Corp., 228 E. 45 St., New York 17, N.Y., 5, 15, 30
For details see ad on page 296
Sel-Rex Precious Metals, Inc., 229 Main St., Belleville 9, N.J., 30
For details see ad on page 296
Somers Brass Co., Inc., Conn., 5, 10, 20, Rolled Strip
Stupakoff Ceramic & Mfg. Co., Box 390, Hillview Ave., Latrobe, Pa., 5
For details see ad on pages 139, 189, 203, 255, 265, 277, 295, 297, 303, 378-379
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 25, 30
For details see ad on pages 417-420
Uniform Tubes, Inc., Pa., Aluminum & Copper Tubes
Union Plate & Wire Co., Mass., 10
United States Steel Corp., Pa., 15
Vacuum Metals Corp., Mass., 5, 10, 15, 20
Western Gold & Plantinum Works, Calif., 5, 20, 25, 30
Westinghouse Electric Corp., Pa., 5, 20
Wilson Co., The H. A., N.J., 5, Clad Bi-Metal

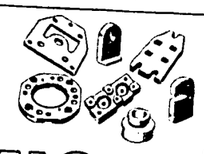
84. Moulded Products.

5. Insulators
10. Knobs & parts
15. Proprietary mouldings

Accurate Electronics Corp., Ohio, 5, 10
Akron Rubber Co., N.Y., Rubber
Alden Products Co., 113 N. Main St., Brockton 64, Mass., 5, 10
For details see ad on pages 150-151
American Insulator Corp., Pa., 10
American Lava Corp., Cherokee & Mfrs. Rd., Chattanooga 5, Tenn., 5, 15
For details see ad on page 4
American Machine & Foundry Co., Mass., 5, 10, 15
American Phenolic Corp., 1830 South 54 Ave., Chicago 50, Ill., 5
For details see ad on page 2
American Radio Hardware Co., N.Y., 10
Atlantic India Rubber Works, Inc., 571 W. Polk St., Chicago 7, Ill., 5, 10
For details see ad on page 9
Auburn Button Works, Inc., N.Y., 5
Campbell Mfg. Co., Ltd., Canada, Rubber
Celomat Corp., N.Y., 10
Chicago Die Mold, Ill., 10
Cincinnati Molding Co., Ohio, 5
Crowley & Co., Inc., Henry L., N.J., 5, 15
Daven Co., N.J., 10
Davies Molding Co., Harry, Ill., 10
Dimco-Gray Co., Ohio, 5, 10, 15
Du Pont de Nemours & Co., Inc., E. I., Del., 5, 10, 15
Eby, Inc., Hugh H., 4700 Stenton Ave., Philadelphia 44, Pa., 10
For details see ad on page 207
Edin Company, Inc., Mass., 10, 15
Elco Corp., Pa., 15
Electro Physics Co., N.Y., 10
Electronic Mechanics, Inc., 101 Clifton Blvd., Clifton, N.J., 5, 15
For details see ad on page 278
Emeloid Co., Inc., N.J., 10, 15
Erie Resistor Corp., 644 W. 12 St., Erie, Pa., 10
For details see ad on page 18
Felsenthal & Sons, Inc., G., Ill., 10, 15
Franklin Fibre-Lamitex Corp., Del., 5, 10, 15
Fretco, Inc., Pa., 5
Friedman Co., N.Y., 10
Gadgets, Inc., Ohio, 15
Gancher Co., Louis, N.Y., 10
Garde Manufacturing Co., 588 Eddy St., Providence 3, R.I., 5, 15
For details see ad on page 270
Garlock Packing Co., N.Y., 5, 15
Gates Radio Co., Ill., 10
Gee-Lar Mfg. Co., Ill., 5, 10
General Cement Mfg. Co., Ill., 10
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 10
For details see ad on pages 380-381, Cover IV
Gries Reproducer Corp., N.Y., 15
Hobson Bros., Ill., 5
Howard Moldings, Inc., Mo., 15
Imperial Radar & Wire Corp., N.Y., 5
Industrial Devices, Inc., N.J., 10, 15
Industrial Television, Inc., N.J., 10
Insulation Products Co., Pa., 5, 10
Insuline Corp. of America, 36-02 35 Ave., Long Island City 1, N.Y., 10
For details see ad on page 134
Interstate Mfg. Corp., N.J., 15
Isolantite Manufacturing Corp., N.J., 5
Kay-Woff Products Co., Neb., 5, 15
Kurz-Kasch, Inc., Ohio, 10
Mansol Ceramics, 13 Valley St., Belleville, N.J., Custom
For details see ad on page 296
Maigne Co., O. J., N.Y., 5
Mills Corp., Elmer E., Ill., 5, 10
Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass., 5, 10
For details see ad on page 336
Minerals & Insulation Co., N.J., 5
Molded Insulation Co., Pa., 5, 10, 15
Molding Specialists, Inc., N.Y., 15
Muirhead & Co., Ltd., England, 10
Mycalex Corp. of America, 125 Clifton Blvd., Clifton, N.J., 5
For details see ad on pages 430-431

(Continued on page 298)

Molded



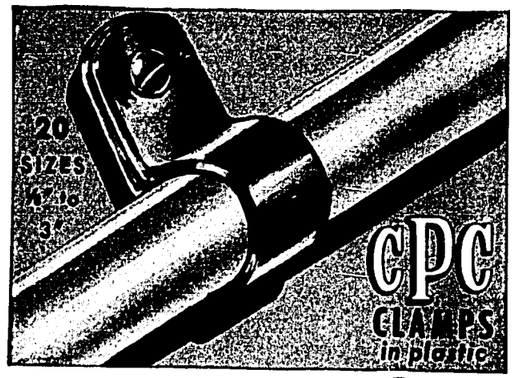
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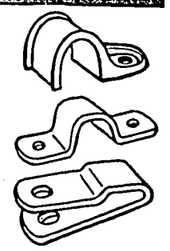
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LATROBE, PENNSYLVANIA



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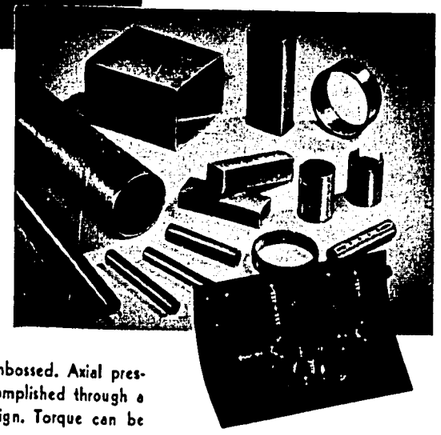
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Resinite Coil Forms are laboratory tested and field proven. Their operating characteristics —volume resistivity . . . power factor . . . thermal properties . . . low moisture absorption . . . and resistance to voltage breakdown—represent a new achievement in basic components for electronic application.

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RESINITE 8104: for coil forms requiring very high dielectric properties under extreme humidity.

RESINITE "AC": for applications requiring very high dielectric strength. Electrolytic corrosion is impossible.

RESINITE 104: for stapling, severe forming, fabricating.

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RESINITE CORPORATION
DIVISION OF PRECISION PAPER TUBE

2035GY W. Charleston St., Chicago 47, Ill.
79 Chapel St., Hartford, Conn.

Moulded Products

(Continued from page 297)

National Co., Inc., 61 Sherman St., Malden 48, Mass., 5, 10
For details see ad on pages 434-435
Neo-Sil Corp., N.J., 5, Rubber
P. M. Industries, Inc., Conn., 15
Painton and Co., Ltd., England, 10
Peerless Products Industries, Ill., Nylon Coil Forms
Polymer Corp. of Pennsylvania, 126 N. 5 St., Reading, Pa., 5, 15
For details see ad on page 278
Product Engineering Labs. Co., Inc., N.J., Plastic Boxes
Quality Components, Inc., Pa., 15
Raytheon Manufacturing Co., Equipment Sales Div., 138 River St., Waltham 54, Mass., 10
For details see ad on page 228
Remler Co., Ltd., Calif., 10, 15
Research Instrument Co., N.Y., 5, 10
Resistoflex Corp., Belleville 9, N.J., 5
For details see ad on page 281
Richardson Co., Ill., Custom
Rogan Bros., Ill., 5, 10, 15
Rohden Manufacturing Co., Ill., 10
Santay Corp., Ill., 5, 10, Coil Forms
Smith & Stone, Ltd., Canada, Custom
Stevens Prod., Inc., N.J., 5
Stokes Molded Products, Inc., N.J., Hard Rubber
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 10
For details see ad on pages 417-420
Syracuse Ornamental Co., Inc., N.Y., 10, 15
Technology Instrument Corp., 535 Main St., Acton, Mass., 10
For details see ad on pages 198, 334
Transradio Ltd., England, 15
U. S. Engineering Co., 521 Commercial St., Glendale 3, Calif., 5
For details see ad on page 91
United States Gasket Co., 611 N. 10 St., Camden 1, N.J., 5
For details see ad on pages 450-451
United States Rubber Co., N.Y., Rubber Wiring Devices
Waterbury Companies, Inc., Conn., 10, 15, Reinforced
Whitso, Inc., Ill., 5, 10, 15
Winchester Electronics, Inc., 15 Crescent St., Glenbrook, Conn., 5
For details see ad on page 156
Winslow Company, Inc., N.J., 10

85. Plastics.

5. Extrusions
10. Raw powders
15. Rods
20. Sheets
25. Tubes

A. K. Manufacturing Co., Ill., 5, 15, 25
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25
American Mica Insulation Co., N.J., 15, 20, 25, Mica Only
American Phenolic Corp., 1830 S. 54 Ave., Chicago 50, Ill., 5, 15, 20
For details see ad on page 2
American Radio Hardware Co., N.Y., 5
Anchor Plastics Co., Inc., N.Y., 5, 15
Auburn Button Works, Inc., N.Y., 5, 15, 20, 25
Baer Co., N. S., N.J., 15, 20, 25
Borden Co., N.Y., 10
Brand and Co., Inc., William, North & Valley St., Willimantic, Conn., 5
For details see ad on page 15

Plastics

Canadian Industries, Ltd., Canada, 5, 10, 15, 20, 25
Cast Optics Corp., Conn., 15, 20, 25
Celanese Corp. of America, N.Y., 10, 20
Celomat Corp., N.Y., 5, 10, 20, 25
Citation Products Co., 233 E. 146 St., New York 51, N.Y., 20, 25
For details see ad on page 269
Commercial Plastics Co., 2824 W. North Ave., Chicago 47, Ill., 5, 25
For details see ad on page 298
Continental-Diamond Fibre Co., 16 Chapel St., Newark 48, Del., 15, 20, 25
See complete catalog in last section
Cortland Industries, Inc., Ill., 15, 20, 25
Crane Packing Co., Ill., 5, 15, 20, 25
Du Pont de Nemours & Co., Inc., E. I., Del. 10, 15, 20, 25
Durez Plastics & Chemicals, Inc., N.Y., 10
Electronic Mechanics, Inc., 101 Clifton Blvd., Clifton, N.J., 5, 15, 20, 25
For details see ad on page 278
Ethylene Chemical Corp., N.J., 15, 20
Formica Co., 4614 Spring Grove Ave., Cincinnati 32, Ohio, 15, 20, 25
For details see ad on page 48
Franklin Fibre-Lamitex Corp., Del., 10, 15
Garlock Packing Co., N.Y., 5, 15, 20, 25
General Electric Co., Mass., 10, 15, 20, 25
General Laminated Prods. Co., Inc., Ill., 5, 15, 20, 25
Gering Products, Inc., N.J., 5, 10, 15, 20, 25
Goodrich Chemical Co., B. F., Ohio, 10
Houghton Laboratories, Inc., N.Y., 15, 20, 25
Irvington Varnish and Insulator, N.J., 5, 15, 20, 25
Kellogg Co., M. W., Danforth Ave., Jersey City 3, N.J., 10, Kel-F
For details see ad on page 76
Kenwood Mfg. Co., N.J., 5, 15, 25
Keystone Electronics Corp., N.Y., 20
Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 5
For details see ad on pages 414-415
Koppers Company, Inc., Pa., 10
Lamoree, C. D., Calif., 15, 20, 25
Libbey-Owens-Ford Glass Co., Ohio, 10
Maigne Co., O. J., N.Y., Teflon
Mallory & Co., Inc., P. R., Ind., 5
Mansol Ceramics, 13 Valley St., Belleville, N.J., 10
For details see ad on page 296
Mark Products Co., Ill., 15, 25
Mica Fabricating Co., N.J., 15, 20, 25
Mica Insulator Co., N.Y., 15, 20
Micarta Fabricators, Inc., Ill., 15, 20
Mills Corp., Elmer E., Ill., 5
Minerals & Insulation Co., N.J., 10, 15
Monsanto Chemical Co., Mass., 10, 20
Mycalex Corporation of America, 125 Clifton Blvd., Clifton, N.J., 15, 20
For details see ad on pages 430-431
Oppenheimer Corp., N.Y., 10
Peters Chemical Mfg. Co., Ill., 10
Polymer Corp. of Pennsylvania, 126 N. 5 St., Reading, Pa., 5, 10, 15, 20, 25
For details see ad on page 278
Printloid, Inc., N.Y., 5, 15, 20, 25
Raybestos Manhattan, Inc., Pa., 5, 15, 20, 25
Resinite Corp., Div. Precision Paper Tube, 2035GY W. Charleston St., Chicago 47, Ill., 25
For details see ad on page 298
Resistoflex Corp., Belleville 9, N.J., 5, 15, 20, 25
For details see ad on page 281
Rex Corp., Hayward Rd., West Acton, Mass., 5, 15, 20
For details see ad on page 280
Richardson Co., Ill., 15, 20, 25
Rohm & Haas Co., Pa., 10, 20
St. Regis Paper Co., N.Y., 15, 20, 25
Shawinigan Products Corp., N.Y., 10
Sheffco Mfg. Co., N.J., 15, 20, 25
Sherwood, Robert H., Co., N.Y., 5
Smith & Stone, Ltd., Canada, 5
Society of the Plastics Industries, Inc., N.Y., Trade & Tech. Assn.
Surprenant Mfg. Co., 172 Sterling St., Clinton, Mass., 5, 20, 25
For details see ad on page 252
Taylor Fibre Co., Pa., 15, 20
Thall Plastics Eng. Co., N.Y., 5, 15, 20
Transradio, Ltd., England, 5
United States Gasket Co., 611 N. 10 St., Camden 1, N.J., 5, 10, 15, 20, 25
For details see ad on pages 450-451
Varflex Corp., N.Y., 25
Westinghouse Electric Corp., Pa., 20

86. Solder.

5. Acid core
10. Fluxes
15. Plain
20. Precious metal
25. Pre-forms
30. Rosin core

Alpha Metals, Inc., N.J., 5, 10, 15, 20, 25, 30
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30
American Platinum Works, N.J., 20
American Silver Co., Inc., N.Y., 10, 20, 25
American Smelting & Refining Co., N.Y., 5, 15, 25, 30
Anchor Metal Co., N.Y., 5, 10, 15, 20, 25, 30
Chase Brass & Copper Co., Conn., 10
Dee Electric Co., Ill., 10
Division Lead Co., Ill., 5, 10, 15, 20, 25, 30
Du Pont de Nemours & Co., Inc., E. I., Del., 10
Eastern Brass & Copper Co., N.Y., 20
Electro Physics Co., N.Y., 10
Enthoven & Sons, Ltd., H. J., England, 15, 30
General Cement Mfg. Co., Ill., 10
General Plate Div., Metals & Controls Corp., Mass., 20, 25
Glaser Lead Co., Inc., N.Y., 5, 10, 15, 25, 30
Goldsmith Bros. Smelting & Refining, Ill., 10, 20
Handy & Harman, N.Y., 10, 20, 25
Johnston Foil Mfg. Co., Mo., Strip
Kester Solder Co., 4219 Wrightwood Ave., Chicago 39, Ill., 5, 10, 15, 25, 30
For details see ad on page 78
Lectrohm, Inc., Ill., Pots
Lenk Mfg. Co., Mass., 5, 10, 15, 25, 30
Linick Chemical Co., Ill., 10
London Chemical Co., Ill., 10
Makepeace Co., D. E., Pine & Dunham Sts., Attleboro, Mass., 20, 25
For details see ad on page 80
Manhattan Research Labs., N.Y., 10, 20

Solder 84-87

Metals & Controls Corp., Mass., 20, 25
Mico Instrument Co., 79 Trowbridge St., Cambridge 38, Mass., 10
For details see ad on page 63
Mitchell Rand Insulation Co., N.Y., 15
Multicore Sales Corp., 164 Duane St., New York 13, N.Y., 5, 10, 15, 30
For details see ad on page 84
National Lead Co., N.Y., 5, 10, 15, 20, 25, 30
Ney Co., The J. M., 71 Elm St., Hartford 1, Conn., 20
For details see ad on page 209
Saf-T-Flux Co., Pa., 5, 10, 15, 30
Sightmaster Corp., N.Y., Aluminum Soldering Spec., N.Y., 5, 10, 15, 20, 25, 30
Super Flow Solder Co., Inc., N.Y., 5, 10, 15, 20, 25, 30
Union Plate & Wire Co., Mass., 20, 25
Vulcan Electric Co., Mass., Pots
Wall Mfg. Co., P., Pa., 5, 10, 15, 25, 30
Western Gold & Platinum Wks., Calif., 20

87. Vacuum Tube Parts.

5. Anodes
10. Envelopes, glass
15. Envelopes, metal
20. Getters
25. Grids & grid wire
30. Guns & gun parts
35. Pins & prongs
40. Spacers & insulators
50. Tube clamps
55. Tubing-cathode

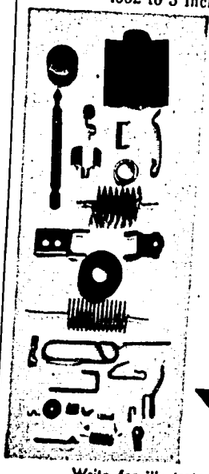
Acheson Colloids Co., Mich., Coatings
Affiliated Screw Products Co., Ill., 35
Alden Products Co., 113 N. Main St., Brockton 64, Mass., 50, Tube Cap Connectors
For details see ad on pages 150-151
(Continued on page 301)

Priced Right! **WIRE FORMS**
& Metal Stampings

STRAIGHTENING & CUTTING
Perfect straight lengths to 12 ft.
.0015 to .125 diameter

WIRE FORMS
.0015 to .125 diameter

SMALL METAL STAMPINGS
.0025 to .035 thickness
.062 to 3 inches wide

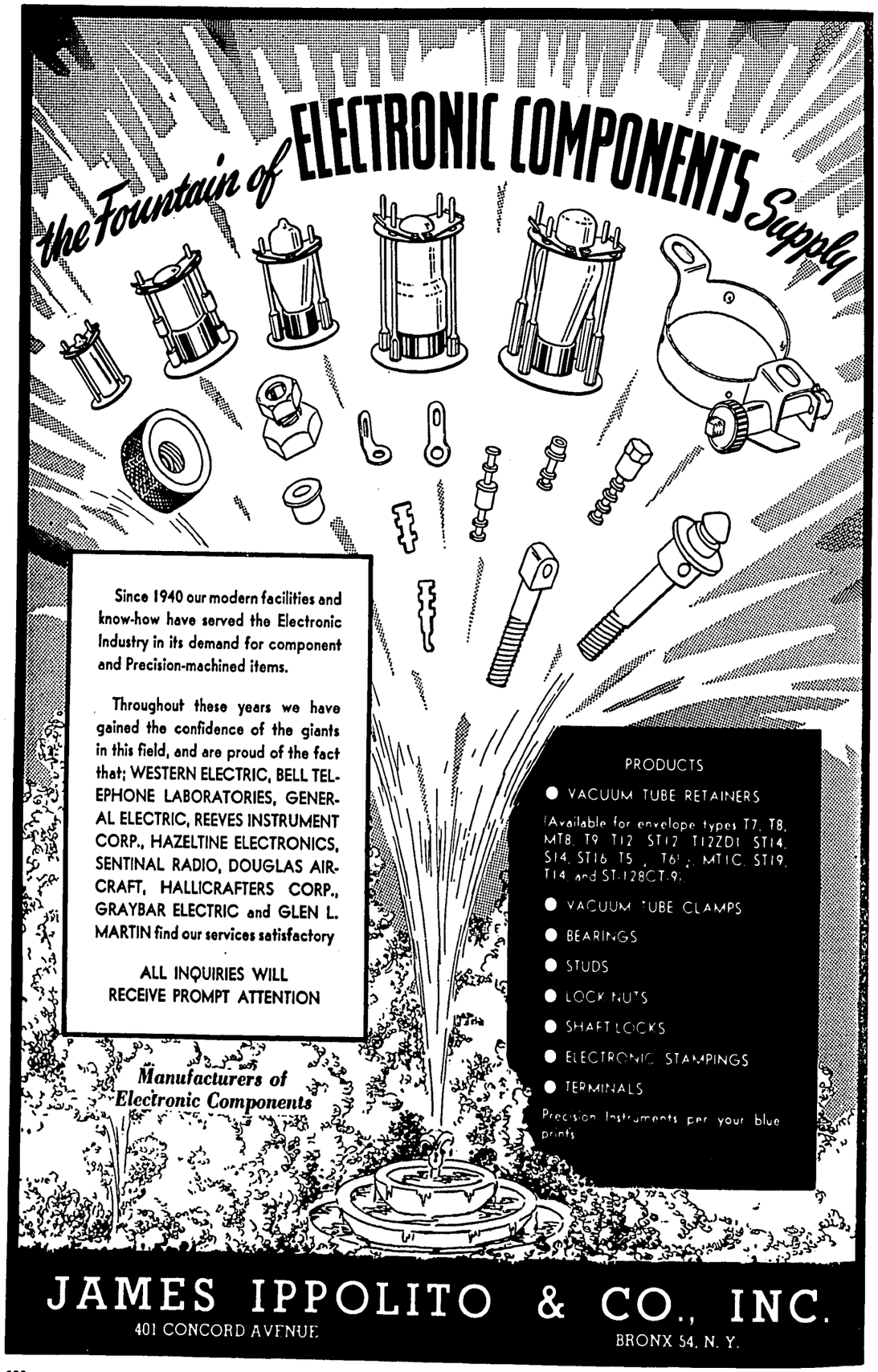


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GETTER
Specialists



KING LABORATORIES, INC. has been a leading supplier of GETTERS for *electron tube* production for many years. Throughout tube development we have produced better and more economical GETTERS to the most stringent specifications.

KING LABORATORIES has been a leader in Subminiature and Cathode Ray Tube GETTER development. As further subminiaturization and improvements in Cathode Ray Tube performance place even more exacting requirements on GETTERS, KING LABORATORIES fundamental research and production facilities can be the answer to your most critical needs.

For the solution to all your

GETTER PROBLEMS

come to . . .

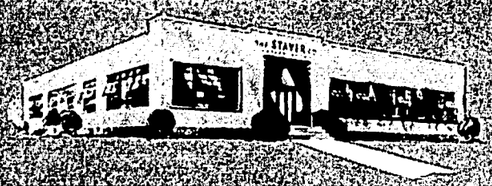
KING LABORATORIES, INC.
127 Solar Street
Syracuse 4, New York

Vacuum Tube Parts

(Continued from page 299)

American Brass Co., 414 Meadow St., Waterbury 20, Conn., 35
For details see ad on page 266
American Electro Metal Corp., N.Y., 5, 25, 55
American Hinge Corp., N.Y., 35
American Lava Corp., Cherokee & Mfrs. Rd., Chattanooga 5, Tenn., 30, 40
For details see ad on page 4
American Mica Insulation Co., N.J., 40
Art Wire & Stamping Co., 3-B Boyden Place, Newark 2, N.J., 5, 15, 20, 25, 30, 35, 40, 50
For details see ad on page 299
Augat Bros., Inc., Mass., 50
Baer Co., N. S., N.J., 40
Bead Chain Mfg. Co., 11 Mountain Grove St., Bridgeport 5, Conn., 35
For details see ad on page 268
Brand and Co., Inc., William, North & Valley St., Willimantic, Conn., 40
For details see ad on page 15
Brooks Radio & Television Corp., N.Y., CRT Mounts
Canadian Westinghouse Co., Ltd., Canada, 5, 25, 30, 35
Central Stamping & Mfg. Co., Ill., Stampings
Commercial Plastics Co., 2824 W. North Ave., Chicago 47, Ill., 50
For details see ad on page 298
Clarke Instr. Div., National Elec. Mach. Shops, Md., 50
Corning Glass Works, N.Y., 10
Crowley & Co., Inc., Henry L., N.J., 40
Dearborn Glass Co., Ill., Implosion Plates
Eitel-McCullough, Inc., 198 San Mateo Ave., San Bruno, Calif., 25
For details see ad on pages 402-403
Electronic Manufacturing Co., 20 Orange St., Newark 2, N.J., 5, Stampings
For details see ad on page 303
Electronic Parts Mfg. Co., 540 39 St., Union City, N.J., 25, 30
For details see ad on page 33
Engineering Co., N.J., Stampings
Fansteel Metallurgical Corp., Ill., 5, 25
Federal Telephone & Radio Corp., 100 Kingsland Ave., Clifton, N.J., 5
For details see ad on pages 368-373
Federal Tool Engineering Co., N.J., 30
Foote Mineral Co., Inc., Pa., 20
General Ceramics & Steatite Corp., Crows Mill Rd., Keasbey, N.J., 40
For details see ad on pages 52, 54, 349
General Laminated Prods. Co., Inc., Ill., 5, 25, 40
Haydu Brothers, N.J., 5, 25, 30, 35, 40, 45, 50, 55
Ippolito & Co., Inc., James, 401 Concord Ave., New York 54, N.Y., 50
For details see ad on page 300
Isolantite Manufacturing Corp., N.J., 40
Johnson & Hoffman Mfg. Co., 31 E. 2 St., Mineola, L.I., N.Y., 5, 30
For details see ad on pages 397-400
Kemet Co., Ohio, 20, 25
King Laboratories, Inc., 127 Solar St., Syracuse 4, N.Y., 20
For details see ad on page 301

(Continued on page 303)



from design to production line...

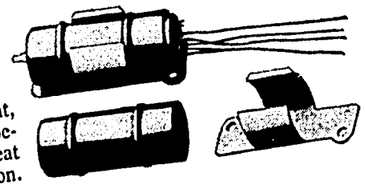
the STAVER company

serves the electronics industry 2 ways

1 the STAVER line of electronic specialties



mini-shield* and clip
Types to fit *all* miniature tubes. Locks tube in socket, prevents vibration. Engineered to accommodate variations in diameter.

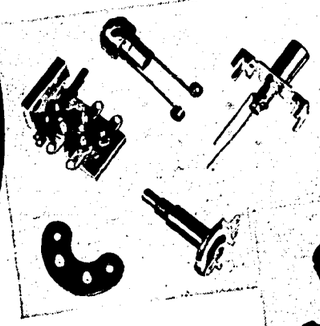


sub-mini-shield
Combination shield, clip and mount, for sub-miniature tubes. Close tube-to-shield contact for maximum heat dissipation. Firm clamping action. Easy to mount.

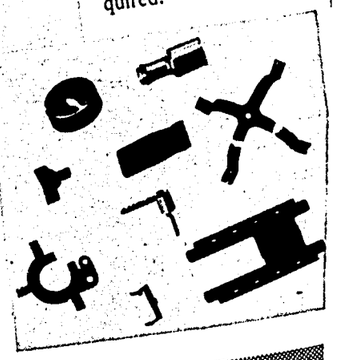


mini-spring*
A vibration-proof tube guard that keeps a steady axial downward pressure and provides sideway support in vertical or horizontal mounting position. Locks or releases tube at touch of a finger.

2 precision parts and components manufactured to customer specifications



assemblies
Special electronic assemblies—to your specifications — controls, relays, connectors, switches, terminal boards, etc Design assistance when required.



stampings
Simple or intricate . . . large or small quantities. Automatic equipment—close tolerances. Non-ferrous metals a specialty.

Write for complete information on our products and facilities.

THE Staver COMPANY INCORPORATED

Reg. U.S. Pat. Off. Trademark Reg.

the staver company, inc. 45 n. saxon ave. bayshore, long island, n.y.

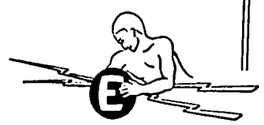
Kirchberger & Co., Inc., M., 1425 37 St., Brooklyn 18, N.Y., 40
For details see ad on page 255
MacKay, Inc., A. D., N.Y., 20
Maigne Co., O. J., N.Y., 40
Martin & Co., H. S., Ill., 5, 10, 30, 40, 55
Metallic Arts of N. Eng. Inc., Mass., Stampings
Mica Insulator Co., N.Y., 40
Multi-Tron Laboratory Ill., 5, 10, 15, 25, 35, 40, 50, 55
National Co., Inc., 61 Sherman St., Malden 48, Mass., 50
For details see ad on pages 434-435
National Video Corp., Ill., 30
North American Philips Co., N.Y., 25
Pix Mfg. Co., Inc., N.J., 35
RCA Victor Division, Tube Dept., 415 S. 5 St., Harrison, N.J., 5, 15, 20, 25, 30, 35, 40
For details see ad on pages 88, 440-441
Remler Co., Ltd., Calif., 50
Scientific Electronic Lab., N.J., 5, 10, 35
Scovill Mfg. Co., Conn., Stampings
Secon Metals Corp., 228 E. 45 St., New York 17, N.Y., 25
For details see ad on page 296
Sonotone Corp., N.Y., 30
Stackpole Carbon Co., Tannery St., St. Marys, Pa., 5
For details see ad on pages 442-443
Staver Company, Inc., 45 N. Saxon Ave., Bay Shore, L.I., N.Y., 40, 50, Stampings
For details see ad on page 302
Stupakoff Ceramic & Mfg. Co., Box 390, Hillview Ave., Latrobe, Pa., 40
For details see ad on pp. 139, 189, 203, 255, 265, 277, 295, 297, 303, 378-379
Superior Steatite & Ceramic, N.Y., 40
Superior Tube Co., 2512 Germantown Ave., Norristown, Pa., 5, 30, 55
For details see ad on pages 444-445
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 5, 20, 25, 30, 35, 40, 50
For details see ad on pages 417-420
Syncore Products Co., Mass., 40
Times Facsimile Corp., 540 W. 58 St., New York 19, N.Y., 50
For details see ad on page 303
Truelove & MacLean, Inc., Conn., Cut Stampings
United-Carr Fastener Corp., 31 Ames St., Cambridge 42, Mass., Stampings
For details see ad on page 446
Volkert Metal Stampings, John, N.Y., 30, Stampings
Western Gold & Platinum Works, Calif., 10, 40
Whitehead Stamping Co., Mich., Stampings
Wrought Washer Mfg. Co., Wis., Stampings

TUBE COMPONENTS

- Tungsten Lead wires (hard glass)
- Transmitter Tube Bases
  Top Caps all types
- Heater Elements

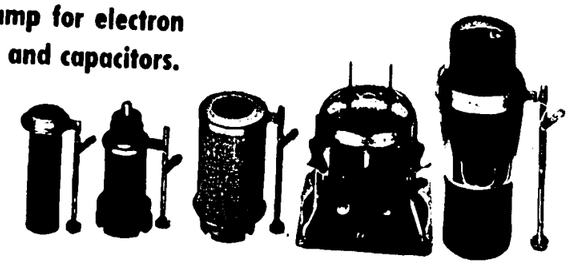
Stampings and spinnings for all inside parts of transmitter tubes.

ELECTRONIC MFG. CO.
20 ORANGE STREET
NEWARK 2, N.J.
MITCHELL 2-3034



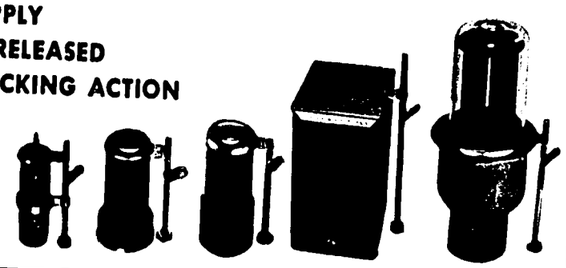
TOP HAT RETAINERS

A widely used, dependable, improved clamp for electron tubes, relays and capacitors.



WRITE FOR FREE CATALOG

EASY TO APPLY
INSTANTLY RELEASED
POSITIVE LOCKING ACTION



TIMES FACSIMILE CORPORATION

Stupakoff

VACUUM TUBE PARTS

Kovar Alloy · Ceramics
Glass to Metal Seals

Stupakoff has long been a leading manufacturer of parts for vacuum tubes. Extensive experience has given Stupakoff engineers a thorough understanding and appreciation of the requirements plus the importance of quality, price and service.

STUPAKOFF CERAMIC & MFG. CO.
LATROBE, PENNSYLVANIA

BALLANTINE

World's Leading Electronic Voltmeters

SENSITIVE AC VOLTMETERS

AUDIO to 150 kc . MODEL 300



Voltage Range.....1mv—100v
Frequency Range.....10cps—150kc
Accuracy.....2% ENTIRE RANGE
Input Impedance.....½ meg shunted by 30μμf

SUB-AUDIO to 150 kc MODEL 302B



Voltage Range.....100μv—100v
Frequency Range.....2cps—150kc
Accuracy.....3% 5cps—100kc
5% elsewhere
Input Impedance.....2 meg shunted by 15 μμf*

AUDIO to 2 mc MODEL 310A



Voltage Range.....100μv—100v
As null detector 20μv min
Frequency Range.....10cps—2mc
As null detector 5cps—4mc
Accuracy.....3% 10cps—1mc
5% elsewhere
Input Impedance.....2 meg shunted by 15μμf*

AUDIO to 6 mc MODEL 314



Voltage Range.....1mv—1000v
(100μv—1mv without probe)
Frequency Range.....15cps—6mc
Accuracy.....3% 15cps—3mc
5% elsewhere
Input Impedance.....11 meg shunted by 6μμf
(1 meg shunted by 25μμf without probe)

PEAK-to-PEAK MODEL 305



Voltage Range.....1mv—1000v pk-to-pk
Frequency Range.....10cps—100kc (sine wave)
Pulse width.....3μsec—250μsec
Min Rep Rate.....20 pulses per sec
Accuracy.....5% for pulses
Input Impedance.....2 meg shunted by 15 μμf*

ACCESSORIES

SENSITIVE INVERTER MODEL 700

For Measuring DC Voltages when combined with any AC Voltmeter



Voltage Range.....1μv—100v DC
Ratios DC Input to RMS Output.....1:100 & 10:1
Accuracy.....1% 100μv—100v
Input Resistance.....>10 meg for 1:100
50 meg for 10:1

DECADE AMPLIFIER MODEL 220A

For Increasing the Sensitivity of any AC Voltmeter by 10 or 100 times



Voltage Range.....10μv—50mv
Frequency Range.....10cps—150kc
Accuracy.....2% ENTIRE RANGE
Input Impedance.....5 meg shunted by 15μμf

MULTIPLIERS MODEL SERIES 1300

For Extending the Voltage Ranges of Ballantine Voltmeters to 1000 and to 10,000 Volts



Voltmeter Model	For Extending Range to 1000v	10,000v
300	1300A	1300B
305	—	1305B
302B 310A	1310A	1310B
314	—	1314B

SHUNTS MODEL SERIES 600

For Measuring Current AC or DC when used with any AC or DC Voltmeter



Model	Resistance	Max Current
601	1 ~	1000ma
602	10 ~	300ma
603	100 ~	100ma
604	1000 ~	30ma

Current from 0.1μa to 1a can be measured using these shunts with Ballantine Voltmeters and Accessories.

SPECIAL PURPOSE MODELS

To Suit Your Requirements.

Write to us about your special measurement problems.

Famous for SENSITIVITY • ACCURACY • STABILITY

Each Ballantine Voltmeter

- Has only ONE voltage scale with decade range switching.
- Provides the same accuracy of reading at ALL points on the logarithmic voltage scale.
- Has a linear decibel scale.
- May be used as a high gain wide band amplifier.
- Responds to the average value of the input voltage wave, thus avoiding "turn-over" discrepancy.

WRITE FOR MORE DETAILED INFORMATION

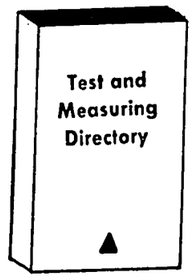
BALLANTINE LABORATORIES, INC.
102 Fanny Road, Boonton, New Jersey

*Shunt capacitance is 8μμf on all ranges except two most sensitive ranges.

A Directory of

8. Test and Measuring Equipment

Laboratory Standards & Supplies



8 Major Groups

58 Products

Organized by functions for Engineers

Test Equipment has long deserved a directory of its own, and this IRE has now produced, in Section 8.

Two IRE Professional Groups are particularly served by this section: the groups on "Instrumentation" and on "Quality Control." It makes good sense to take Test and Measuring Equipment out entirely from the listings of components, materials and services, and set up such apparatus in its own condensed, easy-to-work-with folio.

Nine basic classes of equipment organize 58 different kinds of apparatus into related groups, and advertising, in this section and elsewhere, adds interest and information.

The products and services of the Radio-Electronics industry have been organized into ten basic directories following closely the organization of the IRE Professional Groups. But 100 major product groups are numbered consecutively throughout.

88 Audio Frequency Test Equipment.
89 General Laboratory Equipment & Supplies.
90 General Test Equipment.
91 Graphic Recorders.
92 Laboratory Standards of Frequency & Time.
93 Microwave & Radar Test Equipment.
94 Nuclear.
95 Oscilloscopes—Cathode-Ray.
96 Radio Frequency Test Equipment.

Always consult the pink pages at the start of the Directory of firms, for a terminology cross-index, or to find products by name. The pink pages list more than 500 products by name, as well as under the product groups. Page numbers are given for speed.

88. Audio Frequency Test Equipment.

5. Beat frequency oscillators
10. Distortion & noise analyzers
15. Intermodulation meters
20. Output power meters
25. RC oscillators
30. Spectrum analyzers
35. Square wave generators
40. Voltmeters-audio frequency

A. R. F. Products, Inc., Ill., 10, 15
Advance Electronics Co., 451 Highland Ave., Passaic, N.J., 40
For details see ad on page 325
Airmec Ltd., England, 20, 25
Alcor Electronics Corp., N.Y., 35
American Chronoscope Corp., N.Y., 40
American Electronic Labs., Inc., Pa., 35
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35, 40
Amplifier Corp. of America N.Y., 25
Atomic Instrument Co., 84 Massachusetts Ave., Cambridge 39, Mass., 35
For details see ad on page 229
Audio Instrument Co., Inc., N.Y., 15, 40
Audio-Tone Oscillator Co., Conn., 5
Ballantine Laboratories, Inc., 102 Fanny Rd., Boonton, N.J., 40
For details see ad on page 304
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 10, 15, 25, 35
For details see ad on page 408
Bassett, Inc., Rex, Fla., 5, 25
Beede Electrical Instrument Co., N.H., 40
Berkshire Laboratories, 584 Beaver Pond Rd., Lincoln, Mass., 25, 35
For details see ad on page 315
Bogue Electric Mfg. Co., 52 Iowa St., Paterson 3, N.J., 35
For details see ad on page 13
Brush Electronics, Ohio, 5, 10, 30
Burlington Instrument Co., 203 N. 3 St., Burlington, Iowa, 15, 20
For details see ad on page 173
Canadian Research Institute, Canada, 5, 20, 25, 35, 40
Clough-Brengle Co., Ill., 5, 25
Cole Instrument Co., Calif., 20, 40
Communication Equip. & Eng., Ill., 20
Communication Measurements Lab., Inc., 350 Leland Ave., Plainfield, N.J., 25, Variable Frequency
For details see ad on page 312
Computing Devices of Can. Ltd., Canada, 30
Connecticut Telephone & Elect., Conn., 25
Crown Engineering, N.M., 5
Cubic Corp., Scott & Canon Sts., San Diego 6, Calif., 20, 35
For details see ad on page 327
Daven Co., N.J., 10, 20
Dawe Instruments, Ltd., England, 10, 20, 25
Decade Instrument Corp., P.O. Box 153, Caldwell, N.J., 5
For details see ad on page 321
Deltron Inc., Pa.
Electrical and Physical Instr., N.Y., 35
Electro Mechanical Research, Inc., Conn., 35
Electrodyne Co., Mass., 25, 35
Electronic Instrument Co., Inc., N.Y., 35
Electronic Instruments, Ltd., England, 40
Electronic Measurements Corp., N.Y., 25
El-Tronics, Inc., Pa., 25, 35
Empire Devices, Inc., N.Y., 10
Franklin Electronics, Inc., Pa., 10, 35
Freed Transformer Co., Inc., 1718 Weirfield St., Brooklyn 27, N.Y., 10, 25, 40
See complete catalog in last section
Furst Electronics, Ill., 10, 40
Furzehill Laboratories, Ltd., England, 5, 40
Gates Radio Co., Ill., 20, 25, 40
General Electric Co., N.Y., 20, 35
General Electrosonics, Inc., N.Y., 5, 30
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 5, 10, 20, 25, 35, 40
For details see ad on pages 380-381, Cover IV
Grason-Stadler Co., Mass., 25, 35, Noise Generators
Greibach Res. & Dev. Labs., N.Y., 40
Heath Co., 305 Territorial Rd., Benton Harbor, Mich., 5, 15, 25, 35, 40 Kits
For details see ad on page 331
Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif., 10, 25, 35, 40
See complete catalog in last section
Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland 8, Ohio, 10, 35
For details see ad on page 170

(Continued on page 307)

SKL PRECISION INSTRUMENTS
FOR YOUR MEASUREMENT PROBLEMS

• QUALITY • ACCURACY • EASE OF OPERATION

VARIABLE PRECISION FILTERS: SERIES 300



All SKL Series 300 precision variable electronic filters are designed to have responses identical to constant k-pi section filters. The filters have 18 db per octave per section attenuation in the rejection band. Max. attenuation 36 db per octave for Models 302 and 306.

MODEL	FUNCTION	CUT-OFF FREQUENCY RANGE	ACCURACY
300	Hi or low pass	20 cps to 200 kc	±3%, 20 cps to 20 kc ±5%, 20 kc to 200 kc
302	Hi or low pass Band pass & rejection	20 cps to 200 kc	"
305	Hi or low pass	2 cps to 20 kc	±3% over entire range
306	Hi or low pass Band pass & rejection	2 cps to 20 kc	"

WIDE-BAND CHAIN AMPLIFIERS: SERIES 200



Broad bandwidth, short rise time, stable gain, and linear phase shift make SKL Chain Amplifiers ideal for amplifying either continuous wave signals or pulses. Each model comes complete with a regulated power supply.

MODEL	BANDWIDTH	GAIN	APPLICATIONS
202C	1 kc - 210 mc	20 db	Pre-amplifier
200B	1 kc - 210 mc	10 db	Phase Inverter
214B	200 cps - 100 mc	30 db	Pulse Amplifier for C.R.T.
212A TV	40 mc - 225 mc	21 db	TV Distribution Systems

504 SQUARE WAVE GENERATOR



A rise time of .03 microseconds and a wave form without tilt or overshoot characterize the performance of this moderately priced instrument. The Model 504 Square Wave Generator has a frequency range from 0.5 cps to 1 mc in eight steps. The output voltage is continuously variable from 0 to 11 volts peak to peak. The unit comes complete with its own regulated power supply.

503 PULSE GENERATOR



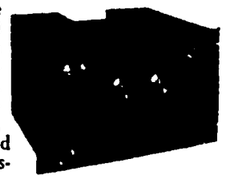
Provides a rectangular pulse shape with a rise time of less than 1 millimicrosecond. Pulse width is varied by changing length of external cable; minimum pulse width less than 1 millimicrosecond while maximum pulse width is unrestricted. Pulse repetition rate is variable from 50 to 150 pps. The pulse output voltage is continuously variable up to 150 volts; either positive or negative. Output impedance is 50 ohms. The Model 503 Fast Rise Pulse Generator is a convenient instrument for testing the response of any wide-band network.

600 CATHODE RAY INDICATOR



Designed to utilize the high writing speed capability of the type 5XP cathode ray tube in applications too advanced or special for standard oscilloscopes. In conjunction with the Model 610 Sweep Generator writing speeds up to 500 centimeters per microsecond may be observed. Conveniently mounted on the front panel are positioning, intensity, focus, and astigmatism controls.

610 SWEEP GENERATOR



Provides continuously adjustable sweep speeds of from 0.05 to 500 centimeters per microsecond for a C.R.T. or other applications requiring a linear, rapidly-rising voltage. Used with the SKL Model 600 Cathode Ray Indicator, ignition voltages, lightning, dielectric breakdown and other very fast pulses may be displayed in detail.

WIDE-BAND TELEVISION DISTRIBUTION SYSTEM: SKL manufacturers complete T.V. distribution systems for community, apartment house, and industrial use. Details upon request.

For further information write

SKL SPENCER-KENNEDY LABORATORIES, INC.
186 MASSACHUSETTS AVE., CAMBRIDGE 39, MASS.
The Finest in Precision Equipment

PHAZOR Pat. Pend. PHASE METER MODEL 200A



$349.50 F.O.B. New York, N. Y.

Measures phase shift in transformers, amplifiers, filters, and phase displacement networks.
- Measures from 0 to 360 degrees.
- Readings not affected by noise and harmonics.
- Phase shifts of the order of .01 degree can be measured employing special circuit techniques.
- Measures in-phase and quadrature components separately.

SPECIFICATIONS

Accuracy—Basic accuracy plus or minus 2 degrees. Plus or minus 1 degree due to meter error.
Noise and Harmonic Rejection—40 db. down
Sensitivity—6 millivolts full scale
Maximum Input Voltage—125 volts RMS
Peak Input Signal—400 volts
Frequency Range—20 to 20,000 cps.
Input Impedance
High Gain—2.0 megohm shunted by 25 mmfd.
Low Gain—2.5 megohm shunted by 10 mmfd.
Reference Input Impedance—4000 ohms
Power Supply—105 to 125 volts, 60 cps., 25 watts
Dimensions—Length 15 in., Hgt. 9 in., Depth 8 in.
Weight—25 pounds

INDUSTRIAL TEST EQUIPMENT CO.
55 EAST 11th ST., N. Y. 3 - Tel: GR. 3-4684

Audio Frequency Test Equipment

(Continued from page 305)

Industrial Test Equipment Co., 55 E. 11 St., New York 3, N.Y., Null Meter
For details see ad on page 307
Instrument Electronics Corp., N.Y., 40
Jackson Elec. Instrument Co., Ohio, 25
Krohn-Hite Instr. Co., Mass., 25, 35
Maico Co., Inc., Minn., Audiometers
Marconi Instruments, Ltd., N.Y., 5, 10, 20, 25, 30, 35, 40
Measurements Corp., Intervale Rd., Boonton, N.J., 15, 25, 35, 40
For details see ad on pages 284, 422-423
Mercury Electronic Co., N.J., 5, 25, 30, 35
Meters Inc., Ind., 20, 40
Moulic Specialties Co., Ill., 25
Muirhead & Co., Ltd., England, 10, 25
New London Instrument Co., Conn., 35
Nuclear Instrument & Chemical, Ill., 35
Osterland Co., Edmund, N.J., 40
Panoramic Radio Products, Inc., 10 S. 2 Ave., Mt. Vernon, N.Y., 10, 15, 30
For details see ad on page 115
Penntronics, Pa., 25, 35
Phebco, Inc., Md., 25
Philco Corp., Pa., 5, 35, 40
Pickard & Burns, Inc., 240 Highland Ave., Needham 94, Mass., 40
For details see ad on pages 113, 284
Polarad Electronics Corp., N.Y., 30
Precise Development Corp., N.Y., 30
Precision Associates, Inc., N.Y., 20, 40
Professional Electronics Co., Calif., 10, 15
Pulse Techniques, Inc., N.J., L C Step Oscillator
Radex Corp., Ill., 25
Radio City, Products Co., Inc., N.Y., 35, 40
Radio Corp. of America, Camden, N.J., 5, 10, 15, 20, 25, 30, 35, 40
For details see ad on pages 88, 440-441
Rawson Elec. Instr. Co., Mass., 40
Reiner Electronics Co., Inc., N.Y., 20, 35, 40
Resdel Engineering, Calif., 5, 25, 35
Ribet Desjardins, France, 25, 35
Rockwell Engineering Co., Ind., 40
Rutherford Electronics Co., Calif., 35
Scott, Inc., H. H., Mass., 10, 25
Sensitive Research Instr. Corp., 9-11 Elm Ave., Mt. Vernon, N.Y., 40
For details see ad on page 307
Servo Corporation of America, 20-20 Jericho Tnpke., New Hyde Park, L.I., N.Y., 35
For details see ad on pages 438-439
Sierra Electronic Corp., Calif., 40
Simpson Mfg. Co., Inc., Mark, N.Y., 10, 25
Sondyna, A. G., Switzerland, 35
Sonotone Corp., N.Y., Audiometer
Specialty Assem. & Packing Co., N.Y., 5, 20, 40
Spencer-Kennedy Laboratories, Inc., 186 Massachusetts Ave., Cambridge 39, Mass., 35
For details see ad on page 306
Starrett Television Corp., N.Y., 5
Supreme Inc., Miss., 5, 40
Sylvania Electric Products Inc., 254 Rano St., Buffalo 7, N.Y., 30
For details see ad on pages 417-420
Teca Corp., N.Y., 25, 35
Tektronix, Inc., Ore., 30
Teletronics Laboratory, Inc., N.Y., 25, 35
Television Equip. Corp., N.Y., 5, 25, 30
Tensor Electric Dev. Co., N.Y., 35
Trad Television Corp., 1001 First Ave., Asbury Park, N.J., 40
For details see ad on page 338
Triumph Mfg. Co., Ill., 25, 35
Vectron, Inc., 402 Main St., Waltham 54, Mass., 30
For details see ad on page 308
Walkirt Co., Calif., 35
Waveforms, Inc., N.Y., 5, 25, 30, 40, Curve Tracer
Wayne-Kerr Labs., Ltd., Sycamore Grove, New Malden, Surrey, England, 10, 25, 35
For details see ad on page 316
Weinschel Engineering Co., Inc., Md., 25 Keyboard Oscillator
Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N.J., 20, 40
For details see ad on page 172
Western Sound & Elec. Labs., Inc., Wis., 5, 10, 15, 20, 25, 30, 35 40

SENSITIVE
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The Finest In Laboratory Standard Instruments For A.C. and D.C.

ACCURACIES UP TO 1/20 OF 1% AVAILABLE

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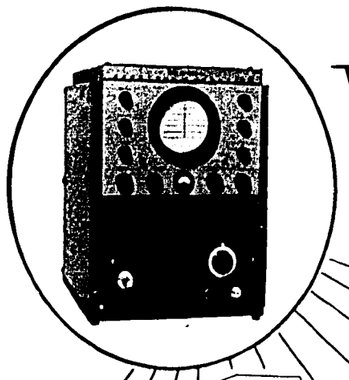
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- ★ A.C.-D.C. POLYRANGER
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Meters and Panel Instruments
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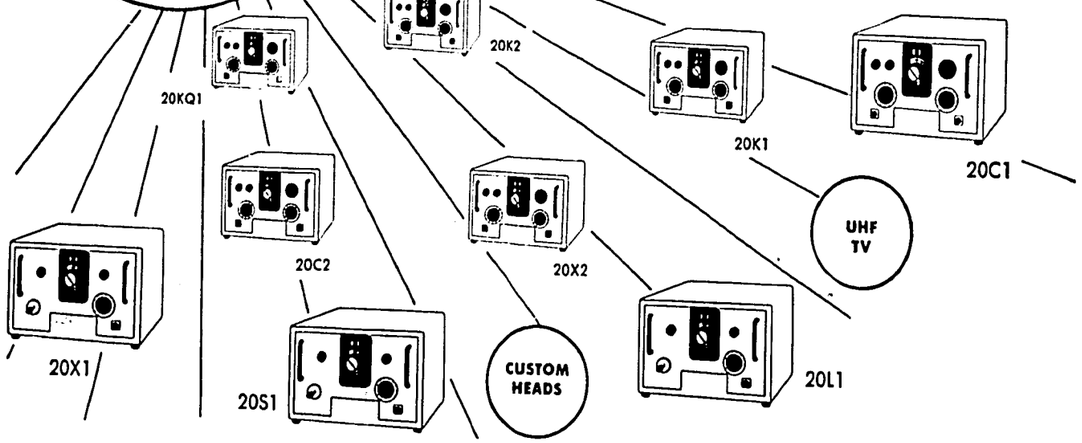
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VECTRON'S MICROWAVE

Spectrum Analyzer

SPECIFIC BAND COVERAGE AT THE OPERATING FREQUENCIES YOU NEED



Interchangeable R. F. Heads save expense . . . save space Vectron's Spectrum Analyzer with interchangeable R. F. Heads eliminates the extra cost and bulk of equipment which covers large areas in bands you never use

No conversion or adaptation Every Vectron R. F. Head can be placed in immediate operation, without conversion or adaptation, in the Vectron SA10 or SA20 Spectrum Analyzer Chassis

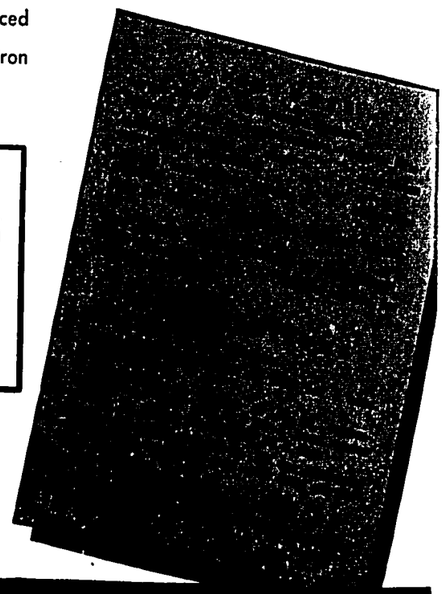
For Microwave Radar and Communications Equipment The Vectron SA20 Spectrum Analyzer presents visually the frequency distribution spectrum of the power output of pulsed or CW microwave oscillators and can be used as a sensitive RF detector for checks and measurements in the design, production and maintenance of microwave radar and communications equipment and components

Vectron's New OSCILLATRON
The new self-contained; self-powered crystal controlled transistor oscillator.

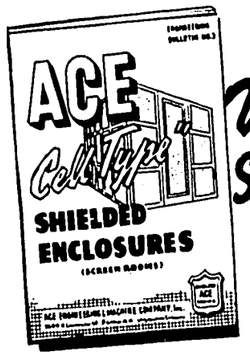
FREQUENCY STANDARD
Have your Vectron representative demonstrate it today or write for latest bulletin.



Write Today **For Bulletin SA20 and a free copy of the new Band Code Reference Table**

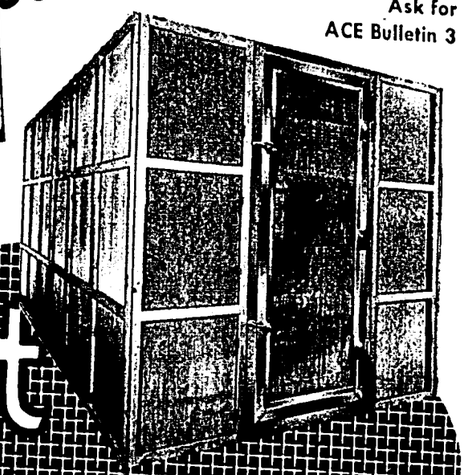


VECTRON, inc. *Electronic and Electro Mechanical Equipment*
402 MAIN STREET, WALTHAM 54, MASS.
Vectron invites your inquiries regarding the development and manufacture of



Write for this SCREEN ROOM GUIDE!

Ask for ACE Bulletin 3

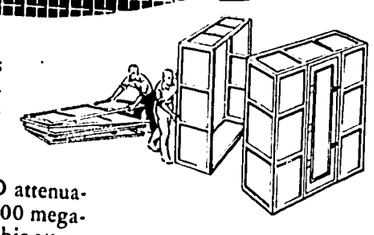


Shut RADIO INTERFERENCE "IN" OR "OUT"

Nine out of 10 screen rooms used in meeting today's exacting specifications were made by ACE!

These sturdy shielded enclosures provide a GUARANTEED attenuation of 100 db from 0.15 to 1,000 megacycles and to closely approach this attenuation at 10,000 mc. They are ideally suited for keeping "background" radio interference influence from affecting sensitive R-F measurements or for shielding equipment that would otherwise cause serious radio broadcast or TV noise.

Features include low R-F impedance door design; complete facilities for power, water, gas, air conditioning or ventilation service entries; access doors; "cell type", single screen or solid shield and many others.



Installed in a few hours!

Ace rooms are supplied in pre-built sectional form for quick, easy erection. They can readily be enlarged or relocated.

SHIELDED ACE ROOMS

MEET EXACTING SPECIFICATIONS
INCLUDING JAN-I-225, 16E4 (SHIPS), MIL-1-6181 AND OTHERS WITH AN ACE SHIELDED ENCLOSURE!

ACE ENGINEERING and MACHINE Co., Inc.
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Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

89. General Laboratory Equipment & Supplies. 89

5. Chemicals
10. General laboratory equipment
15. Screen Rooms
20. RF Shielding materials

Ace Engineering & Machine Co., Inc., 3644 N. Lawrence Ave., Philadelphia 40, Pa., 15
For details see ad on page 309
American Instrument Co., Inc., Md., 10 Humidity Test
American Machine & Foundry Co., Mass., 5, 10, 15, 20
Anchor Specialty Mfg. Co., N.J., 10
Bache & Co., Semon, N.Y., Optical Systems
Burroughs Corp., New Products Div., 511 N. Broad St., Philadelphia 23, Pa., 10
See complete catalog in last section
Canadian Radium & Uranium Corp., N.Y., 15
Canadian Research Institute, Canada, 5, 10
Central Scientific Co., Ill., 5, 10
Chisholm Industries, Ltd., Canada, 15
Eastman Kodak Co., N.Y., 5
Eldico of New York, Inc., 44-31 Douglaston Pkwy., Douglaston, L.I., N.Y., 15, 20
For details see ad on page 257
Electro Products Lab., Inc., 4501 N. Ravenswood Ave., Chicago 40, Ill., 10
For details see ad on page 231
Electro-Search, 4337 N. 5 St., Philadelphia 40, Pa., 15
For details see ad on page 283
Electronic Heating Corp., Mass., 15, 20
Engineering Developments, Inc., R.I., Optical Inspection Devices
Fisher Scientific Co., Pa., 5, 10
Gaertner Scientific Corp., Ill., 10 Optical Inspection
Gates & Co., Inc., George W., N.Y., 10
General Cement Mfg. Co., Ill., 5
General Electrosonics, Inc., N.Y., 10
Hartman Engineering Co., Mass., 10
Kollmorgen Optical Corp., N.Y., Optics
Kupfrian Mfg. Co., N.Y., 20
Lindgren & Associates, Erik A., 4515 N. Ravenswood Ave., Chicago 40, Ill., 10, 15, 20
For details see ad on page 311
Linear Equipment Labs., 295 West Shore Dr., Massapequa, L.I., N.Y., 10
For details see ad on page 333
Mackay, Inc., A. D., N.Y., 5
Marsh-Theiss, Inc., N.Y., Optical
Metal Textile Corp., 647 E. First Ave., Roselle, N.J., 20
For details see ad on page 279
Micro-Circuits Co., New Buffalo, Mich., 5, 20
For details see ad on page 287
Multi-Tron Laboratory, Ill., 10
North American Philips Co., N.Y., 10
North American Philips Co., Inc., N.Y., Electron Microscope
Nuclear Instrument & Chemical, Ill., 5, Radioactive
Optical Film Engineering Co., 2737 N. 6 St., Philadelphia 33, Pa., Front Surface Mirrors
For details see ad on page 69

(Continued on page 311)

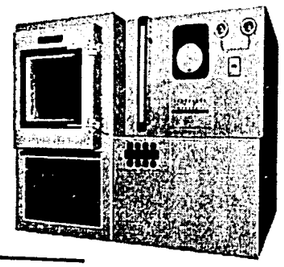
temperatures!
atmospheres!
pressures!

FOR ACCURACY TEST WITH Tenney

. . . For Tenney Test Chambers are precision-engineered for maximum efficiency and can be designed to simulate the complete range of temperature, atmospheric or pressure conditions found anywhere on earth—or above it to altitudes of 120,000 ft. plus! They attain sub-zero temperatures quickly, maintain them efficiently and provide full instrumentation for accurate evaluation of complete test data.

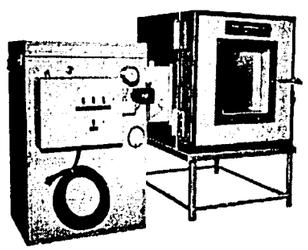
TENNEYZPHERE ALTITUDE CHAMBERS

Designed to withstand atmospheric pressure and to simulate global conditions of pressures, temperatures and humidities. Altitudes from sea level to approx. 80,000 ft. Temperature range from plus 200°F to minus 100°F. Also simulates desired (20% to 95%) relative humidity.



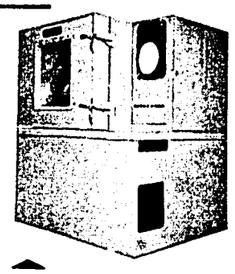
TENNEY SERVO UNIT

Portable air conditioning unit which may easily be attached to various types of laboratory enclosures —impact machines; tension machines; torsion testers; cold boxes and similar equipment. Through its use, articles undergoing testing, aging or weathering can be subjected to wide variations of humidity, heat and cold. Photo shows servo attached to companion chamber.

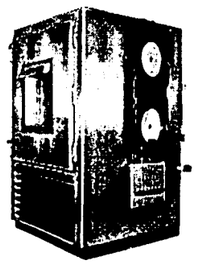


TENNEY TEMPERATURE AND HUMIDITY CHAMBERS

These chambers provide positive control of wet- and dry-bulb temperatures, humidity, and air circulation; and are designed for research and production testing of physical quality, fragility, tension, and all other pertinent factors, at constant conditions or on planned program cycles.



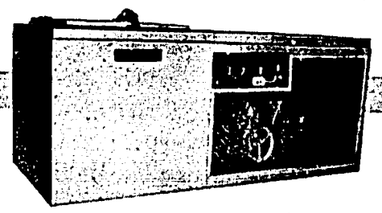
Model TR—Precision recorder controllers permit accurate simulation and check of temperatures to +200°F. Meets all Mil and JAN specifications for low- and high-temperature requirements by incorporation of temperatures down to —100°F. Humidities within 20%-95% range. Built in a variety of standard sizes.



Model TH—Specifically designed for a temperature range of +35°F to +180°F, and a humidity range of 20%-95%. Accurately simulates, controls, and checks all above-freezing temperatures. Can incorporate program control for meeting a wide variety of Mil specifications if desired. Manufactured in many standard sizes.

TENNEY SUB-ARCTIC INDUSTRIAL CABINETS

Designed for low-temperature testing of metals, radios, instruments, plastics, liquids, chemicals and pharmaceuticals. Temperature ranges of —40°F, —60°F, —95°F and —150°F are standard for each size.



Tenney ENGINEERING, INC.

Los Angeles Representative:
GEORGE THORSON & CO.

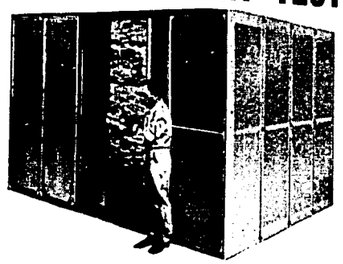
Engineers and Manufacturers
of Automatic Environmental Test Equipment

B670

For further information on these and other Tenney test equipment, write to Tenney Engineering, Inc., Dept. N, 26 Avenue B, Newark 5, New Jersey.

PROVEN BY EXACTING LABORATORY TESTS

MINIMUM R F INTERFERENCE





EASY TO ASSEMBLE . . . and easy to take apart for storage or relocation.



LEAK PROOF DOORS Wedge shaped like refrigerator doors, to assure tight shield.



FLOOR CONSTRUCTION Standard load 140 lbs. per sq. ft. Up to 2000 lbs. available.

LINDGREN DOUBLE SHIELDED PORTABLE SCREEN ROOMS

Latest laboratory tests show up to 146 DB attenuation practically level over the entire frequency range, 15 KCS to 1000 MCS, and excellent results are had at frequencies up to 10,000 MCS . . . highest ever known!

Lindgren true double shielded portable screen rooms meet the exacting requirements set up by Industry, Armed Forces, and Laboratories. Here is a truly double shield—made in sections, easily assembled or taken down. No soldering required. Excellent metal to metal contact is made with low impedance contacting.

Don't take chances with improvised screen rooms. Get the best . . . guaranteed to meet government specifications. 10 standard sizes . . . or built to your requirements.

WRITE for illustrated circular, specifications, performance charts, and price list.

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4515-17 N. Ravenswood Ave. Chicago 40, Ill.
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—Established 1939—

Electrically Conductive Cloth

A New Engineering Material for many Applications in Electronics

Suggested uses: RF Shielding
Radar Reflection
Microwave Gasketing
Warning Systems
Attenuators

Buy it by the yard and sew it to shape on any sewing machine. Or, have us sew it for you.

Write or phone

SWIFT INDUSTRIES, Inc.
10 Love Lane, Hartford 1, Conn.
Hartford 2-1181

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(Continued from page 309)

Pickard & Burns, Inc., 240 Highland Ave., Needham 94, Mass., 23
For details see ad on pages 113, 284
Pennsylvania Testing Laboratory, Pa., 10
Precision Measurement Co., N.Y., 10
Production Control Units, Inc., Ohio, 10
RFI Shielded Enclosures Corp., Pa., Solid Shielded Enclosures
Radio Sonic Corp., N.Y., 10
Rolab Studios, Conn., Camera Timers
Semon Bache & Co., N.Y., Optical Systems
Shielding, Inc., Riverside Park, N.J., 15, 20
For details see ad on page 313
Southwest Technical Lab., N.M., 20
Standard Pressed Steel Co., Pa., 10
Stark Electronic Instruments, Ltd., Canada, 15
Steiner-Ives Co., N.J., 10
Stockman Electronics Research, Mass., 10
Swift Industries, Inc., 10 Love Lane, Hartford 1, Conn., 20
For details see ad on page 311
Sylvania Electric Products Inc., 254 Rano St., Buffalo 7, N.Y., 10
For details see ad on pages 417-420
T. L. G. Electric Corp., N.Y., 30

(Continued on page 313)

LEAK DETECTORS AND MULTI-PORT MANIFOLDS

Our staff of engineers is ready to consult with you on any of your leak testing problems; the Veeco Mass Spectrometer Leak Detector offers the most sensitive method of finding and locating leaks; Evacuating, Leak-Testing and Back-Filling Manifolds supplied with one or many ports.

SPECIAL EQUIPMENT, ENGINEERED BY VEECO, CAN BE BUILT TO YOUR SPECIFICATIONS.

VEECO
VACUUM-ELECTRONIC ENGINEERING CO.
86-P Denton Avenue
New Hyde Park, New York
GARDEN CITY 7-1161

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

CML TEST EQUIPMENT PERFORMANCE

Model 1435 Variable Frequency Electronic Generator



Frequency Range: 50-6000 cps in 4 ranges

Frequency Control: Single dial, direct reading, linear scale in 4 ranges: 50-180; 170-600; 540-1800; 1700-6000 cycles.

Power Output: Nominal rating 2200 w continuous duty.

Output Voltage: The controlled output voltage is continuously adjustable from 40 volts to 140 volts. Normal performance is considered at the 120 volt RMS output where the change in output voltage from no load to full load of 2200 watts will not exceed 2%.

Waveform: The waveform varies slightly from no load to full load. At full load, the distortion is less than 7%.

Power Supply: Any 60 cycle single phase source between 208 and 260 volts capable of carrying a 5Kw. load with good regulation. A tapped auto transformer is provided to take care of this range of input voltages.

Model 1430 Electronic Generator

Similar to Model 1435 except power output is 1400 watts. Power input 3500 Watts.



Model 1100-1110 Electronically Regulated Power Supplies

Power Source: 110-115-125 volts, 50-60 cycles.

D.C. Power Output: 200 ma. from 225 volts to 300 volts. 180 ma. from 300 volts to 320 volts.

Total noise content in output is less than 5 millivolts. Regulation: less than 1 volt change from no load to full load. Unregulated heater supply 6.3 volts at 5 amperes.

Model 1130 Regulated Power Supply

Power Input: 105 to 125 volts, 60 cycles.

D.C. Output: 210 volts to 310 volts 0 to 400 ma.

Regulation less than 1% from no load to full load at 310 volts. Below 270 volts at any load, or below 300 ma. load at any voltage, regulation is better than 1 volt.

Total noise content in output does not exceed 10 millivolts at 310 volts-400 ma. at any load below 270 volts or at any voltage below a 300 ma. load noise output is less than 5 millivolts.



Model 1420 Variable Frequency Electronic Generator

Frequency Range: 50-6000 cycles in 4 ranges. 50-180; 170-600; 500-1800; 1700-6000 cps.

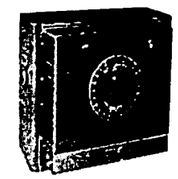
Power Output: 300 watts continuous duty.

Maximum distortion at full output into resistive load less than 5%.

Regulation no load to full load within 2%.

Nominal regulated voltage output 80-120-135-215-255 or 270 volts.

Power input 115 volts 60 cycles 1 Kw.



Model 1010 Rotobridge

Automatic Inspector For Production Line Testing.

Checks equipment for opens or shorts in wiring. Checks tolerance of resistors at 5%, 10% or 20% as required.

Resistance Test Range: 200 ohms to 2 megohms at 5%. Tests smaller and larger values at 10%.

Tests one circuit per second, up to 119 circuits in one cycle PROVIDES NUMERICAL indication of every defective circuit.

Model 1210B Stroboscope



Stroboscope lamp mounted in small probe.

Range 480 to 60,000 rpm in 4 ranges individually calibrated on fundamentals 80-1000 cycles.

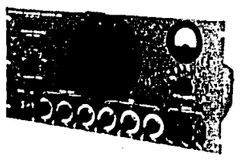
Vibrating reed for calibration.

Accuracy of reading better than 1%.

Overall maximum departure from calibration less than 3%.

Power Supply requirements: 105-125 volts, 50-60 cycles.

Model 1440 Three Phase Oscillator



Model 1440: Three Phase Oscillator Frequency Range 17 to 17,000 cycles. One, two or three-phase output.

Phase relationship of all phases adjustable through 360 degrees rotation.

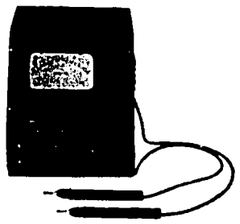
Model 1135 Regulated Power Supply

Power Input: 105-125 volts, 50-60 cycles.

Output #1: 0-200 ma from 0-170 volts; 160-300 volts in two ranges. Noise less than a millivolt.

Output #2: Regulated "C" bias 0-100 volts.

Output #3: Unregulated 6.3 volts 5 amp. ac.



MODEL 1515 MEGOHM METER

Range: 0.4 to 100,000 megohms in 5 over-lapping ranges.

Accuracy: Better than 5% on all ranges at all points on the scale.

Guarding: The instrument is efficiently guarded on all ranges so that atmospheric conditions do not affect its accuracy.

WRITE FOR COMPLETE CATALOG

COMMUNICATION MEASUREMENTS LABORATORY, INC.

350 LELAND AVE PLAINFIELD N J

For RF interference suppression

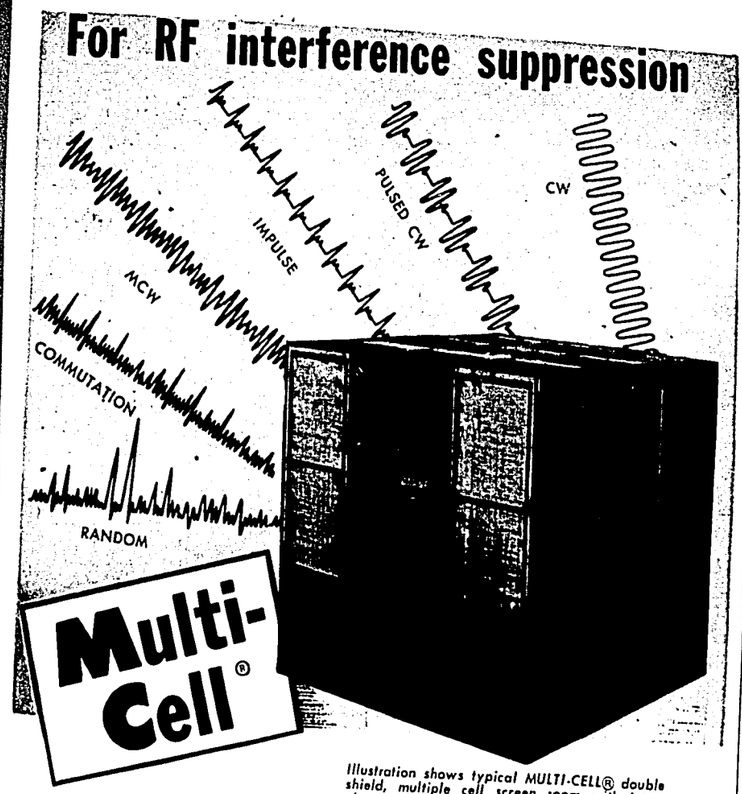


Illustration shows typical MULTI-CELL® double shield, multiple cell screen room with interchangeable sections and buffer panels.

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SHIELDING ROOMS

PROVEN . . . the best shielding available over the major portion of the Spectrum in use today . . .

Attenuation characteristics approaching the ultimate, jig-precision sectional construction, and superior set-up flexibility have won top rating for MULTI-CELL® Shielding rooms with military, industrial and scientific organizations. Their better performance, under the most difficult of field conditions, has been thoroughly proved and fully recorded for the information of engineers with shielding problems. Consultation available anywhere — without obligation.

JAN-I 225. 16E4 (Ships), MIL-I-16910,* MIL-S-4957

Specifications fully met, in addition to all others for electrical and electronic equipment performance in research, development and production. Attenuation Min. 100db from .15 to 10,000 MC. Room sizes and types as required.

**Standard, approved Military specifications for shielding rooms.*

Greatly increased manufacturing facilities and personnel now enables us to give PROMPT SERVICE and FAST DELIVERY anywhere.

CATALOG ON REQUEST

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LOS ANGELES, CAL., OFFICE: 2924 Selby Ave. Phone: Vermont 9-6388



R-F SHIELDING ROOMS

SHIELDING, INC.

RIVERSIDE, N. J.

Phone Riverside N J 4 1707

The Talent to Create The Skill to Produce

General Laboratory Equipment & Supplies

(Continued from page 311)

Televex Co., N.Y., Microscopes, Stylus Inspection

Television Zoomar Corp., N.Y., Lenses

Tenney Engineering, Inc., 26 Avenue B, Dept. N, Newark 5, N.J., Test Chambers

For details see ad on page 310

Tracerlab, Inc., Mass., 5

Vacuum-Electronic Engineering Co., 86-P Denton Ave., New Hyde Park, L.I., N.Y., 10

For details see ad on pages 294, 311

Wakefield Industries, Inc., Ill., Scientific Glass

Welch Mfg. Co., W. M., Ill., 5, 10

Wilmad Glass Co., Inc., Franklin & Flower Sts., Landisville, N.J., Glass Tubing

For details see ad on page 95

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York Co., Inc., Otto H., N.J., 20

Zenith Optical Laboratory, N.Y., Optics

90. General Test Equipment.

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10. Bridges, impedance
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20. Decades, capacitance
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30. Multimeters
35. Ohm & megohm meters
40. Strain gauges
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Airmec, Ltd., England, 35, 55

Air-O-Tronics, Calif., 30, 55

American Chronoscope Corp., N.Y., 55

American Instrument Co., Inc., Md., 40

American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60

American Thermo Electric Co., N.Y., Vacuum Thermocouples

Analytical Measurements, Inc., N.J., PH Meters

Associated Research, Inc., Ill., 15, 35, 45

Audio Instrument Co., Inc., N.Y., 55

Austin Co., N.Y., 15

Baird Associates, Inc., Mass., Spectrometer Flame Photometer

Ballantine Laboratories, Inc., 102 Fanny Rd., Boonton, N.J., 55

For details see ad on page 304

Bardwell & McAlister, Calif., 5

Beckman Instruments, Inc., Calif., 55

Berkshire Laboratories, 704 Beaver Pond Rd., Lincoln, Mass., 45

For details see ad on page 315

Beta Electric, N.Y., Insulation Test

Biddle Co., James G., Pa., 15, 35

Biophysical Instruments, Inc., Pa., 10, 40

Bone Engineering Corp., Calif., 60

Boonton Radio Corp., Intervale Rd., Boonton, N.J., 10

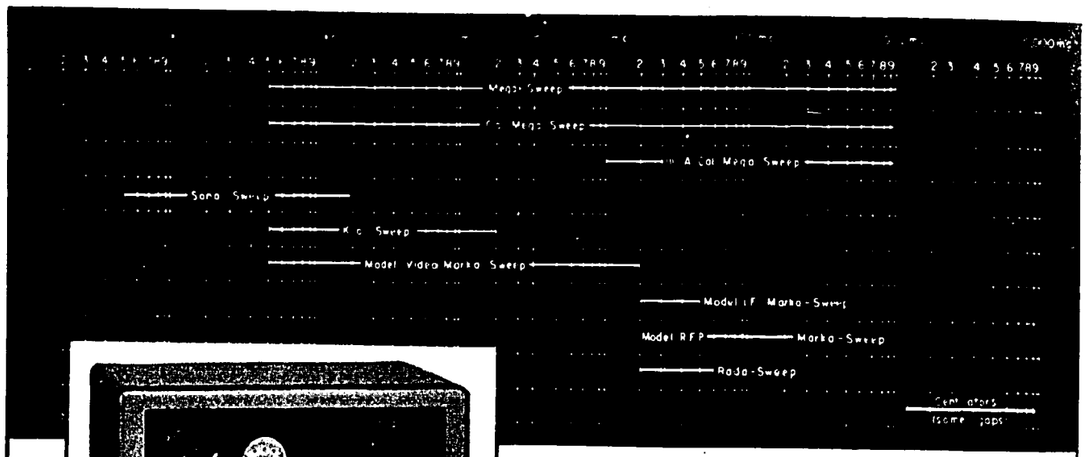
For details see ad on page 332

Borden Engineering Co., N.J., 15, 35

Bourns Laboratories, Calif., Potentiometer Test Meters

Branson Instruments, Inc., Conn., Thickness Tester

(Continued on page 315)



NEED SWEEPING OSCILLATORS

FOR RAPID and ACCURATE VISUAL MEASUREMENTS ?

	Frequency Range	Tuning	Maximum Sweep Width	Markers	Output (Open Circuit)	Price* f.o.b. factory
Mega-Sweep	50 kc - 1000 mc	Continuous	30 mc	None	0.1 volt	$395.00
Calibrated Mega-Sweep	50 kc - 950 mc	Continuous	30 mc	None	0.1 volt	425.00
111-A Calibrated Mega-Sweep	10 mc - 950 mc 450 mc - 900 mc	Continuous	40 mc	None	0.3 volt, 70 ohms 0.6 volt, 300 ohms	575.00
Sona-Sweep	5 kc - 200 kc	Continuous	20 kc	Up to six crystal positions	1.0 volt	525.00
Kilo-Sweep	50 kc - 2 mc	Continuous	100 kc	Up to six crystal positions	1.0 volt	525.00
Model Video Marka-Sweep	50 kc - 20 mc	Three Ranges 50 kc - 5 mc 50 kc - 10 mc 50 kc - 20 mc	Complete Range	Up to six crystal positions	0.6 volt	495.00
Model IF Marka-Sweep	20 mc - 50 mc	Four Ranges	500 kc (Narrow) 15 mc (Wide)	Up to nine crystal positions	0.5 volt	295.00
Model RF-P Marka-Sweep	All 12 channels, VHF TV Range	Switchable	15 mc	Pix and Sound crystal positions	0.5 volt, 70 ohms 1.0 volt, 300 ohms	795.00
Rada-Sweep	30 & 60mc centers; Others, special	Switchable	3 mc (Narrow) 20 mc (Wide)	Up to nine crystal positions	0.5 volt	395.00
No. 1214 Centilator	1245 mc - 1460 mc	Continuous	5 mc	None	134 mw	595.00
No. 3439 Centilator	3400 mc - 3960 mc	Continuous	40 mc	None	106 mw	495.00
No. 4249 Centilator	4240 mc - 4910 mc	Continuous	35 mc	None	115 mw	450.00
No. 6274 Centilator	6250 mc - 7425 mc	Continuous	50 mc	None	110 mw	450.00
No. 8596 Centilator	8500 mc - 9660 mc	Continuous	60 mc	None	30 mw	395.00

In some cases small extra charge for crystal substitutions or additions

Marker Generators • Pulse Generators • Random Noise Generators • Spectrum Analyzers • Reflected Energy Measuring Equipment • Attenuators • Noise, Vibration and Speech Analyzers • Gain Measuring Equipment • Tachometers • Other LF, HF, UHF, Microwave Test Equipment.



REQUEST NEW 1952-1953 CATALOG FOR FULL DETAILS

KAY

KAY ELECTRIC COMPANY

14 Maple Avenue — Phone CAldwell 6-4000 — Pine Brook, New Jersey

Brilmayer Laboratories, Inc., E. W., N.Y., Metal Detectors
Brown Electro-Measurement Corp., Ore., 5, 10, 15, 25
Brush Development Co., Ohio, 5, 10, 15
Brush Electronics, Ohio, 10, 35, 60
Buck Engineering Co., Inc., N.J., 50
Burroughs Corp., New Products Div., 511 N. Broad St., Philadelphia 23, Pa., Computer Test Equip.
See complete catalog in last section
C. G. S. Laboratories, Inc., Conn., 5, 55
Calidyne Co., The, Mass., 60
Canadian Research Institute, Canada, 5, 15, 20, 25, 30, 35, 50, 55, 60
Central Sales & Mfg. Corp., N.J., 50
Central Scientific Co., Ill., 15
Clippard Instrument Laboratory, Ohio, 5, 15, 35, 55
Clough Brengle Co., Ill., 5, 10, 15
Cole Instrument Co., Calif., 5, 10, 15, 20, 25, 30, 35, 55, Insulation Test
Columbia Technical Corp., 5 E. 57 St., New York 22, N.Y., Coil Tester
For details see ad on page 245
Communication Measurements Lab., Inc., 350 Leland Ave., Plainfield, N.J., 35, 45
For details see ad on page 312
Computer Corporation of America, N.Y., 55
Computer Research Corp., Calif., Germanium Diode Testers
Computing Devices of Can., Ltd., Canada, 5, 10
Conn., Ltd., Electronics Div. C. G., Ind., 45
Consolidated Engineering Corp., Calif., 60
Control Engineering Corp., Mass., 40
Cornell-Dubilier Electric Corp., 333 Hamilton Blvd., South Plainfield, N.J., 5, 20
For details see ad on page 6
Daven Co., N.J., 10, 15, 25, 55
Davies Laboratories, Inc., Md., 60
Dawe Instruments, Ltd., England, 10, 20, 25, 35, 45
De Ryder, Herbert, N.J., 50
De Wald Radio Mfg. Corp., N.Y., 60
Dice Co., J. W., N.J., 35
Dollar Co., Robert, Calif., Ion Gauges
Douglas Instrument Labs., Mass., 30
Douglas Labs., Inc., 373 Fourth Ave., New York 19, N.Y., 5, 50
For details see ad on page 401
Douglas Radio Labs., Mass., 30
Dyna Labs., Inc., N.Y., Gaussmeter
Edin Company, Inc., Mass., 40
Electrical Device Mfg. Co., N.J., 30, 50
Electro Products Laboratories, Inc., 4501 N. Ravenswood Ave., Chicago 40, Ill., 60
For details see ad on page 231
Electronic Designs, Inc., N.Y., 55
Electronic Engineering Asso., Calif., Transducers
Electronic Instrument Co., Inc., N.Y., 5, 15, 25, 30, 50, 55
Electronic Instruments, Ltd., England, 30, 35, 55
Electronic Measurements Co., Inc., N.J., 45, 55
Electronic Measurements Corp., N.Y., 30, 35, 50, 55
Electronic Tube Corp., Pa., 60
Elliott Brothers London, Ltd., England, 40
Elm Laboratories, N.Y., 5, 15
El-Mec Laboratories, Inc., N.J., 30
El-Tronics, Inc., Pa., 35
Endevco Corp., Calif., 60
Entwistle Co., James L., R.I., 50
Eppley Laboratory, Inc., R.I., Standard Cells
Espey Manufacturing Co., Inc., N.Y., Interference Testers
F. S. D. Laboratories, Conn., 5, 10, 15, 20
Feldman & Co., Henry, Calif., 10, 60
Fluke Engineering Co., John, Wash., V A W Meter
Franklin Electronics, Inc., Pa., 10, 60
Freed Transformer Co., Inc., 1718 Weirfield St., Brooklyn 27, N.Y., 5, 10, 20, 35, 55
See complete catalog in last section
Furzehill Laboratories, Ltd., England, 25, 55
General Electric Co., N.Y., 5, 10, 15, 35, 40, 60
General Electric Co., N.Y., 15
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 5, 10, 15, 20, 25, 35, 45, 55, 60
For details see ad on pages 380-381, Cover IV
Glenco Corp., 212 Durham Ave., Metuchen, N.J., 5, 40, 60
For details see ad on page 137

BERKSHIRE LABMARKERS



The simple, easy way to add time marks to C.R. 'scope traces. Generate pulses from sine waves. Wholly self-contained. Model 1-U $18.50

BERKSHIRE LABCASES



To house 3- or 4-terminal networks for plug-in service. Model 19-S, 4-terminal $4.00 Model 19-G, 3-terminal $3.50

To house circuits using up to 2 miniature tubes. Molded Tenite half-shells hold octal base and two 9-pin Noval sockets. Model 19-P $2.00

LABTRANS PULSE TRANSFORMER



Mod.	Imp.	Rise Time	Percent Droop 1μs	2μs	10μs	Price
PT-1	100	.04μs	20	50	80	8.95
PT-2	100	.04μs	20	30	70	8.95
PT-3	120	.03μs	20	40	75	9.50

PT-4, hermetically sealed version of PT-3 .....$15.00

BERKSHIRE LABSTROBE



For checking speed of motors, machines, turntables. Flashes 60 times a second. Chromed case, reflector, 6 ft. cord $9.95

BERKSHIRE GERMANIUM DIODES

as used in Berkshire Labmarkers. Model GCD-1 .....$3.00

BERKSHIRE METALS TESTER

For sorting, grading, and comparing metal parts by rapid check of critical magnetic of electrical properties. Model 44 .....$710.00

BERKSHIRE LABORATORIES

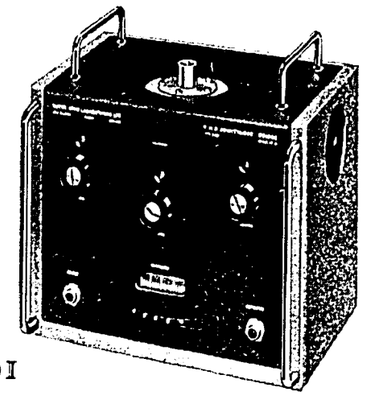
704 Beaver Pond Road
Lincoln, Massachusetts

Gow-Mac Instrument Co., N.J., Gas Analysis
Gray Instrument Co., Pa., 15, 20, 25
Greer Hydraulics, Inc., N.Y., Aircraft Accessories
Gulton Mfg. Corp., N.J., 5, 60
Hasler Tel. Co., N.Y., Tachometer
Hathaway Instrument Co., Colo., 15
Heath Co., 305 Territorial Rd., Benton Harbor, Mich., 5, 10, 15, 20, 25, 30, 35, 50, 55, Kits
For details see ad on page 331
Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif., 10, 55
See complete catalog in last section
Hewson Co., John, N.Y., D C Insul. Test
Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland 8, Ohio, 30, 35, 50, 55
For details see ad on page 170
Hycor Co., Inc., Calif., 25
Industrial Control Co., N.Y., Servo Test
Industrial Instruments, Inc., 5, 15, 20, 25
Industrial Television, Inc., N.J., 30
Industrial Transformer Corp., Pa., 10, 55, Insulation Test
Instrument Electronics Corp., N.Y., 55
Instrument Laboratories, Ill., 30, 35
International Instruments, Inc., P.O. Box 2954, New Haven 15, Conn., 30
For details see ad on page 171
Jackson Elec. Instrument Co., Ohio, 5, 50, 55
Jersey City Technical Lab., N.J., 30
Kahn & Co., Inc., Conn., 15
Kalbfell Laboratories, Inc., 1090 Morena Blvd., San Diego 10, Calif., 5
For details see ad on page 257
Kartron, Calif., Shorted Turn
Kay Electric Co., 14 Maple Ave., Pine Brook, N.J., 60
For details see ad on page 314
Keithley Instruments, Ohio, 35, 55
L. A. B. Corp., N.J., 60
Lee Electronic Labs., Inc., Mass., 25
Lehigh Valley Electr. Engr., & Mfg., Pa., Quartz Crystal Test
Lektra Laboratories, Inc., N.Y., Electronic Timer
Livingston Electronic Corp., N.J., 50
M. B. Manufacturing Co., Inc., Conn., 60
Macleod & Hanopol, Inc., Mass., 5, 35, 50
Magnetic Amplifiers, Inc., 632 Tinton, New York 55, N.Y., Transistor Curve Tracer
For details see ad on page 167
Mallory & Co., Inc., P. R., Ind., 5, 60
Marconi Instruments, Ltd., N.Y., 5, 10, 15, 55
Marion Electrical Instrument Co., 400 Canal St., Manchester, N.H., 15, 30
For details see ad on page 234
Marma Electronic Co., Ill., 25
Master Appliances, Inc., Ind., 50, Coil Test
Measurements Corp., Intervale Rd., Boonton, N.J., 55
For details see ad on pages 284, 422-423
Mercury Electronic Co., N.J., 30, 45, 55
Meters, Inc., Ind., 30

(Continued on page 317)

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

True
BRIDGE MEASUREMENT
up to 250 mc/s



B901

FOR UNBALANCED MEASUREMENT IN THE RANGE 50-250 Mc/s.

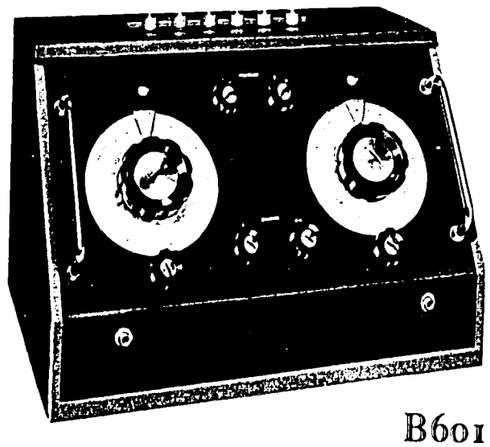
Provided with a co-axial outlet to which various types of plug and socket can be fitted by means of adaptors. As with other bridges in this series, the difficulties associated with large standard elements in the bridge circuit are avoided by the use of transformer coupling between the unknown and standard.

Specification

Susceptance:	Equivalent to ± 75 pfd.
Conductance:	0 - 100 millimhos.
Accuracy:	Susceptance: ± 2% or ± .5 pfd.
	Conductance: ± 2% or ± 0.2 millimho (whichever is the greater)

ARANGE of bridges for use with external source and detector in the measurement of antennas, cables, feeders, and a variety of components and materials. Built to conform with the exacting standards of the British Broadcasting Corporation and the General Post Office, these bridges use the transformer ratio arm technique. They have therefore the unique advantage of the extreme stability at all frequencies resulting from low impedance to ground and between terminals at balance. Calibration is independent of frequency and is in terms of conductance and positive or negative capacitance. Both balanced and unbalanced impedances can be measured up to 100 Mc/s.

★ *These bridges are distributed in the U.S.A. by Marconi Instruments Ltd., 23-5 Beaver Street, New York, 4, N.Y. HAnover 2-0197-8 and in Canada by the Canadian Marconi Company, 2442 Trinton Avenue, Montreal 16. Atlantic 9441.*



B601

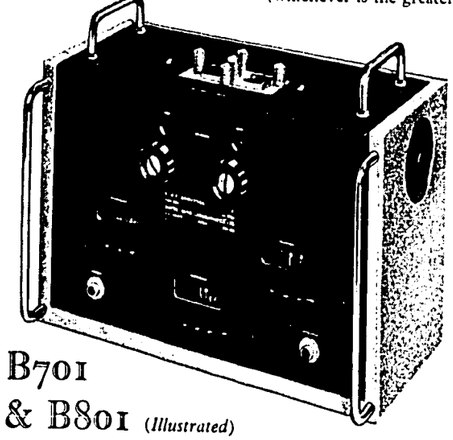
FOR MEDIUM FREQUENCIES

Developed by Wayne Kerr in collaboration with the B.B.C. Research Department, this bridge is a highly accurate and versatile hand-calibrated laboratory instrument. In addition to the measurement of resistance capacitance and inductance, it will measure complex impedances, balanced or unbalanced, and the impedance between any pair of terminals in a three-terminal network.

Specification

Capacitance range:	0.01 pf to 20,000 pf.
Resistance range:	10 ohms to 10 megohms.
Inductance range:	0.5 uH to 0.05 H.
Operating frequency:	15 Kc/s to 5 Mc/s.
Accuracy:	1% over major part of range.

A RANGE OF V.H.F. STANDARDS OF CAPACITANCE, INDUCTANCE AND RESISTANCE HAS BEEN DEVELOPED FOR THESE BRIDGES IN COLLABORATION WITH THE TECHNICAL RESEARCH ESTABLISHMENT AND THE MINISTRY OF SUPPLY. THESE ARE AVAILABLE TO SPECIAL ORDER.



B701
& B801 *(Illustrated)*

FOR BALANCED OR UNBALANCED MEASUREMENTS IN THE RANGE 1-100 Mc/s.

SPECIFICATION

Susceptance:
B.701 — Equivalent to ± 80 pfd.
B.801 — Equivalent to ± 230 pfd.
Accuracy — ± 2% or ± .5 pfd.
Conductance:
B.701 — 0 - 100 millimhos.
Accuracy — ± 2% or ± 0.02 millimho.
B.801 — 0 - 100 millimhos.
Accuracy — ± 2% or ± .1 millimho.

Covered by B.B.C. Patent No. 566970 and Wayne Kerr Patents No. 642617 (U.K.) and 2589535 (U.S.A.). (Other patents pending).

THE WAYNE KERR LABORATORIES LIMITED

Wayne Kerr

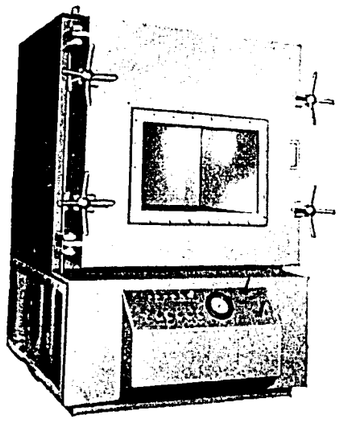
NEW MALDEN · SURREY · ENGLAND

M & M TEST CABINETS
COLD TEMPERATURE . . . HUMIDITY . . . ALTITUDE SIMULATION

A Complete Line . . . SIZES for Every Requirement

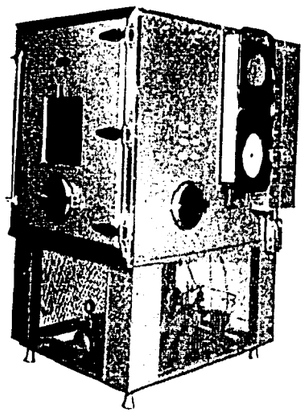
ALTITUDE SIMULATION CHAMBER

- Altitude Range to 120,000 feet
- Temperature Range from 300° F. to —140° F.
- Micrometer Temperature Adjustments hold ±2° F.
- Compact Design . . . Requires less Floor Space
- Humidity Cycle available



Providing extreme flexibility in temperature and vacuum ranges, M & M Altitude Simulation Chambers give you precise control and easier, simpler operation that will reduce test costs considerably. Custom-quality built in every detail, M & M Chambers are designed to meet Government altitude simulation test standards. Available with many optional features to speed testing, such as Program Heating, Cooling, and Humidity Cycles, Automatic Recorder for controlling and integrating temperature, humidity and altitude.

HUMIDITY TEST CABINET
for Laboratory or Production Testing



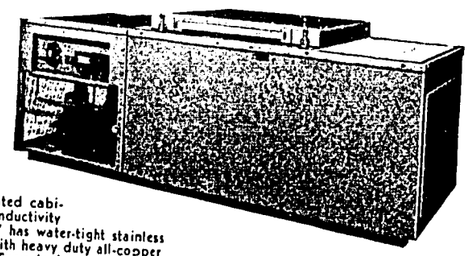
- Built-in refrigeration and condensing systems provide FAST TEMPERATURE and HUMIDITY changes. (Supplies Relative Humidities between 20% and 90%—Temperatures +35° F. to +185° F.)
- Close Control of humidity and temperature ratios
- 27 cu. ft. working space
- Hermetically sealed refrigeration unit—Extra capacity condenser system
- 6 electrical leads in work space for fast, easy connections
- Forced air circulation—glass viewing panel

Built-in humidification, heating and refrigeration systems provide fast, accurate humidity testing . . . quick temperature rise or pull-down and minimum condensation on material being tested. Individual and/or interlocked control of temperature, humidity and cooling provide flexibility to meet any need.

Optional equipment includes time control system for pre-setting dry and wet bulb temperatures for automatic variation of relative humidity. Cabinets are laboratory tested and shipped ready for operation.

LOW TEMPERATURE CHESTS FOR HEAVY DUTY USE

- Ranges to —140° F.
- Hermetically Sealed Refrigeration Units
- Micrometer Adjustment Maintains Temperature to ±2° F.
- Automatic overload protection
- 9 Standard Models
- Heating Cycle Available



Model LTP—10-150 has heavily insulated cabinet packed with extra thick, low-conductivity insulation. Test space 33" x 26" x 20" has water-tight stainless steel liner refrigerated on four sides with heavy duty all-copper coil welded for trouble-free service. Snap locks positively seal double-gasket on counterbalanced lid. Vibration eliminators on all tubing. Recessed controls are placed for convenience and accessibility. Designed for long, trouble-free service—manufactured to insure dependable low cost operation.

Write for catalog and complete specification data today

MURPHY & MILLER, Inc.
1340 South Michigan Avenue · Chicago 5, Illinois

General Test Equipment

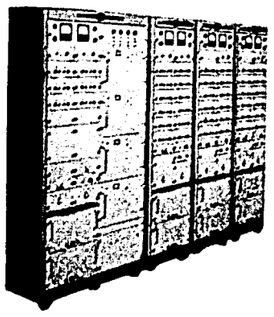
(Continued from page 315)

Metropolitan Electr. & Instr. Co., N.Y., 5, 10, 15, 20, 25, 30, 50, 55
Micro Balancing, Inc., N.Y., Dynamic Balance
Millivac Instrument Corp., N.Y., 30, 55
Moulic Specialties Co., Ill., Test Panels
Muirhead & Co., Ltd., England, 5, 10, 15, 20, 25, 60
Mullard Overseas, Ltd., England, 15, 55
Munson Mfg. & Service, Inc., N.Y., 30, 50
Murphy & Miller, Inc., 1340 S. Michigan Ave., Chicago 5, Ill., Simulation Chambers
For details see ad on page 317
National Union Radio Corp., 237 Jacksonville Rd., Hatboro, Pa., 50, CRT
For details see ad on page 46
Newton Scientific Co., Mass., 30, 55
Northern Electronic & Vacuum Ind., Canada, 50
Northern-Zaleski, Ltd., N.Y., High Altitude Test
Nothelfer Winding Labs., N.J., High Voltage
Oak Electronics Co., N.Y., 50
Oak Ridge Products, N.Y., 30, 50
Ohmite Manufacturing Co., Ill., 25
Osterland Co., Edmund, N.J., 55
Owen Laboratories, Calif., Transistor Testers
Pantek Co., Calif., 45
Panoramic Radio Products, Inc., 10 S. 2 Ave., Mt. Vernon, N.Y., 60
For details see ad on page 115
Patent Button Co., Conn., Flame Photometer
Pennsylvania Testing Laboratory, Pa., 5, 50, Synchro Test, VT Aging Racks
Penntronics, Pa., 40
Petty Laboratories, Inc., Tex., 5, 10, 15, 40, 55
Phaostron Co., 151 Pasadena Ave., South Pasadena, Calif., 30, 35
For details see ad on page 175
Philco Corp., Pa., 30, 50, 55
Photobell Co., N.Y., 14
Pioneer Electric & Research Corp., Ill., 10
Polytronics Co., Canada, 15, 20, 25
Polyphase Instrument Co., Pa., Transistor Test
Precise Development Corp., N.Y., 20, 25, 55
Precise Measurements Co., 942 Kings Highway, Brooklyn 23, N.Y., 35
For details see ad on page 294
Precision Apparatus Co., Inc., 92-27 Horace Harding Blvd., Elmhurst, L.I., N.Y., 30, 35, 50, 55
For details see ad on page 330
Precision Associates, Inc., N.Y., 15, 20, 25, 30, 35, 50, 55
Precision Electronics, Inc., Ill., 55
Professional Electronics Co., Calif., 40
Q. O. S. Corp., N.Y., 15
Radex Corp., Ill., 10
Radio City Products Co., Inc., N.Y., 15, 30, 35, 50, 55
Radio Corp. of America, Camden, N.J., 30, 55
For details see ad on pages 88, 440-441

(Continued on page 319)

WRITE EAI

FOR

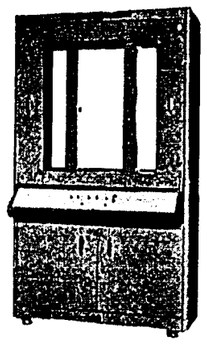


PRECISION ANALOG COMPUTER

Precision Analog Computer

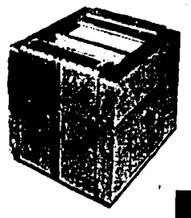
Designed to meet the demand for a highly accurate, dependable, and versatile general-purpose analog computer for solving problems in dynamics for industrial, research, educational, and military groups. Features a new high-gain, low-drift, contact-stabilized d-c amplifier with outstanding frequency response and power output characteristics; centralized operation from a control console which houses the problem board and its bay, attenuators, initial condition potentiometers, limiters, and other operating controls; precision network components contained in a controlled environment to insure reliable and accurate performance; a grounded 1800 position problem board which confines all terminal leakages to ground.

FOR



VARIPLOTTER MODEL 205J

Variplotter - MODELS 205G and H



VARIPLOTTER MODELS 205G AND H

A self-balancing potentiometer type recorder designed to record one variable d-c voltage as a function of a second variable d-c voltage. Model 205G is a single pen board that will present a single X vs. Y plot. Model 205H has an additional arm and pen allowing it to record two independent sets of X vs. Y data simultaneously. Static error is .05 per cent of full scale at 70 degrees Fahrenheit. Dynamic error averages .05 per cent of full scale plus the static error. Standard sensitivity is 50 millivolts per inch or 1.5 volts for full scale deflection of 30 inches. Maximum writing speed is 8-½ inches per second. Continuously variable uncalibrated scale factor and parallax controls are provided for each axis.

Variplotter - MODEL 205J

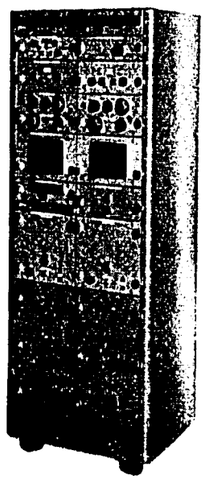
Essentially the same characteristics as the Models 205G and H described above except that the plotting surface is vertical. The plotted result, in the form of an inked line, is presented on a 30 inch square of paper which is held firmly to the plotting surface by a unique vacuum system. Static error is .05 per cent of full scale at 70 degrees Fahrenheit and dynamic error average .05 per cent of full-scale plus the static error. Maximum writing speed is 8-½ inches per second. Standard sensitivity is 50 milli-volts per inch or 1.5 volts for full-scale deflection of 30 inches. Where floor space is limited, the MODEL 205J Variplotter is recommended for your recording needs such as analog computer output, guided missile data, engine performance, etc.

Digi-Verter Group - TYPE 17-31A



FUNCTIONAL POTENTIOMETERS

The Digi-Verter can be used to convert digital information, such as that obtained from card reading machines or tabular lists, into analog form suitable for presentation as a point plot on a Variplotter plotting board. It is designed to accept two four-decimal digit numbers and their signs from an IBM machine such as Type 513, 517, 519, 523, etc. Complete operating controls include power switch, feed switch, input switch, storage clear, and scale factor and parallax controls for both X and Y. Scale factor will provide plot expansion up to 10 times and parallax controls allow the zero-zero origin to be located anywhere on the plotting surface. The complete digital plotting system consists of the Digi-Verter, Data Input Keyboard, Model 205G Variplotter plotting board



DIGI-VERTER GROUP TYPE 17-31A

Functional Potentiometers

There are two models of sine-cosine potentiometers available—Type 462 which is a single unit and Type 315 which provides two sets of sine-cosine functions. Accuracy, is within .15% of the theoretical voltage for all points throughout 360° of shaft rotation. Angular resolution is .005% of 360° and electrical resolution, expressed as a percentage of the total voltage applied across one 90 degree quadrant is with .05%.

LONG BRANCH, ELECTRONIC ASSOCIATES Incorporated NEW JERSEY

General Test Equipment

(Continued from page 317)

RCA Victor Division, Tube Dept., 415 S. 5 St., Harrison, N.J., 55
For details see ad on pages 88, 440-441
Radio Engineering Labs., Inc., N.Y., Crystal Testers
Radio Kits, Inc., N.Y., 5, 20, 25, 30, 35, 55
Radio Sonic Corp., N.Y., 50
Rawson Electrical Instrument Co., Mass., 30, 35
Reeves Instrument Corp., N.Y., Servo Volt Meter
Reiner Electronics Co., Inc., N.Y., 15, 30, 50, 55
Reon Resistor Corp., 117 Stanley Ave., Yonkers 2, N.Y., 15, 25
For details see ad on page 200
Resdel Engineering, Calif., 5, 10
Research Electronics, Pa., 50, CRT & Transistor & Diode
Ribet Desjardins, France, 35, 40, 60
Rochester Electronics Co., Inc., N.Y., 25
Rockwell Engineering Co., Ind., 55
Rubicon Co., Pa., 15, 25, Coil Testers
Rutherford Electronics Co., Calif., Time Delay Generators
Scala Radio Co., 2814 19th St., San Francisco 10, Calif., Probes, Signal Tracing, Low Capacity, Voltage Divider
For details see ad on page 337
Schauer Manufacturing Corp., Ohio, 60
Scientific Specialties Corp., Mass., 55
Scott, Inc., H. H., Mass., 60
Sensitive Research Instr. Co., 9-11 Elm Ave., Mt. Vernon, N.Y., 30, 35, Electrostatic Voltmeters; Ratio, Flux & Millivolt Meters
For details see ad on page 307
Shallcross Mfg. Co., 524 Pusey Ave., Collingdale, Pa., 10, 15, 25, 35
For details see ad on page 98
Shepard Laboratories, N.J., Pulse Voltmeter
Sherron Electronics Corp., N.Y., 15, 20, 25, 55
Skiatron Electronics & TV Corp., N.Y., 45
Sierra Electronic Corp., Calif., 55 and Carrier Frequency
Simpson Mfg., Co., Inc., Mark, N.Y., 30, 35, 50, 55
Special Instruments Lab., Inc., Tenn., 15
Specialty Assem. & Packing Co., N.Y., 30
Spellman Television Co., Inc., 3029 Webster Ave., New York 67, N.Y., Kilovolt Meters
For details see ad on page 185
Sprague Electric Co., Mass., 5
Standard Electric Time Co., 73 Logan St., Springfield 2, Mass., 45
For details see ad on page 325
Stark Electronic Instruments, Ltd., Canada, 30, 50, 55
Statham Laboratories, Inc., Calif., 40, Accelerometer & Dynamometer
Sticht & Co., Inc., Herman H., 27 Park Pl., New York 7, N.Y., 15, 25, 30, 35
For details see ad on page 173
Stockman Electronics Research, Mass., 30, 55
Stoddart Aircraft Radio Co., Inc., 6644 Santa Monica Blvd., Hollywood 38, Calif., Freq. Selective Microwave Voltmeter
For details see ad on page 246
Supreme Inc., Miss., 30, 50, 55
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 5, 35, 50, 55
For details see ad on pages 417-420
Taco West Corp., Ill., Pyrometric Controller
Takk Corp., Ohio, Insulation Tester
Tech Laboratories, Inc., N.J., 15, 20, 25
Telemark, Inc., Conn., 45
Teletronics Laboratory, Inc., N.Y., Diode Transistor Test
Tensitron, Inc., Mass., Tension Meter
Transistor Products, Inc., Snow & Union Sts., Brighton Sta., Boston 35, Mass., Transistor Tester
For details see ad on page 206
Trans Sonics, Inc., Mass., 40
Transvision, Inc., N.Y., 50
Triplett Electrical Instruments, Ohio, 30, 35, 50, 55
Triumph Mfg. Co., Ill., 30, 55
Universal Aviation Equipment, N.Y., Organic Coating Testers
Vacuum-Electronic Engineering Co., 86-P Denton Ave., New Hyde Park., L.I., N.Y., Vacuum Testers
For details see ad on pages 294, 311
Vidaire Electronics Mfg., Co., N.Y., 50, CRT
Waveforms, Inc., N.Y., 55
Wayne-Kerr Laboratories, Ltd., Sycamore Grove, New Malden, Surrey, England, 5, 10, 15
For details see ad on page 316
Welch Mfg. Co., W. M., Ill., 5, 15, 20, 25, 30, 35
Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N.J., 5, 10, 15, 30, 35, 55
For details see ad on page 172
Western Sound & Elec. Labs., Inc., Wis., 5, 10, 15, 55
Westinghouse Electric Corp., Pa., 30
Winslow Company, Inc., 5, 10, 15, 25, 35
Yonkers Industries, Inc., N.Y., 55

MODEL PFR **POLINEAR RECORDER**

FOR AUTOMATICALLY PLOTTING both ANGULAR and STRAIGHT LINE functions on either POLAR or RECTILINEAR coordinates in any COMBINATION . . .

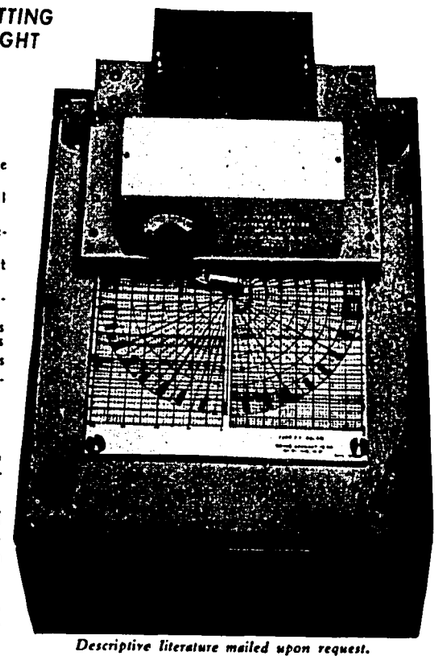
- Records both AC and DC voltage levels
- Designed for STANDARD 8½ × 11 chart sheet
- POLAR and LINEAR turntable movement
- TURNTABLE instantly set to any chart position
- Auxiliary Electrical linkage for synchronizing to turntable motion:
  Oscillators Rotational Devices
  Test Turntables Analyzers
- Interchangeable range potentiometers
- Dependable and service free operation

Typical applications:

Beam Pattern Plotting of antennas, microphones, loudspeakers, lighting fixtures, ultrasonic devices;

Frequency Response Records of microphones, loudspeakers, amplifiers, Filters, Radio and television circuits;

Rectilinear Curves on vacuum tubes, potentiometers, amplifiers, counting and computing devices.



Descriptive literature mailed upon request.

Designers and Manufacturers of Graphic Recorders
SOUND APPARATUS COMPANY · STIRLING, N. J.
Instruments Engineered for Individual Requirements

91. Graphic Recorders.

5. Charts & papers
10. Ink writing
15. Inkless types
20. Fixed speed types
25. Variable speed types

Alden Electr. & Impulse Recording Co., Westboro, Mass., 15, 20, 25
For details see ad on page 125
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25
Audio Instrument Co., Inc., N.Y., 25
Audio Tone Oscillator Co., Conn., AF & Sound Pressure
Bailey Meter Co., Ohio
Boehme, Inc., H. O., N.Y., 10
Bristol Co., Conn., 5, 10, 15, 20, 25

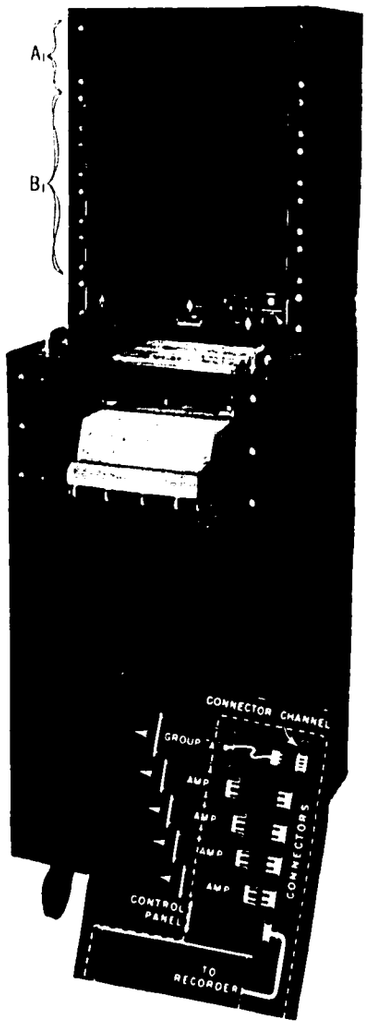
(Continued on page 321)

It's VERSATILITY that sells SANBORN in the field of Industrial Recording

As indicated by references at the right, you may have a choice of five different instruments (A) for quick and convenient standard rack mounting in the system at A_1, PLUS a choice of up to four of any of the three different type amplifiers (B) or any combination of these amplifiers

with the

SANBORN
FOUR-CHANNEL
OSCILLOGRAPH RECORDING SYSTEM
(MODEL 67)



A



DC PREAMPLIFIER



AC PREAMPLIFIER



DC CONVERTER—for low level DC recording such as thermocouple output.



TRIPLEXER—when coupled to a DC amplifier permits the recording of three events in one channel.



THRESHOLD MONITOR provides means for the control of voltage levels or rate of change.

B



DC (General Purpose) AMPLIFIER



STRAIN GAGE (Carrier) AMPLIFIER



SERVO MONITOR AMPLIFIER—a phase discriminating AC amplifier used in servo design and testing.

As shown in the diagram, removing or interchanging any of the amplifiers or other instruments is simply a matter of sliding the unit in or out of the mounting rack where contact is made automatically by plug-in connectors. Screws at the four corners of the panel hold the instrument in place.

Other features of this system which add to Sanborn VERSATILITY are the choice of eight paper speeds—50, 25, 10, 5, 2.5, 1.0, 0.5 and 0.25 mm/sec, and the use of either 4-, 2-, or 1-channel recording paper.

And, of course there are these popular Sanborn advantages: a high torque movement (200,000 dyne cms per cm deflection), direct *inkless* recording in *true rectangular coordinates*, and provision for code and time markings.

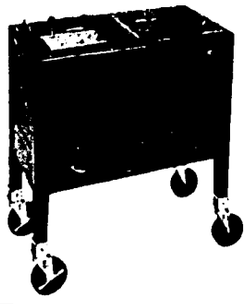
Sanborn Recording Systems may be used to record any one or more of a wide variety of phenomena whose characteristics range from static to 100 cycles per second. If your recording problem is not one which can be solved by standard Sanborn equipment, our engineers will be glad to suggest ways in which modifications of it may suit your requirements.

A complete catalog of Sanborn Industrial Recording Equipment will be sent gladly on your request.

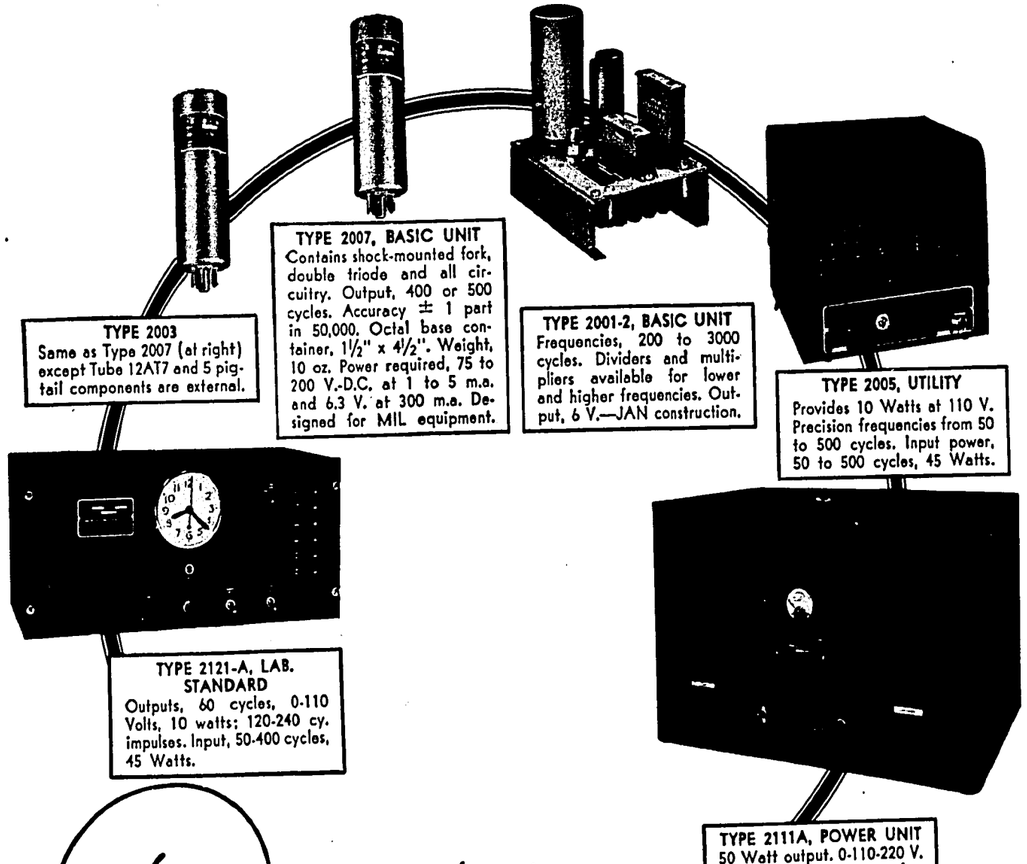
SANBORN COMPANY
CAMBRIDGE 39, MASS.

SANBORN 1-, AND 2-CHANNEL RECORDING SYSTEMS





One channel Model 128/141 above and two-channel Model 60 at right both incorporate Sanborn recording advantages which include interchangeability of amplifiers and (with Model 60) preamplifiers.



Precision FREQUENCIES

GUARANTEED ACCURACY
1 PART IN 100,000 (.001%)
except where otherwise noted

The basis of these frequency standards is an electronically actuated high-precision fork, temperature-compensated and hermetically sealed against barometric changes. The partial list of uses at the right not only suggests the broad range of applications but also proven dependability where there can be no compromise with accuracy. Please request details by Type No. Our engineers are available for advice or cooperation on related problems.

WIDELY USED IN SUCH FIELDS AS
Aviation, Navigation
Ordnance, Ballistics
High Speed Photography
Viscosity Measurement
Fluid Flow
Nuclear Physics, Telemetering
Chemical Reaction
Radiation Counting
Computers
Facsimile
Fire Control
School and Indl. Research Labs.
Accurate Speed Control

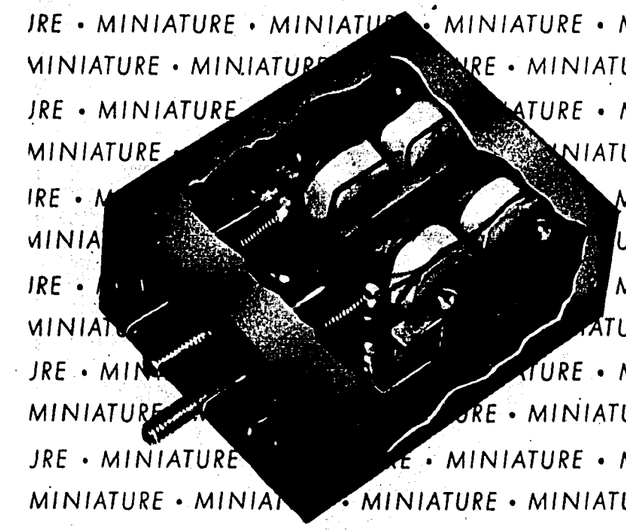
American Time Products, Inc.

580 Fifth Avenue **New York 36, N.Y.**

OPERATING UNDER PATENTS OF WESTERN ELECTRIC COMPANY

new miniaturized tuning fork resonator...

(*Model J*)



ILLUSTRATED ACTUAL SIZE
DIMENSIONS 1" x 2 1/16 x 2 1/16
MAXIMUM WEIGHT—8 OUNCES

accuracies...

1 part in 10,000 (.01%) or 1 part in 2,000 (.05%), from —40° to + 85° Centigrade.

frequencies...

From 400 to 2,000 cycles in either accuracy rating.

construction...

Thermally compensated, solder-sealed and evacuated, completely interchangeable, internally mounted using shock retarding silicone rubber, externally designed for fastening to chassis through silicone rubber grommets thus providing excellent vibration and shock isolation.

For complete information write for Folder No. 102 or telephone HYacinth 2-4800

Philamon Laboratories Inc.

5717 THIRD AVENUE, BROOKLYN 20, NEW YORK

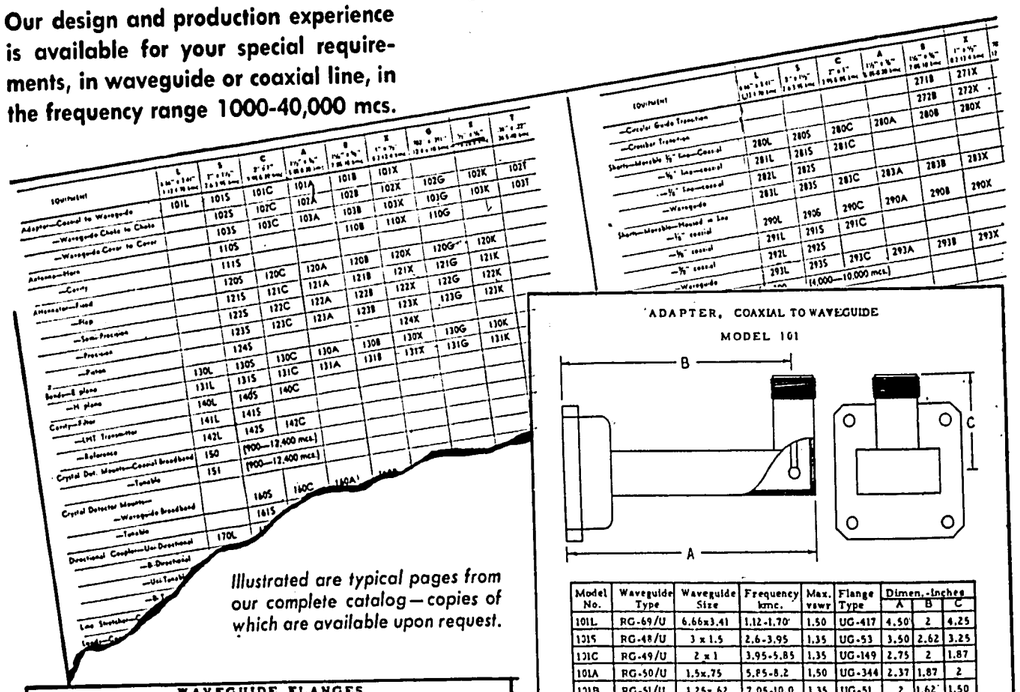
Laboratory Standards of Frequency & Time

(*Continued from page 321*)

Kent Engineering Co., Inc., Ill., 20
Lavoie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N.J., 20
For details see ad on page 328
Manhattan Research Labs., N.Y., Radioactive Standards
Marconi Instruments, Ltd., N.Y., 10, 20
Metal Products Co., Tenn., 20, 25
Miller Instruments, Inc., William, Calif., 30
Missouri Research Labs., Inc., Mo., 5, 15
Muirhead & Co., Ltd., England, 20, 30
Norrman Laboratories, Ernst, Wis., 10, 15, 20, 25
Oak Ridge Products, N.Y., 5
Philamon Laboratories, Inc., 5717 3rd Ave., Brooklyn 20, N.Y., 20, 30
For details see ad on page 323
Polytechnic Research & Dev. Co., Inc., 55 Johnson St., Brooklyn 1, N.Y., 20
For details see ad on pages 374-375
Presto Recording Corp., P.O. Box 500, Paramus, N.J., 20
For details see ad on page 110
Radio Corp. of America, Camden, N.J., 5
For details see ad on page 88, 440-441
Rhodes, Inc., M. H., Conn., 5
Rutherford Electronics Co., Calif., 25
Servo Corp. of America, 20-20 Jericho Tnpke., New Hyde Park, L.I., N.Y., 20
For details see ad on pages 438-439
Skiatron Electronics & TV Corp., N.Y., 5
Sondyna, A. G., Switzerland, 20
Special Instruments Lab., Inc., Tenn., 5
Specialty Assem. & Packing Co., N.Y., 30
Standard Electric Time Co., 73 Logan St., Springfield 2, Mass., 5, 10, 15, 20, 25
For details see ad on page 325
Sticht Co., Inc., Herman H., 27 Park Pl., New York 7, N.Y., 5
For details see ad on page 173
Technology Instrument Corp., 535 Main St., Acton, Mass., Primary & Secondary Phase
For details see ad on pages 198, 334
Teletronics Laboratory, Inc., N.Y., 20
Times Facsimile Corp., 540 W. 58 St., New York 19, N.Y., 10, 30
For details see ad on page 303
Varo Mfg. Co., Inc., Tex., 30
Vectron, Inc., 400 Main St., Waltham 54, Mass., 5, 10, 15, 20, 25
For details see ad on page 308
Vega Co., Mass., 30
Walkirt Co., Calif., 5
Waveforms, Inc., N.Y., 20
Welch Mfg. Co., W. M., Ill., 30
Wright Engineering Co., Calif., 5, 10, 15, 20, 25
Yellow Springs Instrument Co., Ohio, 5

MICROWAVE TEST EQUIPMENT
and Component Parts

Our design and production experience is available for your special requirements, in waveguide or coaxial line, in the frequency range 1000-40,000 mcs.



Illustrated are typical pages from our complete catalog—copies of which are available upon request.

ADAPTER, COAXIAL TO WAVEGUIDE

MODEL 101

Model No.	Waveguide Type	Waveguide Size	Frequency kmc.	Max. vswr	Flange Type	Dimen.-Inches A	B	C
101L	RG-69/U	6.66x3.41	1.12-1.70	1.50	UG-417	4.50	2	4.25
101S	RG-48/U	3 x 1.5	2.6-3.95	1.35	UG-53	3.50	2.62	3.25
101C	RG-49/U	2 x 1	3.95-5.85	1.35	UG-149	2.75	2	1.87
101A	RG-50/U	1.5x.75	5.85-8.2	1.50	UG-344	2.37	1.87	2
101B	RG-51/U	1.25x.62	7.05-10.0	1.35	UG-51	2	1.62	1.50
101X	RG-52/U	1 x .50	8.20-12.4	1.35	UG-39	2	1.62	1.75

APPLICATION: Couples waveguide and coaxial lines together.

MATERIAL: Brass; beryllium copper and polystyrene.

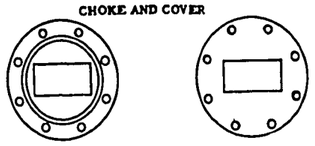
PLATING: Silver-.0002 to .0004 inches thick; rhodium flash.

FINISH: External surfaces - gray enamel paint.

DOUGLAS MICROWAVE CO, Inc. 338 E. 95 St. New York 28, N.Y.

WAVEGUIDE FLANGES

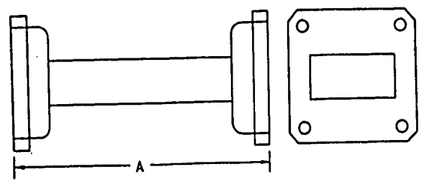
CHOKE AND COVER



UNIT type	UNIT brass	W.G. brass	W.G. size	UNIT alum.	W.G. alum.
Cover	UG-39/U	RG-52/U	1 x .500	UG-135/U	RG-67/U
Choke	UG-40/U	RG-52/U			

ADAPTER, WAVEGUIDE, COVER TO COVER

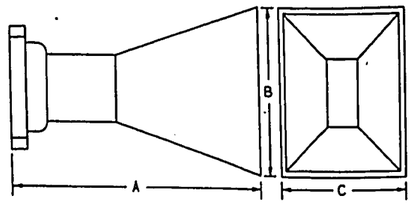
MODEL 103



Model No.	Waveguide Type	Waveguide Size	Frequency kmc.	Cover Type	Length-in. A
	CC	3 x 1.5			

ANTENNA, HORN

MODEL 110S



Model No.	Waveguide Type	Waveguide Size	Frequency kmc.	Max. vswr	Flange Type	Dimen.-Inches A	B	C
110S	RG-48/U	3 x 1.5	2.6-3.95	1.25	UG-53	16	9.5	7

DOUGLAS MICROWAVE Co., Inc.

338 EAST 95th STREET NEW YORK 28, N. Y. • TRafalgar 6-6095

TYPE 302 CONTINUOUSLY VARIABLE DELAY LINE



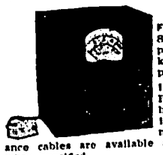
Time Delay: Continuously variable from zero to 0.6 microsecond.
Impedance: 080 ohms nominal.
Rise time: Less than 10% of time delay at any point.
Construction: Distributed parameter.
Overall size: 4" x 12" x 12". **Price: $88**

TYPE 506 MINIATURE CONTINUOUSLY VARIABLE DELAY LINE



Time Delay: Continuously variable from zero to 0.25 microsecond.
Impedance: 190 ohms nominal.
Rise time: Less than 10% of the time delay at any point.
Construction: Distributed parameter.
Overall size: 1" x 4" x 4". **Price: $59**

Type 202 VECTORLYZER



Frequency Range: 8 cps to 3 mc through panel binding posts, 20 kc to 300 mc through probe.

Input Impedances: Probe—2.5 uuf shunted by 100,000 ohms, coaxial arrangements for matching low impedance cables are available and will be furnished when specified. Binding Posts—16 uuf shunted by one megohm.

Voltage Range: Binding Posts—0.06, 0.6, 6, 60, and 600 volts full scale. Probe—0.6, 6, and 60 volts full scale.

Phase Angle Range: 0-180, and 180-360 degrees, ranges with better angular sensitivity can be obtained through panel adjustment.

Accuracy: ± 2% through panel binding posts, ± 1 db through probe for phase angle measurements.

Power Supply: 115 volts rms ± 15%, 50-60 cycles, 80 watts.
Price: $445

Type 404A PHASE METER



Frequency: External indicator —100 kc to + 0 cps. Panel Meter—100 kc to 0.001 cps.

Range: 36°, 90°, 180°, and 360° full scale phase lead or lag.

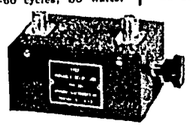
Input voltage: 0.8 to 300 volts from + 0 cps to 10 kc, then the lower limit increases slowly up to 1 volt at 100 kc; better sensitivity can be obtained through panel adjustment.

Accuracy: ± 1% or one degree from + 0 cps to 10 kc, then increases slowly up to 4% or four degrees at 100 kc with external indicator; an additional error of + 1.5% at any operating frequency with panel meter.

Waveform: Any symmetrical or unsymmetrical periodic waveform does not affect the accuracy of the instrument.

Input impedance: One megohm shunted with 10 uuf on the "Cathode Follower" input, and 24,000 ohms shunted with 25 uuf on others. **Price: $586**

TYPE 601 STEP VARIABLE DELAY LINE



Time Delay: Variable in step of 0.2 microsecond up to 2.2 microseconds.
Impedance: 190 ohms nominal.
Cutoff frequency: 0.2 mc nominal.
Construction: Lumped parameter.
Overall size: 3" x 3" x 5".
Price: $124

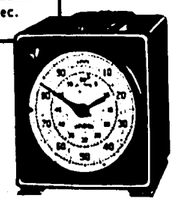
ADVANCE ELECTRONICS CO.

P. O. Box 394, Passaic, N. J.

STANDARD TIMERS

AN ECONOMICAL INVESTMENT IN LONG-LIFE PERFORMANCE AND EXTREME ACCURACY. RUGGED, FOR HEAVY-DUTY SERVICE; FLEXIBLE IN APPLICATION.

Model	Scale Divisions	Totalizes	Accuracy
S-100	1/5 sec.	6000 sec.	±.1 sec.
S-60	1/5 sec.	60 min.	±.1 sec.
SM-60	1/100 min.	60 min.	±.002 min.
S-10	1/10 sec.	1000 sec.	±.02 sec.
S-6	1/1000 min.	10 min.	±.0002 min.
S-1	1/100 sec.	60 sec.	±.01 sec.
MST	1/1000 sec.	.360 sec.	±.001 sec.
MST-500	1/1000 sec.	30 sec.	±.002 sec.



The clutch coil can be connected directly in the plate circuit of electronic tubes. For this use the coil has a resistance of 2000 ohms and requires 50 to 60 milliamperes. When ordering for this purpose, always specify 120V DC clutch coil.

STANDARD *Since 1884*

WRITE FOR BULLETIN 198.

The STANDARD ELECTRIC TIME CO.

73 LOGAN STREET • SPRINGFIELD 2, MASS.

93. Microwave & Radar Test Equipment.

5. Pulse generators
10. Slotted lines & measuring accessories
15. Time delay generators

Advance Electronics Co., P.O. Box 394, Passaic, N.J., 15
For details see ad on page 325
Airborne Instruments Laboratory, N.Y., Oscillators
Aircraft Armaments, Inc., Md., 5, 10, 15
Aircraft Radio Corp., Boonton, N.J., 5
For details see ad on page 123
American Electroneering Corp., Calif., 10
American Machine & Foundry Co., Mass., 5, 10, 15
Amertronic, Inc., D.C., 5
Apahouser Corp. of N.E., Mass., 10
Applegate & Co., C. J., Colo., 5, 15
Arenberg Ultrasonic Laboratory, Mass., 5
Atomic Instrument Co., 84 Massachusetts Ave., Cambridge 39, Mass., 5
For details see ad on page 229
Bart Laboratories Co., Inc., 227 Main St., Belleville, N.J., 10
For details see ad on page 259
Berkeley, Div. Beckman Instruments, Inc., 2200 Wright Ave., Richmond, Calif., 5
For details see ad on page 8
Berkshire Laboratories, 584 Beaver Pond Rd., Lincoln, Mass., 5
For details see ad on page 315
Bogart Mfg. Co., N.Y., 10
Bone Engineering Corp., Calif., 10
Boonton Radio Corp., Intervale Rd., Boonton, N.J., 5
For details see ad on page 332
Burroughs Corp., New Products Div., 511 N. Broad St., Philadelphia 23, Pa., 5, 15, Pulse; Delays, Counters, Mixers, Gaters
See complete catalog in last section
Canadian General Electric Co., Canada, 5, 10, 15
Cascade Research Corp., Calif., 10
Central Research Laboratories, Minn., 10
Century Electronics, Div. Century Metalcraft Corp., 14806 Oxnard St., Van Nuys, Calif., 5, 10, 15
For details see ad on page 329
Control Instrument Co., Inc., N.Y., 5, 15
Cubic Corp., Scott & Canon Sts., San Diego 6, Calif., 5, 10, 15
For details see ad on page 327
Dawe Instruments Ltd., England, 5
Demornay-Bonardi, Inc., Calif., 10
Deutschmann Corp., Tobe, Mass., 5
Diamond Microwave Corp., Mass., 10
Douglas Labs., Inc., 373 Fourth Ave., New York 16, N.Y., 5
For details see ad on page 401
Douglas Microwave Co., Inc., 338 E. 95 St., New York 28, N.Y., 10
For details see ad on page 324
E. S. C. Corp., N.Y., 5
Eder Engineering Co., Wis., 5
Electrical and Physical Instruments, N.Y., 5

(Continued on page 327)

Browning

TEST EQUIPMENT

●

Oscillosynchroscope ON-5 A/X

Low-priced instrument satisfies requirements for basic laboratory equipment to be used in pulse work. Sweep writing rate continuously variable over a wide range; broad frequency coverage; high sensitivity; self-calibrating on the X and the Y axis. Prices: ON-5A $485.00
ON-5X (with video delay) ..$535.00

Klystron Power Supply TVN-11

Well-regulated, low-ripple-content, power supply provides all necessary voltages for operation, modulated or unmodulated, of small Klystrons and other low-power reflex tubes. Internal modulator for square-wave or saw-tooth modulation. Internal metering for critical currents and voltages. Price $325.00

Standing Wave Ratio Amplifier TAA-16B

May be operated broadband or selective between 500 and 5000 cycles. Protective circuits prevent burnouts of bolometers and crystals. Output may be fed to meter or d-c recorder. Price $365.00

FM Modulation Monitor MD-33

Checks modulation for compliance with F. C. C. regulations. Complete coverage 25-174mc in two bands; no crystals or plug-in coils. Meter shows swings up to 20 kc. Flasher shows excessive voice peak modulation. Price $335.00

—AND OTHER PRECISION ELECTRONIC DEVICES.

●

Browning

TUNERS

For the HI-FI listener . . .

Model RV-31 . . .

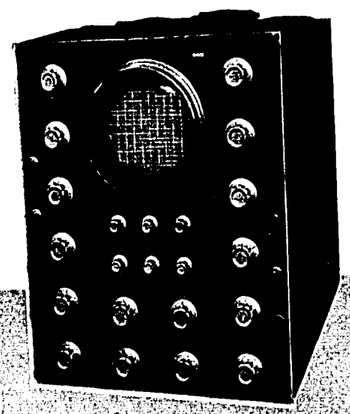
. . . FM tuner with selectable AFC, cathode-follower output, audio inputs for PHONO, TV, and RECORDER, self-contained power supply. Net price $99.50

Model RJ-42

. . . FM/AM tuner engineered for use with the modern, full-control amplifier. Only two controls—one for tuning and one to select OFF/AM/FM with AFC/FM. Built-in power supply. Net price $166.50

The right bandwidth for your work

DC to 5 MC
5 cycles to 10 MC



These 2 Browning 'scopes give you these valuable features

Model OA-16 . . . an extremely versatile instrument having d.c. amplification with extended high-frequency response and sweeps ranging from seconds to microseconds.

FEATURES

- Bandwidth—from d.c. to 5 megacycles
- Deflection sensitivity—50 peak-to-peak millivolts per inch
- Internal provision for balancing out d.c. components
- Trace position remarkably independent of line voltage
- Sweep speeds 0.4 μsec. per cm. to 1 sec. per cm.
- All sweeps below fastest range expandable 5 times for detailed examinations
- Sweep may be recurrent, or triggered by positive or negative external pulses or by vertical amplifier signals.

Model OL-23 . . . combines the functions of an oscilloscope and a synchroscope for observing repetitive phenomena or single transients. Broadband amplification, fast sweeps, and high beam-accelerating potential make this 'scope particularly desirable in observing and measuring steep wavefronts and fast pulses.

FEATURES

- Bandwidth—from 5 cycles to 10 megacycles
- 4000-volt accelerating potential
- Sweeps expandable up to the maximum writing rate of the sweep circuits
- Fast sweeps—to 0.1 μsec. per cm.
- Step-controlled attenuation continuously adjustable between steps
- Calibration accurate to 5%
- Sweep delay ranges of 100, 1000, and 10,000 μsec.

Each instrument is contained in a blower-cooled steel case 13¼" wide, 15¾" high, and 22" deep. Case and panel are finished in green, with knobs and markings in frosted aluminum. Prices, complete with tubes:

Model OA-16 .....$745.00
Model OL-23 .....$890.00

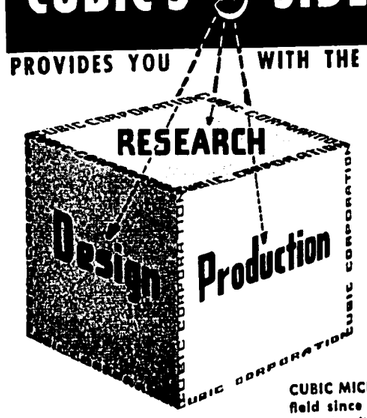
Prices are net F. O. B. Winchester, Massachusetts

WRITE TODAY FOR FULL TECHNICAL INFORMATION

BROWNING
Laboratories, Inc.
Winchester, Mass.

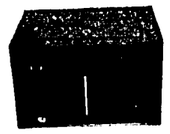
CUBIC'S 3 SIDED COVERAGE

PROVIDES YOU WITH THE WORLD'S FINEST



- **ELECTRONIC INSTRUMENTS**
- **TEST EQUIPMENT**
- **MICROWAVE & RADAR COMPONENTS**

CUBIC MICROWAVE ENGINEERS—specialists in the field since the inception of Radar in World War II—start with electronic problems and ideas, and convert them into the most accurate precision-built electronic instruments and equipment! We welcome inquiries—not only in connection with our rapidly developing list of products—as represented below—but on ideas, problems, or design of microwave assemblies of your own specification you may want developed and produced.



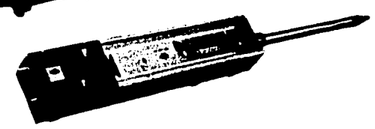
MICROWAVE CALORIMETRIC WATTMETER

portable . . . for lab and field use . . to measure absolute microwave power.

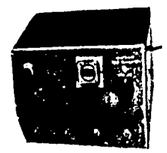
Frequency Range: 2600 MC to 26500 MC
Max. VSWR: 1.1
Max. Peak Power: 600 KW



COAXIAL CALORIMETRIC WATTMETER

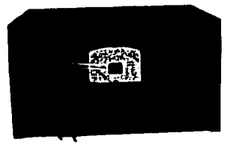


Frequency Range: 200 MC to 3000 MC—Max. VSWR: 1.5 over range—Max. Peak Power: 1⅝" Coaxial rating



MICROWAVE (X-BAND) PULSE MEASURING WATTMETER

for measuring peak power of microwave pulses from signal generators or radar systems.



ELECTRONIC DIRECT-READING PHASE METER

Frequency Range: 20 to 50,000 cycles 0-360 degrees



Shown at left are a few of our standard microwave components available as catalog items. Special purpose wave guide assemblies designed to customer's specs can also be produced.

CUBIC

Microwave & Radar Test Equipment

(Continued from page 325)

Electro Impulse Laboratory, 62 White St., Red Bank, N.J., 10

For details see ad on page 240

Electronic Engineering Co. of California, Calif., 5
Electronic Systems Co., N.Y., 5
Elliott Brothers, Inc., N.Y., 5
Empire Devices London, Ltd., England, 5
Espey Manufacturing Co., Inc., N.Y., 5
F-R Machine Works, Inc., 44-14 Astoria Blvd., Long Island City 3, N.Y., 5, 10

For details see ad on page 283

Federal Mfg. & Engineering Corp., N.Y., 5
Federal Telecommunication Labs., Inc., N.J., 10
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5, 10

For details see ad on pages 368-373

Ferris Instrument Co., N.J., 10
Freed E. & C. Corp., N.Y., 5
G-W Associates, Calif., 10
General Electric Co., N.Y., 5
General R-F Fittings Co., 702 Beacon St., Boston 15, Mass., 10

For details see ad on page 151

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 5, 10

For details see ad on pages 380-381, Cover IV

Gertsch Products, Inc., Calif., VHF Frequency Meter
Gilfillan Bros., Inc., Calif., 15
Graham Mfg. Co., Inc., R.I., 10
Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif., 5, 10

See complete catalog in last section

Hycon Mfg. Co., Calif., 5, 10, 15
Jerrell Electronic, Ohio, 5
Kay Electric Co., 14 Maple Ave., Pine Brook, N.J., 5

For details see ad on page 314

Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 10

For details see ad on pages 414-415

Kings Microwave Co., Inc., N.Y., 10
Laboratory for Electronics, Inc., 75 Pitts St., Boston 14, Mass., Oscillator

For details see ad on pages 432-433

Lavoie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N.J., 5, 10

For details see ad on page 328

Lerner Instrument & Electronics, N.Y., 10
Litton Engineering Laboratories, Calif., 10
Magnex Corp., N. Y., 5
Manson Laboratories, Conn., 5
Marconi Instruments, Ltd., N.Y., 5, Radar Test Set
Mark Products Co., Ill., 10
Measurements Corp., Intervale Rd., Boonton, N.J., 5

For details see ad on pages 284, 422-423

Metavac, Inc., N.Y.,
Mico Instrument Co., 79 Trowbridge St., Cambridge 38, Mass., 10

For details see ad on page 63

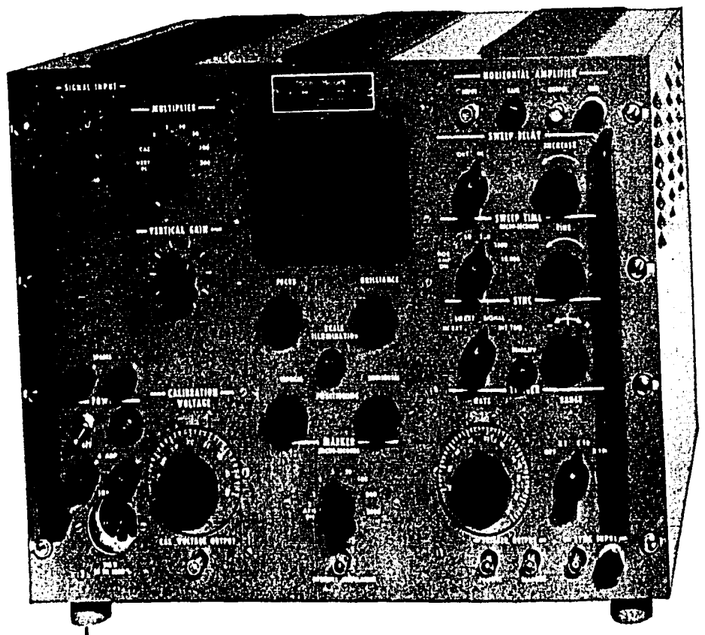
Microlab, N.J., 10
Microwave Associates, Inc., Mass., 10

(Continued on page 329)

SUPERIOR PERFORMANCE

On 3 Cycles to 20 Megacycles

The **LA-239 C** Oscilloscope



DATA

1. Wider Bandwidth: Complex waves from 5 Cycles to 15 Megacycles. Sine waves from 3 Cycles to 20 Megacycles.

2. Extended Sweep Frequencies: Linear from 10 Cycles to 20 Megacycles internally synchronized. Triggered sweep, from single random impulses to irregular pulse-intervals up to as high as 6 Megacycles.

3. Square Wave Response: Rise time 0.042 Microseconds; only 5% droop on flat-topped pulses as long as 30,000 Microseconds duration.

4. Greater Stability: Electronically regulated power supplies throughout to maintain accuracy and constant operation under varying line conditions or line surges. You can display surges on the line from which Model LA-239C is being powered without distortion of the trace!

5. Higher Signal Sensitivity: Maximum sensitivity without Probe: 10.4 millivolts. With Probe: 100 millivolts. (Maximum signals, 125 V. Peak and 450 V. Peak respectively.)

6. Timing Markers: Interval Markers of 0.2; 1; 5; 20; 100; 500; or 2,000 Microseconds may be superimposed on the trace for the accurate measurement of the time base.

7. Voltage Calibration: Signal amplitude is compared against a 1,000 cycle square wave (generated internally) the amplitude of which is controlled by a step-and-slide attenuator calibrated in peak volts. (A jack is provided to deliver 40V Peak for use in calibrating other instruments.)

8. Sweep Delay: Any portion of the sweep longer than a 10 Microsecond section may be expanded by 10:1 for detailed study of that portion of the signal.

9. Power Source: 110 to 130 V AC; from 50 to 1,000 cycles. 295 Watts. (Fused at 4 Amperes.)

10. Dimensions: In Bench Cabinet: 19½ in. Wide; 15¼ in. High; 16¾ in. Deep. In Rack Mounting (With cabinet removed to fit standard relay rack): 19½ in. Wide; 14 in. High.

THE LAVOIE MODEL LA-239C has been designed to surpass the high performance of the TS-239A/UP, which has been the standard test oscilloscope for the Armed Services since its introduction. Model LA-239C is the result of a long period of research and development which has included the study of new tubes, new circuits, and new techniques. Rugged design has been combined with functional simplicity to produce an instrument as attractive as it is efficient.

To create a circuit that will produce a certain complex wave form, or study transients and pulse phenomena, no better precision instrument is available today.

Lavoie Laboratories take pride in offering this precision oscilloscope as the combination of engineering perfection and manufacturing skill.

UHF

Lavoie Laboratories, Inc.
MORGANVILLE, NEW JERSEY
DESIGNERS AND MANUFACTURERS OF ELECTRONIC EQUIPMENT

(Continued from page 327)

Microwave Development Labs., Inc., 220 Grove St., Waltham 54, Mass., 10
For details see ad on page 284
Nassau Research & Dev. Assoc., Inc., 66 Main St., Mineola, L.I., N.Y., 5, 10
For details see ad on page 243
Newton, Arnold, N.Y., 10
Pickard & Burns, Inc., 240 Highland Ave., Needham 94, Mass., 5
For details see ad on pages 113, 284
Polarad Electronics Corp., N.Y., 5, 10
Polytechnic Research & Dev. Co., Inc., 55 Johnson St., Brooklyn 1, N.Y., 10, Attenuators, Signal & Noise Generator
For details see ad on pages 374-375
Precise Development Corp., N.Y., 5
Radiation Counter Labs., Inc., Ill., 5
Radio Corp. of America, Camden, N.J., 5
For details see ad on pages 88, 440-441
Resdel Engineering, Calif., 5
Rollin Co., Calif., 10
Rutherford Electronics Co., Calif., 5, Oscillators
Sightmaster Corp., N.Y., Calorimeters
Sivers Lab., Sweden, 10, Frequency Meters
Southern Elec. & Transmission Co., Tex., Multiplexing
Specialty Assem. & Packing Co., N.Y., 5
Spencer-Kennedy Laboratories, Inc., 187 Massachusetts Ave., Cambridge 39, Mass., 5
For details see ad on page 306
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 5, 10, 15
See complete catalog in last section
Stelma, Inc., Conn., 5
Stoddart Aircraft Radio Co., Inc., 6644 Santa Monica Blvd., Hollywood 38, Calif., 5, Attenuators, Coaxial
For details see ad on page 246
Syntronic Instruments, Inc., Ill., 5
Technicraft Laboratories, Inc., Conn., 10
Technitrol Engineering Co., Inc., 2751 N. 4 St., Philadelphia 33, Pa., 5
For details see ad on page 221
Teletronics Laboratory, Inc., N.Y., 5, 15
Titeflex, Inc., N.J., 10
Trad Television Corp., 1001 First Ave., Asbury Park, N.J., Standing Wave Indicator
For details see ad on page 338
Universal Mfg. Co., Inc., 404 Hillside Ave., Hillside, N.J., 10
For details see ad on pages 149, 247
Vectron, Inc., 400 Main St., Waltham 54, Mass., 5, 10, Spectrum Analyzer
For details see ad on page 308
Wang Laboratories, 296 Columbus Ave., Boston 16, Mass., 5
For details see ad on page 230
Waterman Products Co., Inc., 2445-63 Emerald St., Philadelphia 25, Pa., 5, 15, 25
For details see ad on pages 386-387
Waveline, Inc., P.O. Box 470, North Cardwell, N.J., 10
For details see ad on page 242
Wayne-Kerr Labs., Ltd., Sycamore Grove, New Malden Surrey, England, 5, 10, Test Oscillators
For details see ad on page 316
Weinschel Engineering Co., Inc., Md., Attenuators; Fixed, Coax., & Step
Wheeler Laboratories, Inc., 122 Cutter Mill Rd., Great Neck, L.I., N.Y., 5, Analyzers, Oscillators, Mixers
For details see ad on page 259
Wright Engineering Co., Calif., 5, 15

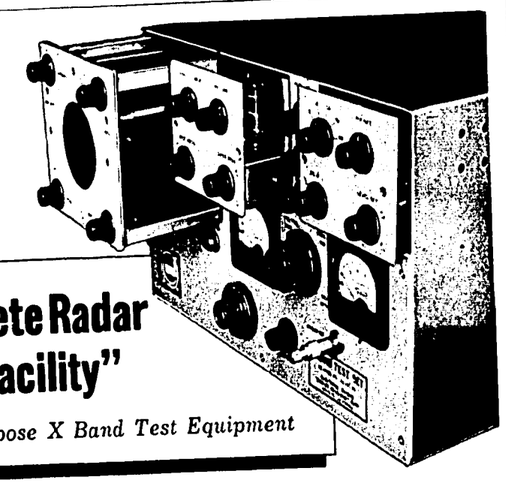
94. Nuclear.

5. Dosimeters
10. Ionization chambers
15. Survey meters

Anton Electronic Labs., Inc., 1226 Flushing Ave., Brooklyn 37, N.Y., 5, 10, 15
For details see ad on page 226
Atomic Instrument Co., 84 Massachusetts Ave., Cambridge 39, Mass., 10, 15, Pulse Height Analyzer
For details see ad on page 229
Beckman Instruments, Inc., Calif. 10, 15
Bendix Aviation Corp., Research Lab., Fisher Bldg., Detroit 2, Mich., 5, 10, 15
For details see ad on pages 176, 366-367
Bendix Aviation Corp., Cincinnati Div., 203 W. 3 St., Cincinnati, Ohio, 5
For details see ad on pages 176, 366-367
Berkeley, Div. Beckman Instruments, Inc., 2200 Wright Ave., Richmond, Calif., 10, 15
For details see ad on page 8
Biophysical Instruments, Inc., Pa., 10
Chatham Electronics Corp., 630 W. Mt. Pleasant Ave., Newark 2, N.J., 5, 10
For details see ad on pages 404-405
Clarke Instr. Div., National Ele. Mach. Shops, Md., 15
Consolidated Engineering Corp., Calif., 5
Dallons Laboratories, Calif., 10
Detectron Co., Calif., 15
De Wald Radio Mfg. Corp., N.Y., 15
Electronic Instruments, Ltd., England, 10
Fisher Scientific Co., Pa., 5, 10, 15
Freed E. & C., Corp., N.Y., 5
General Electric Co., N.Y., 10
Glens Falls Laboratory, Inc., N.Y., 15
Halcross Instruments Corp., Canada, 15
Interelectronics Corp., N.Y., 5, 10
Magnex Corp., N.Y., 5, 10, 15
Manhattan Research Labs., N.Y., 15
Menlo Research Lab., Calif., 5
Multi-Tron Laboratory, Ill., 10
Northern Electronic & Vacuum Ind., Canada, 15
Nuclear Development Laboratory, Mo., 10, 15
Nuclear Instrument & Chemical, Ill., 5, 10, 15
Nuclear Research Corp., Pa., 15
Nuclear Research & Development, Mo., 10, 15
Nucleonic Co. of America, N.Y., 15
Ohmart Corp., Ohio, 10, 15
Precision Radiation Instruments, Calif., 15

(Continued on page 331)

Model 109



"Complete Radar Test Facility"

Multi-Purpose X Band Test Equipment

Spectrum Analyzer	Displays supplied spectra from 8.5 to 10. KMC on a 3" CRT
Signal Generator	Delivers CW, square wave, FM, or pulse (1, 5 or 10 μs) modulated RF, 8.5 to 10 KMC up to 25 MW
Power Monitor	Measures average power of CW or pulsed RF, external or internal, from 8.5 – 10.5 KMC
Frequency Meter	Measures applied RF from 8.5 – 10.5 KMC to .1% accuracy.

All major units plug in, 17" x 10½" x 13". 45 lbs.

Century Electronics

A DIVISION OF CENTURY METALCRAFT CORPORATION — 14806 OXNARD STREET • VAN NUYS, CALIFORNIA

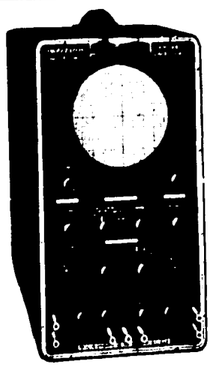
Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

ENGINEERS IN INDUSTRY AND LABORATORY...

depend on **PRECISION**

ELECTRONIC TEST INSTRUMENTS... *because*

- ... **they recognize** that there is no compromise, no guesswork, behind the design and workmanship of a "PRECISION"-built instrument;
- ... **they have seen** the "insides" of the equipment, which reveals the high quality components and the infinite care given to "Precision Individualized Production";
- ... **they have learned,** over the past twenty years — in the laboratory, on the production line, in the maintenance department, that they can always look to PRECISION Test Equipment, as the standard of performance, accuracy and value!



SERIES ES-500A
High Sensitivity, Wide-Range 5" OSCILLOSCOPE
20 MV per inch "V" Sensitivity

- ★ Push-Pull V. and H. Amplifiers. 10 cycles to 1 MC response.
- ★ Frequency Compensated Vertical Input Step Attenuator.
- ★ Built-in 1 volt P-P Calibrator.
- ★ "V" phase reversing switch.
- ★ "Z" Axis Modulation Input.
- ★ All 4 Hor. and Vert. Plate Connections Directly Accessible.

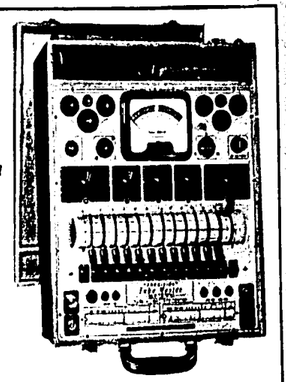
Net Price.....$173.70

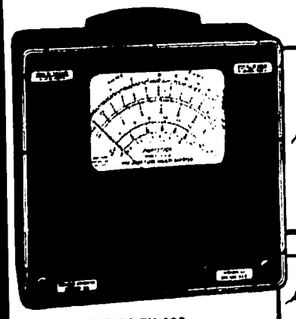
SERIES SP-5 . . . TEST PROBE SET
Specially engineered for use with ES-500A.
Net Price $23.50

SERIES 10-12
Electronamic TUBE MASTER
The All-Inclusive, Positive Vacuum-Tube PERFORMANCE Test, *that is not limited to Mutual Conductance alone!*

Incorporates the time-proven "Precision" ELECTRONAMIC Tube performance Test Circuit . . . plus an advanced, multiple-element, master-lever selector system. Affords the highest practical order of test results and anti-obsolescence insurance.

Net Price.....$107.50





SERIES EV-10A
True Zero-Center VTVM and Multi-Range Test Set
with Direct Peak Reading High Frequency Scales.

58 Ranges to:
6000 V., 2000 Megs.,
12 Amps +77 DB

Net Price.....$99.75



SERIES RF-10A
Vacuum Tube H. F. Probe
Provides direct hi-freq. peak voltage measurements with the EV-10A.
Net Price.....$14.40



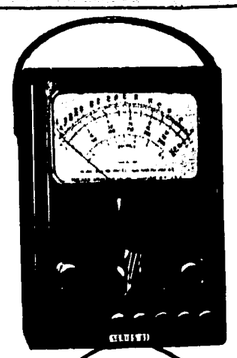
SERIES TV-4
Super High Voltage SAFETY TEST PROBE
Voltage Ranges to 60,000 Volts D. C. when used with Series EV-10A
Net Price.....$14.75

SERIES 85
High Sensitivity
AC-DC CIRCUIT TESTER
(20,000 ohms per volt, D.C.)

34 Self-Contained Ranges to:
6000 V., 60 Megs., 12 Amps., +70 DB

A Compact, versatile, Test Set, Application-Engineered for modern electronic circuits AM-FM-TV
Size.....5½" x 7⅛" x 3"

Net Price.....$39.95



LC-1—LEATHER INSTRUMENT CASE
Custom-designed for Series 85. Includes a tool and test lead compartment. Genuine, top-grain cowhide.
Net Price.....$9.50



PRECISION APPARATUS CO., INC.
92-27 Horace Harding Boulevard, Elmhurst 17, New York

Complete, illustrated catalog, describing entire line of "Precision" Test Instruments, available on request.

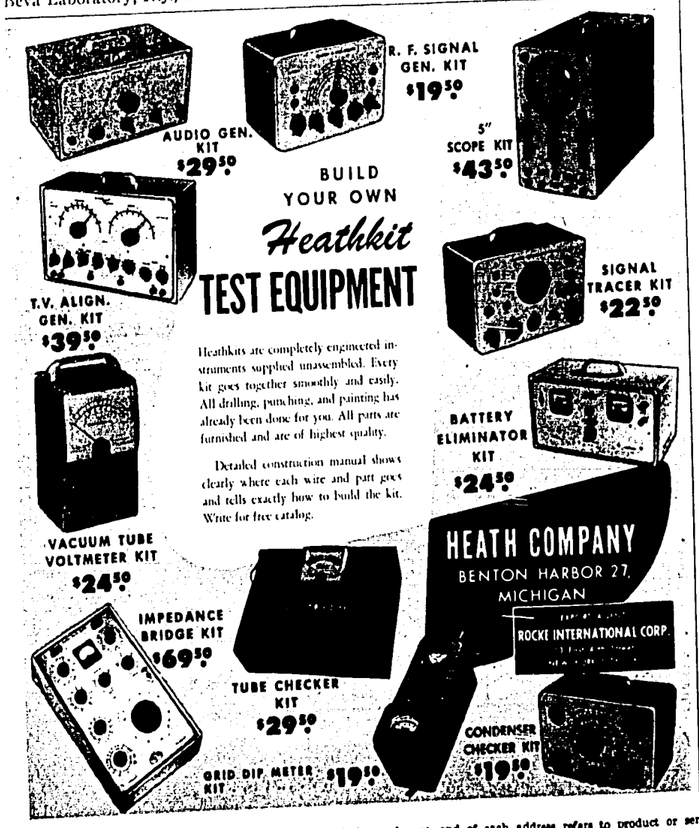
(Continued from page 329)

Professional Electronics Co., Calif., 10
R. C. Scientific Instr. Co., Calif., 5, 15
Radiation Counter Labs., Inc., Ill., 5, 10, 15
Resdel Engineering, Calif., 5, 10, 15
Special Instruments Lab., Inc., Tenn., 10, 15
Specialty Assem. & Packing Co., N.Y., 5
Tracerlab, Inc., Mass., 5, 10, 15
U. S. Radium Corp., N.Y., Ion Sources
Victoreen Instrument Co., Ohio, 5, 10, 15
Wayne-Kerr Labs., Ltd., Sycamore Grove, New Malden, England, 10
For details see ad on page 316

95. Oscilloscopes—Cathode-Ray.

5. General purpose
10. Oscilloscope cameras
15. Oscillosynchroscopes
20. Recording oscillographs
25. Special UHF & Pulse Analysis equipment

Advance Electronics Co., 415 Highland Ave., Passaic, N.J., 15
For details see ad on page 325
Aircraft Armaments, Inc., Md., 15, 25
Airmec, Ltd., England, 5, 10
Allegany Instrument Co., Md., 10, 20
American Electronic Labs., Inc., Pa., 5
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25
Andrea Radio Corp., N.Y., 5, 25
Beva Laboratory, N.J., 25
Browning Laboratories, Inc., 750 Main St., Winchester, Mass., 5, 15
For details see ad on page 326
Burke, James S., Inc., Ill., 10
Central Research Laboratories, Minn., 20, 25
Central Scientific Co., Ill., 5
Century Geophysical Corp., Okla., 20
Century Metalcraft Corp., Calif., 25
Chicago Electronic Laboratories, Ill., 25
Computing Devices of Can., Ltd., Canada, 5
Consolidated Engineering Corp., Calif., 20
Corona Engineering Service, N.Y., 5
Cossor (Canada), Ltd., Canada, 5, 10
Cyclotron Specialties Co., Calif., 5
De Wald Radio Mfg. Corp., N.Y., 5
Douglas Instrument Labs., Mass., 15
DuMont Labs., Inc., Allen B., Instrument Div., 760 Bloomfield Ave., Clifton, N.J., 5, 10, 15, Projection Lens
For details see ad on page 29
Eastman Kodak Co., N.Y., 10
Edin Company, Inc., Mass., 20
Electro Medical Laboratory, Inc., Vt., 10
Electronic Instrument Co., Inc., N.Y., 5
Electronic Measurements Corp., N.Y., 5
Electronic Systems Co., N.Y., 25
Electronic Tube Corp., Pa., 10
Elliott Brothers London, Ltd., England, 25
El-Tronics, Inc., Pa., 5
Engineering Research Corp., Colo., 10

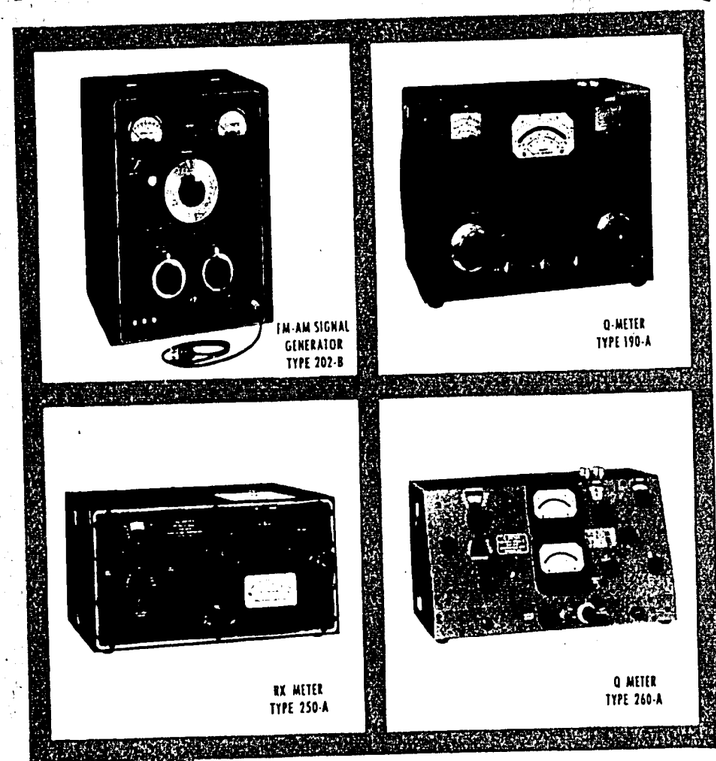


Oscilloscopes—Cathode-Ray

Fairchild Camera & Instr. Corp., Robbins Lane, Syosset, L.I., N.Y., 10
See complete catalog in last section
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 25
For details see ad on pages 368-373
Franklin Electronics, Inc., Pa., 10, 15, 20, 25
Freed E. & C. Corp., N.Y., 5
Furzehill Laboratories, Ltd., England, 5, 10
General Electric Co., N.Y., 5
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 10
For details see ad on pages 380-381, Cover IV
Gilfillan Bros., Inc., Calif., 15
Grass Instrument Co., Mass., 10
Hathaway Instrument Co., Colo., 5, 10, 20
Heath Co., 305 Territorial Rd., Benton Harbor, Mich., 5, Kits
For details see ad on page 331
Heiland Research Corp., 130 E. 5 Ave., Denver 9, Colo., 20
For details see ad on page 232
Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland 8, Ohio, 5, 25
For details see ad on page 170
Hycon Mfg. Co., Calif., 5, 10, 15, 25
Industrial Television, Inc., N.J., 5, 15
International Electronics Corp., N.Y., 10, 15, 20
Jackson Elec. Instrument Co., Ohio, 5
Laboratory for Electronics, Inc., 75 Pitts St., Boston 14, Mass., 5, 15, 25
For details see ad on pages 432-433
Labscope, Inc., N.J., 5
Lavoie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N.J., 5, 15
For details see ad on page 328
Linear Equipment Labs., 295 W. Shore Drive, Massapequa, L.I., N.Y., 25
For details see ad on page 333
Loral Electronics Corp., N.Y., 25
Magnex Corp., N.Y., 25
Miller Instruments, Wm., Calif., 10, 20
Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass., 5, 15
For details see ad on page 336
Miller Instruments, Inc., William, Calif., 20
Mullard Overseas, Ltd., England, 5
Multi-Tron Laboratory, Ill., 25
Offner Electronics, Inc., Ill., 20
Photron Instrument Co., Ohio, Oscillographs
Polarad Electronics Corp., N.Y., 25
Precise Development Corp., N.Y., 5
Precision Apparatus Co., Inc., 92-27 Horace Harding Blvd., Elmhurst, L.I., N.Y., 5
For details see ad on page 330
Radio City Products Co., Inc., N.Y., 5
Radio Corp. of America, Camden, N.J., 5, 25
For details see ad on pages 88, 440-441
RCA Victor Division, Tube Dept., 415 S. Fifth St., Harrison, N.J., 5
For details see ad on pages 88, 440-441
Reiner Electronics Co., Inc., N.Y., 5
Resdel Engineering, Calif., 5, 15
Ribet Desjardins, France, 5, 15

(Continued on page 333)

PRECISION ELECTRONIC MEASURING INSTRUMENTS



Signal Generators

Frequency and Amplitude Modulated
For Aircraft Navigation Receivers
For Mobile Communications Receivers

Q Meters

Low, Medium and High Frequencies
Very High Frequencies

Univerters

Low, Medium and High Frequencies
Impedance Measurements

Write for complete information

Q METERS					
Type	Freq. Range	Q Range	Tuning Capacity Range	Q Accuracy	Price
260-A	50 kc to 50 mc	10 to 625	30–450 mmf	5% to 30 mc	$725.
190-A	20 mc to 260 mc	5 to 1200	7.5 to 100 mmf	7% to 100 mc	$625.

FM-AM SIGNAL GENERATORS						
Type	Freq. Range	Output Range	Modulation FM	Modulation AM	Application	Price
202-B	54–216 mc	0.1 to 200,000 uv	0–240 kc	0–50%	General	$975.
202-C	54–216 mc	0.1 to 200,000 uv	0–240 kc	0–50%	Mobile	$1090.
202-D	175–250 mc	0.1 to 200,000 uv	0–240 kc	0–100%	Telemetering	$980.

WIDE BAND IMPEDANCE MEASURING EQUIPMENT — RX Meter					
Type	Freq. Range	R Range	C Range	L Range	Price
250-A	0.5 to 250 mc	15 to 100,000 ohms	0–20 uuf	0.001 uh–100 mh	$1250.

OMNI-RANGE SIGNAL GENERATOR (Crystal Monitored)					
Type	Freq. Range	Output Range	Modulation	Application	Price
211-A	88–140 mc	0.1 to 200,000 uv	0–100% am	Omni-Range Rcvrs.	$1800.

GLIDE SLOPE SIGNAL GENERATOR					
Type	Freq. Range	Output Range	Modulation	Application	Price
232-A	329–335 mc	1.0 to 200,000 uv	0–100% am	Glide Slope Rcvrs.	$1500.

UNIVERTERS						
Type	Freq. Range	Output Range	Modulation FM	Modulation AM	Accessory to	Price
207-A	0.1 to 55 mc	0.1 to 100,000 uv	0–240 kc	0–50%	202-B and 202-C	$345.
207-B	0.1 to 55 mc	0.1 to 100,000 uv	0–240 kc	0–50%	202-D	345.

BOONTON RADIO Corporation
BOONTON·N·J·U·S·A·

Oscilloscopes—Cathode-Ray

(Continued from page 331)

Rutherford Electronics Co., Calif., Calibrators
Sanborn Co., 39 Osborn St., Cambridge 39, Mass., 20
For details see ad on page 320
Servo Corp. of America, 20-20 Jericho Tnpke., New Hyde Park, L.I., N.Y., 20
For details see ad on pages 438-439
Simpson Electric Co., 5200 W. Kinzie St., Chicago 44, Ill., 5
For details see ad on page 174
Smith & Stone, Lt., Canada, 20
Spencer-Kennedy Laboratories, Inc., 186 Massachusetts Ave., Cambridge 39, Mass., 15, 25
For details see ad on page 306
Sperry-Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 25
See complete catalog in last section
Stark Electronic Instruments, Ltd., Canada, 5
Supreme Inc., Miss., 5
Sylvania Electric Products, Inc., 1740 Broadway, New York 19, N.Y., 5, 25
For details see ad on pages 417-420
Syntronic Instruments, Inc., Ill., 15
Technical Apparatus Builders, N.Y., 5
Telechrome, Inc., 88 Merrick Rd., Amityville, L.I., N.Y., 15, 25
For details see ad on pages 120, 285
Telemark, Inc., Conn., 5
Television Equipment Corp., N.Y., 5
Trad Television Corp., 1001 First Ave., Asbury Park, N.J., 5
For details see ad on page 338
Triplett Electrical Instr., Ohio, 5
Triumph Mfg. Co., Ill., 5
Vectron, Inc., 400 Main St., Waltham 54, Mass., 25
For details see ad on page 308
Wang Laboratories, 296 Columbus Ave., Boston 16, Mass., 25
For details see ad on page 230
Waterman Products Co., Inc., Pa., 5, 15, 25
Wayne-Kerr Labs., Ltd., Sycamore Grove, New Malden, England, 25
For details see ad on page 316
Western Sound & Elec. Labs., Inc., Wis., 10, 15

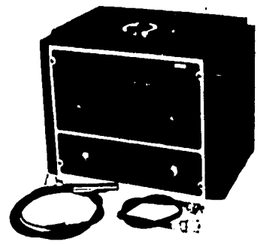
96. Radio Frequency Test Equipment.

5. Field strength meters		35. Signal generators, AM	
10. Impedance & admittance meters		40. Signal generators, FM	
15. Marker generators		45. Signal generators, TV	
20. "Q" Meters		50. SWR meters	
25. RF power output meters		55. Sweep generators	
30. Multi-vibrators		60. Wavemeters	

A. R. F. Products, Inc., Ill., 35, 40, 45, 50, 55
Advance Electronics Co., 451 Highland Ave., Passaic, N.J., 10
For details see ad on page 325
Aeronautical Communication Equipment Inc., Fla., 50
Aircraft Radio Corp., Boonton, N.J., 35
For details see ad on page 123

THE LO-C OSCILLOPROBE

MODEL HF-3



WHAT IT IS

The LO-C OSCILLOPROBE is a unique low capacity probe and wide-band amplifier combination having 1/5 the input capacity of the conventional accessory probe.

WHAT IT DOES

The LO-C OSCILLOPROBE transfers a signal from a circuit under observation to any oscilloscope without amplitude loss or waveform distortion.

- C Input < 2 μμf
- Z Input = 5 Meg. Ω
- 10 cps. to 10 Mcps
- .035 μs rise time
- Z Out = 60 Ω
- .25 Mv. Noise Level
- 3 Stage amplifier

For full details write to

LINEAR EQUIPMENT LABORATORIES
BRIGHTWATER PLACE, MASSAPEQUA, NEW YORK

Radio Frequency Test Equipment

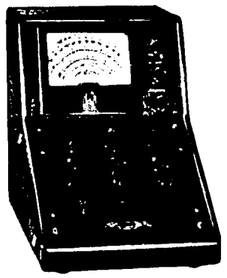
Airmec, Ltd., England, 35
American Electroneering Corp., Calif., 15, 25, 35
American Encaustic Tiling Co., Inc., Pa., 5, 60
American Machine & Foundry Co., Mass., 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60
Andrea Radio Corp., N.Y., 55
Andrew Corp., Ill., Phase
Approved Electronic Instrument, Co., N.Y., 5, 15, 35, 40, 45, 55
Avion Instrument Corp., N.J., 40, 55
Barker & Williamson, Inc., 237 Fairfield Ave., Upper Darby, Pa., 25
For details see ad on page 408
Bassett, Rex, Inc., Fla., 35
Bellaire Electronics, Inc., N.Y., 35, 40
Berkshire Laboratories, 584 Beaver Pond Rd., Lincoln, Mass., 15, 30
For details see ad on page 315
Bird Electronic Corp., Ohio, 25, 50
Bogart Mfg. Co., N.Y., 25, 60
Boonton Radio Corp., Intervale Rd., Boonton, N.J., 10, 20, 35, 40, 45, 55
For details see ad on page 332
Brush Development Co., Ohio, 5
C. G. S. Laboratories, Conn., 50
Canadian Research Institute, Canada, 20, 35
Central Rediffusion Services, England, 60
Century Electronics, Century Metalcraft Corp., 14806 Oxnard St., Van Nuys, Calif., 60
For details see ad on page 329
Clarke Instr. Div., National Elec. Mach. Shops, Md., 5
Clough Brengle Co., Ill., 15, 20, 35, 55
Cole Instrument Co., Calif., 20, 35
Connecticut Telephone & Elect., Conn., 40, 45
Crest Laboratories, Inc., N.Y., 45
Crosby Laboratories, Inc., Box 233, Robbins Lane, Hicksville, L.I., N.Y., Phase Modulation Exciters
For details see ad on pages 114, 282
Crown Engineering, N.M., 5
Cubic Corp., Scott & Canon Sts., San Diego 6,, Calif., 25, 40, 50, 55, 60
For details see ad on page 327
Dawe Instruments, Ltd., England, 20
Decade Instrument Corp., P.O. Box 153, Caldwell, N.J., 15, 35, 40, 55
For details see ad on page 321
Decimeter, Inc., Colo., 60
Demornay-Bonardi, Inc., Calif., 50, 60
De Wald Radio Mfg. Corp., N.Y., 25, 40
Diamond Microwave Corp., Mass., 60
Douglas Microwave Co., Inc., 338 E. 95 St., New York 28, N.Y., 60
For details see ad on page 324
Electro Impulse Laboratory, 62 White St., Red Bank, N.J., 25, 50, 60
For details see ad on page 240
Electronic Engineering Co. of Calif., Calif., 30
Electronic Instrument Co., Inc., N.Y., 15, 35, 40, 45, 55
Electronic Measurements Corp., N.Y., 35, 45

(Continued on page 335)

TIC INSTRUMENTS

Complex Plane Analyser

Type 250A



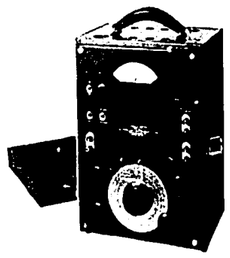
Plot the Poles and zeros of your system on the complex frequency plane and gather the following design information:

The Complex Plane Analyser solves magnitude and phase angle responses for any sinusoidal frequency. Exponential and complex driving functions determined. Complete transient response for impulse, step and other inputs. Root locus plotting simplifies solution of closed-loop systems. Multiplies and divides complex vectors giving magnitude and angle of the product vector. A compact, system design instrument.

Impedance Measurement Audio Frequency

Z-Angle Meter Type 310 A

30 to 20,000 c.p.s.



Measures impedance directly in polar coordinates as an *impedance* magnitude in ohms and *phase angle*, in degrees $Z\angle\pm\theta$. 310-A measures, with equal ease, pure resistance, inductance, capacitance or complex impedances comprised of most any RLC combinations. Range: Impedance (Z), 0.5 to 100,000 ohms; Phase Angle ($\pm\theta$) + 90° (X_L) through 0° (R) to −90° (X_C). Accuracy: Within ± 1% for impedance and ±2° for phase angle. Price: $470.00.

Phase Measurement

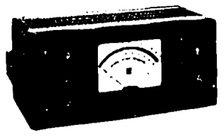
Phase Meter Type 320 AB

Frequency Range 20 cycles to 100 kc.

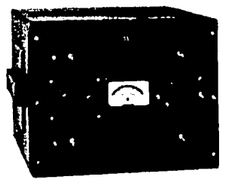
All electronic instrument that directly measures phase angle between two periodic voltages from zero to 360°. Readings made directly without balancing on four scale ranges, 0 to 36°, 0 to 90°, 0 to 180°, and 0 to 360°. Voltage Range: 1 to 170 volts peak; Terminals for recorder; Relay Rack mounted or cabinet; Absolute accuracy: 1% of full scale plus 3°; Incremental accuracy better than 1%.

Price: With cabinet $565.00.





Precision Phase Meter Type 322A



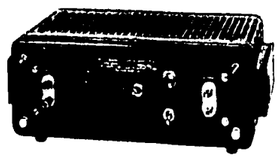
is an ultra-high precision phase measuring instrument which utilizes the same principles of phase measurement as the Type 320AB Phase Meter.

More elaborate circuit design techniques permit phase angles to be read with an accuracy of ± 1° from 0 to 360° without ambiguity over the frequency range from 20 cycles to 20 kilocycles. Useful frequency range extends up to 1 megacycle. Precision of phase angle reading obtained is within ± 0.1° so that changes in the relative phase angle between two voltages can be read with an accuracy of ± 0.1°. Instrument measures phase angle difference between positive going zero axis crossings independent of wave form. Input impedance is approximately 4.7 megohms shunted by 13 μμf. Recorder terminals are provided.

Primary Phase Standard — Type 7000 A

Provides two voltages of the same frequency whose relative phase angle is precisely known and continuously variable from 0 to 360°. Frequency: Available for operation at any one fixed frequency from 60 cycles to 20 kcs. Accuracy: ± .05 degrees; with special operating techniques ± .01 degrees.

Wide Band Amplifier Type 500-A

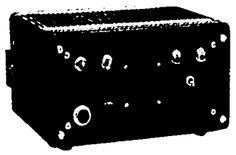


Designed for use as a general purpose laboratory amplifier and also with the phase meter at voltage levels below one volt. Features high gain, negligible phase shift and wide band width.

Outstanding specifications: *Amplification*—10; 100; 1000 selected by rotary switch . . . *Accuracy* —±2% nominal . . . *Frequency response*—±0.5db from 5 cycles to 2mc on gain of 10; ±0.5db on 5 cycles to 1.5 mc on gain of 100; ±0.8db from 5 cycles to 1mc on gain of 1000 . . . *Phase shift* —0±2° from 20 cycles through 100kc . . . *Gain stability*—constant with line voltages (105-125v). *Input impedance*—160 megohms shunted by 7 μμf. *Output impedance*—approximately 200 Ω (from cathode follower).

Price: With cabinet $205.00; with relay rack $200.00.

Ponogometer Type 394 A



A precision potentiometer noise tester designed for laboratory and production quality control in the manufacture of single or multi-turn precision potentiometers. Monitoring the transient contact noise resistance appearing between the wiper and resistance element, both audible and visual indications are given when threshold level is exceeded.

Range: Equivalent Noise Resistance threshold level adjustable from 10 to 5000 ohms. Lower levels can be set up by means of accessory amplifiers.

Wiper Exciting Current: Constant 1 milliampere. For other values accessory current sources can be set up. Price $350.00.

R-F Oscillator — Type 410 A — 100 kc to 10 mc.

(Special models 46.5 kc to 4.65 mc available.)



Power oscillator for use as bridge driver and general laboratory measurements. Features: High stability, high output (approximate 30 volts), 50-60Ω output impedance, expanded frequency scale, direct reading output voltmeter, compact design. Price: $385.00.

Technical Catalog—yours for the asking. Contains detailed information on all TIC Instruments, Potentiometers and other equipment. Get your copy without obligation — write today.

TECHNOLOGY INSTRUMENT CORP.

535 Main Street · Acton, Massachusetts · Telephone: ACton 3-7711

Engineering Representatives

Chicago, Ill.—UPtown 8-1141
Cleveland, Ohio—PRospect 1-6171
Waltham, Mass.—WAltham 5-6900
Rochester, N.Y.—Monroe 3143
Dayton, Ohio—Michigan-8721
Arnprior, Ont., Can.—Arnprior 400
Hollywood, Cal.—HOllywood 9-6305
Dallas, Texas—DIxon 9918
Roseland, New Jersey—Caldwell 6-4545
Wyncote, Pa.—Ogontz 8805
Silver Spring, Md.—Sligo 7-550

New 800-2600 mcs FREQUENCY METERS

Lightweight — Portable Units

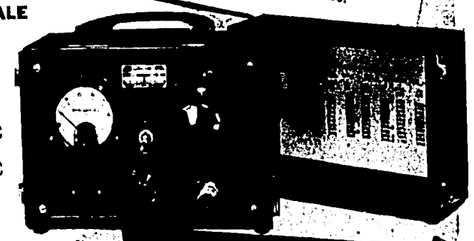
...For Field and Laboratory Use!

SPECIFICATIONS

1. **ACCURACY** Better than .05% from 20°F to 120°F
2. **SENSITIVITY** Usable indication with 1 milliwatt input Adjustable for higher levels
3. **INDICATOR** 50 Microammeter
4. **INPUT** 50 Ohm Type N Connector
5. **EXTERNAL DC OUTPUT** Pin Jacks
6. **EXCURSION OF MICROMETER** One-half inch
7. **MICROMETER SCALE** at 1000 Mc — 1 Division equals 290 KC at 1400 Mc — 1 Division equals 350 KC at 2000 Mc — 1 Division equals 450 KC at 2600 Mc — 1 Division equals 555 KC
8. **EXTERNAL SIZE** 6½ x 9¾ x 7"
9. **WEIGHT** Four pounds

Models
FS-C-171-A 800-1200 MCS.
FS-C-172-A 1200-1600 MCS.
FS-C-173-A 1600-2250 MCS.
FS-C-174-A 1700-2600 MCS.

Units consist of cavity body, micrometer control, crystal, suitable connectors and calibration chart. Write for specifications and prices.



(Cavity units are also available for custom housing)

frequency standards
P. O. Box 504.
Asbury Park, New Jersey

New! COMPARISON TESTER for TRANSISTOR APPLICATIONS

TEST JUNCTION TRANSISTORS, POINT CONTACT TRANSISTORS, DIODES, AND OTHER SEMI-CONDUCTOR DEVICES ON A 'GO NO-GO' BASIS



Ideal for Factory Production and Laboratory Development

TRANSISTOR TESTER
MODEL TT-11

Price Complete* $189.50
F.O.B. Caldwell, N.J.

FEATURES

✓ Both Static and Dynamic Comparison Tests Performed
✓ Independent of Voltage and Temperature Variation
✓ Never obsoleted by new Transistor Types
✓ Simple to Operate ✓ Moderately Priced

Order your Transistor Tester today or write for Bulletin ID

* Reference Transistors not supplied with this unit.

ELECTRONIC RESEARCH ASSOCIATES, INC.
BOX 29, CALDWELL, N. J.

Radio Frequency Test Equipment

(Continued from page 333)

Electronic Research Associates, Inc., P.O. Box 29, Caldwell, N.J., Transistor Test
For details see ad on pages 180, 335

Electron Radar Products, Ill., 25, 60

Elk Electronic Laboratories, Inc., 333 W. 52 St., New York 19, N.Y., 5, 20, 35, 40
For details see ad on page 257

El-Mec Laboratories, Inc., N.J., 50

El-Tronics, Inc., Pa., 45, 55

Empire Devices, Inc., N.Y., 5

Erwood, Inc., Ill., 5

Espey Manufacturing Co., Inc., N.Y., 5, 35

F-R Machine Works, Inc., 44-14 Astoria Blvd., Long Island City 3, N.Y., 50
For details see ad on page 283

Federal Electric Mfg. Co., Ltd., Canada, 5

Federal Mfg. & Engineering Corp., N.Y., 35, 40, 60

Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N.J., 5, 10
For details see ad on pages 368-373

Ferris Instrument Co., N.J., 5, 35

Franklin Electronics, Inc., Pa., 15, 55

Freed Transformer Co., Inc., 1718 Weirfield St., Brooklyn 27, N.Y., 20
See complete catalog in last section

Frequency Standards, P.O. Box 504, Eatontown, N.J., 60
For details see ad on page 335

G-W Associates, Calif., 25

General Communication Co., 681 Beacon St., Boston 15, Mass., 35, 40, 55
For details see ad on page 210

General Electric Co., N.Y., 15, 45, 55

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., 10, 35, 60
For details see ad on pages 380-381, Cover IV

Gertsch Products, Inc., Calif., 60

Harman-Kardon, Inc., N.Y., 50

Heath Co., 305 Territorial Rd., Benton Harbor, Mich., 20, 35, 45, 55, Kits
For details see ad on page 331

Hewlett-Packard Co., 395 Page Mill Rd., Palo Alto, Calif., 35, 45, 50
See complete catalog in last section

Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland 8, Ohio, 15, 35, 40, 45, 55
For details see ad on page 170

Hycon Mfg. Co., Calif., 25, 30, 35, 40, 50, 55, 60

Industrial Television, Inc., N.J., 5

Industrial Test Equipment Co., 55 E. 11 St., New York 3, N.Y. Phase
For details see ad on page 307

Interelectronics Corp., N.Y., 20

International Electronics Corp., N.Y., Ultra Sonic Generator

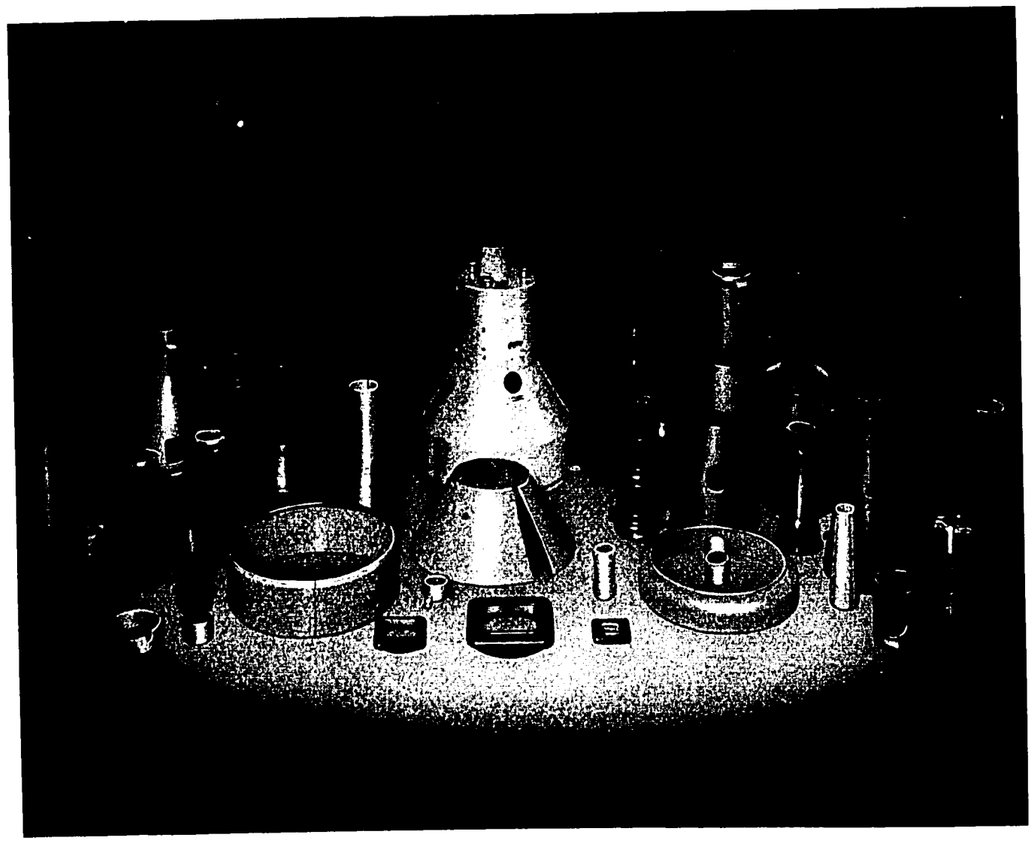
International Television Corp., N.Y., 15

Jackson Elec. Instrument Co., Ohio, 35, 45, 55

Jones Electronics Co., Inc., M. C., 96 N. Main St., Bristol, Conn., 25, 50
For details see ad on page 51

(Continued on page 337)

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.



Designed for Application

Mu Metal Shields

The James Millen Mfg. Co. Inc. has for many years specialized in the production of magnetic metal cathode ray tube shields for the entire electronics industry, supplying magnetic metal shields to manufacturing companies, laboratories and research organizations. Stock shields are immediately available for all of the more popular sizes and types of cathode ray tubes as well as bezels for 2″, 3″ and 5″ size tubes.

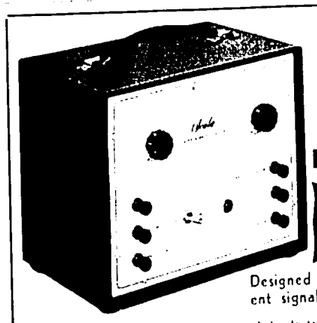
Many production problems, however, make desirable special shields designed in conjunction with the specialized requirement of the basic apparatus. Herewith, are illustrated a number of such custom built shields. Our custom design and fabrication department is at the service of our customers for the development and manufacture of magnetic metal shields of either nicoloi or mumetal for such specialized applications.

JAMES MILLEN MFG. CO., INC.
MAIN OFFICE AND FACTORY
MALDEN, MASSACHUSETTS, U.S.A.

Radio Frequency Test Equipment

(Continued from page 335)

Kay Electric Co., 14 Maple Ave., Pine Brook, N.J., 15, 50, 55, 60, Random Noise
For details see ad on page 314
Kings Electronics Co., 40 Marbledale Rd., Tuckahoe, N.Y., 20, 60
For details see ad on pages 414-415
Kings Microwave Co., Inc., N.Y., 60
Lako Co., Wis., 20
Lampkin Laboratories, Inc., Fla., 25
Lavoie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N.J., 35, 60
For details see ad on page 328
Lear, Inc., Calif., 5, 25
Letting Radio Mfg. Co., N.Y., Antenna Tuner
Linear Equipment Labs., 295 West Shore Drive, Massapequa, L.I., N.Y., 45, 55, 60
For details see ad on page 333
Lytle Engineering & Mfg. Co., Ill., 15
Manufacturers Engrg. & Equipment Corp., Pa., 55
Marconi Instruments, Ltd., N.Y., 10, 20, 25, 35, 40, 45, 50, 55, 60
Measurements Corp., Intervale Rd., Boonton, N.J., 5, 35, 40, 45
For details see ad on pages 284, 422-423
Mercury Electronic Co., N.J., 35, 40, 60
Metropolitan Electronics & Instruments Co., N.Y., 35, 40, 45, 55
Mico Instrument Co., 79 Trowbridge St., Cambridge 38, Mass., 60, Coaxial
For details see ad on page 63
Microlab, N.J., 35
Microwave Development Labs., Inc., 220 Grove St., Waltham 54, Mass., 60
For details see ad on page 284
Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass., 50, 60
For details see ad on page 336
Moseley Co., F. L., Calif., 35
Morrow Radio Mfg. Co., Ore., 50, 60
Mullard Overseas, Ltd., England, 40
Munston Mfg. & Service, Inc., N.Y., 35, 40
Nassau Research & Dev. Assoc., Inc., 66 Main St., Mineola, L.I., N.Y., 5, 10, 20, 25, 35, 50, 60
For details see ad on page 243
National Co., Inc., 61 Sherman St., Malden 48, Mass., 5
For details see ad on pages 434-435
New London Instrument Co., Conn., 35, 40, 45, 55
Newton, Arnold, N.Y., 40, 45, 50, 55, 60
Northern Electronic & Vacuum Ind., Canada, 30
Oak Ridge Products, N.Y., 35, 40, 45, 55
Panoramic Radio Products, Inc., 10 S. Second Ave., Mt. Vernon, N.Y., 55, Ultrasonic, Spectrum & RF Spectrum Analyzers
For details see ad on page 115
Pickard & Burns, Inc., 240 Highland Ave., Needham 94, Mass., 50
For details see ad on pages 113, 284
Pennsylvania Testing Laboratory, Pa., 40
Polarad Electronics Corp., N.Y., 5, 45
Polytechnic Research & Dev. Co., Inc., 55 Johnson St., Brooklyn 1, N.Y., 10, 25, 35, 40, 45, 50, 55, 60, Noise Generator
For details see ad on pages 374-375
Precise Development Corp., N.Y., 35, 45, 55
Precision Apparatus Co., Inc., 92-27 Horace Harding Blvd., Elmhurst, L.I., N.Y., 15, 35, 40, 45, 55
For details see ad on page 330
Radio City Products Co., Inc., N.Y., 15, 30, 35, 40, 45, 55, TV Test Pattern
Radio Corp. of America, Camden, N.J., 5, 15, 25, 35, 40, 45, 55
For details see ad on pages 88, 440-441
RCA Victor Division, Tube Dept., 415 S. 15 St., Harrison, N.J., 15, 45, 55
For details see ad on pages 88, 440-441
Radio Sonic Corp., N.Y., Ultra Sonic Generator
Reiner Electronics Co., Inc., N.Y., 15, 20, 30, 35, 40, 45, 55
Resdel Eng., Calif., 5, 35, 40, 55, 60
Rollin Co., Calif., 25, 35, 40, 50
Scala Radio Co., 2814 10th St., San Francisco 10, Calif., 15
For details see ad on page 337
Servo Corp. of America, 20-20 Jericho Tnpke., New Hyde Park, L.I., N.Y., 15, 40
For details see ad on pages 438-439
Sierra Electronic Corp., Calif., 10, 25, 50
Simpson Electric Co., 5200 W. Kinzie St., Chicago 44, Ill., 5, 15, 25, 40, 45, 55
For details see ad on page 174
Sivers Lab., Sweden, 50, 60
Sonar Radio Corp., N.Y., 5, 25
Sondyna, A. G., Switzerland, 5, 30, 45, 55, 60
Special Products, Co., Md., Signal Tracers
Specialty Assem. & Packing Co., N.Y., 35
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, L.I., N.Y., 5, 10, 15, 20, 25, 35, 40, 50, 55, 60
See complete catalog in last section
Stark Electronic Instruments, Ltd., Canada, 35, 40, 45, 55
Starrett Television Corp., N.Y., 15, 40, 45, 60
Stockman Electronics Res., Mass., 35, 60
Stoddart Aircraft Radio Co., Inc., 6644 Santa Monica Blvd., Hollywood 38, Calif., 5
For details see ad on page 246
Supreme Inc., Miss., 5, 15, 35, 40, 45, 55
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N.Y., 15, 35, 40, 45, 55
For details see ad on pages 417-420
Technology Instrument Corp., 535 Main St., Acton, Mass., 10, 20, 35, Phase Angle
For details see ad on pages 198, 334
Telechrome, Inc., 88 Merrick Rd., Amityville, L.I., N.Y., 45
For details see ad on pages 120, 285
Teletronics Laboratory, Inc., N.Y., 15
(Continued on page 339)



Save alignment time with the

Scala SUPER MARKER INJECTOR SMI-53...$67.50

SAVE UP TO 75% IN TIME

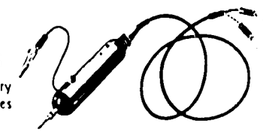
Designed to speed and simplify alignment, using your present signal generator, marker generator, and oscilloscope.

SAVES TIME—Marker size determined by instrument setting only. Not affected by characteristics or defects of circuits being aligned. Only one setup for each section (video I.F., sound I.F., detector or tuner) regardless of number of stages.

MORE ACCURATE—Marker will always be the same size whether on top of I.F. curve, on slope, bottom, in middle of ratio detector, or in sound trap. Marker cannot overload receiver or circuit being tested. Marker completely bypasses unit being tested. $67.50

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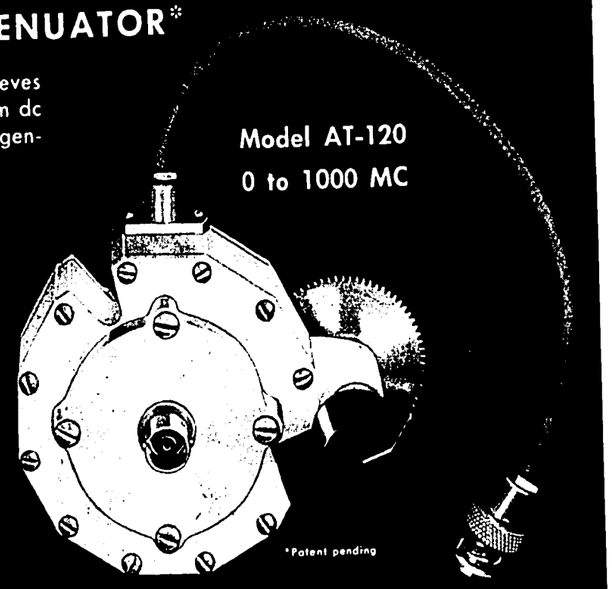
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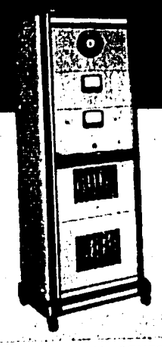
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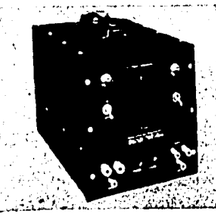
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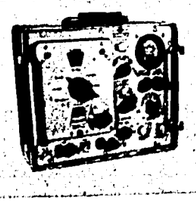


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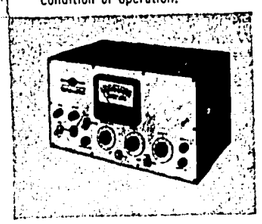
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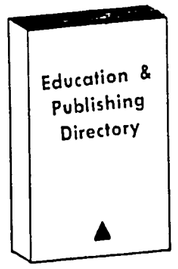
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9. Education & Publishing



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Education
Publishing

in this special section. Note particularly the sub-classification codes at the end of each firm address.

97 Education.
- 05 Technical instruction—home study
- 10 Technical instruction—resident

98 Publishing.
- 05 Book publishers
- 10 Magazines

Always consult the pink pages at the start of the Directory of firms, for a terminology cross-index, or to find products by name. The pink pages list more than 500 products by name, as well as under the product groups. Page numbers are given for speed.

Radio Frequency Test Equipment

(Continued from page 337)

Tel Instrument Co., Inc., 50 Paterson Ave., East Rutherford, N.J., 55, RF, UHF, IF
For details see ad on page 120

Thompson Products, Inc., Ohio, 60

Trad Television Corp., 1001 First Ave., Asbury Park, N.J., RF Signal Generators
For details see ad on page 338

Transvision, Inc., N.Y., 5

Triplett Electrical Instrument, Ohio, 15, 35, 40, 45, 55

United Technical Laboratories, N.J., Pattern Generator for TV

Vectron, Inc., 400 Main St., Waltham 54, Mass., 15, 50, 60, Variable Freq. Generator
For details see ad on page 308

Waveforms, Inc., N.Y., 35, 40, Crystal Calibrator

Waveline, Inc., P.O. Box 470, North Caldwell, N.J., 25, 40, 50, 60
For details see ad on page 242

Wayne-Kerr Labs., Ltd., Sycamore Grove, New Malden Surrey, England, 35, 60
For details see ad on page 316

Weston Electrical Instrument Corp., 614 Frelinghuysen, Newark 5, N.J., 10
For details see ad on page 172

Wheeler Laboratories, Inc., 122 Cutter Mill Rd., Great Neck, L.I., N.Y., 60
For details see ad on page 259

Wright Engineering Co., Calif., 15

97. Education.

5. Technical instruction—home study
10. Technical instruction—resident

American Television, Inc., Ill., 5, 10

Audel & Co., Theo., N.Y., 5

Berkeley and Asso., Edmund C., N.Y., 5, 10

Capitol Radio Engineering Inst., D.C., 5, 10

Coyne Electrical & TV Radio School, Ill., 10

DeForest's Training, Inc., Ill., 5, 10

Hollywood Radio & TV Institute, Calif., 5

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National Radio Institute, D.C., 5

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Preisman & Biser, D.C., 5, 10

RCA Institutes, Inc., N.Y., 5, 10

State University of N.Y., N.Y., 10

Stern Co., Roger M., 93 Nassau St., New York 38, N.Y., 5, 10
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Brentanos Technical Department, N.Y., 5, 10

Caldwell-Clements, Inc., N.Y., 10

Cambridge University Press, N.Y., 5

Coyne Electrical & TV Radio School, Ill., 5

Drake & Co., Frederick J., Ill., 5

Electronic Design Magazine, N.Y., 10

Frederick Research Corp., 4650 East-West Highway, Bethesda 14, Md., 15
For details see ad on page 283

High Fidelity Magazine, Mass., 5, 10

Illustrated Technical Prod. Corp., N.Y., 5

Industrial Laboratories, Ill., 10

Institute of Radio Engineers, 1 East 79 St., New York 21, N.Y., 10
For details see ad on pages 360, 396, 416, 448-449

Macmillan Co., 60 Fifth Ave., New York 11, N.Y., 5
For details see ad on page 340

MacRaes Blue Book, Ill., 5

McGraw-Hill Book Co., Inc., 330 W. 42 St., New York 36, N.Y., 5, 10
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(Continued on page 341)

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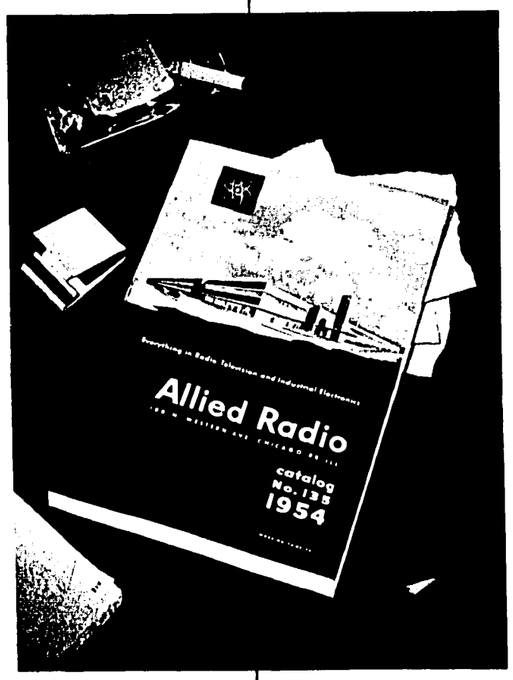
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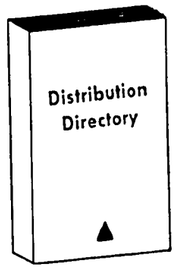
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The final section of our "10 in 1" directory is the complement to manufacturing, which is distribution. It has proved to be a real service to IRE member engineers and executives to put into this book a list of annually checked jobbers, wholesalers and distributors. Many of these firms are identified further by the initials REP, as member of "The Representatives," or NEDA, as member of the National Electronic Dealers Association. The number after the address codes each firm as shown at start of listing, top left.

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- 20 Sales & Service
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For details see ad on page 343

Aaron, Paul D., 120 Liberty St., New York 6, N.Y., 15 (REP)

Acme Electronics, Inc., 74 Willoughby St., Brooklyn 1, N.Y., 10

Acme Radio Supply, 412 E. 10 St., Topeka, Kan., 10 (NEDA)

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Adams, Thomas N., P.O. Box 2158, Greensboro, N.C., 15 (REP)

Adelman Co., Leon L., 25 Chittenden Ave., New York 33, N.Y., 15

Adirondack Radio Supply, 32 Guy Park Ave., Amsterdam, N.Y., 10 (NEDA)

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Aikins Electronic Supplies, Inc., 428 Bank St., New London, Conn., 10 (NEDA)

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Akeroyd, Arthur E., John Hancock Bldg., Boston 16, Mass., 15 (REP)

All State Dist. Co., 2407 Ross Ave., Dallas 1, Tex., 10 (NEDA)

Allen, Leonard D., 2401 S. State St., Syracuse 5, N.Y., 15 (REP)

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Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill., 10 (NEDA)
For details see ad on page 342

Allied Supply Co., Inc., 359 W. Monument Ave., Dayton 2, Ohio, 10 (NEDA)

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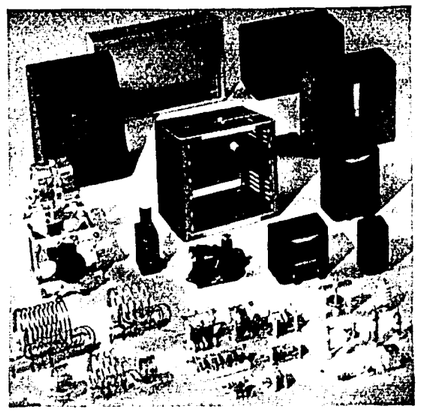
Amateur Radio Equipment Co., 1203 East Douglas, Wichita, Kan., 10 (NEDA)
American Airmotive Corp., Box 6, Miami Springs, Fla., 5, 10, 20, 25
American Amplifier & Television Corp., 1111 19 St., N.W., Washington 6, D.C., 10, 20
American Radio Co., Inc., 135 Broadway, New York 6, N.Y., 15
American Radio Corp., 510 Central Ave., Dover, N.H., 10 (NEDA)
Anderson, George E., 1903 Griffin St., Dallas 2, Tex., 15 (REP)
Anderson, Robert B., 172 State St., Boston 9, Mass., 15 (REP)
Andrews, A. R., 521 Cumberland Ave., Syracuse 10, N.Y., 15 (REP)
Andrews, Martin P., Mott Rd., Fayetteville, N.Y., 15 (REP)
Antle, Glen M., 5024 Bradford St., Dallas, Tex., 15 (REP)
Appleton, Harry N., 136 San Fernando Rd., Los Angeles 31, Calif., 15 (REP)
Arace Electronic Distributors, 25-27 Henry St., Kingston, N.Y., 10 (NEDA)
Arcee Electronics Co., 96 Warren St., New York 7, N.Y., 10
Arco Electronics, Inc., 103 Lafayette St., New York 13, N.Y., 10
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Argyle Electronics Co., 8 W. 18 St., New York 11, N.Y., 10, 15
Arnold, A. W., 1321 Rosedale Ave., Chicago 40, Ill., 15 (REP)
Arnold, Wm., 313 Washington St., Newton, Mass., 15 (REP)
Arrow Electronics, Inc., 82 Cortlandt St., New York 7, N.Y., 10
Arrowhead Radio & TV Supply Co., 1212-16 "D" St., San Bernardino, Calif., 5, 10
Asco Sound Corp., 115 W. 45 St., New York 36, N.Y., 20
Ashe Radio Co., Walter, 4335 Loughborough St., St. Louis 16, Mo., 10 (NEDA)
Associated Radio Distributors, 1251-3 Folsom St., San Francisco, Calif., 10 (NEDA)
Atcheson, Stewart, P.O. Box 2158, Greensboro, N.C., 15 (REP)
Atlas Radio Corp., Ltd., 560 King St., W., Toronto, Ont., Canada, 10, 15
Avnet Electronic Supply Co., 6 W. Broadway, New York 7, N.Y., 10
Audio & Video Products Corp., 730 Fifth Ave., New York 19, N.Y., 15, 20
Auriema, Inc., Ad, 82 Broad St., New York 4, N.Y., 5, 15
Aymond, Edward F., Jr., 4310 Maple Ave., Dallas 4, Tex., 15 (REP)
B & B Distributors, 222 Fulton St., New York 7, N.Y., 10, 15, 25
B & R Electric Co., St. Marys, Pa., 10 (NEDA)
B & R Electronics Corp., 118 N. 8 St., Vineland, N.J., 10 (NEDA)
Baier, A. H., 2138 Lee Rd., Tracy Bldg., Cleveland 18, Ohio, 15 (REP)
Baker Radio Electric, 111 Johns St., Johnstown, Pa., 10 (NEDA)
Baker Sales Co., Inc., H. C., 19 Franklin Rd., Roanoke, Va., 10 (NEDA)
Baldwin, D. H., c/o Diethert, 2323 W. Devon, Chicago 45, Ill., 15 (REP)
Ball, Marshall T., 58 E. Quaker St., Orchard Park, N.Y., 15 (REP)
Banfield, Carroll S., 68 Hudson St., Hoboken, N.J., 15 (REP)
Barber-Colman Co., 1300 Rock St., Rockford, Ill., 15
Barbey Co., Inc., George D., 2 & Penn Sts., Reading, Pa., 10
Barnett Bros. Radio Co., 117 N. Seventh St., Philadelphia 6, Pa., 10 (NEDA)
Barnett Bros. Radio Co., 201 S. 4 St., Reading, Pa., 10 (NEDA)
Barno Radio Co., 321 6 Ave., McKeesport, Pa., 10 (NEDA)
Barron, Bert, 408 S. Alvarado, Los Angeles 5, Calif., 15 (REP)
Bauer, Wm. G., Jr., c/o Trinkle, No. 2 Roberts Block, Glenside, Pa., 15 (REP)
Baum, Sidney H., 70-15 Fleet St., Forest Hills 75, N.Y., 15 (REP)
Bauman & Bluzat, 2753 W. North Ave., Chicago 47, Ill., 15
For details see ad on page 344
Bauman, W. J., 2753 W. North Ave., Chicago 47, Ill., 15 (REP)
Bauman Co., 3033-35 Lyndale Ave. S., Minneapolis 8, Minn., 10 (NEDA)
Beacon Electronic Distributors, 108 Lincoln Bldg., Watertown, N.Y., 10 (NEDA)
Beacon Electronics, Inc., 411-419 Columbia St., Utica 2, N.Y., 10 (NEDA)
Beam Instruments Corp., 350 Fifth Ave., New York 1, N.Y., 5, 20
Bean, Everett P., 1336 Madison Ave., Memphis 4, Tenn., 15 (REP)
Bear, Howard, 3434 Oak Rd., Stow, Ohio, 15 (REP)
Bear, Neal, West Richfield, Ohio, 15 (REP)
Becker, Herbert, 1140 Crenshaw Blvd., Los Angeles 19, Calif., 15 (REP)
Becker, R. F., 3020 N. Cicero Ave., Chicago 41, Ill., 15 (REP)
Beckman Co., C. E., 11-35 Commercial St., New Bedford, Mass., 10 (NEDA)
Bee, Robert E., c/o Bluzat, 5949 W. North Ave., Chicago 39, Ill., 15 (REP)
Beebe, J. R., 5707 W. Lake St., Chicago 44, Ill., 15 (REP)
Beier, Leroy W., 6518 W. North Ave., Chicago 35, Ill., 15 (REP)
Beitel, Wayne C., 16267 James Couzens Hwy., Detroit 21, Mich., 15 (REP)
Belchamber, Philip A., 1401 Middle Harbor Rd., Oakland, Calif., 15 (REP)
Bell, Fred, 11621 Detroit Ave., Cleveland 2, Ohio, 15 (REP)
Benge, J. R., 506 Wyndmoor Ave., Philadelphia 18, Pa., 15 (REP)
Berman, Alvin A., 3757 Northwood Rd., University Heights 18, Ohio, 15 (REP)
Berman, Eugene L., 758 Natoma St., San Francisco, Calif., 15 (REP)
Berndt, W. E., 655 S. Warren St., Syracuse, N.Y., 10 (NEDA)
Berthold, A. L., 4111 Maple Ave., Dallas 4, Tex., 15 (REP)
Bettis, Maury E., 406 W. 34 St., Kansas City 2, Kan., 15 (REP)
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Bieberich, Walter W., 2817 Plaza Dr., Ft. Wayne 5, Ind., 15 (REP)
Biggs, J. Alan, P.O. Box 450, Doylestown, Pa., 15 (REP)
Bittan, D. R., 53 Park Pl., New York 7, N.Y., 15 (REP)
Bivins & Caldwell, Security Bank Bldg., High Point, N.C., 15
Blair-Steinberg Co., 395 Broadway, New York 13, N.Y., 15
Bloom, Hy, 8 W. 18 St., New York 11, N.Y., 15 (REP)
Bluff City Dist., Co., 905-7 Union St., Memphis 3, Tenn., 10 (NEDA)
Bluzat, C. R., 5949 W. North Ave., Chicago 39, Ill., 15 (REP)
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Boeck, G. A., 81 Lake Dr., Mt. Lakes, N.J., 15 (REP)
Boehme, C. D., B 4, Talbott Bldg., Dayton 2, Ohio, 15
Boenecke, C. A., 210 N. 6 St., Camden, N.J., 15 (REP)
Bond Radio Supply, 439 West Main St., Waterbury, Conn., 10 (NEDA)
Boniface, Robert L., 7422 Melrose Ave., Los Angeles 46, Calif., 15 (REP)
Bonn Co., Lew, 1211 La Salle Ave., Minneapolis 4, Minn., 10 (NEDA)
Booth, Claude R., 4000 W. North Ave., Chicago 39, Ill., 15 (REP)
Border, Barrett, 10 Highwood Ave. Tenafly, N.J., 15 (REP)
Bouda, Roy J., c/o Burgoyne, 7001 N. Clark St., Chicago 26, Ill., 15 (REP)
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Bowman & Co., J. G., 257 W. Lincolnway, Valparaiso, Ind., 10 (NEDA)
Boyd, P. A., 409 Todd St., Pittsburgh 21, Pa., 15 (REP)
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Braddock, Edward, Browning Lane, Haddonfield, N.J., 15
Brandt, Edward W., 780 Natoma St., San Francisco 3, Calif., 15 (REP)
Branum, Mose, 123 Manufacturing St., Dallas, Tex., 15 (REP)
Brauer, W. J., 15631 Lakewood Hts. Blvd., Cleveland 7, Ohio, 15 (REP)
Brennan, F. X., 38 Lackawanna Plaza, Montclair, N.J., 15 (REP)
Bressler, Jules J., 1780 Broadway, New York 19, N.Y., 15 (REP)
Breuer, R. E., 250 W. 57 St., New York 19, N.Y., 15 (REP)
Bristol Dist. Co., 419 N. Pacific Ave., Fargo, N.D., 10 (NEDA)
British Electronic Group, 366 Madison Ave., New York 17, N.Y., 5, 15
British Radio Electronics, Ltd., 1 Thomas Circle, Washington 5, D.C., 5
British Electronic Sales Co. 23-03 45 Rd., Long Island City, N.Y., 5
Brookfield, R. F., 55 Cricket Ave., Ardmore, Pa., 15 (REP)
Brotherson, Clyde, 744 Audobon, Jackson, Mich., 15 (REP)

(Continued on page 346)

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Brujac Electronic Corp., 103 Lafayette St., New York 13, N.Y., 10
Bruno-New York, Inc., 460 W. 34 St., New York 1, N.Y., 10 (NEDA)
Buchman Radio Co., 492 Atlantic Ave., Brooklyn 17, N.Y., 10 (NEDA)
Burcaw & Co., K. C., Wm. S. Lee, 22128 Grand River, Detroit 19, Mich., 15
Burcham, Don H., 917 S.W. Oak St., Portland 5, Ore., 15 (REP)
Burghardt Radio Supply, 12 N. Broadway, Watertown, S.D., 10 (NEDA)
Burgoyne, Wm. E., 7001 N. Clark St., Chicago 26, Ill., 15 (REP)
Burlingame, Assoc., 103 Lafayette St., New York 13, N.Y., 15
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Burns, Walter C., 544 Ruby St., Saginaw, Mich., 15 (REP)
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Burroughs Radio, Inc., 218 E. Second St., Mansfield, Ohio, 10 (NEDA)
Burstein-Applebee Co., 1012 McGee St., Kansas City, Mo., 10 (NEDA)
For details see ad on page 346
Burwell, Henry W., 1133 Ponce de Leon Ave. N.E., Atlanta 3, Ga., 15 (REP)
Burwell, Henry W., Jr., 1133 Ponce de Leon Ave N.E., Atlanta 3, Ga., 15 (REP)
Bush, Leon S., 439 Redondo Ave., Salt Lake City, Utah, 15 (REP)
Bush, Robert T., c/o Allen, 2401 S. State St., Syracuse 5, N.Y., 15 (REP)
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Butters, John T., 4924 Oleander Dr., Wilmington, N.C., 15 (REP)
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C. & G. Radio Supply Co., 2502-6 Jefferson Ave., Tacoma 2, Wash., 10 (NEDA)
Cabell Electric Co., 422-24 S. Farish St., Jackson, Miss., 10 (NEDA)
Cain, H. E., 770 Lexington Ave., S.W., Atlanta, Ga., 15 (REP)
Callahan, Wilfred J., 647 S. Warren St., Syracuse 2, N.Y., 15 (REP)
Camber, Marty, 1700 York Ave., New York 28, N.Y. 15 (REP)
Cambria Equipment Co., 17-27 Johns St., Johnstown, Pa., 10 (NEDA)
Cameradio Co., 1121 Penn Ave., Pittsburgh 22, Pa., 10 (NEDA)

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Campion, R. M., Jr., P.O. Box 4116, Station A, Dallas 8, Tex., 15 (REP)
Capitol Radio Wholesalers, Inc., 2120-22 14 St., Washington 9, D.C, 10 (NEDA)
Carduner, Eugene, 164 Duane St., New York 13, N.Y., 15 (REP)
Carey, Thomas J., Jr., 744 Broad St., Newark 2, N.J., 15 (REP)
Carlson, Hatton & Hay, Inc., 96 East 10 Ave., Eugene, Ore., 10 (NEDA)
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Cartwright, W. C., 4030 Club Dr. N.E., Atlanta, Ga., 15 (REP)
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Central Missouri Dist. Co., 324 E. Capital St., Jefferson City, Mo., 10 (NEDA)
Central Radio Parts Co., 1723 W. Fond du Lac Ave., Milwaukee 5, Wis., 10 (NEDA)
Central Radio Supply, P.O. Box 1688, Alexandria 1, La., 10 (NEDA)
Cer, Arthur E., 744 Broad St., Newark 2, N.J., 15 (REP)
Certified Radio Supply, Rt. 84, Montgomery Rd., Middletown, N.Y., 10 (NEDA)
Chalker Insulation Co., 1439 Irving St., Rahway, N.J., 15
Chamberlin, Harold A., 31 Milk St., Boston 9, Mass., 15 (REP)
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Chemcity Radio & Electric Co., P.O. Box 2066, Charleston 27, W.Va., 10 (NEDA)
Chief Electronics, Inc., 104 Main St., Poughkeepsie, N.Y., 10 (NEDA)
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Clark-Reiss Distributors, 55 Walker St., New York 13, N.Y., 10
Clark, Roger, 6349 N. Clark St., Chicago 26, Ill., 15 (REP)
Clary Co., James W., 1713 Second Ave., South Birmingham 3, Ala., 10 (NEDA)
Clement, C. F., 1218 Olive St., St. Louis 3, Mo., 15 (REP)
Cluphf, Stanley W., 4265 S. Sante Fe, Littleton, Colo., 15 (REP)
Coakley, Tim, 11 Beacon St., Boston 16, Mass., 15 (REP)
Coast Electronic Supply Co., 527 West Main St., Alhambra, Calif., 10 (NEDA)
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Communications Equipment Co., 131 Liberty St., New York 7, N.Y., 10
Concord Radio Corp., 55 Vesey St., New York 7, N.Y., 5, 10, 20, 25
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Cozzens, Warren B., 220 Kedzie St., Evanston, Ill., 15
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Crockett, John L., 505 N. Ervay St., Dallas 1, Tex., 15 (REP)
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Dage Corp., 40 Hudson St., New York 13, N.Y., 5
Dalis, Inc., H. L., 175 Varick St., New York 14, N.Y., 5, 10
For details see ad on page 348
Dalton-Hege Radio Supply Co., Inc., 924 W. 4 St., Winston Salem, N.C., 10 (NEDA)
Dandreta & Co., Wm., 129 Regent Ave., Providence 8, R.I., 10, 20
D'Angelo, Jack, c/o MacDonald, 1531 Spruce St., Philadelphia 2, Pa., 15 (REP)
Dares Radio Service, 22 E. Genesee St., Auburn, N.Y., 10 (NEDA)
Daugherty, Frank A., 1120 Croyden Rd., Cleveland 24, Ohio, 15 (REP)
Davis Electronics Corp., 204 Main St., Hempstead, N.Y., 10 (NEDA)
Davis, George W., 5259 E. Beverly Blvd., Los Angeles 22, Calif., 15 (REP)
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De Mambro Radio Supply, Inc., 90 Broadway, Providence, R.I., 10 (NEDA)
Denison Radio Supply, 310 W. Woodward, Denison, Tex., 10 (NEDA)
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Diethert, Russ, 2323 W. Devon Ave., Chicago 45, Ill., 15 (REP)
Dixie Radio Supply Co., 715 W. Moorehead St., Charlotte, N.C., 10 (NEDA)

(Continued on page 348)

(Continued from page 347)

Dixie Radio Supply Co., 1700 Laurel St., Columbia, S.C., 10 (NEDA)
Dixie Radio Supply Co., 22 S. Richardson St., Greenville, S.C., 10 (NEDA)
Dodge, Donald P., 301 W. Main St., Waterloo, N.Y., 15 (REP)
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Dunlap Wholesale Radio Co., Inc., 27 N. Grant St., Stockton 8, Calif., 10 (NEDA)
Dunn, Robert S., c/o Beier, 6518 W. North Ave., Chicago 35, Ill., 15 (REP)
Dymac, Inc., 2329 Main St., Buffalo 14, N.Y., 10 (NEDA)
Dynamic Electronics, 73-39 Woodhaven Blvd., Glendale, L.I., N.Y., 10
Ealy, M. D., 11056 Cumpston St., N. Hollywood, Calif., 15 (REP)
Ebinger Radio & Supply Co., 2501-03 S. Jefferson, St. Louis 4, Mo., 10 (NEDA)
Economy Electronics, 624 Ridge Rd., Lyndhurst, N.J., 10 (NEDA)
Edlie Electronics, Inc., 154 Greenwich St., New York 6, N.Y., 10
Edmunds, E. J., 101 N. Lexington Ave., Havertown, Pa., 15 (REP)
Edwards, E. C., 2123 E. 9 St., Rm. 510, Cleveland 15, Ohio, 15 (REP)
Eidson Electronic Co., 1902 N. 3 St., Temple, Tex., 10, 20
Egert, Samuel S., 11 Park Pl., New York 7, N.Y., 15 (REP)
Electra Distributing Co., 1914 West End Ave., Nashville 4, Tenn., 10
Electric City Radio Supply (1566 State St., Schenectady 4, N.Y., 10 (NEDA)
Electric Products Sales Co., 427 E. Michigan Ave., Lansing 29, Mich., 10 (NEDA)
Electric Trading Co., 313-315 Canal St., New York 13, N.Y., 10, 25
Electrical Supply Corp., 1739 Massachusetts Ave., Cambridge 40, Mass., 10 (NEDA)
Electro-Tech Equipment Co., 308 Canal St., New York 13, N.Y., 10
Electrodesign, 209 St. Paul Sta. W., Montreal, Canada, 5, 15
Electronic Center, Inc., 107 3rd Ave., N. Minneapolis 1, Minn., 10
Electronic Dist. Co., 856 Raymond Ave., St. Paul 14, Minn., 10 (NEDA)
Electronic Equipment Co., 917-19 Florence, Ft. Worth 3, Tex., 10
Electronic Equipment & Eng. Co., 805 S. Staples St., Corpus Christi, Tex., 10 (NEDA)
Electronic Labs. & Supply Co., 1415-19 Oriskany St. W., Utica 4, N.Y., 10 (NEDA)
Electronic Marketers, Inc., 415 Halsey St., Newark 2, N.J., 10
Electronic Service Corp., 431 W. Jefferson, Louisville 2, Ky., 20
Electronic Supplies, 219 E. 1 St., Tulsa 3, Okla., 10, 25
Electronic Supply Co., 248 E. Pike St., Pontiac, Mich., 10 (NEDA)
Electronic Supply Corp., 134 E. Long St., Columbus 15, Ohio, 10 (NEDA)
Electronic Supply Corp., 94 Hamblin Ave., Battle Creek, Mich., 10 (NEDA)
Electronic Supply, Inc., 422 11 St., Huntington 1, W.Va., 10 (NEDA)
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Empire Electronic Dist., Inc., 37 E. Union St., Pasadena 1, Calif., 10
Engineering Associates, 434 Patterson Rd., Dayton 9, Ohio, 25
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Engle, Karl D., 4724 N. Sheridan Rd., Chicago 40, Ill., 15 (REP)
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Erde, Seymour, 270 Hempstead Ave., Malverne, L.I., N.Y., 15 (REP)
Erdman, K. B., c/o Stratton, 7852 Montgomery Ave., Philadelphia 17, Pa., 15 (REP)
Esse Radio Co., 42 W. South St., Indianapolis, Ind., 25
Estersohn, Harry, 7135 Germantown Ave., Philadelphia 19, Pa. 15 (REP)
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Everett Associates, Inc., 6744 N. California, Chicago 45, Ill., 15
Excel Distributors, 118 W. 2 St., Wichita 2, Kan., 10 (NEDA)
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Federated Semi-Conductor Co., 66 Dey St., New York 7, N.Y., 10 (NEDA)
For details see ad on page 204
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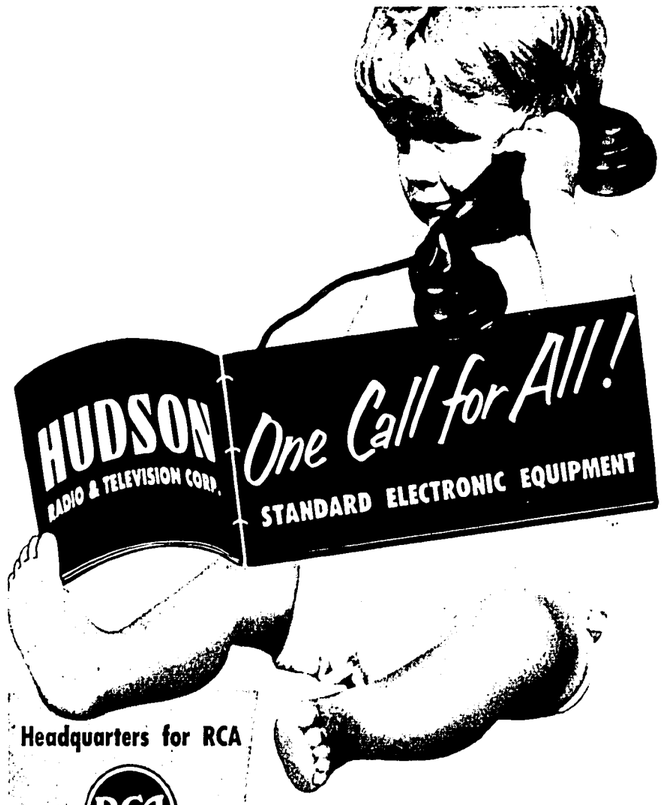
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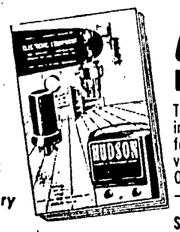
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Fisch, Bud, 419 Sherwood Terr., Ft. Wayne 6, Ind., 15 (REP)
Fischer Dist. Co., Inc., 118 Duane St., New York 7, N.Y., 10 (NEDA)
Fitzner, B. J., 8803 Michigan, Detroit 10, Mich., 15 (REP)
Fitzpatrick Electric Supply Co., 444 Irwin Ave., Muskegon, Mich., 10 (NEDA)
Fleischman, Sidney, c/o Carduner, 164 Duane St., New York 13, N.Y., 15 (REP)
Florence Radio Supply, Inc., 223-27 E. Cheves St., Florence, S.C., 10 (NEDA)
Fogels, 92 Liberty St., New York 6, N.Y., 20
Foley, Andrew A., 640 Federal St., Camden, N.J., 15 (REP)
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Forest Sales Co., Inc., 700 Madison, Oak Park, Ill., 25
Forrest, Bernard J., 102 Warren St., New York 7, N.Y., 15 (REP)
Forshay, John M., 71 Murray St., New York 7, N.Y., 15 (REP)
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Fort Worth Radio Supply Co., 1201 Commerce St., Ft. Worth, Tex., 10 (NEDA)
Four State Radio & Supply Corp., 201 Main St., Joplin, Mo., 10 (NEDA)
Freck Radio & Supply Co., Inc., 38 Biltmore Ave., Asheville, N.C., 10 (NEDA)
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Fryburg, Charles H., 111 S. 22 St., Philadelphia, Pa., 15 (REP)
Fulton Radio Supply Co., 1208 Greenwood Ave., Jackson, Mich., 10 (NEDA)
Furman, Nat, 395 Broadway, New York 13, N.Y., 15 (REP)
Gamble, Milton E., c/o Whitesell, 2208 E. Washington St., Indianapolis 1, Ind., 15 (REP)
Garfinkle, Wm., 17 E. 42 St., New York 17, N.Y., 15 (REP)
Gary, Al, 1961 Broadway, New York 23, N.Y., 15 (REP)
Gassner, Frank, 6349 N. Clark St., Chicago 26, Ill., 15 (REP)
Gates Co., 110 Harvard Dr. S.E., Albuquerque, N.M., 15
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(Continued on page 350)



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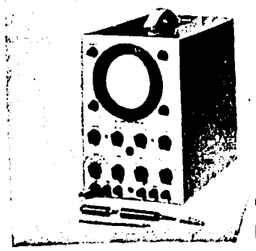


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(Continued from page 349)

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Gerber Radio Supply Co., 1900 Columbus Ave., Boston 19, Mass., 10 (NEDA)
Gebhard, Harry W., 5129 W. Devon Ave., Chicago 30, Ill., 15 (REP)
Geist & Assoc., Inc., Henry J., 60 E. 42 St., New York 17, N.Y., 15
Gelb, Benjamin W., 1777 Grand Concourse, New York 53, N.Y., 15 (REP)
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General Radio, Inc., 100 Wall St., Seattle 1, Wash., 10 (NEDA)
Genesee Radio & Parts Co., 205 Genesee St., Buffalo 3, N.Y., 10 (NEDA)
Gentry, Richard, 68 Hudson St., Hoboken, N.J., 15 (REP)
Gianaras, Alec, 2345 W. Devon Ave., Chicago 45, Ill., 15 (REP)
Gibson, W. S., 1018 Commonwealth Ave., Boston 15, Mass., 15 (REP)
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Gifford-Brown, Inc., 1326 Walnut, Des Moines 9, Iowa, 10 (NEDA)
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Golten, Jerry, 2750 W. North Ave., Chicago 47, Ill., 15 (REP)
Goss, Jack, 28 Gloucester St., Arlington 74, Mass., 15 (REP)
Graham Electronics Supply Co., 102 S. Pennsylvania St., Indianapolis 4, Ind., 10 (NEDA)
Graham, Wilfrid, 610 Latham Dr., Wynnewood, Pa., 15 (REP)
Grand, Jack, 103 Lafayette St., New York 13, N.Y., 15 (REP)
Gray, Gordon, 4524 W. Madison Ave., Chicago 24, Ill., 15 (REP)
Green Co., John A., 6815 Oriole Dr., Dallas 9, Tex., 15, 20
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Green Tele Radio Dist., Inc., 472 Sutter Ave., Brooklyn 7, N.Y., 10 (NEDA)
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Greenleaf, C. T., Jr., 11621 Detroit Ave., Cleveland 2, Ohio, 15 (REP)
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Halinton, Melvin, 5500 W. Devon Ave., Chicago 30, Ill., 15 (REP)
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Hannigan, Walter T., 43 Leon St., Boston 15, Mass., 15 (REP)
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Hargis Co., Inc., 1205 Washington Ave., P.O. Box 526, Waco, Tex., 10 (NEDA)
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Hatry of Stamford, Inc., 97 Main St., Stamford, Conn., 10 (NEDA)
Hatry of Waterbury, Inc., 89 Cherry St., Waterbury 4, Conn., 10 (NEDA)
Hatry & Young of Lawrence, Inc., 262 Lowell St., Lawrence, Mass., 10 (NEDA)
Hatry & Young of Mass., Inc., 811 Boyleston St., Boston 16, Mass., 10 (NEDA)
Hatry & Young of Springfield, 169 Spring, Springfield, Mass., 10 (NEDA)
Hausfeld Radio Supply, 116 N. 3 St., Steubenville, Ohio, 10 (NEDA)
Hawthorne Electronics, 700 S.E. Hawthorne, Portland 14, Ore., 15
Hayes, W. R., 2011 Cedar Springs, Dallas 1, Tex., 15 (REP)
Heidenreich, Max, 6505 Park Lane, Dallas, Tex., 15 (REP)
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Herberger Radio Supply, P.O. Box 1197, Peoria 1, Ill., 10 (NEDA)
Herman Radio Supply Co., P.O. Box 358, Allapattah Station, Miami 42, Fla., 10 (NEDA)
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Hollenbacks Radio Supply, 2221 8 Ave., Altoona, Pa., 10 (NEDA)
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Holmes, Frank B., c/o Maynard, 139 N. Central Ave., Clayton 5, Mo., 15 (REP)
Holtz, Leo, c/o Carduner, 164 Duane St., New York 13, N.Y., 15 (REP)
Holub & Hogg Co., 1400 Sycamore St., Cincinnati 10, Ohio, 10
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Hooker, Samuel C., 397 Highland Ave., Winchester, Mass., 15 (REP)
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Houck, J. W., Box 6844, Towson 4, Md., 15 (REP)
Hub Distributors, 106 N. Main St., Crown Point, Ind., 10 (NEDA)
Hudson Radio & Television Corp., 48 W. 48 St., New York 19, N.Y., 10 (NEDA)
For details see ad on page 350
Hughes, Kenneth E., 17 W. 60 St., New York 23, N.Y., 15 (REP)
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Hughes-Peters, Inc., 111 E. Long St., Columbus 15, Ohio, 10 (NEDA)
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Interstate Supply Co., 10 & Walnut Sts., St. Louis, Mo., 10 (NEDA)
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Jeffries, S. A., 105 Forest Ave., Narbeth, Pa., 15 (REP)
Jenkins, Victor E., c/o Forshay, 27 Park Pl., New York 7, N.Y., 15 (REP)

(Continued on page 352)

(Continued from page 351)

Jersey Electronic Dist. Co., 301 Grand St., Paterson 1, N.J., 10 (NEDA)
Jordan Electronic Co., 1130 German St., Erie, Pa., 10 (NEDA)
Joe's Radio Shop, 67-69 S. Pearl St., Bridgeton, N.J., 10 (NEDA)
Johannesen Elec. Co., Inc., 312-314 N. Eugene St., Greensboro, N.C., 10 (NEDA)
Johnston-Gasser Co., Inc., 3023 W. Marshall St., Richmond 21, Va., 10 (NEDA)
Jones, Kenneth H., San Juan de Letran 84, Mexico 1, D.F., Mexico, 15
Jones, Mel, 2800 Milwaukee Ave., Chicago 18, Ill., 15 (REP)
Joseph, Ben, 509 5 Ave., New York 17, N.Y., 15 (REP)
Joyner, J. E. Jr., P.O. Box 341, Station A, Atlanta, Ga., 15 (REP)
K. L. A. Laboratories, Inc., 7422 Woodward Ave., Detroit 2, Mich., 10 (NEDA)
Kadell, Harold W., 2406 W. Bryn Mawr, Chicago 45, Ill., 15 (REP)
Kaelber, Julius, 1270 Broadway, New York 1, N.Y., 15 (REP)
Kann-Ellert Electronics, Inc., 9 S. Howard St., Baltimore 1, Md., 10 (NEDA)
Kahn, Irving I., 541 Windsor St., Hartford 1, Conn., 15 (REP)
Karet, Robert, 13 W. Hubbard St., Chicago 10, Ill., 15 (REP)
Kathrinus, Norman W., 1218 Olive St., St. Louis 3, Mo., 15 (REP)
Kay, James P., 3760 Broadway, Kansas City 2, Kan., 15 (REP)
Kearns, Inc., Harrisburg & Atlantic Ave., Atlantic City, N.J., 10 (NEDA)
Keefe, John Jr., 201 N. 6 St., Camden, N.J., 15 (REP)
Keeneth, John A., c/o Hicks, 29-27 Bridge Plaza N., Long Island City, N.Y., 15 (REP)
Kelley, Wilfred L., 660 Seward Ave., Detroit 2, Mich., 15 (REP)
Kemp Co., E. M., 1115 R St., Sacramento 14, Calif., 10 (NEDA)
Ken-Els Radio Supply Co., 501 1 Ave., Ft. Dodge, Iowa, 10 (NEDA)
Kent, Roscoe, 495 43 Ave. N., St. Petersburg, Fla., 15
Kilroy, John W., c/o Neal Bear, West Richfield, Ohio, 15 (REP)
King & Irwin, Inc., 314 11 St., Huntington 14, W.Va., 10 (NEDA)
Kirkeby, Marvin H., 437 Oliver Ave. S., Minneapolis 5, Minn., 15
Kittleson, H. A., 7614 Melrose Ave., Los Angeles 46, Calif., 15 (REP)
Kleeman, Edward E., c/o Carduner, 164 Duane St., New York 13, N.Y., 15 (REP)
Kleker, Jerome, 177 Sunset Ave., Glen Ellyn, Ill., 15 (REP)
Klicpera, M. F., P.O. Box 3113, Houston 1, Tex., 15 (REP)
Knight, W. Bert, 10373 W. Pico Blvd., Los Angeles 64, Calif., 15 (REP)
Knuepfer, George, 2650 W. Belden Ave., Chicago 47, Ill., 15 (REP)
Koehler-Pasmore Co., 11833 Hamilton, Detroit 3, Mich., 15
Koelemay Sales Co., 2530 Linwood Ave., Shreveport, La., 10 (NEDA)
Koenig, G. L., 6359 Antioch Ave., Merriam, Kan., 15 (REP)
Koessler, Frank B., 7422 Melrose Ave., Los Angeles 46, Calif., 15 (REP)
Kolans, W. H. Jr., 1355 Market St., San Francisco 3, Calif., 15 (REP)
Kolshorn, Henry, P.O. Box 207, Belton, Mo., 15 (REP)
Komisar & Son, Inc., David, 16 Hudson St., New York 13, N.Y., 5, 15
Kopke Electronics Co., 119 Peasley St., Boise, Idaho, 10 (NEDA)
Kopple, John, 60 E. 42 St., New York 17, N.Y., 15 (REP)
Krich-New Jersey, Inc., 428 Elizabeth Ave., Newark 8, N.J., 10 (NEDA)
Kudukis, A. M., c/o Hitchcock, 1754 W. Madison, Chicago 12, Ill., 15 (REP)
Lamont, M. B., c/o Taylor, 8416 Georgia Ave., Silver Spring, Md., 15 (REP)
Lampley Radio Co., 802 N. McLeansboro St., Benton, Ill., 10 (NEDA)
Landfear, J. M., 2138 Lee Rd., Cleveland 18, Ohio, 15 (REP)
Landis, B. C., 81-11 Roosevelt Ave., Jackson Hts. 72, N.Y., 15 (REP)
Larrabee, Fred H., 6033 Main St., Kansas City 2, Kan., 15 (REP)
Lassberg, Alex A., 5004 Ross Ave., Dallas 6, Tex., 15 (REP)
Lassberg, Edwin K., 5004 Ross Ave., Dallas 6, Tex., 15 (REP)
Lasure, Harry A., 9041 W. Pico Blvd., Los Angeles 35, Calif., 15 (REP)
Lavender Radio Supply Co., 520 E. 4, Texarkana, Ark., 10 (NEDA)
Lavin, Henry, 65 White Rd., Meriden, Conn., 15 (REP)
Lawman, Paul M., 1262 Shady Crest Dr., Pittsburgh 16, Pa., 15 (REP)
Lazar Radio Co., Nat, 4231 Lancaster Ave., Philadelphia 4, Pa., 10 (NEDA)
Leader, Robert, 111 S. 22 St., Philadelphia, Pa., 15 (REP)
Leban, Albert D., 218 Lloyd Lane, Philadelphia 31, Pa., 15 (REP)
Lebell, Frank, 988 Market St., San Francisco 2, Calif., 15 (REP)
Lee, David M., 2517 2 Ave., Seattle 1, Wash., 15 (REP)
Lee, Wm. S., 22128 Grand River Ave., Detroit 19, Mich., 15 (REP)
Lehner, J. W., 367 Brynhild Rd., Columbus 2, Ohio, 15 (REP)
Leonard Electronic Supply Co., 409 West End Blvd. N.W., Winston Salem, N.C., 10 (NEDA)
Leonard Radio, Inc., 69 Cortlandt St., New York 7, N.Y., 10 (NEDA)
Leroy, Gordon C., 29 Bancroft Dr., Rochester, N.Y., 15 (REP)
Leuck Radio Supply Co., 243 S. 11 St., Lincoln, Neb., 10 (NEDA)
Levison, Melvin S., 5 Waverly Pl., New York 3, N.Y., 15 (REP)
Lewis, Chas. W., c/o Allen, 2401 S. State St., Syracuse 5, N.Y., 15 (REP)
Lewis, Dean A., 248 9 St., San Francisco 3, Calif., 15 (REP)
Lexington Audio Eng. Corp., 206 W. 3 St., Lexington, Ky., 10, 20
Liberty Electronics, Inc., 135 Liberty St., New York 6, N.Y., 10
Lichter, Wm., 90 W. Broadway, New York 7, N.Y., 15 (REP)
Liddle, Edwin F., 18925 Grand River, Detroit 23, Mich., 15 (REP)
Lienau, Charles W., 10203 McKenney Ave., Silver Spring, Md., 15 (REP)
Liedtke, John E., 4275 W. 215 St., Cleveland 16, Ohio, 15 (REP)
Lifsey Dist. Co., 726-30 N. Saginaw, Flint 3, Mich., 10 (NEDA)
Lima Radio Parts Co., 600 N. Main St., Lima, Ohio, 10 (NEDA)
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Linz, William M., 7115 N. Mobile Ave., Chicago 31, Ill., 15 (REP)
Lippman & Co., Aaron, 99-107 Newark St., Newark 4, N.J., 10 (NEDA)
Lipscomb Associates, Earl, P.O. Box 8042, Dallas 5, Tex., 15, 20
Little, W. T., 704 Lumpkin St., East Point, Ga., 15 (REP)
Lofgren Dist. Co., 1202 4 Ave., Moline, Ill., 10 (NEDA)
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Logan, Les, 530 Gough St., San Francisco 2, Calif., 15 (REP)
Lohmann, Sid, 4829 Woodward, Detroit 1, Mich., 15 (REP)
Lohse, Perry O., 2123 E. 9 St., Rm. 510, Cleveland 15, Ohio, 15 (REP)
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Lowenthal Co., T. R., 1205 W. Sherwin Ave., Chicago 26, Ill., 10, 25
For details see ad on page 352
Lowry-Dietrich Co., 1404 Swantek St., Pittsburgh 4, Pa., 15
Lowery, L. D., Box 115, 50 E. Wynnewood Rd., Wynnewood, Pa., 15 (REP)
Lukko Sales Corp., 5024 W. Irving Pk. Rd., Chicago 41, Ill., 10
Lund, Lloyd S., 505 N. Ervay St., Dallas, Tex., 15 (REP)
Lund, Russell O., 1900 W. Montrose, Chicago 13, Ill., 15 (REP)
Lurtz Electric Co., 219-221 N. Illinois St., Belleville, Ill., 10 (NEDA)
Luske, Wm., c/o Ritter, 612 N. Michigan Ave., Chicago 11, Ill., 15 (REP)
M & H Sporting Goods Co., 722 Market St., Philadelphia 6, Pa., 10 (NEDA)
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MacInnis, Norman R., 53 Youle St., Melrose, Mass., 15 (REP)
Mack, Preston W., c/o Kaelber, 1270 Broadway, New York 1, N.Y., 15 (REP)
MacNabb, Vernon C., 909 Westfield Blvd., Indianapolis 20, Ind., 15 (REP)
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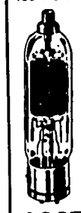
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Mahannah, F. G., 20599 Almar Dr., Cleveland 22, Ohio, 15 (REP)
Manhattan Radio & Equipment Inc., 1732 Grand Avenue, Kansas City 8, Mo., 10 (NEDA)
Manufacturers Surplus Prod. Co., 225 Lafayette St., New York 12, N.Y., 25
Mahoney, J. J., 1531 Spruce St., Philadelphia 2, Pa., 15 (REP)
Maine Electronic Supply Corp., 148 Anderson St., Portland 3, Me., 10 (NEDA)
Malone, Pierce P., c/o Gianaras, 2345 W. Devon Ave., Chicago 45, Ill., 15 (REP)
Mandel, J. J., 11 Park Place, New York 7, N.Y., 15 (REP)
Mark Associates, Lee, P.O. Box 8467, Kansas City 14, Mo., 15
Markowitz, Jesse, 10 S. Middle Neck Rd., Great Neck, L.I., N.Y., 15 (REP)
Marsey, Joseph S., 74 Park Ave., Rochester 7, N.Y., 15 (REP)
Marsh, Lloyd D., 2601 First Ave., Seattle 1, Wash., 15 (REP)
Marsh, Joseph W., 4216 W. Jefferson Blvd., Los Angeles 16, Calif., 15 (REP)
Marsh Radio Supply Co., 838 N. Fourth St., Milwaukee 3, Wis., 10 (NEDA)
Marsh, Walter F., c/o Beier, 6518 W. North Ave., Chicago 35, Ill., 15 (REP)
Marshall, G. S., 40 S. Los Robles, Pasadena 1, Calif., 15 (REP)
Marshall Co., John, 201 Anderson St., Pittsburgh, Pa., 10 (NEDA)
Marshank, David N., 672 S. Lafayette Pk. Pl., Los Angeles 5, Calif., 15 (REP)
Marshank, Norman J., 672 S. Lafayette Pk. Pl., Los Angeles 5, Calif., 15 (REP)
Martin & Co., Ed., 1105 Barclay St., Baltimore 2, Md., 15
Martin-Brotherson, 515 N. Byers St., Joplin, Mo., 10 (NEDA)
Massey Associates, 1 Thomas Circle, N.W., Washington 5, D.C., 15
Maston, Bruce, c/o Sullivan, 1551 N. Austin Blvd., Chicago 51, Ill., 15 (REP)
Mayer Co., A. W., 895 Boylston St., Boston 15, Mass., 10 (NEDA)
For details see ad on page 353
Maynard, Lee, 139 N. Central Ave., Clayton 5, Mo., 15 (REP)
McCarthy, L. C., 9 S. Clinton St., Chicago 6, Ill., 15 (REP)
McLoud, W. Clif, 5528 E. Colfax Ave., Denver 7, Colo., 15 (REP)
McConnells, 3834 Germantown Ave., Philadelphia 40, Pa., 10
McCorvey, V. Avis, 212 Mimosa Dr., Decatur, Ga., 15 (REP)
McFadden, John J., 150 E. Broad St., Columbus 15, Ohio, 15 (REP)
McFadden, Wm. E., 150 E. Broad St., Columbus 15, Ohio, 15 (REP)
McGary, Wm. T., 6635 Delmar Blvd., St. Louis 5, Mo., 15 (REP)
McGee Radio Co., 1422 Grand Ave., Kansas City, Mo., 10 (NEDA)
McGrade, E. W., 5326 W. 71 St., Kansas City 15, Kan., 15 (REP)
McKinney, Jack F., 1330 N. Industrial Blvd., Dallas, Tex., 15 (REP)
McNeal Electric & Eq. Co., 4736 Olive St., St. Louis 8, Mo., 25
McTaggart, L. J., 116 Eiseman, Kenmore, N.Y., 15 (REP)
Measurement Eng., Ltd., Arnprior, Ont., Canada, 15, 20
Melrose Sales Co., 407 Franklin St., Melrose 77, Mass., 10 (NEDA)
Melville Radio Corp., 160-13 Northern Blvd., Flushing, L.I., N.Y., 10 (NEDA)
Melville Radio Corp., 259 Mamaroneck Ave., White Plains, N.Y., 10 (NEDA)
Merchant, Charles J., c/o Brauer, 15631 Lakewood Hts., Cleveland 7, Ohio, 15 (REP)
Merchant, R. C., 4829 Woodward, Detroit 1, Mich., 15 (REP)
Meridian Electronic Eq. Co., 608 W. Bload St., Richmond, Va., 10
Metropolitan Overseas Supply Corp., 1133 Broadway, New York 10, N.Y., 5, 15, 25
For details see ad on page 353
Meyer, Charles N., 1355 Market St., San Francisco 3, Calif., 15 (REP)
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(Continued on page 354)

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Millar, James, 1036 Peachtree St. N.E., Atlanta 5, Ga., 15 (REP)
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Miller, Gerald B., 1550 N. Highland Ave., Los Angeles 28, Calif., 15 (REP)
Miller, Harry, 1180 Raymond Blvd., Newark, N.J., 15 (REP)
Miller-Jackson Co., Inc., 121 E. California, Oklahoma City, Okla., 10 (NEDA)
Millers Radio & Television, 336 E. 8 St., Oakland, Calif., 10 (NEDA)
Mingins, Les, Jr., 107-37 71 Ave., Forest Hills, N.Y., 15 (REP)
Minthorne, Roger M., 7521 N.E. Glisan, Portland 16, Ore., 15 (REP)
Mission Radio, Inc., 521 Broadway, San Antonio, Tex., 10 (NEDA)
Mitchell, Wm. H., Box 372, Denver, Colo., 15 (REP)
Moch, Gerald M., c/o Shulan, 136 Liberty St., New York 6, N.Y., 15 (REP)
Modern Radio Supply Co., 131 Farmington Ave., Kensington, Conn., 10 (NEDA)
Modjopait Trading Corp., 18 Pasar Pisang, Djakarta, Kota, Indonesia, 5, 15
Mooney Radio Supply Co., 1635 Huff, P.O. Box 969, Wichita Falls, Tex., 10 (NEDA)
Moore, Jack B., 4500 Dublin Rd., Columbus 2, Ohio, 15 (REP)
Moore, S. Lloyd, Jr., c/o Quinlan, 4700 Frankford Ave., Philadelphia 24, Pa., 15 (REP)
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Monson, Harry A., 919 N. Michigan Ave., Chicago 11, Ill., 15 (REP)
Montague Radio Dist. Co., 760 Laurel, P.O. Box 3045, Beaumont 1, Tex., 10 (NEDA)
Morrisons Radio Supply, 331 Center St., Ashtabula, Ohio, 10 (NEDA)
Morrow, Les, 3123 W. 117 St., Cleveland 11, Ohio, 15 (REP)
Morse, Irv, 150 Broadway, New York 38, N.Y., 15 (REP)
Moses Radio Electronics Co., 54 Flower St., Hartford 5, Conn., 10 (NEDA)
Moss, Charles R., 16956 Van Aken Blvd., Shaker Hts. 20, Ohio, 15 (REP)
Moss, Gordon, Box 428, Greeley, Colo., 15 (REP)
Moss, Leroy G., Box 428, Greeley, Colo., 15 (REP)
Moulthrop, Richard W., 160 Tenth St., San Francisco 3, Calif., 15 (REP)
Moyer Electronic Supply Co., Inc., 330 E. Norwegian St., Pottsville, Pa., 10 (NEDA)
Moyer, Harold A., 154 Merion Ave., Haddonfield, N.J., 15 (REP)
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Muskogee Electronic Supply Co., 229-231 Court St., Muskogee, Okla., 10 (NEDA)
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Murphy, Brower, 1409 Peachtree St. N.E., Atlanta 5, Ga., 15 (REP)
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Nemec, John, c/o Booth, 4000 W. North Ave., Chicago 51, Ill., 15 (REP)
Neuber, Herbert K., 1539 Race St., Philadelphia 2, Pa., 10, 20
Newark Electric Co., 223 W. Madison St., Chicago 6, Ill., 10
Newell, Lloyd L., c/o Gray, 4524 W. Madison St., Chicago 24, Ill., 15 (REP)
Newnam, Harold L., 420 Market St., San Francisco 11, Calif., 15 (REP)
Newson, C. H., Jr., 150 Terminal Ave., Philadelphia 18, Pa., 15 (REP)
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Odom, H. J., c/o Wallace Associates, 2151 Beecher Rd., Atlanta, Ga., 15 (REP)
Offenbach & Reimus, 1564 Market St., San Francisco 2, Calif., 10
Offenhauer Co., 227 W. Washtenaw, Lansing 25, Mich., 10 (NEDA)
Olsen, John O., 16201 Shaker Blvd., Cleveland 20, Ohio, 15 (REP)
Olsson, Albert C., 22111 Cleveland St., Dearborn, Mich., 15 (REP)
Oskam, W. P., San Juan de Letran 84, 505 Mexico 1, D.F., Mexico, 5, 15
Overton Electric Co., Inc., 522 Jackson St., Topeka, Kan., 10 (NEDA)
Owens, Lee H., 2331 W. Washington Blvd., Los Angeles 18, Calif., 15 (REP)
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Pearson, Raymond T., 1528 Upland Ave., Jenkintown, Pa., 15 (REP)
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Peerless Electronics Dist. Corp., 76 Willoughby St., Brooklyn 1, N.Y., 10, 20
Peerless Radio Dist., Inc., 9232 Merrick Rd., Jamaica, L.I., N.Y., 5, 10, 20
Pembleton Laboratories, 236 E. Columbia, Ft. Wayne 2, Ind., 10
Penn Electronic Parts Co., 5303 Frankford Ave., Philadelphia 24, Pa., 10 (NEDA)
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Permag Corp., 210 Taaffe Pl., Brooklyn 5, N.Y., 10
For details see ad on page 354
Perna Co., Frank J., 2506 Stoneybrook Lane, Drexel Hill, Pa., 15
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Petitt, George, 549 W. Washington, Chicago 6, Ill., 15 (REP)
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Pickett, James M., 205 E. 66 St., New York 21, N.Y., 15 (REP)
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Pittsfield Radio Co., 41 West St., Pittsfield, Mass., 10 (NEDA)
Pheasant, Charles E., 18 N. Bolton Ave., Indianapolis 19, Ind., 15 (REP)
Powell Radio Supply, 115 Water St., Hallowell, Me., 10 (NEDA)
Powell Radio Supply, 142 W. 169 St., New York 52, N.Y., 10 (NEDA)
Pound & Co., Harris, 5093 Randall Ave., Montreal 29, Canada, 15
Power City Radio Co., 410 Jones St., Sioux City, Iowa, 10 (NEDA)
Power City Radio Co., 209 S. First Ave., Sioux Falls, S.D., 10 (NEDA)
Power, Ralph L., 767 Castelar St., Los Angeles 12, Calif., 15 (REP)
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Pointon, Charles W., 1926 Gerrard St., East Toronto 8, Ont., Canada, 15
Popper & Sons, Inc., 300 4 Ave., New York 10, N.Y., 15
Portland Radio Supply Co., 1300 W. Burnside, Portland 9, Ore., 10 (NEDA)
Potapchuk, Wm., c/o Edwards-Lohse, 2123 E. 9 St., Cleveland 15, Ohio, 15 (REP)
Pray, W. B., 18 Brewster Rd., Wellesley Hills, Mass., 15 (REP)
Prestwood Electronics Co., 708 Reynolds St., Augusta, Ga., 10 (NEDA)
Pringle Radio Wholesale, 2514 Colby, Everett, Wash., 10 (NEDA)
Purdy, Wm. J., 79 Ninth St., San Francisco 3, Calif., 15 (REP)
Purdy, Wm. J., Jr., 79 Ninth St., San Francisco 3, Calif., 15 (REP)
Pugh, C. L., 4500 Dublin Rd., Columbus 14, Ohio, 15 (REP)
Quement, Inc., Frank, 161 W. San Fernando St., San Jose, Calif., 10 (NEDA)
Quinlan, David G., 4700 Frankford Ave., Philadelphia 24, Pa., 15 (REP)
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R & R Electronic Co., 707 Adams, Amarillo 1, Tex., 10 (NEDA)
R & R Supply Co., Inc., P.O. Box 329, Lubbock, Tex., 10 (NEDA)
Radcom Engineering Co., 8 Livingston St., Newark 3, N.J., 5, 10, 15, 20
Radio Development & Sales Co., 323 Atlantic Ave., Brooklyn 2, N.Y., 10, 25
Radio Dist. Co., 915 S. 13 St., Harrisburg, Pa., 10 (NEDA)
Radio Distributors, 701 E. Johnson St., Madison 3, Wis., 10 (NEDA)
Radio Electric Service Co., 5 N. Howard St., Baltimore 1, Md., 10 (NEDA)
Radio Electric Service Co. of Pa., 406 N. Albany Ave., Atlantic City, N.J., 10 (NEDA)
Radio Electric Service Co. of Pa., 701 Arch St., Philadelphia 6, Pa., 10 (NEDA)
Radio Electric Shop, 631 S. 60 St., Philadelphia 43, Pa., 20
Radio & Electronic Parts Corp., 3235 Prospect Ave., Cleveland 15, Ohio, 10 (NEDA)
Radio Electronic Sales Co., 52 Chandler St., Worcester 2, Mass., 10 (NEDA)
Radio Electronic Supply Co., 505 Jefferson Ave. S.E., Grand Rapids, Mich., 10 (NEDA)
Radio Equipment Co., 480 Skain Ave., Lexington 34, Ky., 10 (NEDA)
Radio Equipment Co., 2852 Douglas St., Omaha 2, Neb., 10 (NEDA)
Radio Equipment Distributors, 1340 S. Olive, Los Angeles 15, Calif., 10 (NEDA)
Radio Equipment Co., 821 W. 21 St., Norfolk 10, Va., 10 (NEDA)
Radio Essentials, Inc., 152 Mac Questen Pkwy., Mt. Vernon, N.Y., 5, 10, 15
Radio, Inc., 1000 S. Main St., Tulsa 3, Okla., 10 (NEDA)
Radio Maintenance Supply Co., 80 Thomas St., Worcester 8, Mass., 10 (NEDA)
Radio Parts of Arizona, 214 S. 11 Ave., P.O. Box 6345, Phoenix, Ariz., 10 (NEDA)
Radio Parts Co., 612 W. Randolph St., Chicago 6, Ill., 10 (NEDA)
Radio Parts Co., Water & Millard Sts., Saginaw, Mich., 10 (NEDA)
Radio Parts Co., 6339 Penn Ave., Pittsburgh 6, Pa., 10 (NEDA)
Radio Parts Co., 902 Crawford, Houston, Tex., 10 (NEDA)
Radio Parts Co., Inc., 1312 Main St., Wheeling, W.Va., 10 (NEDA)
Radio Parts Co., Inc., 538 W. State St., Milwaukee 3, Wis., 10 (NEDA)
Radio Parts Dist. Co., 128 W. Olney Rd., Norfolk 10, Va., 10 (NEDA)
Radio Products Sales, Inc., 1501 S. Hill St., Los Angeles 15, Calif., 10 (NEDA)
Radio Products Sales Co., 1214 First Ave., Seattle, Wash., 10 (NEDA)
Radio Sales & Service Co., 1326 First Ave., Columbus, Ga., 10 (NEDA)
Radio Service Co., 346 South Main St., Wilkes-Barre, Pa., 10
Radio Service Laboratory, 670 Chestnut St., Manchester, N.H., 10 (NEDA)
Radio Service & Supply Co., Inc., 615 Third St., Wausau, Wis., 10 (NEDA)
Radio Shack Corp., 167 Washington St., Boston 8, Mass., 10 (NEDA)
Radio Specialties, 136 Pine Ave. S.E., Warren Ohio, 10 (NEDA)
Radio Specialties, 456 Charlotte St., Detroit 1, Mich., 10 (NEDA)
Radio Supply Co., 200 Walton St., Syracuse, N.Y., 10 (NEDA)
Radio Supply Co., Inc., 1125-27 E. Douglas, Wichita 7, Kan., 10 (NEDA)
Radio Supply Co., Inc., 28 Cross St., Auburn, Me., 10 (NEDA)
Radio Supply Co., Inc., 711 Granby St., Norfolk 10, Va., 10 (NEDA)
Radio Supply Co., Inc., 3302 W. Broad St., Richmond 21, Va., 10 (NEDA)
Radio Supply, Inc., 724 N. Hudson St., Oklahoma City, Okla., 10 (NEDA)
Radio Surplus Corp., 732 S. Sherman St., Chicago 5, Ill., 25
Radio & Television Parts Co., 118-120 Seventh St., San Antonio 2, Tex., 10 (NEDA)
Radio Trade Supply, Ltd., 595 Yonge St., Toronto 5, Ont., Canada, 10 (NEDA)
Radio Trade Supply Co., 1224 Grand Ave., Des Moines 9, Iowa, 10 (NEDA)
Radio Wire Television, Inc., 100 6 Ave., New York 13, N.Y., 5, 10
Radonics, 5040 Easton Ave., St. Louis 13, Mo., 10 (NEDA)
Radonics, 2218 S. Jefferson Ave., St. Louis 4, Mo., 10 (NEDA)
Radiotronic Dist., Inc., 208 N. College St., Charlotte, N.C., 10 (NEDA)
Rahe, Norman H., 11816 McCracken Rd., Cleveland 25, Ohio, 15 (REP)
Ralphs Radio Electronic Supply, 812 Main St., Baton Rouge, La., 10 (NEDA)
Ralphs Radio Electronic Supply, 3004 Cameron St., Lafayette, La., 10 (NEDA)
Randall, Kenneth, 121 N. Broad St., Philadelphia 7, Pa., 15 (REP)
Rauer, Frank W., 4144 Marvin Ave., Cleveland 9, Ohio, 15 (REP)

(Continued on page 356)

Code number at end of each address refers to product or service sub-classifications listed at the head of the major classification.

Ray-Mac Supply Co., 200 Ballou St., Waterloo, Iowa, 10 (NEDA)
Ray-Tel, Inc., 2409 Ross Ave., Dallas 1, Tex., 10 (NEDA)
Ray Distributing Co., 284 Glen St., Glens Falls, N.Y., 10 (NEDA)
Raymond, Kenneth N., 5528 E. Colfax Ave., Denver., Colo., 15 (REP)
Red Arrow Electronic Sales Co., 1217 Summit Ave., Union City, N.J., 25
Reed Radio & Supply Co., Harry, 805-809 Boonville, Springfield 1, Mo., 10 (NEDA)
Reeves Equipment Corp., 10 E. 52nd St., New York 22, N.Y., 5
Reid Distributing Co., 1724 5th Ave., North Birmingham 3, Ala., 10 (NEDA)
Reliance Merchandizing Co., 23rd & Arch St., Philadelphia 3, Pa., 5, 10, 25
Reynolds, Harrison, 313 Washington St., Newton 58, Mass., 15 (REP)
Richter, William, 3 Juniper St., Rochester 10, N.Y., 15 (REP)
Ridley, Percival, 1551 N. Austin Blvd., Chicago 51, Ill., 15 (REP)
Rife, Jack, 7019 Lynford St., Philadelphia 21, Pa., 15 (REP)
Rio Radio Supply Co., P.O. Box 168, McAllen, Tex., 10 (NEDA)
Rissi, Al J., 1169 S. Broadway, Los Angeles 15, Calif., 15 (REP)
Rissi Electronic Supply Co., 1112 W. Warren, Detroit 1, Mich., 10 (NEDA)
Ritter, Ralph B., 612 N. Michigan Ave., Chicago 11, Ill., 15 (REP)
Roberts, Ernest V., 5069 W. Washington Blvd., Los Angeles 16, Calif., 15 (REP)
Robitaille, Lou, c/o Forshay, 71 Murray St., New York 7, N.Y., 15 (REP)
Roberts & O'Brien, P.O. Box 1076, Syracuse 1, N.Y., 10 (NEDA)
Roden Electrical Supply Co., 808 N. Central Ave., Knoxville, Tenn., 10 (NEDA)
Rochester Radio Supply Co., 114 St. Paul St., Rochester 4, N.Y., 10 (NEDA)
Rocke, Lee, c/o Newhope Corp., 6 E. 39th St., New York 16, N.Y., 15 (REP)
Rocket Dist., Inc., 209-14 41 Ave., Bayside 61, N.Y., 10, 15, 20
Roes, H. Courtney, 2601 Cherry, Kansas City 8, Kan., 15 (REP)
Roes, Herbert A., 2601 Cherry, Kansas City 8, Kan., 15 (REP)
Rollan Sales Corp., 663 N. Wells St., Chicago 10, Ill., 10
Root, Eugene C., Jr., c/o Morrow, 3123 W. 117th St., Cleveland 11, Ohio, 15 (REP)
Rose Company, 76 Vesey St., New York 7, N.Y., 5, 10, 20, 25
Rose, J. K., 2323 W. Devon Ave., Chicago 45, Ill., 15 (REP)
Rosen & Co., Raymond, 32nd & Walnut Sts., Philadelphia 4, Pa., 10 (NEDA)
Ross, David H., 1355 Market St., San Francisco 3, Calif., 15 (REP)
Ross, Milton, 550 Fifth Ave., New York 19, N.Y., 15 (REP)
Ross Radio Co., 325 W. Federal St., Youngstown 3, Ohio, 10
Roth Sales Co., Mike, 4397 Groveland Rd., Cleveland 18, Ohio, 15
Royal National Co., Inc., 75 West St., New York 6, N.Y., 5, 15
Rucker Electronic Products Co., 1312 14th St. N.W., Washington, D.C., 10 (NEDA)
Rudat, Dan J., 383 Brannan St., San Francisco 7, Calif., 15 (REP)
Rupp, Vern T., 2239 W. 11th St., Los Angeles 6, Calif 15 (REP)
Rush Co., L. K., 103 Highland Ave., Jackson, Tenn., 10 (NEDA)
Ryan, John L., 263 Edgemont Pl., Teaneck, N.J., 15 (REP)
Ryb, Inc., 251 S. Robertson Blvd., Beverly Hills, Calif., 20
Rywelski, Joseph M., c/o Forshay, 71 Murray St., New York 7, N.Y., 15 (REP)
S & S Radio Supply, 721 S. Detroit, Tulsa 3, Okla., 10 (NEDA)
S. O. S. Cinema Supply Corp., 602 W. 52nd St., New York 19, N.Y., 5
Saffro, Yale L., 800 N. Clark St., Chicago 10, Ill., 15 (REP)
Saftler, Perry, 53 Park Place, New York 7, N.Y., 15 (REP)
St. Joseph Radio & Supply Co., 922 Francis St., St. Joseph, Mo., 10 (NEDA)
Saltzman, Walter P., 1600 Commercial Trust Bldg., Philadelphia 2, Pa., 15
Sanford Electronics Corp., 157 Chambers St., New York 7, N.Y., 10 (NEDA)
San Francisco Radio & Supply Co., 1282-84 Market St., San Francisco, Calif., 10 (NEDA)

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Sargent, Robert E., 42 Oak Ave., Tuckahoe, N.Y., 15 (REP)
Sarkis, Henry D., 6560 N. Sheridan Rd., Chicago 26, Ill., 15 (REP)
Satterfield Electronics, Inc., 326-28 W. Gorham St., Madison 3, Wis., 10 (NEDA)
Saul, Howard M., 5720 Wilshire Blvd., Los Angeles 36, Calif., 15 (REP)
Scarborough, George G., Box 115, 50 E. Wynnewood St., Wynnewood, Pa., 15 (REP)
Schaal, Albert A. Jr., 4 Waltham St., Lexington 73, Mass., 15 (REP)
Schmitt, F. Edwin, 136 Liberty St., New York 6, N.Y., 15 (REP)
Schmitz, J. O., 406 W. 34 St., Kansas City 2, Kan., 15 (REP)
Schoonmaker, J. Y., 2011 Cedar Springs, Dallas 1, Tex., 15 (REP)
Schroeder, Henry J., P.O. Box 518, West Richfield, Ohio, 15 (REP)
Schroeder, Wm., 909 Westfield Blvd., Indianapolis 20, Ind., 15 (REP)
Scholes, Wm. R., 506 Wyndmoor Ave., Philadelphia 18, Pa., 15 (REP)
Schofield, R. J., c/o Ellinger, 6540 Northwest Hwy., Chicago 31, Ill., 15 (REP)
Scholz, Paul G., 210 W. 8 St., Kansas City 6, Kan., 15 (REP)
Schryver, Clyde H., 4550 Main St., Kansas City 2, Kan., 15 (REP)
Schubert, Arthur J., c/o Sarkis, 6560 N. Sheridan Rd., Chicago 26, Ill., 15 (REP)
Schulz, Edwin A., 721 Sherwood Dr., Indianapolis 20, Ind., 15 (REP)
Schuster Electric Co., 321 E. 8 St., Cincinnati 2, Ohio, 10 (NEDA)
Schwartz, Adolph, 1 Exchange Pl., Jersey City, N.J., 15 (REP)
Schweber Electronics, 122 Herricks Rd., Mineola, L.I., N.Y., 10
See complete catalog in last section
Scooters Radio Supply, 509-11 Commerce St., Fort Worth, Tex., 10 (NEDA)
Scott, E. E., P.O. Box 157, Nashville, Tenn., 15 (REP)
Scott, Ernest P., 1836 Euclid Ave., Cleveland 15, Ohio, 15 (REP)
Scott Co., Michael, 90 Edmunds Rd., Wellesley Hills 82, Mass., 15
Scott, Thomas T., 2737 W. Grand Blvd., Detroit 8, Mich., 15 (REP)
Scott Radio Supply, 266 Alamitos Ave., Long Beach 2, Calif., 10 (NEDA)
Scranton Radio & Tel. Supply Co., 519-521 Mulberry St., Scranton 2, Pa., 10 (NEDA)
Seattle Radio Supply, Inc., 2117 2 Ave., Seattle 1, Wash., 10 (NEDA)
Sebright, Russ D., 4030 Chouteau St., St. Louis 10, Mo., 15 (REP)
Seelie, John C., 912 Ft. Wayne Bank Bldg., Ft. Wayne 2, Ind., 15 (REP)
Segal, Gilbert K., 4730 Pine St., Philadelphia 18, Pa., 15 (REP)
Segel, Charles, 143 Newbury St., Boston 16, Mass., 15 (REP)
Segel, Henry P., 143 Newbury St., Boston 16, Mass., 15 (REP)
For details see ad on pages 79, 356
Servo-Tek Products Co., 1086 B. Goffle Rd., Hawthorne, N.J., 25

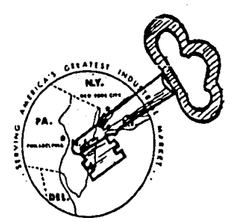
Seyd, Ernest K., Longhill Rd., Andover, Conn., 15 (REP)
Shaffer, Grant, 16267 James Couzens Hwy., Detroit 21, Mich., 15 (REP)
Shand Radio Specialties, 203 W. Kearsley St., Flint 3, Mich., 10 (NEDA)
Shaw, Samuel A., 92 S. Central Ave., Hartsdale, N.Y., 15 (REP)
Shelps, George A., 2604 Cheltenham Ave., Philadelphia 19, Pa., 15 (REP)
Shilt, Noble C., 1531 Spruce St., Philadelphia 2, Pa., 15 (REP)
Shirk, George, 128 Kercheval, Grosse Pt. Farms 30, Mich., 15 (REP)
Shulan, Wally, 136 Liberty St., New York 6, N.Y., 15 (REP)
Siegel, Samuel, 1145 S. La Cienega Blvd., Los Angeles 35, Calif., 15 (REP)
Silberne Radio & Electric, 3308 10 11 St. N.W., Washington 10, D.C., 10 (NEDA)
Silvey, Charles, 8575 W. Washington Blvd., Culver City, Calif., 15 (REP)
Simberkoff, J. A., 68 Hudson St., Hoboken, N.J., 15 (REP)
Simberkoff, S. W., 68 Hudson St., Hoboken, N.J., 15 (REP)
Simons & Son, Inc., M., 25 Warren St., New York 7, N.Y., 5
Sinai, Arnold A., 65 9 St., San Francisco 3, Calif., 15 (REP)
Skolburg, John E., 912 Ft. Wayne Bank Bldg., Ft. Wayne 2, Ind., 15 (REP)
Slate & Co., 2755 Webster Ave., New York 58, N.Y., 10 (NEDA)
Smith & Crawford, 1345 Mission St., San Francisco 3, Calif., 10 (NEDA)
Smith, Berry, 622 W. 59 Terrace, Kansas City 2, Kan., 15 (REP)
Smith, Dolores, Suite 1101, 505 N. Ervay St., Dallas 1, Tex., 15 (REP)
Smith, Howard F., 259 W. 14 St., New York 11, N.Y., 15 (REP)
Smith, J. Earl, 1101 N. Ervay St., Dallas 1, Tex., 15 (REP)
Smith, J. J., 1862 Burkholder Circle, Jacksonville, Fla., 15 (REP)
Smith, Maitland K., 315 Forest Ave. N.E., Atlanta 3, Ga., 15 (REP)
Smith-Meekar Eng. Co., 157 Chambers St., New York 7, N.Y., 5
Smith, Oren H., 221 W. Huron St., Chicago 10, Ill., 15 (REP)
Snefsky, Edward A., 2046 Brookfield Dr., Pittsburgh 16, Pa., 15 (REP)
Snyder, V. A., 7 Hyatt St., Staten Island 1, N.Y., 15
For details see ad on page 357
Sonics Equipment Co., 2321 Hudson Blvd., Jersey City 4, N.J., 20
Sonkin, David, 10 Fiske Pl., Mt. Vernon, N.Y., 15 (REP)
Somers, F. C. Jr., 1805 Grand Ave., Kansas City 8, Kan., 15 (REP)
Sonocraft Corp., 115 W. 45 St., New York 36, N.Y., 10
Soundco Electronic Supply Co., 147 Dwight St., Springfield, Mass., 10 (NEDA)
Sound Workshop, 75 N. 11 St., Brooklyn 11, N.Y., 10, 20
Southeastern Radio Supply Co., 404 N. Eugene St., Greensboro, N.C., 10 (NEDA)
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Sparf, Walter H., c/o Bauman, 2753 W. North Ave., Chicago 47, Ill., 15 (REP)
Specialty Dist. Co., Inc., 425 Peachtree St. N.E., Atlanta 3, Ga., 10, 20
Spellman, Fred, 206 E. 4 St., Brooklyn, N.Y., 15 (REP)
Springfield Radio Co., Inc., 405 Dwight St., Springfield 3, Mass., 10 (NEDA)
Sprung, Joseph, 254 W. 31 St., New York 1, N.Y., 15 (REP)
Srepco, Inc., 314 Leo St., Dayton 4, Ohio, 10 (NEDA)
Sroka, A. A., c/o Magnuson, 4258 W. Irving Park Rd., Chicago 41, Ill., 15 (REP)
Stallman of Ithaca, Inc., 123-131 S. Tioga St., Ithaca, N.Y., 10 (NEDA)
Stan-Burn Radio & Electronics, 1697 Broadway, New York 19, N.Y., 10 (NEDA)
Stan-Burn Radio & Electronics, 558 Coney Island Ave., Brooklyn 18, N.Y., 10 (NEDA)
Standard Parts Corp., 277 N. Franklin St., Hempstead, L.I., N.Y., 10 (NEDA)
Standard Products, Inc., 650 E. Gilbert, Wichita 11, Kan., 10, 15, 20, 25
Standard Radio Parts, 218 N. 1 Ave., Tucson, Ariz., 10 (NEDA)
Standard Radio Parts C., 1244 State St., Racine, Wis., 10 (NEDA)
Stang, Robert A., 79 Storer Ave., Pelham, N.Y., 15 (REP)
Stangel, Arthur, 68 Hudson St., Hoboken, N.J., 15 (REP)
Stark Radio Supply Co., 71 S. 12 St., Minneapolis 4, Minn., 10 (NEDA)
Steffen, Delbert, 1836 Euclid Ave., Cleveland 15, Ohio, 15 (REP)
Steinberg & Co., Albert, 2520 N. Broad St., Philadelphia 32, Pa., 10 (NEDA)
Steinberg & Co., Albert, 6324 Sackett St., Philadelphia, Pa., 10 (NEDA)
Steinberg, Hy, 395 Broadway, New York 13, N.Y., 15 (REP)
Steinbergs, Inc., 633 Walnut St., Cincinnati 2, Ohio, 10 (NEDA)
Steinke, A. R., 19277 Henry Rd., Fairview Park, Cleveland 26, Ohio, 15 (REP)
Stemm, Royal A., 21 E. Van Buren St., Chicago 5, Ill., 15 (REP)
Stemm, R. Edward, 5681 W. Lake St., Chicago 44, Ill., 15 (REP)
Sterling Radio of Beaumont, Inc., 1025 S. 4 St., Beaumont, Tex., 10 (NEDA)
Sterling Radio Products Co., 1616 McKinney St., P.O. Box 1746, Houston, Tex., 10 (NEDA)
Stevens, K. C., Box N, Lincoln, Mass., 15 (REP)
Stevens Co., T. W., P.O. Box 37, Oklahoma City 1, Okla., 15, 20
Smith, Inc., Stewart W., 325 E. Water St., Syracuse 2, N.Y., 10 (NEDA)

(Continued on page 358)

(Continued from page 357)

Still, L. C., 407 Whitehead Bldg., Atlanta 3, Ga., 15 (REP)
Straits Dist. Inc., 412 N. Main St., Cheboygan, Mich., 10 (NEDA)
Strassner, Conrad R., 1865 N. Western Ave., Los Angeles 27, Calif., 15 (REP)
Strassner, Ellard E., 1865 N. Western Ave., Los Angeles 27, Calif., 15 (REP)
Strassner, Richard A., 1865 N. Western Ave., Los Angeles 27, Calif., 15 (REP)
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Stroum, Samuel N., 1612 Broadway, Seattle 22, Wash., 15 (REP)
Stubbs Electric Co., 33 N.W. Park Ave., Portland 9, Ore., 10 (NEDA)
Stuchell, H. E. Jr., Box 115, 50 E. Wynnewood Rd., Wynnewood, Pa., 15 (REP)
Stuedeman, W., 5 Washington St., E. Orange, N.J., 20
Sturgeon, Paul R., 25 Huntington Ave., Boston 16, Mass., 15 (REP)
Suedekum Electronic Supply Co., 902 S. Sprigg St., Cape Girardeau, Mo., 10 (NEDA)
Sullivan, Ralph T., 1551 N. Austin Blvd., Chicago 51, Ill., 15 (REP)
Sun Radio & Electronics Co., Inc., 650 6 Ave., New York 11, N.Y., 10
Sun Radio Co., 110 E. Market St., Akron 8, Ohio, 10 (NEDA)
Superior Distributing Co., 5124 Liberty Ave., Pittsburgh 24, Pa., 10 (NEDA)
Sussman, Ira, 130 Lafayette St., New York 13, N.Y., 15 (REP)
Sussman, Jules, 130 Lafayette St., New York 13, N.Y., 15 (REP)
Sutliff, George E., 16956 Van Aken Blvd., Shaker Hts. 20, Ohio, 15 (REP)
Suttons Wholesale Dist., Bill, 601 Commerce St., Fort Worth 2, Tex., 10 (NEDA)
Swank, Wally B., 2310 Bellevue Ave., Syracuse 4, N.Y., 15 (REP)
Sylvan Wellington Co., 269 Canal St., New York 13, N.Y., 10 (NEDA)
Sylvester, R. A., Box 115, 50 E. Wynnewood Rd., Wynnewood, Pa., 15 (REP)
Tallen Co., Inc., 159 Carlton Ave., Brooklyn 5, N.Y., 10
Tanner, George O., 600 Grant St., Pittsburg 19, Pa., 15 (REP)
Tatro, Frank B., 6022 N. Rogers Ave., Chicago 30, Ill., 15 (REP)
Taylor, Benjamin B., 241 Sunrise Blvd., Rockville Centre, L.I., N.Y., 15 (REP)
Taylor Co., E. E., 465 Central Ave., Albany 5, N.Y., 10 (NEDA)
Taylor, M. F., 8416 Georgia Ave., Silver Spring, Md., 15 (REP)
Taylor, Robert F., 308 W. Washington St., Chicago 6, Ill., 15 (REP)
Technical Representation, Suite 200, 25 S. Easton Rd., Glenside, Pa., 15
Technicraft Co., Commonwealth Ave., Boston 34, Mass., 15
Tel-Rad, Inc., 274 Farmington Ave., Hartford 5, Conn., 10, 20
Terminal Radio Corp., 85 Cortlandt St., New York 7, N.Y., 5, 10
Terwilliger, Percy, 1805 Grand Ave., Rm. 515, Kansas City 8, Kan., 15 (REP)
Test Equipment Sales Co., 4447 N. Bodine St., Philadelphia 40, Pa., 15, 20
Texas TV Stores, 506 W. Hildebrand Ave., San Antonio 12, Tex., 10, 20
Texport Co., 5004 Ross Ave., Dallas 10, Tex., 15
Thibau, A. R., 402 Mfrs. Exchange Bldg., Kansas City 6, Kan., 15 (REP)
Thomas, James G., c/o Rose, 2323 W. Devon, Chicago 45, Ill., 15 (REP)
Thompson, Harlan, 6101 College Ave., Indianapolis 20, Ind., 15 (REP)
Thompson, John F., 315 Forrest Ave. N.E., Atlanta 3, Ga., 15 (REP)
Thompson Radio Supplies, Inc., 182 E. Long St., Columbus 15, Ohio, 10
Thorpe, Jack M., 4390 Haverhill, Detroit 24, Mich., 15 (REP)
Thurow Distributors, 342 3 Ave. S., St. Petersburg, Fla., 10 (NEDA)
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Toledo Radio Specialties, 1215 Jackson St., Toledo 2, Ohio, 10 (NEDA)
Tomlin, H. M., 1212 Camp St., Dallas 2, Tex., 15 (REP)
Tracey & Co., Inc., 937 N.W. Glisan, Portland 9, Ore., 10 (NEDA)
Tri-City Radio Supply Co., 1919 4 Ave., Rock Island, Ill., 10 (NEDA)
Tri-State Radio & Supply Co., 536 E. Pine Blvd., Poplar Bluff, Mo., 10 (NEDA)
Trinkle, W. S., No. 2 Roberts Block, Glenside, Pa., 15 (REP)
Trojan Radio Co., Inc., 420 River St., Troy, N.Y., 10 (NEDA)
Tubergen, John B., 2232 W. 11 St., Los Angeles 6, Calif., 15 (REP)
Turney & Beale, 40-08 Corp. Kennedy St., Bayside 61, L.I., N.Y., 10, 15
TV Supply Co., 1226 3 Ave., Huntington 1, W.Va., 10 (NEDA)
Tydings Co., Div. Keps Electric Co., 5800 Baum Blvd., Pittsburgh 6, Pa., 10 (NEDA)
For details see ad on page 358
Tydings, Emmet J., 1565 McFarland Rd., Pittsburgh 16, Pa., 15 (REP)
United Radio & Electric Co., 47 W. 63 Rd., New York 23, N.Y., 10 (NEDA)
United Radio Supply, 47-53 E. Main St., New Britain, Conn., 10 (NEDA)
United Radio Supply, Inc., 22 N.W. 9 Ave., Portland 9, Ore., 10 (NEDA)
U.S. Recording Company, 1121 Vermont Ave. N.W., Washington 5, D.C., 10, 20
Universal Radio Supply Co., 1729 S. Los Angeles St., Los Angeles 15, Calif., 10
Universal Radio Supply Co., 533 S. 7 St., Louisville 3, Ky., 10
Vactron, 398 Ashford Ave., Dobbs Ferry, N.Y., 10
Valentine, Forrest C., 912 Ft. Wayne Bank Bldg., Ft. Wayne 2, Ind., 15 (REP)
Vanby Corp., 122 E. 42 St., New York 17, N.Y., 5, 15
Van Dusen, R. H., 940 Lake Elbert Dr., Winter Haven, Fla., 15 (REP)
Van Gilder, Frank, 230 Mill Rd., Havertown, Pa., 15 (REP)
Van Sickle Radio Co., 1113 Pine St., St. Louis 1, Mo., 10 (NEDA)
Variety Elec. Co., Inc., 468 Broad St., Newark, N.J., 10
Ventilaire Fan & Blower Co., Mercer & Canal St., New York 13, N.Y., 10
Vermilya, Robert H., 1355 Market St., San Francisco 3, Calif., 15 (REP)
Vilfroy, Richard H., 3294 E. 140 St., Cleveland 20, Ohio, 15 (REP)
Vore, Fred, 1321 Rosedale Ave., Chicago 40, Ill., 15 (REP)
Vrbik, Jerry, 309 Guaranty Bldg., Cedar Rapids, Iowa, 15 (REP)
Wadsworth, H. M., 509 Balsam St., Liverpool, N.Y., 15 (REP)
Waelterman, L. F., 8543 McKenzie Rd., St. Louis 23, Mo., 15 (REP)
Wahl Co., A. C., 9448 Winton Rd., Cincinnati 15, Ohio, 15

Walder Radio & Appliance, 1809 N.E. 2 Ave., Miami, Fla., 10 (NEDA)
Walker-Jimieson, Inc., 311 S. Western Ave., Chicago 12, Ill., 10 (NEDA)
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Wallace, Stanley K., P.O. Box 744, Lutz, Fla., 15 (REP)
Wallace, Wm. H., 1206 Maple Ave., Los Angeles 15, Calif., 15 (REP)
Walker Radio Co., L. B., 218 W. 8 St., Pueblo, Colo., 10 (NEDA)
Walters Radio Supply, 3645 Main, Kansas City, Mo., 10 (NEDA)
Walker Co., Verl G., P.O. Box 1586, Medford, Ore., 10 (NEDA)
Walton, H. E., 76 Kercheval, Detroit 36, Mich., 15 (REP)
Warbington, R. E., 407 Whitehead Bldg., Atlanta 3, Ga., 15 (REP)
Ware Radio Supply Co., 913 Centre St., Brockton 11, Mass., 10 (NEDA)
Warner, Dayton L., 15423 Honore Ave., Harvey, Ill., 15 (REP)
Warren Radio Co., 1716 S. Harrison, Ft. Wayne 2, Ind., 10 (NEDA)
Warren Radio Co., 713 Fortage St., Kalamazoo 7, Mich., 10 (NEDA)
Warren Radio, Inc., 31 Forest Ave., Jamestown, N.Y., 10
Warren Radio Co., 71 S. Broadway, Akron 8, Ohio, 10 (NEDA)
Warren Radio Co., 222 S. Elizabeth St., Lima, Ohio, 10 (NEDA)
Warren Radio Co., 1320 Madison Ave., Toledo 2, Ohio, 10 (NEDA)
Warren Radio, Inc., 1125 State St., Erie, Pa., 10 (NEDA)
Warren Radio Supply, 115 S. Indiana Ave., Sioux Falls, S.D., 10 (NEDA)
Waters, Robert A., 4 Gordon St., Waltham, Mass., 15 (REP)
Weatherford Co., R. V., 6821 San Fernando Rd., Glendale 1, Calif., 10 (REP)
Webb, Cecil E., 4014 Washington Blvd., Indianapolis 5, Ind., 15 (REP)
Weber, Dale G., 234 Sherlock Bldg., Portland 4, Ore., 15 (REP)
Weber, Harold I., 1206 Long Beach Ave., Los Angeles 21, Calif., 15 (REP)
Wedel, Frank, 3215 Western Ave., Seattle 99, Wash., 15 (REP)
Wedemeyer Electronic Supply Co., 213-217 N. 4 Ave., Ann Arbor, Mich., 10 (NEDA)
Wedemeyer Electronic Supply Co., 800 Merrill St., Lansing, Mich., 10 (NEDA)
Wedemeyer, R. C., 1234 Folsom St., San Francisco 3, Calif., 15 (REP)
Weingarten Electronic Lab., Inc., 7556 Melrose Ave., Los Angeles 46, Calif., 10
Weiss, Wm. W., 509 5 Ave., New York 17, N.Y., 15 (REP)
Weller-Rahe Co., P.O. Box 212, Worthington, Ohio, 15
Weller, W. R., 361 E. Kanawha Ave., Worthington, Ohio, 15 (REP)
Wellman, W. N., 4114 Sarpy Ave., St. Louis 10, Mo., 15 (REP)
Wesselman, Eugene, c/o Golten, 2750 W. North Ave., Chicago 47, Ill., 15 (REP)
West, Jack, 6153 N. Milwaukee Ave., Chicago 30, Ill., 15 (REP)
West Side Radio Supply, 8140 Michigan Ave., Detroit 10, Mich., 10 (NEDA)
West Texas Radio Supply, 1026 W. 6, Amarillo, Tex., 10 (NEDA)
Westchester Electronic Supply Co., 420 Mamaroneck Ave., White Plains, N.Y., 10 (NEDA)
Western Distributors, 227 Santa Fe, Salina, Kan., 10 (NEDA)
Western Electronic Supply Co., 717 Dexter Ave., Seattle 9, Wash., 10 (NEDA)
Western Engineers, Elk Grove, Calif., 25
Western International Co., 45 Vesey St., New York 7, N.Y., 10
Westrex Corp., 111 8 Ave., New York 11, N.Y., 5
Whelan, Robert E., 1110 Broad Blvd., Dayton 9, Ohio, 15 (REP)
Whitaker, Joseph F., 401 N. Broad St., Philadelphia 8, Pa., 15 (REP)
White, P. H., 1116 Great Plain Ave., Needham, Mass., 15 (REP)
White Radio Supply Co., David, 1222 Main St., Little Rock, Ark., 10 (NEDA)
Whitehead Radio Co., 124 E. Long St., Columbus 15, Ohio, 10 (NEDA)
Whitesell, Robert O., 2208 E. Washington St., Indianapolis 1, Ind., 15 (REP)
Wholesale Radio Parts Co., Inc., 311 W. Baltimore St., Baltimore 1, Md., 10 (NEDA)
Wible Radio Supply, Inc., P.O. Box 1163, Tacoma 1, Wash., 10 (NEDA)
Wicks Radio Equipment Co., 513 15 S. Staples St., Corpus Christi, Tex., 10 (NEDA)
Wilco Radio Distributors, 383 E. 138 St., New York 54, N.Y., 10 (NEDA)
Wile, Eugene G., 218 S. 11 St., Philadelphia 7, Pa., 10 (NEDA)
Wiley, Paul F., 1406 S. Grand Ave., Los Angeles 15, Calif., 15 (REP)
Wilgreen Industries, 99 Murray St., New York 7, N.Y., 10
For details see ad on page 409
Wilkinson Brothers, 2406 Ross Ave., Dallas 1, Tex., 10 (NEDA)
Wilkinson, Robert L., Maxalea Dr., Baltimore 12, Md., 15 (REP)
Willgold Electronic Sales Corp., 350 5 Ave., New York 1, N.Y., 15
Williams Co., Carl B., 154 S. Main St., Phillipsburg, N.J., 10 (NEDA)
Williams, Norman D., 407 Whitehead Bldg., Atlanta 3, Ga., 15 (REP)
Williams, Victor W., 5 Circle Dr., Margate, N.J., 15 (REP)
Williamsport Radio Supply, 518 W. 3 St., Williamsport 28, Pa., 10 (NEDA)
c/o Wilson, 2750 W. North Ave., Chicago 47, Ill., 15 (REP)
Wilson Supply Co., 108 W. Jefferson St., Springfield, Ill., 10 (NEDA)
Wilson, Wesley L., 2750 W. North Ave., Chicago 47, Ill., 15 (REP)
Wimpie, Sydney, c/o Rockbar Corp., 211 E. 37 St., New York 16, N.Y., 15 (REP)
Winfree Supply Co., 800 W. Cary St., Richmond 20, Va., 10 (NEDA)
Winteradio, Inc., 1468 W. 25 St., Cleveland 13, Ohio, 10 (NEDA)
Winters Radio Laboratory, 11 Warren St., New York 7, N.Y., 20
Wise Radio Supply, 1001 Towson Ave., Fort Smith, Ark., 10 (NEDA)
Withers & Roper, 2400 W. Madison St., Chicago 12, Ill., 15
Wilson, Fred D. Jr., c/o Maguire, 593 Drexel Bldg., Philadelphia 6, Pa., 15 (REP)
Williamson, Paul H., 720 Rittenhouse, Philadelphia 44, Pa., 15 (REP)
Widdekind, M. K., 518 1 Ave. N., Seattle 9, Wash., 15 (REP)
Wineblatt, Edward, c/o Cerf, 744 Broad St., Newark 2, N.J., 15 (REP)
Williams, Allen I. Jr., 230 Cooper Bldg., Denver 2, Colo., 15 (REP)
Willison, G. G., 1821 W. Alabama St., Houston 6, Tex., 15 (REP)
Wilks, Ernest L., 1212 Camp St., Dallas 2, Tex., 15 (REP)
Willison, R. J., 1821 W. Alabama St., Houston 6, Tex., 15 (REP)
Wresco, 140 9 St., San Francisco 3, Calif., 10 (NEDA)
Wright, Austin L., 33 E. Golf View Rd., Ardmore, Pa., 15 (REP)
Wright, James L., 4241 Melbourne Rd., Indianapolis 44, Ind., 15 (REP)
Wright, Warren H., 4241 Melbourne Rd., Indianapolis 44, Ind., 15 (REP)
Wolf, O. C., 15 Centennial Dr., Syracuse, N.Y., 15 (REP)
Wolfe-Marsey Sales Co., 74 Park Ave., Rochester 7, N.Y., 15
Wolfe, Michael, 136-52 71 Rd., Flushing, L.I., N.Y., 15 (REP)
Wood, Ash M., P.O. Box 150, El Monte, Calif., 15 (REP)
Woolf, Alan, 135 Liberty St., New York 6, N.Y., 15 (REP)
Woolf, Irving W., 135 Liberty St., New York 6, N.Y., 15 (REP)
Womack Radio Supply Co., 502-504 Craghead St., Danville, Va., 10 (NEDA)
World Radio Laboratories, 738-744 W. Broadway, Council Bluffs, Iowa, 10 (NEDA)
York Radio & Refrigeration Parts, 265 W. Market St., York, Pa., 10 (NEDA)
Young, Edward L., 8147 Delmar Ave., St. Louis, Mo., 15 (REP)
Yount, W. J., 1431 Pleasant Dr., Dallas, Tex., 15 (REP)
Yukon Radio Supply, Inc., Box 406, Anchorage, Alaska, 10 (NEDA)
Zack Radio Supply Co., 1424 Market St., San Francisco 2, Calif., 10 (NEDA)
Zaffina, Lawrence F., 14611 Alma, Detroit 5, Mich., 15 (REP)
Zied, Julius, 132 S. 11 St., Philadelphia 7, Pa., 25
Zimmerman, Wilson H., 647 Warren St., Syracuse 2, N.Y., 15 (REP)
Zimmerman Wholesalers, 162 Bedford St., Cumberland, Md., 10 (NEDA)
Zimmerman Wholesalers, 114 E. Washington St., Hagerstown, Md., 10 (NEDA)
Zimmerman Wholesalers, 55 Morgantown St., Uniontown, Pa., 10 (NEDA)
Zobrist, Herb E., 2121 Westlake Ave., Seattle 1, Wash., 10 (NEDA)



30,000 Radio-Electronic Engineers will receive and use the 1953 IRE DIRECTORY

The 1953 IRE DIRECTORY is— Better and Better and Better!

More Engineers Listed than ever before! IRE membership continues to gain and gain! More engineers (now 30,000) are listed, and therefore have a direct, personal interest in this DIRECTORY.

Up-to-dateness is almost a mania with IRE DIRECTORY compilers! Membership lists are corrected up to May 30th. Industry lists, compiled and classified by high speed IBM sorting methods are accurate to June 15th. No firm's report is older than 18 months.

Information at high speed! "Data the way an engineer thinks" is the key to IRE DIRECTORY classifications. All products are divided into 10 fundamental groups, many of which parallel professional group organization. The grouping plan makes this the fastest working directory you ever used! No components are mixed with test equipment—you turn right to a section where each item belongs.

Yet good engineering detail is maintained. 99 basic classes of products under these ten sectional product directories keep listings from becoming cumbersome, but clearly define products. Overlapping listings are skillfully eliminated. Simplicity makes this book easy to work with—insures faster finding of facts when forgotten. Thus the faults of terminology listings are avoided.

Completeness is insured! Most firms make many products in a single classification. Wasteful, eye-confusing relisting of the same firms over and over is quite sensibly solved by using a system of codes under the 99 basic headings which actually provide 489 separate classifications. A more complete picture of what each firm's full line is results, but you travel through fewer listings. The "Copp Principle" of Directory indexing makes these lists wide, well marked highways to information —fast.

3000 Firms listed. The alphabetical directory gives a clear definition of these firms by showing any or all of the ten fundamental groups in which these firms belong after every name.

Machol Edge Index is just one more modern service to help the user find information fast.

Ads positioned with reason! In a DIRECTORY where ads play an important part in supplying information the user wants and needs, it makes good sense to cross-reference every advertiser in each listing so that the user can quickly find more detail. Ads are also placed facing company alphabetical listings, or in the product section in which they properly belong. No effort is spared to "organize" ad information.

More advertisers—more information! Never before have so many advertisers served IRE readers with so much information! The advertisers' list this year is truly a "social register" of this great industry.

And 1954 will be even better! IRE membership is constantly growing —providing a larger audience of selected engineers at a lower rate per reader. Catalog insert rates compete with postage. Earned discounts apply to advertisers in Proceedings. Write today for rates, closing dates, and other mechanical information.



THE INSTITUTE OF RADIO ENGINEERS

BRyant 9-7550 • ADVERTISING DEPT., 1475 BROADWAY, NEW YORK 36, N. Y.

Part Four—1953 Complete-Data-Spreads

The full spirit of the IRE DIRECTORY is to give the reader-engineer "facts" in complete detail, and specific enough to be of useful service. Our advertisers have recognized this, and many have made their copy presentation full of useful specifications and illustrations.

Actually, a Directory Publisher cannot hope to describe products adequately in standardized listings. Only the Advertiser, using display space, and with his own intimate knowledge of his service or product, can do that job right.

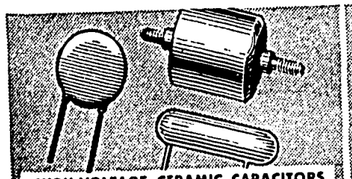
The Part Four Advertisers, listed below, have done their utmost to provide the reader with engineering data in full detail, through spreads and catalogs filed in this book for easy access and permanent reference. This can prove to be the most useful part of the 1953 IRE DIRECTORY to you.

Index to Complete-Data-Spreads

Aerovox Corp.	362-363
Ampex Electric Corp.	364-365
Barker & Williamson, Inc.	408
Bendix Aviation Corp., Eclipse-Pioneer Div.	366-367
Bomac Labs., Inc.	382-383
Chatham Electronics Corp.	404-405
Chicago Telephone Supply Corp.	376-377
Cinch Mfg. Corp.	384-385
Clarostat Mfg. Co., Inc.	394-395
Collins Radio Co.	428-429
Constantin & Co., L. L.	393
Dale Products, Inc.	452-453
Douglas Laboratories, Inc.	401
Eitel-McCullough, Inc.	402-403
Federal Telephone & Radio Corp.	368-373
General Radio Co.	380-381
Hammarlund Mfg. Co., Inc.	424-427
Institute of Radio Engineers	396, 416, 448-449
Jennings Radio Mfg. Co.	390-392
Johnson & Hoffman Mfg. Co.	397-400
Kenyon Transformer Co.	406-407
Kings Electronics Co.	414-415
Laboratory for Electronics	432-433
Measurements Corp.	422-423
Mepco, Inc.	388-389
Mycalex Corp. of America	430-431
National Co., Inc.	434-435
Northern Radio Co., Inc.	410-412
Polytechnic Research & Dev. Co., Inc.	374-375
Radio Corp. of America	413, 440-441
Radio Materials Corp.	436-437
Servo Corp. of America	438-439
Sickles Co., F. W.	421
Stackpole Carbon Co.	442-443
Stupakoff Ceramic & Mfg. Co.	378-379
Superior Tube Co.	444-445
Sylvania Electric Products, Inc.	417-420
Ucinite Co.	447
United-Carr Fastener Corp.	446
U. S. Gasket Co.	450-451
Varian Associates	454-455
Waterman Products Co.	386-387
Wilgreen Industries	409

Complete catalogs describing in detail the products of 15 firms, are filed in the last part of the IRE DIRECTORY. See:

INDEX TO CATALOGS ON PAGE 456.



HIGH-VOLTAGE CERAMIC CAPACITORS . . . Result of extensive research by Hi-Q engineers to produce high-voltage units with same dependable adherence to specifications, ratings and tolerances which characterize all Hi-Q components. Special dielectric material and new designs for high working voltages in relation to size. Available in slugs, disks, plates, tubulars.

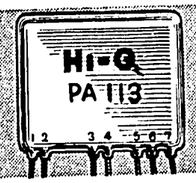
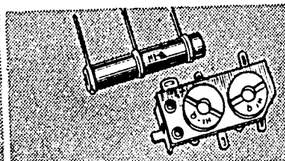
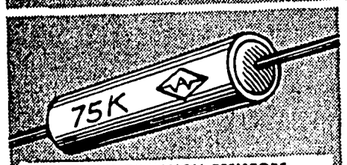


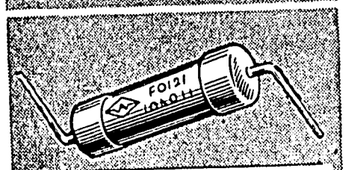
PLATE ASSEMBLIES SAVE SPACE AND LABOR . . . Most versatile of electronic components. Virtually endless combinations of capacitors and resistors in single units. Limited only by "K" of material, and physical size. Contribute to dependable miniaturization. Simplify assembly. Reduce number of soldered leads.



SPECIAL Hi-Q COMPONENTS . . . Developed to meet special needs. These special components meet all requirements as established by RTMA for class 2 ceramic dielectric capacitors. Can meet class 1 requirements if necessary. Trimmers, stand-off capacitors, feed-thru capacitors, eyelet feed-thrus, resistor-capacitor combinations, low-inductance ribbon and lug leads, etc.



CARBOFILM PRECISION RESISTORS . . . Further improved by newly-developed Wilkor coating material W-65 and the ceramic hermetically-sealed cases. New material specifically developed to meet military specifications MIL-R-10509A. Units can be mounted close to other components with minimum capacitance effect. Also in uncased types.



BOROFILM PRECISION RESISTORS . . . Featuring extremely low temperature coefficient of resistance. Available in resistance values up to 20,000 ohms, with temperature coefficient of 100 PPM or less. Furnished as standard coated units, and also in metal or ceramic hermetically-sealed cases. Ideal for any application requiring high-precision resistors.

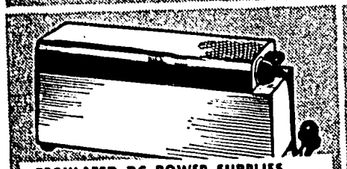
FUNCTION FITTED

FUNCTION-FITTED *Components*

A Touch of Tomorrow in the Components of Today! Embarking upon its 31st year of pioneering and producing the finest in electronic components, Aerovox presents this capsule information on some of its latest capacitor and component developments.

Indeed, to initiate, coordinate and check on all Aerovox products, the company maintains an outstanding research and engineering development at New Bedford. Over and above the usual standard types of capacitors, resistors and certain electronic equipment, Aerovox is constantly anticipating radio-electronic trends with advanced designs, materials and production facilities.

For capacitors and resistors and electronic specialties truly *function-fitted* to your circuitry, other components and operating requirements—*consult Aerovox specialists!*



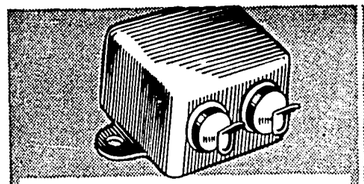
REGULATED DC POWER SUPPLIES . . . Incorporating use of magnetic amplifier techniques — eliminating all vacuum tubes. Provides extremely dependable, trouble-free precision equipment for industrial and laboratory uses. Minimum of 20,000 hours' continuous service. Available in variety of voltages and frequencies. Output: 300 v. D.C. with plus/minus 1% regulation from 0 to 200 MA. Less than 1% ripple.



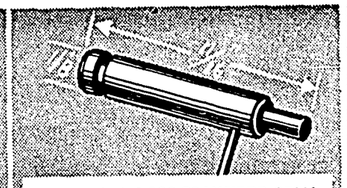
MAGNETIC AMPLIFIERS . . . Acme's extensive "know-how", gained through the development of magnetic amplifiers, can provide you with the precise component to fit your exact need. Power gain as high as 10 million. Carrier operating frequencies from 60 cps to 100 kcs. Power output up to 20 watts. Input sensitivity of 0.10 microwatt. In the "instrument grade" class.



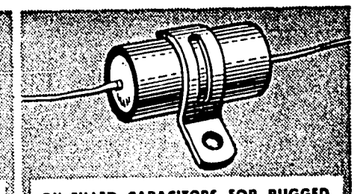
RADIO RANGE FILTERS . . . Depending on frequency required, Acme can supply standard or miniaturized filters with either toroidal or laminated inductors. Where required, these filters can be manufactured to hold very close phase shift tolerances and close output ratings over wide temperature ratings. Acme can build the "toughest" ones!



HIGH-TEMPERATURE METALLIZED PAPER CAPACITORS . . . A major Aerovox development. Ideal for miniaturization. Units enjoy wide usage and are giving excellent service. Full-voltage operation up to 100° C; to 125° C with voltage derating. Unique thermo-setting *solid* dielectric — maximum shock- and vibration-proof — no oil leakage.



ELECTROLYTICS FOR TRANSITOR APPLICATIONS . . . A sub-sub-miniature electrolytic, Type HA, designed especially for new transitors. Marked size reduction — considerably smaller than any previously available commercial unit. Typical example: 6 v. 1 mfd. unit shown measures only ⅛" dia. X 11/16" long.



OIL-FILLED CAPACITORS FOR RUGGED SERVICE . . . Choice of impregnants that are *function-fitted* to operating conditions. Many different case styles—metal-case tubulars and bathtubs, round-can and rectangular-can transmitter units, large steel-case units, widest choice of mountings and terminals, etc.

We solicit your PROBLEMS and NEEDS

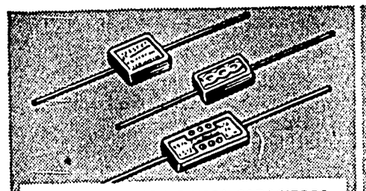
To expedite the handling of inquiries and orders, you are respectfully referred to the following divisions:

All types of capacitors for all purposes —paper, electrolytic, oil-filled, molded tubulars, mica, silver-mica, metallized-paper, motor-starting, filters, etc. Also "printed wiring." AEROVOX CORPORATION, New Bedford, Mass.

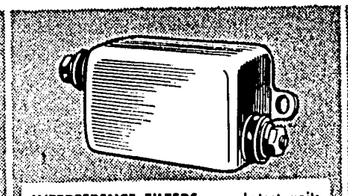
Specializing in ceramic capacitors of all types, trimmers, resistor-capacitor combinations, plate assemblies, radio chokes, etc. Hi-Q DIVISION, Aerovox Corporation, Olean, N.Y.

Precision resistors — Carbofilm units including hermetically-sealed types; Borofilm units for extremely low temperature coefficient of resistance; Corohm wire-wound units, etc. WILKOR DIVISION, Aerovox Corporation, 2882 Detroit Ave., Cleveland 14, Ohio.

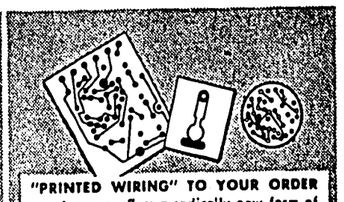
Electronic equipment specialties — wide variety of wave filters, radio range and band-pass filters, delay lines, regulated DC power supplies, toroidal inductors, magnetic amplifiers, etc. ACME ELECTRONICS, INC., 300 N. Lake Ave., Pasadena 4, Calif.



HIGH-TEMPERATURE MICA CAPACITORS . . . Suitable for operation at temperatures as high as 125° C. Increasingly used in military and special commercial applications. Available in all molded bakelite-case styles: Also close temperature coefficient units in which "F" characteristic of JAN is almost halved. Silver-micas also.



INTERFERENCE FILTERS . . . Latest units provide maximum attenuation from 150 KC well up into UHF range. Extra rugged, extra compact, extra efficient, by any comparison with previously-available filters. In several standard types for wide variety of uses. For extraordinary requirements, special filters can be developed and built.



"PRINTED WIRING" TO YOUR ORDER . . . Aerovox offers a radically new form of printed wiring. Employs silver as the conductor. Many distinct advantages. Essentially, this printed wiring offers fidelity of reproduction of original wiring design, with excellent adhesion of conducting material to base material. No corrosive chlorides or other harmful materials used in production.

AEROVOX capacitors

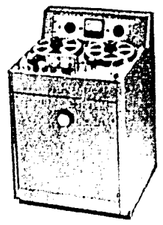
Hi-Q DIVISION OLEAN, N Y — **ACME ELECTRONICS INC** PASADENA 4, CALIF — **WILKOR DIVISION** CLEVELAND OHIO

Export 41 E 42nd St New York 17 N Y ⊕ Cable AEROCAP N Y ⊕ In Canada AEROVOX CANADA LTD Hamilton Ont JOBBER ADDRESS 740 Belleville Ave New Bedford Mass

AMPEX
MAGNETIC RECORDERS

the finest tape recorders

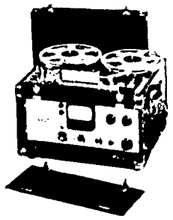
AMPEX AUDIO RECORDERS



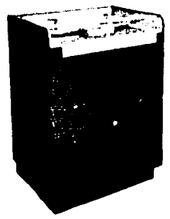
Series 300 console



Series 350 table top console on base



Series 400 single case portable



Model 450 console on base

For uses where utmost reliability, "perfect" fidelity and accuracy of timing are of prime importance, Ampex Tape Recorders are universally preferred. America's four major broadcasting networks, the country's leading phonograph record manufacturers and various important musical organizations are among those whose usage has established Ampex as the world's standard of excellence in sound recording.

SERIES 300

These, the finest of the Ampex line, are the machines used where speaking or musical performances justify the best recordings it is possible to make. Because of their supreme reliability, the 300 Series machines are used by major radio networks to originate, delay and rebroadcast important radio shows. Record manufacturers use the Series 300 for master recordings because of their high signal-to-noise ratio and low flutter and wow.

SERIES 350

Newest of Ampex's general purpose audio recorders, the 350 has a 30° slant on the top-plate. This puts reels, editing knobs and all controls within easier reach of the operator. Tape editing is faster and less tedious. A three motor tape transport (also used on the higher priced Model 300) provides excellent tape control and utmost reliability of operation. The Series 350 is unusually accessible for servicing.

SERIES 400

The Series 400 was the first tape recorder to bring the Ampex standard of performance within reach of smaller radio stations, schools, conservatories, high fidelity enthusiasts and semi-professional users. The 400 Series portables are the lightest of the Ampex models and consequently the best suited for professional quality recordings on location.

MODEL 450

For background music, automatic broadcasting and TV test patterns, the Model 450 Continuous Tape Reproducer provides up to 8 hours of continuous unrepeated program. The Model 450 uses 14-inch NARTB reels with double track pre-recorded tapes. Starting, stopping, reversing and program repeating are controlled automatically with no attention from a standby operator.

TAPE DUPLICATOR

Designed to make duplicate tapes at minimum labor cost, the Ampex Tape Duplicator makes from 1 to 10* duplicates simultaneously and employs a time-saving speedup. Double track tapes are made in one pass. Fidelity is high (see specifications). Duplicates of any standard tape speed can be made from masters of any standard speed.

**User has the option of buying from 1 to 10 slaves to operate from one master unit.*

***SPECIFICATIONS**

	Series 300	Series 350	Series 400	Model 450	Tape Duplicator
Frequency response (Tape speeds shown are not all available in all models)	15 in/sec.—30 to 15,000 cps. within ± 2 db 7½ in/sec.—40 to 15,000 cps within ± 4 db 40 to 10,000 cps. within ± 2 db 3¾ in/sec.—50 to 7,500 cps. within ± 4 db				
Signal-to-noise ratio (by NARTB Standards)	Over 60 db	Over 55 db	Over 55 db	Over 50 db	Over 45 db
Flutter and wow	Well under 0.1% rms. at 15 in/sec.	Well under 0.2% rms. at 15 in/sec.	Well under 0.2% rms. at 15 in/sec.	Well under 0.4% rms. at 3¾ in/sec.	Ampex Data Bull. 3-3-1
Available mounting	Console, rack and portable				Unmounted

*Full specifications are given in bulletins on each individual series or model.

Write for further information to Dept. X-1274

AMPEX ELECTRIC CORPORATION
934 Charter Street, Redwood City, California

- **Audio Distributors** in principal cities
- **Canadian Distribution**—Canadian General Electric Company

for every field of use

AMPEX DATA RECORDERS

Ampex magnetic tape machines retain test data in "live" electrical form. Hence a playback of the data is like a rerun of the original test. The tremendous "memory capacity" of magnetic tape retains more complete and detailed information than any other data recording method. The data can be scanned, speeded up, slowed down, automatically reduced or converted to any other electrical, visual or physical form. To cover the widest range of data situations, Ampex data recorders are offered with various frequency ranges, numbers of tracks and modes of recording.

F-M CARRIER TYPE RECORDER—MODEL 306

Explosions, shock waves, geophysical data and other highly transient phenomena can be recorded on the Model 306 with excellent "instantaneous" accuracy. Because the machine uses an fm carrier to modulate the signal, the accuracy of the recording is unaffected by minor tape imperfections.

Also, the Model 306 is able to record the vast majority of all mechanical occurrence, since it covers the extremely useful frequency range from 5000 cycles/sec. down to zero (D.C.).

OPTIONS: *One to 14 tracks*
Rack, console or combination mounting
Record and playback, record only or playback only

WIDE RANGE DIRECT RECORDER—MODEL 307

With a frequency response from 100 to 100,000 cycles per second, the Model 307 is particularly suited to steady state data occurring over a wide range of frequencies. The 307 has had extensive application in fm-fm telemetering, sharing this field with the Model 500 described below.

OPTIONS: *Same as Model 306*

PULSE WIDTH RECORDER—MODEL 303

This model can record any type of phenomena that lends itself to pulse width coding. Pulses can range from 60 to 1000 microseconds and will be accurate in duration to closer than 2 microseconds. Since each track on the machine may record commutated data consisting of many channels, it is possible to record hundreds of parallel data channels on one tape on a Model 303 machine.

OPTIONS: *Same as Model 306*

COMBINATION RECORDERS—MODELS 309, 311, etc.

Special Ampex Data Recorders can incorporate combinations of the heads and electronic circuitry of the 303, 306 and 307. Thus the parallel tracks on the same combination recorder might have the widely differing characteristics of each of those models. For example, on its parallel channels such a recorder might have an overall frequency response of 0 to 100,000 cycles/sec.

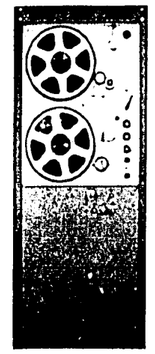
OPTIONS: *Same as Model 306 (but 2 or more tracks)*

"LOW FLUTTER" WIDE RANGE RECORDER—MODEL 500

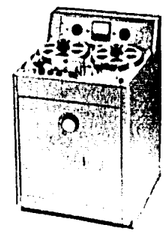
The Model 500 is a four-track, two-speed magnetic tape recorder designed to achieve extreme stability of tape motion while recording information in the frequency range between 100 and 100,000 cycles. Thus it is able to record fm-fm telemetering data without introducing any objectionable data error from small variations in tape speed. It has the lowest known flutter and wow characteristics of any tape recorder—less than 0.1% peak-to-peak by RDB standards.

Console mounting only
Four tracks only

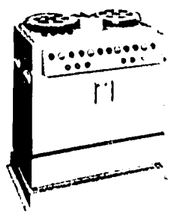
For specifications and other information, write Dept. X-1274.



Series 300 data recorder in rack mounting.



Series 300 data recorder in console mounting. Rack mounting of portions of the electronic components may be necessary on multi-track console mounted recorders.



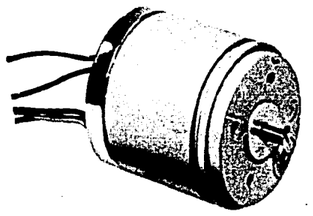
Ampex Model 500 Recorder

AMPEX ELECTRIC CORPORATION
934 Charter St., Redwood City, California

BRANCH OFFICES:
New York, Chicago, Atlanta, San Francisco and College Park, Maryland (Washington, D.C., area)
DISTRIBUTORS:
Radio Shack, Boston; Bing Crosby Enterprises, Los Angeles; Southwestern Engineering & Equipment, Dallas and Houston; Canadian General Electric Company in Canada.

AMPEX
MAGNETIC RECORDERS

Eclipse-Pioneer



CORROSION-RESISTANT AUTOSYN* SYNCHROS

(AY-200 Series)

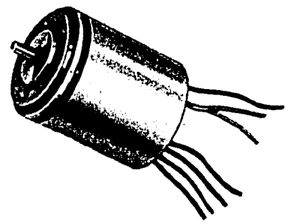
AVAILABLE FOR ALL APPLICATIONS

TYPICAL ELECTRICAL CHARACTERISTICS

	Type Number	Input Voltage Nominal Excitation	Input Current Milliamperes	Input Power Watts	Input Impedance Ohms	Stator Output Voltages Line to Line	Rotor Resistance (DC) Ohms	Stator Resistance (DC) Ohms	Maximum Error Spread Minutes
Transmitters	AY201S-26	26V, 400~, 1 ph.	125	0.6	40+j230	11.8	12	5.8	15
Control Transformers	AY201S-25	From Trans. Autosyn	Dependent Upon Circuit Design				40	10.2	20
Differentials	AY231S-25	From Trans. Autosyn	Dependent Upon Circuit Design				14	10.2	30
Resolvers	AY221S-25	26V, 400~, 1 ph.	70	0.4	108+j440	11.8	50	11.4	24

*Registered trademark Bendix Aviation Corporation.

Eclipse-Pioneer



PYGMY AUTOSYN SYNCHROS

(AY-500 Series*)

DESIGNED FOR USE WHERE SPACE AND WEIGHT ARE CRITICAL

TYPICAL ELECTRICAL CHARACTERISTICS

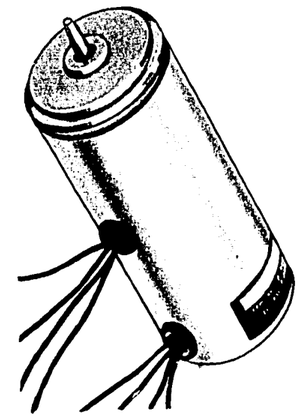
	Type Number	Input Voltage Nominal Excitation	Input Current Milliamperes	Input Power Watts	Input Impedance Ohms	Stator Output Voltages Line to Line	Rotor Resistance (DC) Ohms	Stator Resistance (DC) Ohms	Maximum Error Spread Minutes
Transmitters	AY503-4	26V, 400~, 1 ph.	220	2.5	45+j100	11.8	23.0	11.0	24
Receivers	AY503-2	26V, 400~, 1 ph.	220	2.5	45+j100	11.8	23.0	11.0	75
Control Transformers	AY503-3	From Trans. Autosyn	Dependent Upon Circuit Design				170.0	45.0	24
	AY503-5	From Trans. Autosyn	Dependent Upon Circuit Design				550.0	188.0	30
Differentials	AY533-3	From Trans. Autosyn	Dependent Upon Circuit Design				93.0	45.0	30
Resolvers	AY523-3	26V, 400~, 1 ph.	55	0.6	290+j490	11.8	210.0	42.0	30
	AY543-5	26V, 400~, 1 ph.	11	0.12	900+j2200	11.8	560.0	165.0	30

*Corrosion-resistant models are available in sample quantities.

Eclipse-Pioneer

Teterboro, New Jersey

Eclipse-Pioneer



CORROSION-RESISTANT PYGMY MOTOR GENERATORS

Typical Electrical Characteristics

GENERATOR DATA

Linearity—½ of 1% to 4000 rpm

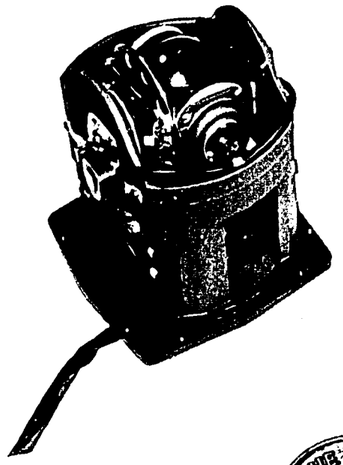
Output—300 mv/1000 rpm with 18 volt, 400 cycle excitation

Null—Less than 10 mv

MOTOR DATA

18 or 26 volt, 400 cycle,
2-phase low inertia motor

Eclipse-Pioneer



GYROS

FOR ALL PRECISION APPLICATIONS

- VERTICAL GYROS
- FREE GYROS
- RATE GYROS
- SPECIAL PURPOSE GYROS

As the world's largest producer of precision gyros, we have the experience to help you solve your gyro problems. We would appreciate an opportunity to work with you.

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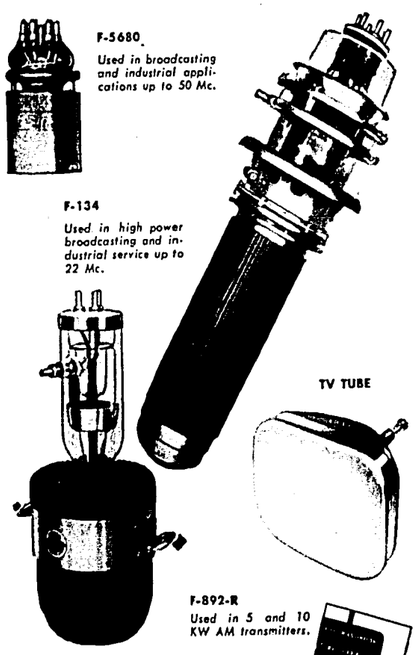
Federal ELECTRONIC TUBES

Dependable Electronic Tubes for...

TRANSMITTING • RECTIFYING • INDUSTRIAL
SPECIAL PURPOSE • TELEVISION

F-5680
Used in broadcasting and industrial applications up to 50 Mc.

F-134
Used in high power broadcasting and industrial service up to 22 Mc.



TV TUBE

F-892-R
Used in 5 and 10 KW AM transmitters.



HANDBOOK OF TUBE OPERATION

72 Page booklet giving complete technical data on how to obtain longer service life from your power vacuum tubes. Write Dept. K-2104 for your copy.

FEDERAL TV PICTURE TUBES Federal has the precise tube for your popular-size TV tube replacements . . . rectangular or round with a new high in light output . . . thrilling performance . . . long service life.

OVERLOAD RADIATION SWITCH

FOR THE PROTECTION OF RADIATION COOLED POWER TUBES

This new device will increase the life of your tubes. Used in conjunction with any tube, providing the radiant energy at the switch is not less than 1 watt per square inch. When an overload occurs, the device will give an alarm, cut off plate voltage or reduce the plate voltage until difficulty is corrected — When the overload is no longer present, the device will reset automatically. Adjustment is extremely simple — Ask for bulletin.



Basic Technical Data Covering The Complete Line of FEDERAL POWER TRIODES

WATER COOLED

TYPE	DESCRIPTION	Maximum Plate Dissipation	Mu	Maximum Plate Input	Maximum DC Plate Voltage	Maximum Frequency for Maximum Ratings	Filament Voltage
F-6009	HF General Purpose	6KW	25	12KW	6,000V	30MC	13
F-891	General Purpose	6	8.5	18	12,000	1.6	11/22
F-129-B	HF General Purpose	7.5	26	18	12,000	30	18
F-5874	Audio Amplifier	7.5	6	15	6,000		7
F-220C/320-B	General Purpose	10	40	22.5	15,000	4.0	21.5
F-343-A	General Purpose	10	40	36	18,000	4.0	21.5
F-892-A	General Purpose	10	50	30	15,000	1.6	11/22
F-858	General Purpose	20	42	40	20,000	1.5	22
F-880	HF General Purpose	20	20	60	10,500	25	12.6
F-5658	HF General Purpose	20	20.5	60	10,500	25	12
F-5771	HF General Purpose	22.5	20	60	12,500	25	7.5
F-342-A	General Purpose	25	40	50	20,000	4.0	20
F-9C23	HF General Purpose	25	32	50	15,000	20	22
F-110X	General Purpose	25	40	10	20,000	40	28
F-342-A	RF Triode	25	40	10	20,000	40	20
F-631	General Purpose	25	40	10	20,000	20	28
F-124-A	HF General Purpose	40	42	135	20,000	20	13.6 per section
F-9C30	HF General Purpose	40	42	120	15,000	20	7.5 per section
F-125-A	Audio Amplifier	40	4.75	100	15,000		13.6 per section
F-9C28	Audio Amplifier	40	4.75	100	15,000		7.5 per section
F-895	HF General Purpose	40	37	140	17,000	6	19 per section
F-5918	HF General Purpose	70	37	300	17,500	22	28.5
F-862-A	General Purpose	100	45	200	20,000	1.6	33
F-898-A	General Purpose	100	45	200	20,000	1.6	16.5 per section
F-134	HF General Purpose	150	21	450	20,000	22	25

AIR COOLED

F-127-A	HF General Purpose	200W	38	950W	3,000V	30MC	10
F-212-E	General Purpose	275	16	700	2,000	4.5	14
F-128-A	HF General Purpose	600	36	3	3,500	30	11
F-132-A	Audio Amplifier	600	10	1.8	3,500		11
F-7C26	VHF Amplifier	1 KW	17	3	3,000	150	9.0
F-7C23	Pulse	1.2	25		17,000	5	11.0
F-5680	Pulse	1.2	25		17,000	5	13.0
F-5680	HF General Purpose	2.5	25	12	6,000	30	13.0
F-5996	HF Industrial	2.5	25	12	6,000	30	13.0
F-7C25	HF Industrial	2.5	25	5.6	4,500	50	11
F-3X2500A3	VHF Amplifier	2.5	20	8	4,000	110	7.5
F-891-R	General Purpose	4	8.5	15	10,000	1.6	11/22
F-892-R	General Purpose	4	50	18	10,000	1.6	11/22
F-129-R	HF General Purpose	5	26	18	12,000	30	18
F-343-AA	General Purpose	5	40	20	18,000	4	21.5
F-220CA/320BA	General Purpose	5	40	22.5	15,000	4	21.5
F-8C25	Audio Amplifier	5	6	10	5,000		7
F-5667	Industrial, HF General Purpose	7.5	21	20	10,000	22.5	11.0
F-124-R	HF General Purpose	20	42	100	20,000	20	13.6 per section
F-9C31	HF General Purpose	20	42	100	15,000	20	7.5 per section
F-9C29	Audio Amplifier	20	4.75	50	15,000		7.5 per section
F-6179	Audio Amplifier	50	4.75	40	15,000	30	27.2

Federal also manufactures vacuum tubes for Rectifying and for Special Purpose; for Television (round and rectangular)

Federal Telephone and Radio Corporation

100 KINGSLAND ROAD, CLIFTON, NEW JERSEY

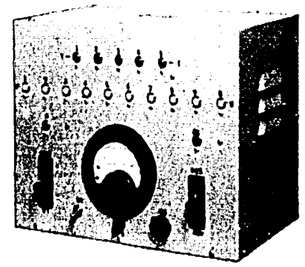
In Canada: Federal Electric Manufacturing Company, Ltd., Montreal, P. Q.
Export Distributors: International Standard Electric Corp., 67 Broad St., N. Y.

Federal ELECTRONIC COMPONENTS & EQUIPMENT

FEDERAL'S AUTOMATIC CIRCUIT CHECKER

For the Simultaneous Check of Continuity • Transpositions • Shorts

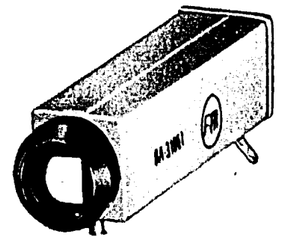
Federal's Automatic Circuit Checker provides extremely simple and reliable means for checking wiring and cabling of circuit equipment such as; signal installations, telephone switchboards, communication receivers and transmitters, electronic navigational aides, radio and television chassis and cable forms and harnesses. This high speed tester accurately locates wiring discrepancies, reduces test time to a minimum — thereby cutting production costs. Each conductor is simultaneously checked against all other conductors and ground for: continuity, short circuits, grounds and transpositions. The flexibility of the design permits ready adaptation to varied types of equipment. Federal's Automatic Circuit Checker when used with an electronic bridge checks the resistance of all components wired in the various circuits.



AUTOMATIC CIRCUIT CHECKER

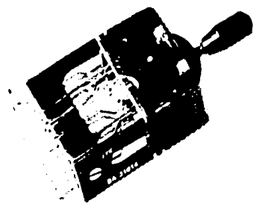
FEDERAL'S MAGNETIC SIGNAL

Federal's modern Magnetic Drop Signal is outstanding for fast indication and dependable performance . . . under rugged conditions . . . in light or darkness. Compact and efficient, this unit supplants mechanical operation common to old type drop signal. Meets military requirements. Its features include: high-sensitivity; sealed against dust, dirt and moisture; vibration-proof construction; is non-positional; luminous-faced indicator; signal mechanically restored. A self contained sensitive indicator. Designed to operate on 8 ma of d.c. or a.c. power. On closure of circuit the target is closed to rotate 90 degrees around its axis presenting a luminescent white surface in place of the normal black surface to indicate a changed condition. As the target rotates, a contact is closed which can be used to actuate other means of signalling such as audio devices.

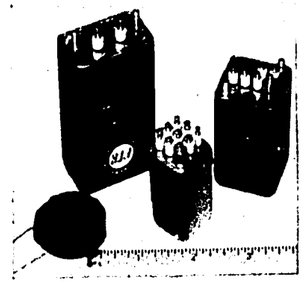


MAGNETIC SIGNAL

FEDERAL'S MINIATURE ANTI-CAPACITY SWITCHING KEY



For airborne and other equipment—whenever compactness and light weight are prime factors. A miniature, light-weight design with 8 "Break-Make" contacts. Two groups of 12 contact springs each are actuated by a molded phenolic drive roller with a simple motion of the lever. Both sides are non-locking. Contact springs are molded into units of 4 springs each, formed and pre-tensioned which will reduce adjusting of springs after assembly to a minimum. The complete spring pileup consists of 6 interlocking molded blocks, mounted into frame with a screw. Meets military requirements.



MINIATURE TRANSFORMERS

Miniature Hermetically Sealed input, output and inter-stage Audio Transformers, featuring Federal's new hermetically sealed terminal. Hermetically sealed power transformers and chokes. Meets government specifications.

TELEPHONE TYPE RELAYS

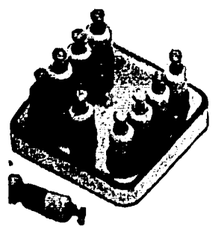


Telephone type relays available with a wide variety of contact combinations and ratings. Single and double coil combinations are available with coil resistances ranging from a few ohms to several thousand ohms.



FEDERAL'S NEW TERMINAL HEADER

For Hermetic Sealing and Miniaturization



Provides greater-than-ever ruggedness, efficiency and service life for transformers, capacitors, condensers, relays and many other sealed components. Meets all requirements of MIL-T-27, Grade 1, Class A. "Floating Electrode" construction. Withstands unusually severe vibration and shock without affecting the hermetic seal. Also retards DC plating. Temp. range: —65 degrees to Plus 500 degrees F. Standard headers supplied with a ceramic of contrasting color in the first terminal location — simplifying terminal number identification on the finished component.

Federal — RADIO-TV SELENIUM RECTIFIERS









The revolutionary circuit elements that have led the way to important design advances in TELEVISION & RADIO RECEIVERS & ELECTRONIC EQUIPMENT

Wherever DC power is required there is a Federal Radio-TV Selenium Rectifier to do the job...and do it with an efficiency and reliability that is backed by the outstanding reputation of Federal—America's oldest and largest manufacturer of Selenium Rectifiers.









●Federal Cat. No.	Max. Output MA-DC	Max. Input (RMS) Volts	MA	Min. Ser. Res. Ohms	Peak Inverse Volts (Max.)	Peak Current (Max.)	▲Construction and Nom. Cell Size	Application
1159	20	130	54	50	380	200	⅜" Dia. (T)	B+ Booster; Bias
1214A	50	130	135	35	380	500	11/16" Square (E)	B+ Radio, UHF Converter
1002A	65	130	175	22	380	650	1" Sq. (E)	B+ AC-DC (5 tube)
1003A	75	130	200	22	380	750	1" Sq. (E)	B+ 3-way Radios
1101A	100	130	270	22	380	1000	1" Sq. (E)	B+ Radios, Television
1004A	100	130	270	22	380	1000	1¼" Sq. (E)	B+ Radios, Television
1005A	150	130	410	15	380	1500	1¼" Sq. (E)	B+ Radios, Television
1006A	200	130	540	5	380	2000	1-17/32" Sq. (E)	B+ Television
1010	250	130	675	5	380	2500	1-17/32" Sq. (S)	B+ Television
1028A	250	130	675	5	380	2500	1-17/32" Sq. (E)	B+ Booster; Bias
1087A	275	130	740	5	380	2750	1-17/32" Sq. (E)	B+ Television
1090A	300	130	810	5	380	3000	1 17/32" Sq. (S)	B+ Television
1023A	350	130	945	5	380	3500	1¾" Sq. (S)	B+ Television
1130A	400	130	1080	5	380	4000	2" Sq. (S)	B+ Television
1021A	450	130	1200	5	380	4500	2" Sq. (S)	B+ Television
1200A	600	130	1600	5	380	6000	2½" Sq. (S)	B+ Television
1223A	750	130	2000	5	380	7500	2½" Sq. (S)	B+ Television
1014A	100	160	270	22	460	1000	1¼" Sq. (E)	Vibrator
1022A	450	160	1200	5	460	4500	2" Sq. (S)	B+ Television
1233	20	260	54	50	740	200	⅜" Diam. (T)	B+ Booster
1007A	75	160*	200	22	460	750	1" Sq. (S)	Vibrator Doubler
1008A	100	160*	270	22	460	1000	1¼" Sq. (S)	Vibrator Doubler
1009A	200	160*	540	5	460	2000	1-17/32" Sq. (S)	Vibrator Doubler
1015	150	25	175	..	35	750	1" Sq. (E)	Bridge Rectifier
1016	300	25	350	..	35	1500	1½" Sq. (E)	Bridge Rectifier
1017	600	25	700	..	35	3000	1-17/32" Sq. (E)	Bridge Rectifier
1013	360	9†	....	..	...	....	1-17/32" Sq. (E)	Battery Charger
1018	1600	26‡	....	..	...	....	4½" lg. (Mtg. Plt.)	Battery Charger
1001A	75	20	200	..	35	750	1" Sq. (E)	Bias Rectifier

▲(E) Eyelet. (S) Stud. (T) Paper Tube.

*These rectifiers have two sections—characteristics given apply to one section only; if both sections are used in series, voltage input is 320 volts.

†The characteristics given for this rectifier are based on its use in a half-wave rectifier circuit with a 3-cell battery load.

‡The characteristics given for this rectifier are based on its use in a full-wave rectifier circuit with a 3-cell battery load.

●'A' after code number indicates locking lug.

FEDERAL'S RADIO-TV SELENIUM RECTIFIER HANDBOOK

84 pages of valuable designs, characteristics and application. Available for 50 cents (coin only).

SELENIUM RECTIFIER EQUIPMENTS

QUALITY-BUILT MAGNETIC AMPLIFIERS

Powered by Quality Controlled

Federal

SELENIUM RECTIFIERS

Presently used in a wide range of successful applications for industry and the Armed Forces, such as:

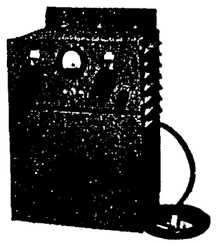
- Voltage Control
- Current Control
- Speed Control
- Position Control
- Temperature Control
- Photoelectric Control
- Counting
- Automatic Regulation

Federal Selenium Rectifiers, in partnership with the right magnetic components, provide Magnetic Amplifiers outstanding for:

Stability • Accuracy • Long Life
High Gain • Fast Response
Low-cost Operation

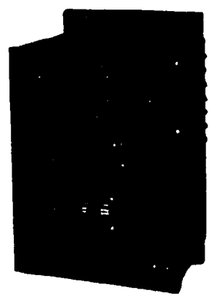
Submit your magnetic amplifier requirements to Federal—write to Dept. M-3104

POWER SUPPLIES: Designed to furnish a dependable and constant source of D-C power. Whether for industrial or laboratory use, these equipments are available in sizes to serve your requirements. For industrial requirements they are used to power magnetic equipment such as chucks, brakes, clutches, screens, separators, drums and pulleys, and also provide power for lifting magnets, relays, circuit-breakers and D-C motors.



Code Number	A-C Input Volts	Phase	Cycles	D-C Output Volts	Amps.
FTR 3246-BS*	115	1	60	6	10
FTR 3352-BS	115	1	50/60	5/10	20/10
FTR 3093-AS*	115	1	60	12	3
FTR 3138-BS*	115	1	60	12	5
FTR 3185-AS*	115	1	60	12	7.5
FTR 3339-BS	115/230	1	50/60	6-24	18
FTR 3341-AS	115	1	50/60	28	5
FTR 3128-BS**	115	1	60	22-30	10
FTR 3300-DS	115	1	60	2-32	50
FTR 3340-BS	115	1	50/60	5-70	12
INDUSTRIAL					
FTR 3115-JS	115	1	50/60	115	1
FTR 3116-BS	115	1	50/60	115	5
FTR 3117-HS	115	1	50/60	115	10
FTR 3117-JS	230	1	50/60	115	10
FTR 3152-AS	220/440	3	50/60	115/230	4.4/2.2
FTR 3153-AS	220/440	3	50/60	115/230	6.6/3.3
FTR 3154-AS	220/440	3	50/60	115/230	8.8/4.4
FTR 3155-AS	220/440	3	50/60	115/230	13/6.5
FTR 3228-BS	220/440	3	50/60	115/230	26/13

**Filtered and regulated equipment. *Filtered.



Federal — ENGINEERING & MANUFACTURING FACILITIES

THE SELENIUM RECTIFIER DIVISION

Offers Its Outstanding Engineering and Manufacturing Facilities to

GOVERNMENT CONTRACTORS

Consult us for Aircraft, Ground and Naval Requirements



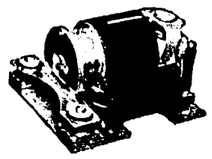
HEAVY-DUTY FEDERAL SELENIUM RECTIFIER



FTR 3146-BS AIRCRAFT POWER SUPPLY



FTR 3414-AS GROUND AIRCRAFT POWER SUPPLY



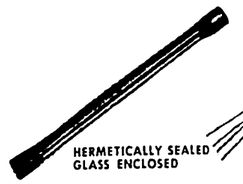
FTR 3141-CS CLIP-IN VOLTAGE REGULATOR

The Selenium Rectifier Division of Federal — the nation's headquarters for selenium rectifiers — is ready to serve you with start-to-finish production of power supplies, battery chargers, voltage regulators, engine starters, cathodic protection and other units—compact, rugged, quiet, dependable power equipments designed for any DC output.

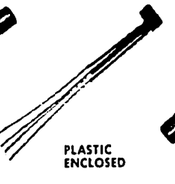
Federal knows selenium rectifiers. Federal has unmatched power conversion experience . . . an experience backed by years of successfully meeting the rigid requirements of contracts for military equipments. And Federal has the capacity to deliver your orders — when you want them!

Mail us your specifications today!

HIGH VOLTAGE SELENIUM RECTIFIERS



HERMETICALLY SEALED GLASS ENCLOSED



PLASTIC ENCLOSED



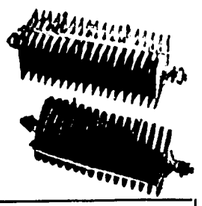
FIBRE ENCLOSED

Federal Code Number	DC Output Voltage	Max. Output MA-DC	Max. Peak Inverse Voltage	AC Input Voltage
147H110Q1	1400	8	4000	1400
147H 82Q1	1050	8	3000	1050
147H 55Q1	700	8	2000	700
147H 28Q1	350	8	1000	350

SELENIUM RECTIFIERS *for Industrial Service* From AC to DC . . . Millowatts to Kilowatts

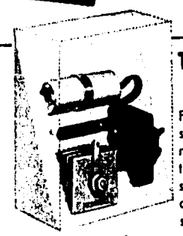


Low-cost power conversion . . . efficient, dependable . . . from a-c to d-c. Introducing new, broad range adaptability in diverse fields, conditions and applications. They obtain direct current from any alternating current source. They are small, light, easy to install. They meet all needs of an unattended service.





FOR COMPLETE DATA Write for Federal's Data Booklet on Selenium Rectifiers. An informative guide to characteristics and applications of the industry's most comprehensive line of high quality rectifiers. Address Dept. F-6104.



The FEDERAL System of ENCAPSULATION

Federal's new method of encapsulating selenium rectifiers and allied components presents an entirely new approach to civilian and military equipment design — particularly where environmental or other unusual conditions necessitate special applications. It is now possible to assemble transformers, capacitors, resistors and other components — interconnected — into single blocks of equipment. Such assembly facilitates the replacement of individual as well as entire groups of components without the necessity of time-consuming repairs. Assures excellent thermal shock characteristics and resistance to vibration and cracking of the sealed unit over wide temperature ranges. Embedments withstand low temperatures to −65°C, as well as high temperatures to plus 125°C. Send for Bulletin F 534 for complete details.

FEDERAL CONTACT PROTECTOR



The Federal Contact Protector permits a rise but not high enough to cause arcing; then the voltage decays to correct line voltage. Its features include:

1. Suppresses contact arcing
2. Extends Contact Life by more than 100 times
3. Reduces circuit failure due to contact erosion (locking, surging, etc.)
4. Minimizes RF Interference
5. Has negligible effect on speed of operation of circuit
6. Needs no attention
7. Is easily installed
8. Requires little space
9. Is low in cost
10. Available as hermetically sealed unit to meet all JAN specifications.

Federal Telephone and Radio Corporation

100 KINGSLAND ROAD, CLIFTON, NEW JERSEY

In Canada: Federal Electric Manufacturing Company, Ltd., Montreal, P. Q.
Export Distributors: International Standard Electric Corp., 67 Broad St., N. Y.

FEDERAL VARIETY OF CABLE TYPES

Federal's cable division produces a variety of H-F cable types. Some of these cables are produced by Federal *exclusively*. All are made to the most exacting standards of quality and control. The materials used are the finest research has developed, assuring top electrical characteristics. Initial dimensional precision helps to maintain stability over a wide temperature range.



SOLID DIELECTRIC COAXIAL CABLES

consist of a solid or stranded inner conductor, dielectric material, one or two copper wire braids, a synthetic resin protective jacket and, in some cases, a protective armor or metal braid. Dual coaxial cables are similar in design to the solid dielectric types, except that two accurately-spaced inner conductors are used.



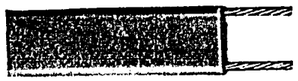
LOW-CAPACITANCE COAXIAL AIR-SPACED CABLES

have a construction similar to that of the solid dielectric types, except that air is made a portion of the dielectric. One method of accomplishing this effect and still maintaining a high dielectric strength is through a construction involving an inner conductor in a thin-walled dielectric tube. This is achieved by means of a dielectric thread wound in a long spiral.



SPIRAL DELAY, HIGH IMPEDANCE LINES

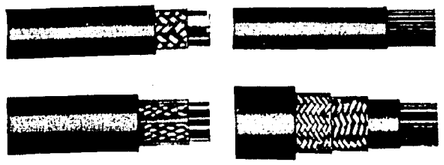
are constructed with an inner conductor spiraled around a center dielectric core and covered with dielectric, braid and jacket. In one typical design each foot has an electric length equivalent to approximately 15 feet of coaxial cable of similar diameter.



TELEVISION ANTENNA LEAD-IN WIRE

consists of two accurately-spaced conductors over which is extruded the dielectric material. These lead-in wires have no braid, jacket or armor, except in special cases. The advances in television have meant ever-new approaches to the design of TV lead-in to the point where it has taken many varied forms, the latest being the tubular shaped "pipeline" lead-in.

SPECIAL CABLE PROBLEMS



Federal Telephone and Radio Corp. maintains a stock of most of the required types. When requirements are so special that they cannot be met by Federal's cable types, Federal research and engineering facilities are readily available to develop any new cable constructions. Charges are based on quantity. Specal Orders—like all Federal production—are executed under the high standards maintained by Federal "Quality Control." Every length of cable is carefully checked to see that it meets *all* tests indicated for the type ordered. Toughness, heat resistance, moisture resistance, dielectric strength, cold-bend—these are just a few of the many tests that must be passed before approval for shipment is given. Federal's consulting service is yours for the asking.

Federal also manufactures many types of plastic-insulated wires and multi-conductor cables for television, intercom and numerous special purposes.

COMMUNITY TV COAXIAL CABLE

FEDERAL'S "BIG 5"—The answer to any Community TV Lead-in problem . . . Engineered for long life, low line loss and DEPENDABLE all-weather signal transmission . . . over the longest link. Federal's K-14, RG-11/U and RG-59/U are the H-F coaxials you can specify with utmost confidence . . . for community TV Distributing Systems in any area . . . for any amplifier system used.

Wherever the annoying, profit-eating problems of signal leakage and revenue loss exist, the answer is Federal's new K-125 and K-126 *non-radiating* alternates for RG-11/U and RG-59/U—used in conjunction with Federal's K-14—the primary lead-in famous for lowest line loss, long cable runs and fewer amplifiers required. Both K-125 and K-126 are *double-shielded* and *double-jacketed*.

All of the "BIG 5" are made to Federal's high standards of quality—and that means *dependable, all-weather transmission performance!*

Principal characteristics of Federal's "BIG 5" of Community TV

TYPE	ZO Impedance Ohms	Capacitance per ft. micro-micro farads	DB per 100 Feet 50Mc	100Mc	200Mc	400Mc	Jacket OD Mils	Weight per 1000 Ft. (lbs.)
K-14	72	21	.57	.90	1.42	2.3	870	392
RG-11/U	75	20.5	1.5	2.15	3.2	4.7	415	89
RG-59/U	73	21	2.7	4.0	5.7	8.5	250	36
K-125	72	20.5	1.5	2.15	3.2	4.7	460	127
K-126	73	21	2.7	4.0	5.7	8.5	315	79

COMPLETE COAXIAL CABLE ASSEMBLIES
also are available from Federal to meet your requirements. This service offers the same "Precision Production" that made Federal the outstanding name in coaxial cables.

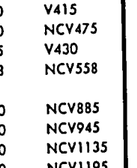
Federal Telephone and Radio Corporation
100 KINGSLAND ROAD, CLIFTON, NEW JERSEY
In Canada: Federal Electric Manufacturing Company, Ltd., Montreal, P. Q.
Export Distributors: International Standard Electric Corp., 67 Broad St., N. Y.

It's *Federal* for . . . EVERY H-F TRANSMISSION LINE REQUIREMENT

Std. Jacket	Type Low Temp. Blk. Jacket △	Zo Impedance Ohms	Capacitance Per Foot Micro-Micro Farads	Db/100 Freq./Mc 100 (Max.)	Inner Conductor Strands ●	Braid +	Jacket ×
RG-5/U	RG-5B/U	53.5	28.5	2.9	C1	C264	V339
RG-6/U	RG-6A/U	76	20	2.9	CW1	CS264	NCV339
RG-7/U		100	12.5	2.4	C1	C304	V379
RG-8/U	RG-8A/U	52	29.5	2.1	C7/#21	C340	V415
RG-9A/U	RG-9B/U	52	30	2.3	CS7/#21	CS355	NCV430
RG-10/U††	RG-10A/U	52	29.5	2.1	C7/#21	C340	NCV475
RG-11/U	RG-11A/U	75	20.5	2.15	T7/#26	C340	V415
RG-12/U††	RG-12A/U	75	20.5	2.15	T7/#26	C340	NCV475
RG-13/U	RG-13A/U	74	20.5	2.15	T7/#26	C355	V430
RG-14/U	RG-14A/U	52	29.5	1.5	C1	C463	NCV558
RG-15U		76	20	1.5			
RG-17/U	RG-17A/U	52	29.5	.95	C1	C760	NCV885
RG-18/U††	RG-18A/U	52	29.5	.95	C1	C760	NCV945
RG-19U	RG-19A/U	52	29.5	.69	C1	C990	NCV1135
RG-20/U††	RG-20A/U	52	29.5	.69	C1	C990	NCV1195
RG-21/U	RG-21A/U	53	29.5	14.0	Res.	CS264	NCV339
RG-22/U	RG-22B/U	95	16	4.4	*C7/0.0152"	T340	V415
RG-22A/U		95	16	4.0	*C7/0.0152"	T345	NCV426
RG-23/U	RG-23A/U	125	12	1.7	*C7/#21	C830x440	V960x670
RG-24/U††		125	12	1.7	*C7/#21	C830x440	1034x735
RG-29/U		53.5	28.5	5.3	C1	C176	PE206
RG-34/U	RG-34A/U	71	21.5	1.32	C7/#21	C540	V645
RG-35/U††	RG-35A/U	71	21.5	.90	C1	C760	NCV945
RG-54A/U		58	26.5	3.1	C7/0.0152"	T220	PE250
RG-55/U		53.5	28.5	4.8	C1	C150	PE184
RG-57/U	RG-57A/U	95	17	3.0	*C7/#21	T540	V640
RG-58/U	RG-58B/U	53.5	28.5	5.3	C1	T150	V200
RG-58A/U	RG-58C/U	52	28.5	6.2		C191	V250
RG-59/U	RG-59A/U	73	21	4.0	CW1	C191	V250
RG-62/U	RG-62A/U	93	13.5	2.7	CW1	C340	V415
RG-63/U	RG-63B/U	125	10.0	2.0	CW1	C340	V415
RG-65/U	RG-65A/U	950	44		C1	T198	PE238
RG-71/U		93	13.5	2.7	CW1	C463	NCV605
RG-74/U††	RG-74A/U	52	29	1.5	C1	C340	NCV475
RG-79U††		125	10	2.0	CW1	C340	NCV475
RG-79B/U††		125	10	2.0	CW1	C340	NCV475
RG-86/U		200	7.8	.56	*C7/#21		
RG-108/U		76	25		*77/0.0126"	T177	V240
RG-111/U††		95	16	4.0	*C7/0.0152"	T345	NCV490
FTR TYPES							
K14		72	21	.90	C1	C760	NCV885
K38		72	22	4.0	*C7/#30	C200	V250
KT107		72	22	6.1	*C7/0.012"	C191	NCV250
K109		160	8.3	8.0	B1	T232	V282
K109A							
K111		300	4.2	3.4	*B1	C435x235	V490x290
K113		34	39	4.5	T41/#34	C150	V200
K115							
K200							
K1201					Phos. B7/0.0254"		PE185

+ C—Copper, T—Tinned Copper, S—Silver Plate Copper, B—Bronze, OD in mils.
× V—Vinyl, PE—Polyethyline, NCV—Non-contaminating Vinyl, OD in mils.
△ See information in Column to right under RG Type Cables.
†† Armored.
* 2 Inner Conductors.
● Inner Conductor Strands column indicates material by same abbreviation as + CW—copperweld.

FOR COMPLETE DATA
Write for Federal's Catalog on HF Cables. An informative guide to characteristics and applications of the industry's most comprehensive line of high quality HF Cables. Address Dept. D-6104.



An Original Development by Federal

RG TYPE CABLES

WITH THE NEW LOW-TEMPERATURE NON-CONTAMINATING THERMOPLASTIC JACKET

Two types of jackets are used by Federal for its standard coaxial cables. The first is Poly Vinyl Chloride, a rugged material capable of standing the tests of time and temperature. This jacket material is contaminating; that is, the migration of the plasticizer through the braid into the dielectric results in some loss of dielectric strength and increase of attenuation after long use.

The second is a non-contaminating vinyl which has all the properties of Poly Vinyl Chloride but will not contaminate the dielectric at temperatures above —25 degrees C.

Federal engineers discovered that under certain severe operating conditions (below —25 degrees C) the second type of vinyl jacket would not withstand the low temperature. To eliminate contamination and solve the cable industry's problem of meeting cold bend requirements of the military services, Federal developed a new low-temperature, non-contaminating thermoplastic jacket—meeting all requirements of the "Exceptions to Specifications JAN-C-17A" (dated March 21, 1949, and amendment thereto dated January 9, 1950).

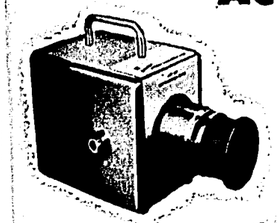
JAN-C-17A requires conditioning of the cable at —40 degrees C for 20 hours. It is wrapped around a mandrel 10 times the diameter of the cable. The cable is heat-aged for two weeks at +80 degrees C. It is then conditioned again at —35 degrees C for 20 hours, and another cold bend test applied. At no time during the bend tests can fractures or cracks appear on either the jacket or the dielectric.

The new RG types are outstanding for their longer service life under the most adverse conditions. Their non-contaminating feature means there is no reduction in dielectric strength due to molecular migration. They are a primary example of Federal leadership in the development and production of top-quality H-F coaxial cables.

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When you *TEST*, use the *BEST*...

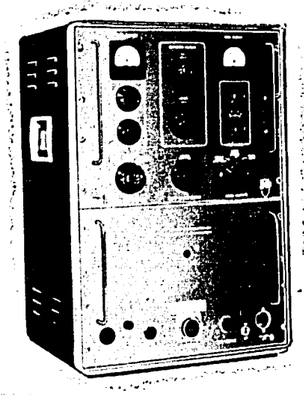
THE SYMBOL OF QUALITY, ACCURACY, DEPENDABILITY



The equipments illustrated are typical examples of the complete line of PRD quality test components. Rigorously engineered and meticulously manufactured to the highest attainable standards, these units are now standard equipment in many of the leading research and development laboratories throughout the world. In addition to the widely diversified standard equipments offered, PRD maintains a highly qualified staff for special products development. This staff is at your service at all times for consultation.

Type 587
UHF FREQUENCY METER
470-900 mc/s

Type 801-A
UNIVERSAL KLYSTRON POWER SUPPLY
300-1500 V at 65 ma;
1.5–3.6 KV at 25 ma



FREQUENCY MEASURING DEVICES

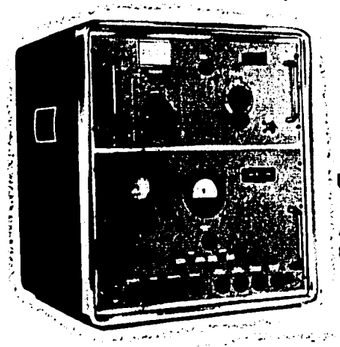
Frequency Meters	Frequency Range (kmc/sec)	Type No.	Transmission Line Size (Nominal O.D.—inches)	R—Reaction T—Transmission
General Purpose	0.47–0.95	587	⅞	T
	2.40–3.40	583	⅞	R
	4.00–10.0	562-A	⅞	Detector included
	3.95–5.85	574	2 x 1	R
	5.85–8.20	575	1½ x ¾	R
	7.05–10.0	576	1¼ x ⅝	R
	8.2–10.0	585-A	1 x ½	R
	8.2–10.0	585-B	1 x ½	T
	8.2–10.0	586-A	1¼ x ⅝	R

In addition to the General Purpose Frequency Meters listed above, PRD manufactures a complete line of Precision Frequency Meters covering the entire frequency range from 0.55 to 39.0 kmc/s. Transmission line sizes include ⅞" coaxial line and all standard wave guide sizes from 0.280" x 0.140" I.D. to 2" x 1" O.D. All types are available in Reaction and Transmission styles.

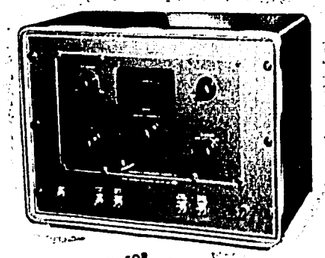
The Type 500 Frequency Standard Multiplier is available to generate standard frequency signals in the UHF and microwave regions when used with the Type 612-A Tunable Crystal Mount.

SIGNAL SOURCES AND RECEIVERS

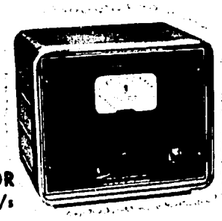
ITEM	DESCRIPTION
TUBE MOUNTS	
Type 701	For type 2K28 klystrons, 2.400—3.445 kmc/sec
Type 702	For type 2K25 klystrons, 8.50—9.60 kmc/sec, 1¼x⅝ waveguide
Type 703	For type 2K25 klystrons, 8.50—9.60 kmc/sec, 1x½ waveguide
OSCILLATORS	
Type 705	Covering the frequency range from 7.0 to 11.0 kmc/sec
Type 706	Covering the frequency range from 3.6 to 7.3 km/sec
POWER SUPPLIES Type 801-A	Providing all required electrode voltages to operate a wide variety of klystrons, plus internal modulators
SPECTRUM ANALYZERS	
Type 853	Covering the frequency range from 2.40 to 3.40 kmc/sec
Type 854	Covering the frequency range from 8.50 to 9.60 kmc/sec
Type 855	Combining both of the above ranges in one instrument
GENERATORS	
Type 902	Covering the frequency range from 3.65 to 7.30 kmc/sec
Type 903	Covering the frequency range from 7.00 to 10.5 kmc/sec
Type 907	Covering the frequency range from 40 to 900 mc/sec
NOISE GENERATORS	
Type 904	For the direct measurement of noise factors in the range of 10 to 1000 mc/sec



Type 854
UNIVERSAL SPECTRUM ANALYZER
8.5–9.6 kmc/s

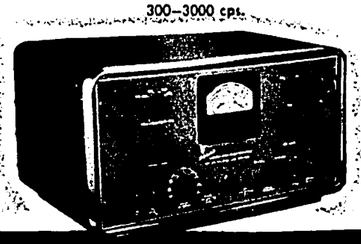


Type 907
BROADBAND SWEEP FREQUENCY GENERATOR
40-900 mc/s



Type 904
VHF-UHF NOISE GENERATOR
.01–1.0 kmc/s

Type 275
VOLTAGE STANDING WAVE RATIO AMPLIFIER
300–3000 cps.



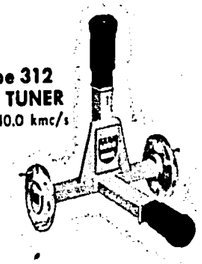


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DEPT. 4-R

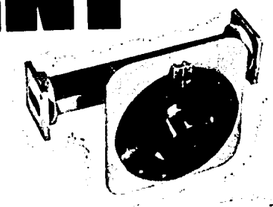
Polytechnic

–from *VHF* through *EHF*,

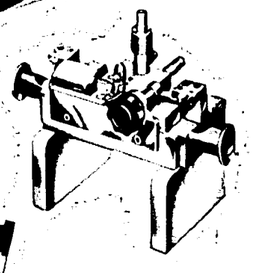
PRECISION *RF* TEST EQUIPMENT



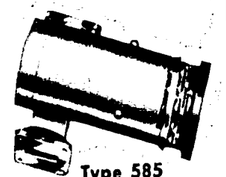
Type 312
E/H TUNER
26.5–40.0 kmc/s



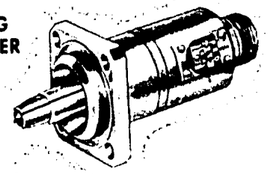
Type 196-B
VARIABLE ATTENUATOR
8.20-12.4 kmc/s
0-40 db



Type 211
PRECISION WAVEGUIDE SLOTTED SECTION
18.0–26.5 kmc/s



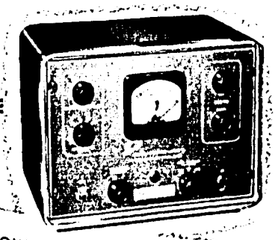
Type 585
DIRECT READING FREQUENCY METER
8.20-10.0 kmc/s



Type 389
COAXIAL TRANSMISSION LINE ADAPTER
0–4.0 kmc/s



Type 612-A
CRYSTAL BOLOMETER MOUNT
1.00–12.4 kmc/s



Type 650-A
UNIVERSAL POWER BRIDGE
0.1, 1.0, 10, 100 mw full scale

ITEM	COAXIAL (Nom. O.D.-in.) ⅞	COAXIAL ⅜	TRANSMISSION LINE SIZE — WAVEGUIDE (Nominal O.D.-inches) 3x1⅓	2x1	1⅓x¾	1¼x⅝	1x½	0.622x 0.311 I.D.	0.420x 0.170 I.D.	0.280x 0.140 I.D.
ATTENUATORS AND TERMINATIONS										
Variable Attenuators Uncalibrated			171	162	1156 161	160	154-A 159	189	190	191
Dial			174-A	169-B	177-B	184-A	196-C 196-D	187		
Precision			175-B	170-A	178-B	185-B	195-B	188-A	153-A	192
Cut-off		181,198					180			
Fixed Attenuators Low Power	136 series	130 series 1100-C	s	s	s	s	140 series	s		
Terminations	145	139	129	115	121	114	116	131	132	133
TRANSMISSION LINE COMPONENTS										
Waveguide to Coaxial Adapters			365	357	356	355	354-A			
Coaxial Transitions	389,390 391,392	389,390 391,392								
Directional Couplers				400	404	401	402	405		
Waveguide Stands			375-A	376-A	377-A	378-A	379-A	386-A	387-A	388-A
Flange Bolt & Nut Assemblies			369-A	369-B	369-B	369-C	369-D	369-E	f	f
Bends and Tees				s	s	s	462 465 481	s	s	s
IMPEDANCE MEASUREMENT & TRANSFORMATION										
Slotted Sections	200-C	205-A 215-A	209-A	201-A	204-A	202-A	203-A	210	211	212
Tuners		306	309	300	305	302	303-A	311 314	313	312

The Type 250-A Broadband Probe is designed for use with the Types 200-C through 209-A and 215-A Slotted Sections; Types 210-212 are supplied with built-in tunable probes. The Type 361 R-F Adapter is available for use with the Type 250-A Probe.

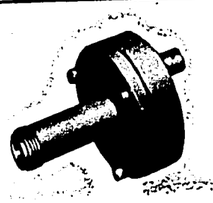
DETECTION AND POWER MEASUREMENT											
Detector Mounts Crystal		612-A 613						601	616	621	615
Bolometer	(s)	612-A,613 627-A,628-A							616	620 621	618
Thermistor								635			

The Type 650-A Universal Power Bridge is designed to be used with any of the bolometers or thermistors listed for the measurement of absolute power level.

BOLOMETERS

TYPE No.	FOR USE WITH	TYPE No.	FOR USE WITH	TYPE No.	FOR USE WITH
610-A	250-A, 612-A, 613	629-A(s)	623(s)	630-B(s)	626(s)
614	210, 211, 616, 621	629-B(s)	624(s)	631-C	627-A
617	212, 618, 620	630-A(s)	625(s)	631-D	628-A

f—Equipment is supplied with captive flange screws
s—Available on special order only



Type 627-A
BROADBAND COAXIAL BOLOMETER MOUNTS
.5-10.0 kmc/s

AND NOW IN PRODUCTION!

PRD Magnetic Amplifiers

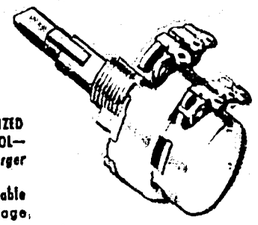
Our Magnetic Amplifier Division is now in production to meet your needs with custom designs or "packaged" units. The T806 is a low level amplifier which will amplify a signal from a thermocouple, strain gauge, thermistor bridge, photo tube, etc., to operate an insensitive meter or relay.



COMPLETE CIVILIAN LINE

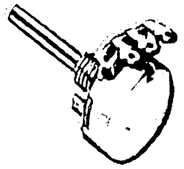
Exceptionally **good delivery cycle on civilian orders due to tremendous mass production facilities.**

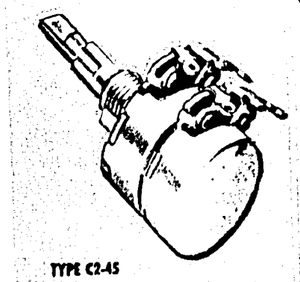
TYPE C45-70



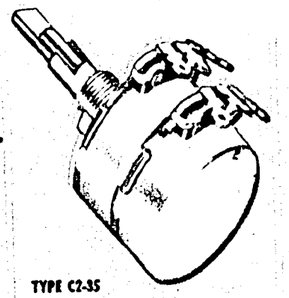
NEW HIGH QUALITY MINIATURIZED "DIME-SIZE" CIVILIAN CONTROL— ***Performance Fully Equals Larger Types.***

TYPE 70, 3/4" diameter variable composition resistor. Wattage rating: .3 watt for resistances through 10,000 ohms, .2 watt with 350 volts maximum across end terminals for resistances over 10,000 ohms. Also available in concentric shaft tandem construction C45-70 as shown above.

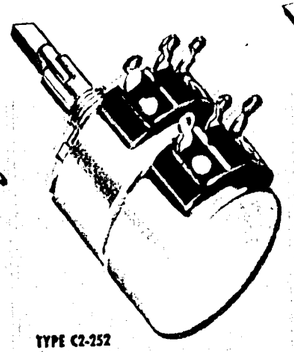




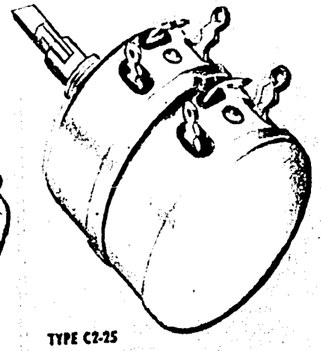
TYPE C2-45



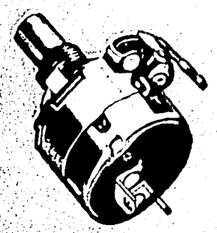
TYPE C2-35



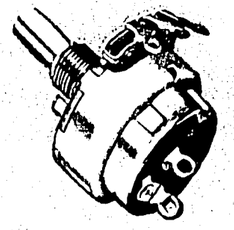
TYPE C2-252



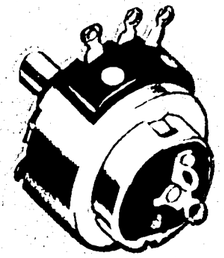
TYPE C2-25



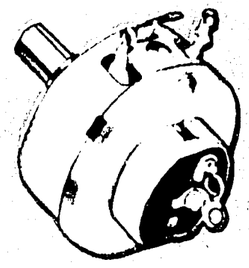
TYPE GC-45, 15/16" diameter variable composition resister. Wattage rating: 1/2 watt for resistances through 10,000 ohms, 1/3 watt for resistances over 10,000 ohms through 100,000 ohms, 1/4 watt with 500 volts maximum across end terminals for resistances over 100,000 ohms. Available with or without illustrated attached switch and in concentric shaft tandem construction C2-45 as shown above.



TYPE GC-35, 1 1/8" diameter variable composition resister. Wattage rating: 3/4 watt for resistances through 10,000 ohms, 2/3 watt for resistances over 10,000 ohms through 25,000 ohms, 1/2 watt with 500 volts maximum across end terminals for resistances over 25,000 ohms. Available with or without illustrated attached switch and in concentric shaft tandem construction C2-35 as shown above.



TYPE GC-252, 2 watt, 1 17/64" diameter variable wirewound resister. Available with or without illustrated attached switch and in concentric shaft tandem construction C2-252 as shown above.



TYPE GC-25, 4 watt, 1 17/32" diameter variable wirewound resister. Available with or without illustrated attached switch and in concentric shaft tandem construction C2-25 as shown above.

Typical concentric shaft tandem with panel and rear sections operating separately from concentric shafts (TYPE C45-70 ILLUSTRATED). Similar construction available for all military resistors.

REPRESENTATIVES

Henry E. Sanders
McClellan Bldg.
69th & Market Sts.
Upper Darby, Penna.
Phone: Flanders 2-4420

W. S. Harmon Company
1638 So. La Cienega Blvd.
Los Angeles 35, California
Phone: Bradshaw 2-2321

John A. Green Company
6815 Oriole Drive
Dallas 9, Texas

IN CANADA
C. C. Meredith & Co.
Streetsville, Ontario

SOUTH AMERICA
Jose Luis Pontet
Buenos Aires, Argentina
Montevideo, Uruguay
Rio de Janeiro, Brazil
Sao Paulo, Brazil

OTHER EXPORT
Talvan Ginsbury
8 West 40th Street
New York 18, N. Y.

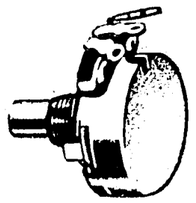


Describes Electrical and Mechanical characteristics, Special Features and Constructions of a complete line of variable resistors for military and civilian use. Includes dimensional drawings of each resistor. *Write today for your copy.*

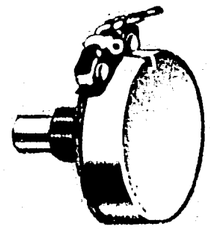
COMPLETE MILITARY LINE

Immediate delivery **from stock on 189 types including JAN-R-94 and JAN-R-19 types of variable resistors.**

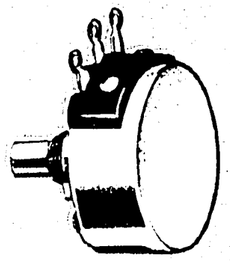
TYPE 45, (JAN-R-94, Type RV2) *1/4 watt, 15/16" diameter variable composition resistor.* Also available with other special military features not covered by JAN-R-94 including concentric shaft tandem construction. Attached switch can be supplied.



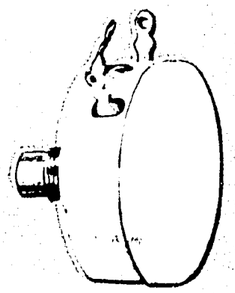
TYPE 35, (JAN-R-94, Type RV3) *1/2 watt, 1 1/8" diameter variable composition resistor.* Also available with other special military features not covered by JAN-R-94 including concentric shaft tandem construction. Attached switch can be supplied.



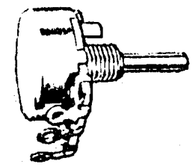
TYPE 252, (JAN-R-19, Type RA20) *2 watt, 1 17/64" diameter variable wirewound resistor.* Also available with other special military features not covered by JAN-R-19 including concentric shaft tandem construction. Attached switch can be supplied.



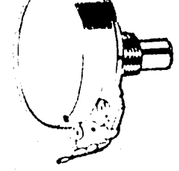
TYPE 25, (JAN-R-19, Type RA30) (May also be used as Type RA25) *4 watt, 1 17/32" diameter variable wirewound resistor.* Also available with other special military features not covered by JAN-R-19 including concentric shaft tandem construction. Attached switch can be supplied.



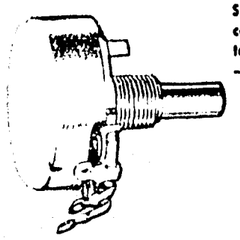
TYPE 65, (Miniaturized) *1/2 watt 70°C, 3/4" diameter miniaturized variable composition resistor.*



TYPE 90 *1 watt 70°C, 15/16" diameter variable composition resistor.* Attached switch can be supplied. Also available in concentric shaft tandem construction.



Specially designed for military communications equipment subject to extreme temperature and humidity ranges. –55°C to +150°C...aridity to saturation.



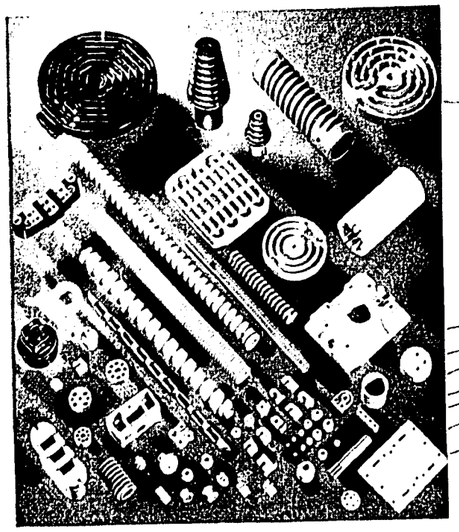
TYPE 95, (JAN-R-94, Type RV4) *2 watt 70°C, 1 1/8" diameter variable composition resistor.* Also available with other special military features not covered by JAN-R-94 including concentric shaft tandem construction. Attached switch can be supplied.

CTS

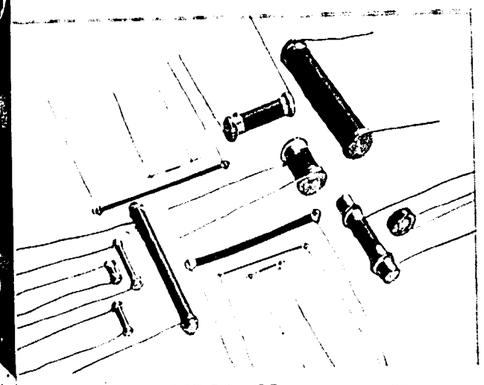
CHICAGO TELEPHONE SUPPLY *Corporation*

ELKHART • INDIANA

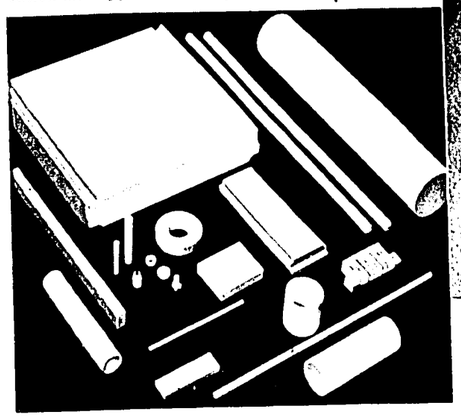
Stupakoff PRODUCTS



CERAMIC PRODUCTS—Stupakoff is a leading supplier of pressed, extruded, machined, ground and assembled ceramic products for electrical and electronic applications, for all voltages, frequencies and temperatures. Specialized resistor ceramics, metallized ceramics, high thermal shock resisting ceramics and ceramic dielectrics are described below. Send for information, giving proposed application and approximate requirements.

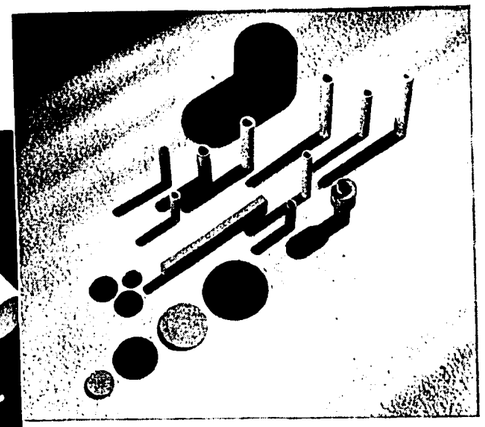


RESISTOR CERAMICS—Stupakoff Temperature-Sensitive Resistors are used for temperature indicating or measuring equipment such as Radiosonde, for infra-red light source and for heating elements. Supplied complete with terminals, in the form of rods, tubes, discs, bars, rings, etc.



STUPALITH—Where thermal shock conditions prevail, parts made of STUPALITH will withstand extremely severe service. Stupakoff makes parts ranging from a fraction of an ounce to several pounds in weight, in simple or intricate shapes, by pressing, extrusion, casting or ramming.

Two principal compositions are ordinarily employed: "zero" expansivity compositions, and non-porous compositions having near-zero expansivities. For parts requiring a high degree of dimensional accuracy, our production process includes machining or grinding to precision tolerances. Safely used at temperatures up to 2400°F.

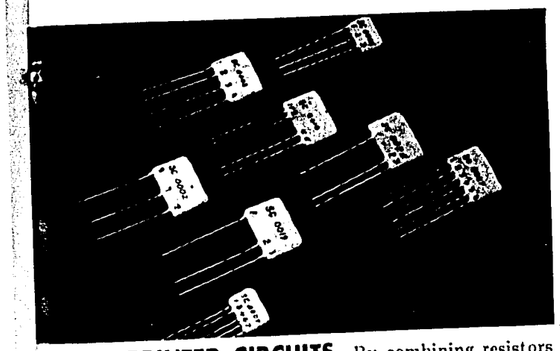


CERAMIC DIELECTRICS—Stupakoff makes general purpose Ceramic Dielectrics for by-pass, lead through blocking, standoffs and trimmer applications. Temperature compensating Ceramic Dielectrics have coefficients from P-100 to N-2700, and high K materials up to K-6000. Made in the form of tubes, discs and special shapes, plain or silvered.

LATROBE,

for Electrical and Electronic Applications

CERAMIC ASSEMBLIES

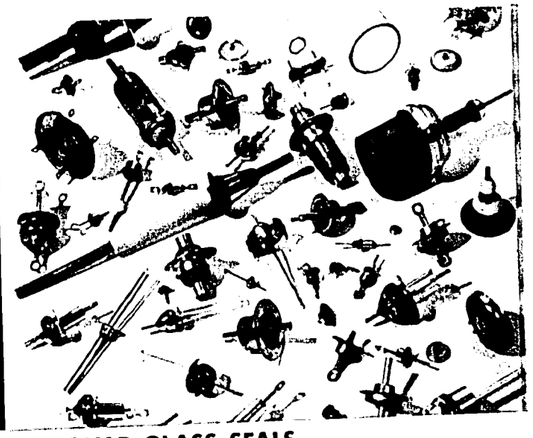


PRINTED CIRCUITS—By combining resistors and capacitors of precision values, in circuits designed in accordance with the requirements of individual applications, Stupakoff printed circuits save space and weight, speed assembly, reduce costs, minimize assembly errors. Soldered connections are reduced by 25% to 80%, assemblies are lighter and more compact, production time is reduced and better products are made. Sturdy, compact, accurate.

METALLIZED CERAMICS

The rotor shafts shown below consist of metal bands attached securely to ceramic rods and are typical of Stupakoff precision manufacture. On a mass production basis, concentricity of components, for example, is held to less than ±0.001 in.

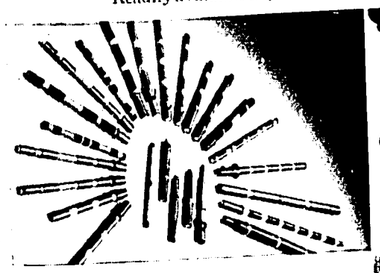
Readily available in production quantities.

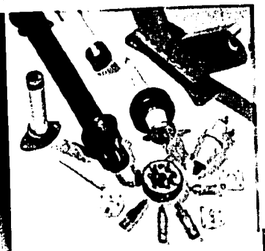


KOVAR-GLASS SEALS

Perfectly closed and durable air-tight assemblies are made with Stupakoff Kovar-Glass Seals. The use of hard glass for these seals provides the highest degree of protection against thermal shock and weathering. Kovar is the ideal metal for such seals because its expansion characteristics closely match those of the hard glass to which it is readily bonded. The resulting seals are uniform in quality and easily assembled.

Stupakoff Seals are available in a wide variety of standard sizes and designs, and can be made in many special forms, as indicated by the illustration above. Extensive experience has given Stupakoff the engineering and manufacturing knowledge and skill to produce Kovar-Glass Seals that are made accurately, uniform and dependable. We will gladly submit samples and quotations.



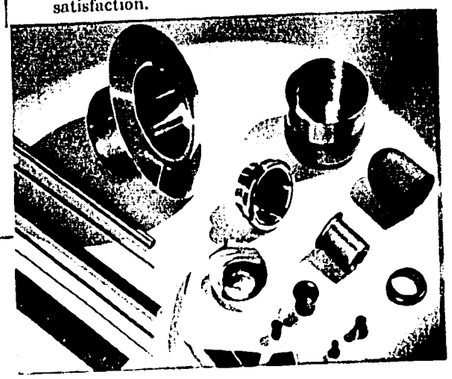




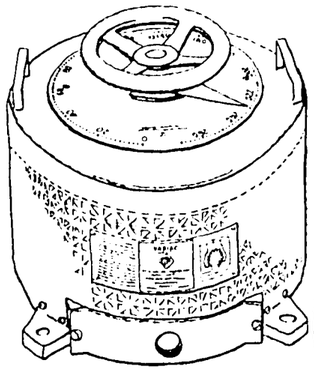
STRAINS, STAND-OFFS

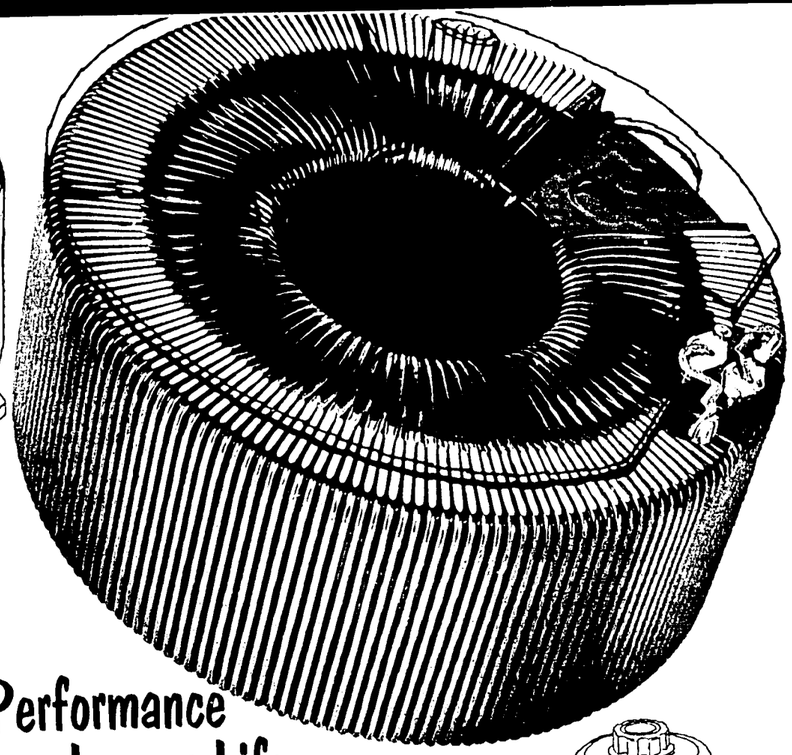
The metallized strains, spreaders and standoffs shown above and to the right are precision-made, and meet the most exacting requirements.

KOVAR METAL—The ideal alloy for glass sealing, Kovar matches the expansivity of hard glass over the entire working temperature range. It resists mercury attack, has ample mechanical strength and seals readily with simple oxidation procedure. It is available as sheet, strip, foil, rod, tube, wire—or fabricated into cups, eyelets, leads and other shapes. The prominent users of KOVAR and the length of time they have employed this metal are convincing proof of satisfaction.



PENNSYLVANIA





. . . for Improved Performance and Even Longer Life

Variac®

with NEW Duratrak *Construction*

Featuring

Good Regulation — *output voltage is substantially independent of load*

Very High Efficiency — *variable autotransformer rather than resistive control makes for very low losses*

Smooth Linear Control — *the calibrated dial enables accurate setting to any output voltage within the VARIAC's range*

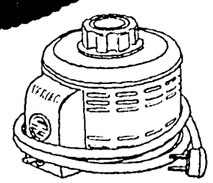
Long Life — *the new DURATRAK construction insures a life as long as that of fixed-ratio power transformers operated at rated loads*

Unaffected by Surges — *VARIACS with DURATRAK will withstand initial surges as high as ten times rated current*

Small Size — *the VARIAC is smaller than any other control of equal power rating*

Rugged Mechanical Design — *dependable, long-life construction — no delicate parts — easy conversion from panel to table mounting*

Minimum Maintenance — *an occasional wiping of the brush track with an alcohol-moistened rag (not supplied) is all that is required — under normal conditions the new DURATRAK will not deteriorate*



The VARIAC® is the original continuously-adjustable autotransformer first made available by General Radio Company over 20 years ago.

Hundreds of thousands of VARIACS have been sold for industrial and laboratory use throughout the world.

NOW a new, improved, brush-track coating is announced to make the VARIAC even more reliable. The new DURATRAK coating — an alloy of silver applied by a carefully controlled process — eliminates all oxidization problems which may become critical under severe conditions of operation.

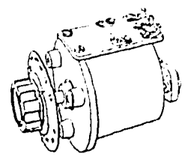
The DURATRAK coating limits failure to the same factors which affect standard fixed-ratio transformers . . . breakdown of insulation due to prolonged overheating, resulting from operation at currents in excess of rated over extended periods.

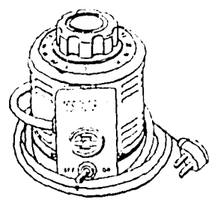
The new DURATRAK brush track coating is but another step in a continual process of development, designed to make the VARIAC the best voltage control you can obtain.

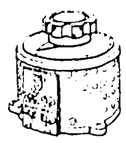
The VARIAC line is listed on the adjacent page. These autotransformers may be used in many circuits to control any device operating from a-c lines. VARIACS can be used singly or ganged for either higher power or for polyphase connections.

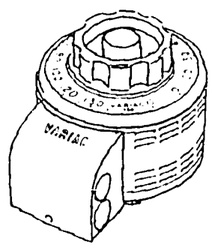
Listing of Variac® UNITS and ASSEMBLIES

All "V" model VARIACS have the new DURATRAK — an improved brush track which sets a new high standard in reliability. VARIACS now have higher ratings per unit volume — will operate at overloads for longer periods — will withstand initial surges ten times their rated current — are practically maintenance free.









	INPUT Volts	INPUT KVA[a]	OUTPUT Volts[b]	OUTPUT Amperes Rated[c]	OUTPUT Amperes Max[d]	Type No.	Price	Description
Single Phase (60~)	115	.17	0-135	1.25	1.5	200-B	$12.50	
	115	.345	0-135	2.5	3	V-2	12.50	
	115	.86	0-135	6	7.5	V-5 V-5M V-5MT	18.50 20.50 25.00	
	115	1.5	0-135	10	12.5	V-10 V-10M V-10MT	33.00 35.50 40.00	
	115	3	0-135	20	25	V-20 V-20M	49.00 55.00	
	115	5	0-135	35	40	50-A	140.00	
	115	6.	0-135	40	50	V-20G2	126.00	
	115	9	0-135	60	75	V-20G3	182.00	
	115	10.	0-135	70	80	50-AG2	310.00	
	115	15	0-135	105	120	50-AG3	460.00	
	230	60	0-270	5	6	V-5H V-5HM V-5HMT	21.00 23.00 27.50	
	230	1.2	0-270	5	6	V-10H V-10HM V-10HMT	34.00 36.50 41.00	
	230	1.7	0-270	7	8	V-5G2	49.00	
	230	2.4	0-270	10	12.5	V-20H V-20HM	49.00 55.00	
	230	3	0-270	10	12.5	V-10G2	79.00	
	230	4.8	0-270	20	25	V-20HG2	126.00	
	230	6	0-270	20	25	V-20G2	126.00	
	230	7.	0-270	30	35	50-B	140.00	
	230	14.	0-270	60	75	50-BG2	310.00	
	230	21.	0-270	90	105	50-BG3	460.00	
	460	1.2	0-540	2.5	3	V-5HG2	54.00	
	460	2.4	0-540	5	6	V-10HG2	81.00	
	460	4.8	0-540	10	12.5	V-20HG2	126.00	
	460	14.	0-540	30	35	50-BG2	310.00	
Single Phase (400-2400~)	115	.86	0-115	7.5	9	60-AU 60-AM	28.00 30.00	
	1200	1.	0-240	4.2	5	V-5HG2	54.00	
	1200	2.	0-240	8.3	10	V-10HG2	81.00	
	1200	3.	0-240	12.5	15	V-5G3	88.50	
Three Phase (60~)	1200	4.	0-240	16.7	20	V-20HG2	126.00	
	1200	5.	0-240	25	30	V-10G3	111.00	
	1200	10	0-240	50	60	V-20G3	182.00	
	1200	12.	0-240	60	75	50-BG2	310.00	
	1200	18	0-240	90	105	50-AG3	460.00	
	460	2.	0-540	2.5	3	V-5HG3	76.00	
	460	4.	0-540	5	6	V-10HG3	116.00	
	460	8	0-540	10	12.5	V-20HG3	182.00	
	460	25.	0-540	30	35	50-BG3	460.00	

a. KVA rating ...

b. Maximum output voltage ...

c. Rated current: amperes ... KVA ...

d. Maximum current: amperes ...

A VARIAC ...

Type VARIAC ...

Fill-in Coupon for a Copy of the **NEW Variac Bulletin**

GENERAL RADIO Company

275 Massachusetts Avenue, Cambridge 39, Massachusetts

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GR

General Radio Company, 275 Massachusetts Ave., Cambridge 39, Mass.

Please send me the new VARIAC bulletin describing the new VARIACS with Duratrak construction.

Name .....
(573)

Street .....

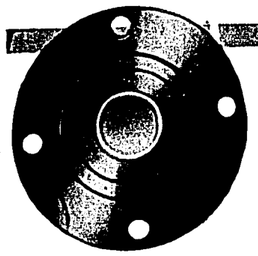
City ..... Zone ..... State .....

Bomac MICROWAVE

GAS SWITCHING TUBES

Bomac has available an extensive line of TR, ATR, Pre TR and attenuator tubes covering all the frequency bands and power levels in use. Many types are in high level production; specialized types can be supplied on short notice. Inquiries are invited on types not listed, or for special frequency bands. If clearance is needed, you will be advised of the appropriate government agency to contact.

	FREQ.	DESCRIPTION	TYPE
K BAND	23630-24580	TR, Integral Cavity, Tunable	1B26
	23500-24500	ATR, Fixed-Tuned, Low Q	1B36
	23350-24950	TR, Band Pass	6282
Ku BAND	16200-16800	ATR, Fixed-Tuned, Low Q	BL-15
	16200-16800	TR, Integral Cavity, Tunable	BL-16
X BAND	9300-9450	Cross Guide Duplexer	BL-29
	9050-9600	ATR, Fixed-Tuned, Low Q	1B35A
	9000-9600	ATR, Fixed-Tuned	BL-43
	9000-9600	ATR, Fixed-Tuned	6038
	8600-9650	TR, Glass Envelope, Fixed-Tuned	724B
	8600-9050	ATR, Fixed-Tuned, Low Q	1B37A
	8490-9600	TR, Integral Cavity, Tunable	1B24A
	8490-9600	TR, Integral Cavity, Tunable	1B60
	8490-9600	TR, Integral Cavity, Tunable, Reservoirless	BL-22
	8490-9600	TR, Tunable, Reservoirless	BL-32
	8490-9600	TR, Tunable, Reservoirless	BL-42
	8490-9600	TR, Side Ignitor, Tunable	BL-20
	8490-9578	TR, Band Pass	1B63A
	8490-9578	TR, Double 1B63A	BL-27
Xb BAND	6200-6700	ATR, Fixed Tuned, Low Q	1B51
	6000-7100	TR, Integral Cavity, Tunable	1B50



Available for all Wave Guide Sizes
Low Q Broad Band Match
Low Insertion Loss
Temperature Range — 55°C to 100°C
30 lb./sq. in. Pressure Differential
For Choke Mounting or Soldering Directly to Guide

PRESSURIZING WINDOWS

TYPE	FREQ.	DESCRIPTION
BL105	9375	P.W. RG 51/u Guide
BL106	9245	P.W. RG 52/u Guide
BL107	9310	P.W. RG 51/u Guide
BL112	9080	P.W. RG 52/u Guide
BL114	9310	P.W. RG 51/u Guide
BL116	16,100	P.W. RG 91/u Guide
BL117	9080	P.W. RG 52/u Guide
BL119	8700-8900	P.W. RG 52/u Guide
BL122	8620-9530	P.W. RG 52/u Guide
BL123	6500	P.W. RG 51/u Guide



Bomac Hydrogen Thyratrons are designed primarily for use as a switch tube in line type modulators for pulsing magnetrons in radar equipment. However, it has also found many applications in laboratory, production and test equipment where precise triggering at high power levels is required.

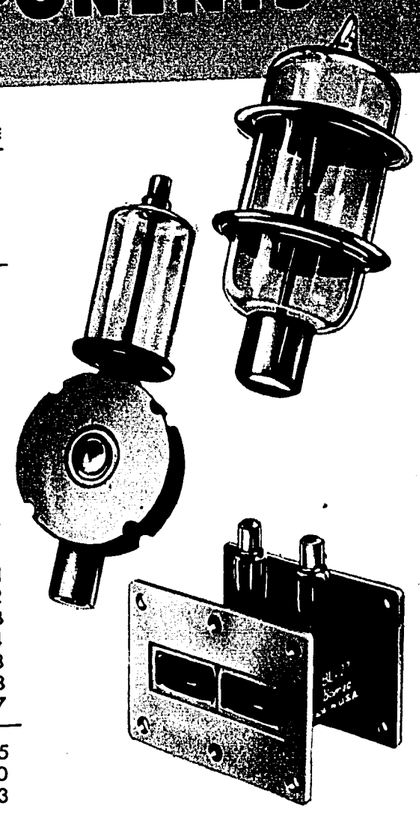
HYDROGEN THYRATRONS

TYPE	Peak Anode Voltage KV Max.	Peak Anode Current Amps Max.	Average Anode Cutrent MA Max.	Peak Trigger Voltage Volts Min.
3C45	3.0	35	45	175
4C35	8.0	90	100	175
5C22	16.0	325	200	200
VC1258	1.0	20	50	130
6130	3.0	35	45	175 High Altitude
5959/E43	8.0	35	45	130
5957/E37	8.0	90	100	175 Wafer Base
HT415	16.0	325	200	200 Low Jitter

SPARK GAP MODULATORS 1B41 1B45

TUBES AND COMPONENTS

BAND	FREQ.	DESCRIPTION	TYPE
C BAND	5395-5905	TR, Band Pass, Fixed-Tuned	5865
	5200-5530	TR, Band Pass, Fixed-Tuned	5925
	5280-5450	ATR, Fixed-Tuned	6022
	5555-5725	ATR, Fixed-Tuned	6081
S BAND	3550-3700	ATR, Fixed-Tuned, Low Q	1B52
	3400-3550	ATR, Fixed-Tuned, Low Q	1B53
	3300-3700	Pre-TR	1B54
	3250-3400	ATR, Fixed-Tuned, Low Q	1B57
	3100-3650	TR, Band Pass	1B55
	3100-3500	TR, Band Pass, Fixed-Tuned	5927
	3000-3100	ATR, Fixed-Tuned, Low Q	5793
	2900-3000	ATR, Fixed-Tuned, Low Q	5792
	2870-3230	TR, Band Pass	5853
	2800-2900	ATR, Fixed-Tuned, Low Q	1B56
	2750-2850	ATR, Fixed-Tuned, Low Q	6024
	2700-3400	TR, Glass Envelope, Tunable	1B27
	2700-3400	TR, Glass Envelope, Tunable	BL-8
	2700-3400	TR, Glass Envelope, Ruggedized	BL-31
	2700-3300	TR, Glass Envelope, Fixed-Tuned	1B62
	2700-3300	TR, Glass Envelope, Fixed-Tuned	721B
	2700-2800	ATR, Fixed-Tuned, Low Q	1B44
	2650-2950	Pre-TR	1B38
	2600-3000	TR, Band Pass	1B58
	2600-3000	TR, Band Pass Pressurized System	6117
L BAND	1215-1355	TR, Glass Envelope, Tunable	BL-25
	1075-1095	TR, Fixed-Tuned, Electrodeless Discharge	1B40
	900-1200	TR, Glass Envelope, Fixed-Tuned	1B23





Bomac Silicon Diodes are manufactured to exceptionally high standards to assure electrical uniformity and mechanical stability. New design considerations and improved manufacturing techniques have resulted in X and S band crystals of increased burnout resistance and higher humidity resistance.

SILICON AND GERMANIUM DIODES

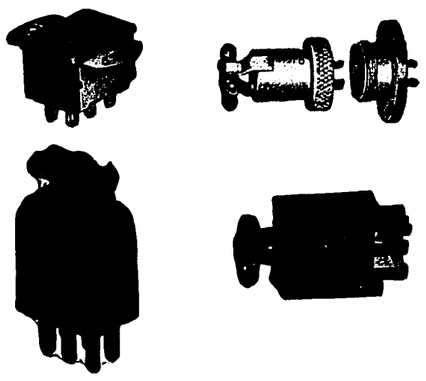
TYPE NO.	1N21B	1N21C	1N23B	1N23BM	1N23C
FREQUENCY (mc)	3,000	3,000	10,000	Matched pair of 1N23B diodes for balanced mixer use.	9,375
CONVERSION LOSS (db. max.)	6.5	5.5	6.5		6.0
NOISE RATIO (max.)	2.0	1.5	2.7		1.8
BURNOUT (ergs)	2.0	2.0	1.0		1.0

We invite your inquiries regarding

- ENGINEERING
- DEVELOPMENT
- PRODUCTION

Catalog on request. Write Dept. D, (on your company letterhead) BOMAC Laboratories, Inc., Beverly, Mass.

Bomac LABORATORIES INC.



JONES PLUGS AND SOCKETS

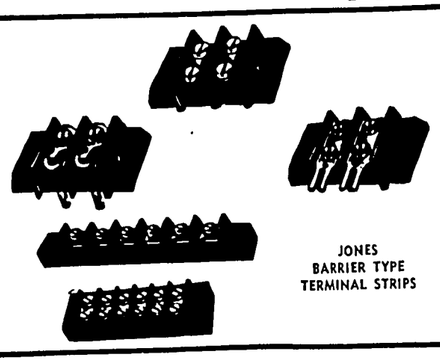
A steadily expanding variety of plugs and sockets as produced at Jones Division have a wide range of the highest quality electrical and mechanical parts to efficiently fill every need. Some indication of extensive variety of these parts is shown in the photographs on this page.

SEND FOR COMPLETE CATALOG

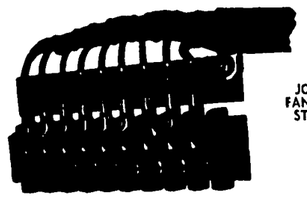
Cat. No. 19 will give you complete data (electrical characteristics, etc.). Your request for this catalogue or for quotes on special products will be promptly answered.

Jones

HOWARD B. JONES DIVISION
CINCH MANUFACTURING CORPORATION
1026 S. Homan Ave. • Chicago 24, Illinois



JONES BARRIER TYPE TERMINAL STRIPS



JONES FANNING STRIPS

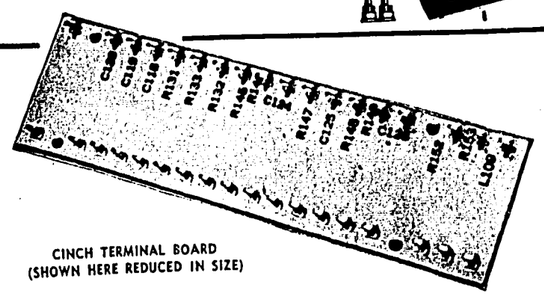
CINCH

The vast engineering behind every Cinch component concerns itself primarily with the problems of perfection, precision and performance in all phases of communications and industrial electronic equipment. Cinch small individual assemblies have always fully performed the service for which they were designed and in many cases have anticipated engineering needs of the future. So that today, judged by service, and by numbers in use as well as by testimonies of users, CINCH PARTS ARE STANDARD. They meet the demands for higher quality materials and closer tolerance in all communications and industrial control equipment.

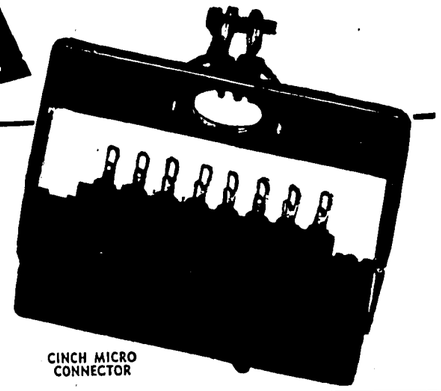
SEND FOR COMPLETE CATALOG

Cat. No. 51 contains complete data on all of the Cinch electronic components. Requests on company letterheads will be promptly answered.

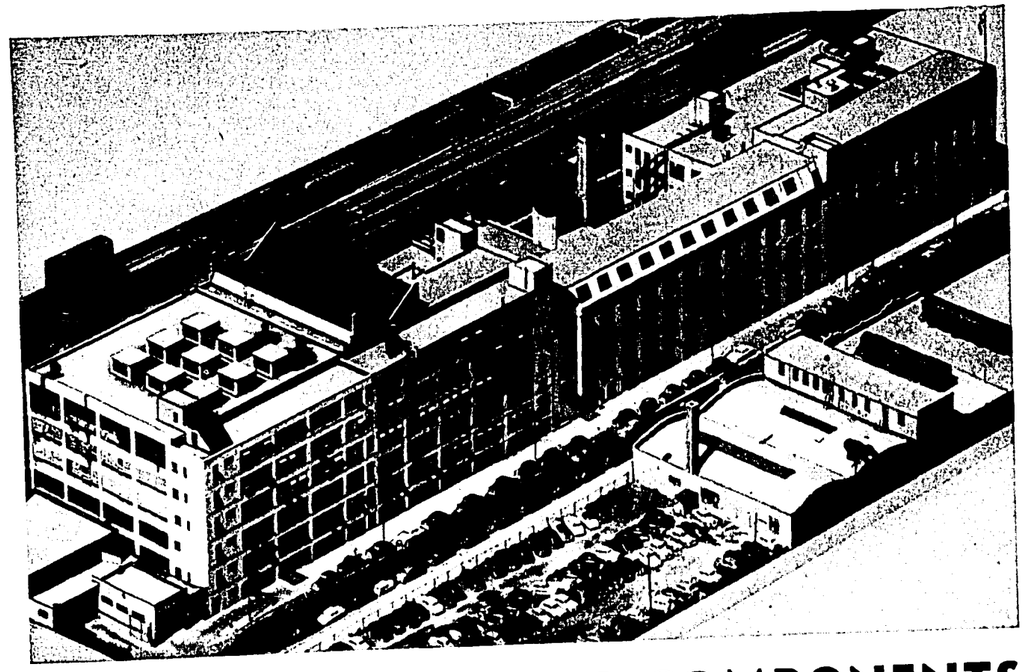
Cinch ELECTRONIC COMPONENTS



CINCH TERMINAL BOARD (SHOWN HERE REDUCED IN SIZE)



CINCH MICRO CONNECTOR



Standard ELECTRONIC COMPONENTS

The list below comprises the products of both Cinch and Jones. They are indicative of their wide scope and also indicate the myriad of variations and redesigning that are possible with this background of production experience.

ANTENNA JACKS
BANANA PINS AND JACKS
BARRIER TERMINAL STRIPS
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METAL STAMPINGS
MICRO-CONNECTORS
MOUNTING DEVICES
PHONO TIP JACKS
PRINTED CIRCUIT, CONNECTORS
SHIELDS, TUBE-MINIATURE & NOVAL & BASES SOLDERING LUGS—200 VARIATIONS
STRAP NUTS
TRANSISTOR SOCKET
TUBE HOLDERS—SPRING TYPE
VIBRATOR PLUGS AND SOCKETS

TERMINAL ASSEMBLIES: Blocks, boards in laminated and molded, assembled with lugs, pins, screw terminals, contacts, clips, turret lugs and other hardware to specifications.

Cinch components available at leading electronic jobbers —everywhere.

CONSULT CINCH

CINCH SOCKETS:



Printed Circuit T3 Socket
CINCH SUB-MINIATURE



CINCH MOLDED MINIATURE

Tube (Receiver, Transmitter and Special): Battery, all types
C-R Tube
Crystal
Electrolytic
Glass Type; 4 to 7 prong laminated
Infra-red Ray Tube
High Altitude Airborne Types
Kinescope; Magnal, Duodecal, Diheptal
Loktal-Miniature-Multiplug-Noval-Octal (Molded bakelite, steatite, teflon, Kel-F, and laminated)
Plexicon
Printed Circuit
Special Sockets to Specs
Sub-Miniature; Hearing Aid Types
TV; 110V Circuit Breakaway
Vibrator
Pencil Tube Transistor
Diode

CINCH NOVAL NINE PRONG

CINCH-ERIE PLEXICON

Cinch ELECTRONIC COMPONENTS

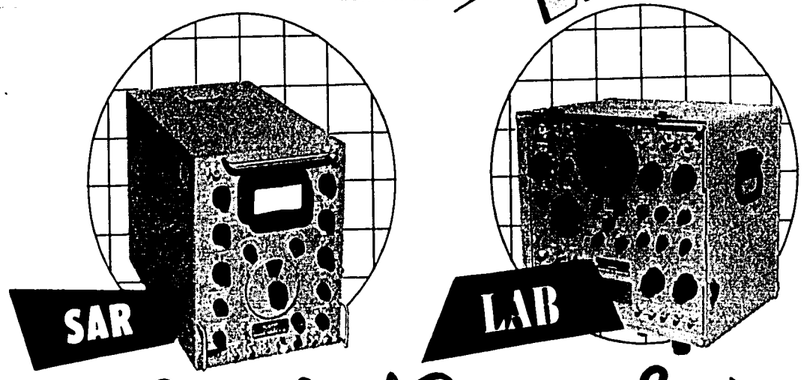
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Subsidiary of United-Carr Fastener Corporation, Cambridge, Mass.

PULSESCOPE®

The Oscilloscope that portrays the Pulse by Waterman



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Investigations of complex waves take great strides forward when either a Waterman SAR or LAB PULSESCOPE is employed. Their compactness, portability and precision have established a new high in pulse measurement instruments for all electronic work. Each PULSESCOPE has internally generated markers which are synchronized with the sweep with the basic difference that the sweep in the LAB PULSESCOPE initiates the markers while in the SAR PULSESCOPE it is the crystal controlled markers which initiate the sweep. Power supply requirements of 50 to 1000 c.p.s. at 115 Volts permits operation almost anywhere.

The SAR PULSESCOPE, model S-4-A, is characterized by a pulse rise time of 0.035 microseconds thru a video amplifier with a sensitivity of 0.5 Volts p to p/inch. A vertical delay of 0.55 microseconds is optional. A and S sweeps covering a continuous range from 1.2 to 12,000 microseconds are augmented by R sweeps, which in turn are variable from 2.4 to 24 microseconds. A directly calibrated dial permits R sweep delay readings from 3 to 10,000 microseconds.

The LAB PULSESCOPE, model S-5-A, has equivalent rise time of 0.035 microseconds, a fixed 0.55 microseconds vertical delay and 0.1 Volts p to p/inch sensitivity, so arranged as to assure portrayal of leading edges on displayed signals. A precision calibrated voltage is provided as well as an optional sweep expansion of 10 to 1. A built-in trigger generator voltage is available for synchronizing any associated test equipment.



WATERMAN RAYONIC CATHODE RAY TUBE DEVELOPMENTS



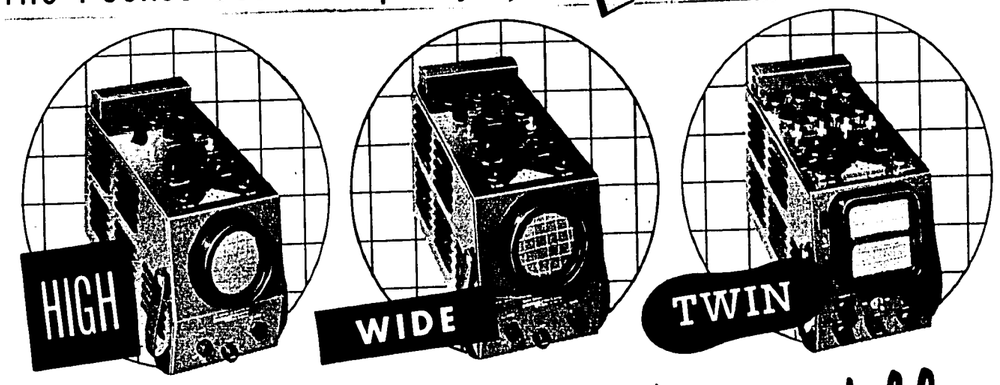
Since the introduction of the Waterman RAYONIC 3MP1 for miniaturized oscilloscopes, scientists in our laboratories have diligently searched for more perfect answers to present day cathode ray tube problems. Such research led to the introduction of the revolutionary new 3SP and 3XP type cathode ray tubes. These tubes were designed with multi-trace oscilloscopy in mind. Every avenue of practical design was explored to produce tubes with bright, sharp traces and high deflection sensitivity at medium anode potentials.

TUBE	PHYSICAL DATA			TYPICAL VOLTAGES				DEFLECTION FACTOR V/IN.		MAX. VOLTS	
	Face	Length	Base	Anode # 3	Anode # 2	Anode # 1	Grid # 1	D1 to D2	D3 to D4	Anode # 3	Anode # 2
3JP	3 inch Round	10 inches	Medium Diheptal 12 Pin	3000	1500	300 to 515	−22.5 to −67.5	127 to 173	94 to 128	4000	2000
				4000	2000	400 to 690	−30 to −90	170 to 230	125 to 170		
3MP	3 inch Round	8 inches	Small Duodecal 12 Pin		1000	200 to 350	0 to −68	140 to 190	130 to 180		2500
					2000	400 to 700	0 to −126	280 to 380	260 to 360		
3SP	1½x3 inches	9.12 inches	Small Duodecal 12 Pin		1000	165 to 310	−28.5 to −67.5	73 to 99	52 to 70		2750
					2000	330 to 620	−58 to −135	146 to 198	104 to 140		
3XP	1½x3 inches	8.88 inches	Loctal		2000	400 to 690	−22.5 to −67.5	68 to 92	25 to 35		2750

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POCKETSCOPE®

The Pocket Oscilloscope by Waterman



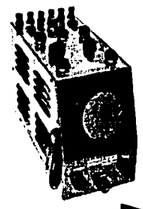
...light...compact...accurate...portable

The HIGH, WIDE and TWIN POCKETSCOPES have become the "triple threat" of the oscilloscope industry. Their small size, light weight and incredible performance, has skyrocketed this team of truly portable instruments into unparalleled prominence. Each oscilloscope features DC coupled amplifiers in both its vertical and horizontal channels. The HIGH GAIN, S-14-A POCKETSCOPE, has a vertical sensitivity of 10 millivolts rms/inch, and a frequency response within −2 db from DC to 200 KC, while the WIDE BAND S-14-B POCKETSCOPE is characterized by frequency response within −2 db from DC to 700 KC and a sensitivity of 50 millivolts rms/inch.

The TWIN POCKETSCOPE is essentially two HIGH GAIN POCKETSCOPES with individual cathode ray tubes, amplifiers, controls, but a common sweep generator. All these are endowed with many identical characteristics. Their sweep generators can be operated as triggered or repetitive over a frequency range from 0.5 cycles to 50 KC, with synchronization polarity optional. Return traces are blanked and provisions are made for modulating the intensity in each cathode ray tube.

Laboratory quality has not been sacrificed in order to accomplish portability and ruggedness. Investigate the many advantages of Waterman POCKETSCOPES.

POCKETSCOPE

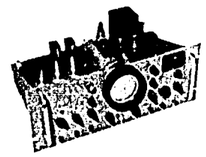


S-11-A

The INDUSTRIAL POCKETSCOPE, model S-11-A, has become America's most popular DC coupled oscilloscope because of its small size, light weight, and unique flexibility. This compact instrument has identical vertical and horizontal amplifiers which permit the observation of low frequency repetitive phenomena, while simultaneously eliminating undesirable trace bounce. Each amplifier sensitivity is 0.1 Volt rms/inch. The frequency responses are likewise identical, within −2 db from DC to 200 KC.

Discover for yourself the amazing utility of this tiny work-horse of industrial electronics.

RAKSCOPE®



S-12-B

The S-12-B RAKSCOPE is a rack mounted, JANized version of the famous Waterman S-11-A POCKETSCOPE, with the addition of a triggered sweep and a special calibrating circuit for rapid frequency comparisons. The entire oscilloscope is built to occupy but seven inches when mounted in a standard relay rack.

Because provisions are made for applying input signals from the rear, as well as the front, the S-12-B is the ideal combination, systems monitor and trouble-shooting oscilloscope. Investigate the multiple applications of this instrument as an integral part of your own rack mounted apparatus.

WATERMAN PRODUCTS

WATERMAN PRODUCTS CO., INC.

PHILADELPHIA 25, PENNA., U. S. A.

CABLE ADDRESS, POKETSCOPE, PHILA.

Manufacturers of POCKETSCOPES® • RAKSCOPES® • PULSESCOPES® and RAYONIC TUBES®

MEPCO PRECISION

MIL-R-93A NEW SEALED TYPES

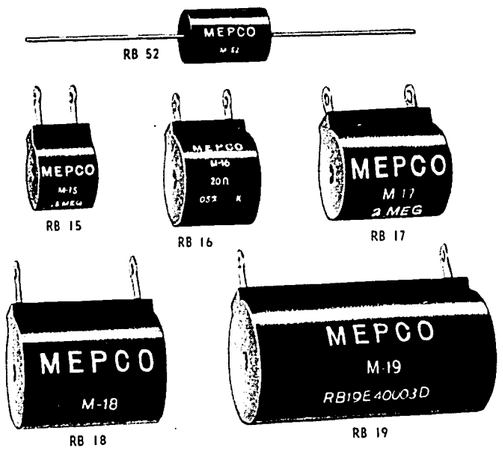
Over 2 years of laboratory development and testing were required to achieve a sealed resistor design up to Mepco's standard of quality. No sacrifice of our standard time-proven features have been made in order to perfect this sealed resistor.

Completely hermetically sealed, these resistors provide perfect protection against immersion and high humidity.

All requirements of MIL-R-93A and JAN-R-93 are exceeded.

The operating temperature is —65°C to +125°C. Temperature coefficients of ±.003%/°C to ±.017%/°C depending upon your requirements. (Refer to MIL-R-93A).

Other sizes available on special order.



WIRE TERMINAL TYPES

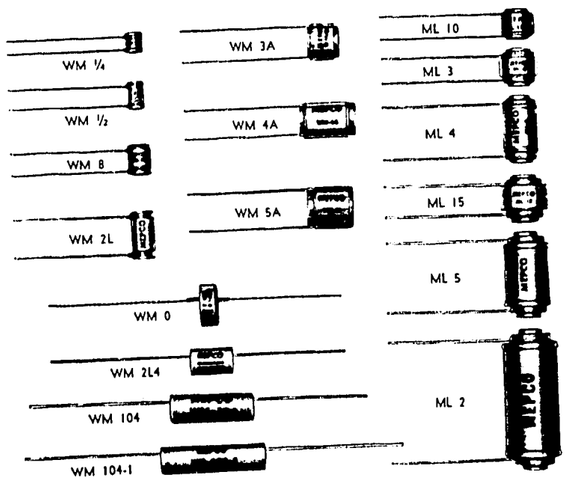
Designed for direct connection into circuit without use of additional leads.

These resistors are of the same basic construction and materials as standard JAN and MIL types therefore providing equal dependability and long life.

Low Temperature Coefficient alloys provide ±.003%/°C from —65°C to +125°C unless otherwise specified by your requirements.

Resistance tolerances range from ±1% down to ±.02%. Sets of matched resistors can be supplied ±.005% or lower.

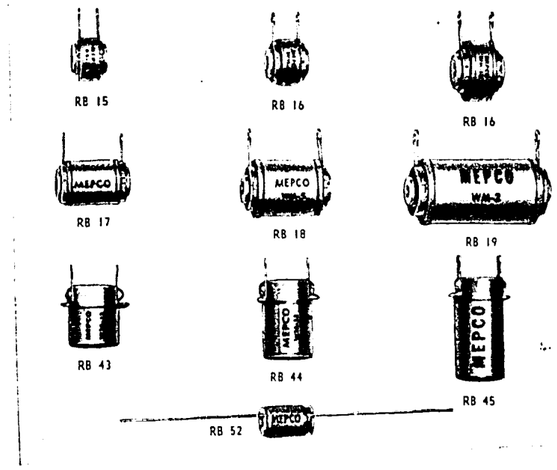
Special types not shown can be manufactured to your exact specifications.



MEPCO, INC.

RESISTORS MEPCO

MIL-R-93A JAN-R-93 STANDARD TYPES



Our standard time proven JAN, MIL and Commercial lug terminal resistor.

Manufactured and 100% tested in accordance with the applicable specifications, these resistors are used by every major electronic equipment manufacturer in the country.

Reversed and balanced PI-windings for low inductance, with use of only the finest resistance alloys.

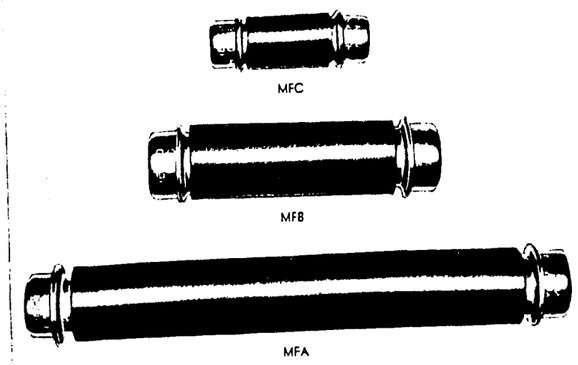
Impregnated with approval fungus, moisture and salt waterproofing compounds.

JAN approved non-hydroscopic steatite bobbin, specially treated prior to winding in order to provide additional protection for fine enameled wire.

Protective fungi resistant acetate label.

Rigid hot solder coated brass terminals for easier soldering.

JAN-R-29 METER MULTIPLIERS



Surpass all requirements of JAN-R-29

HERMETICALLY SEALED:
Insures dependable operation under most severe moisture conditions.

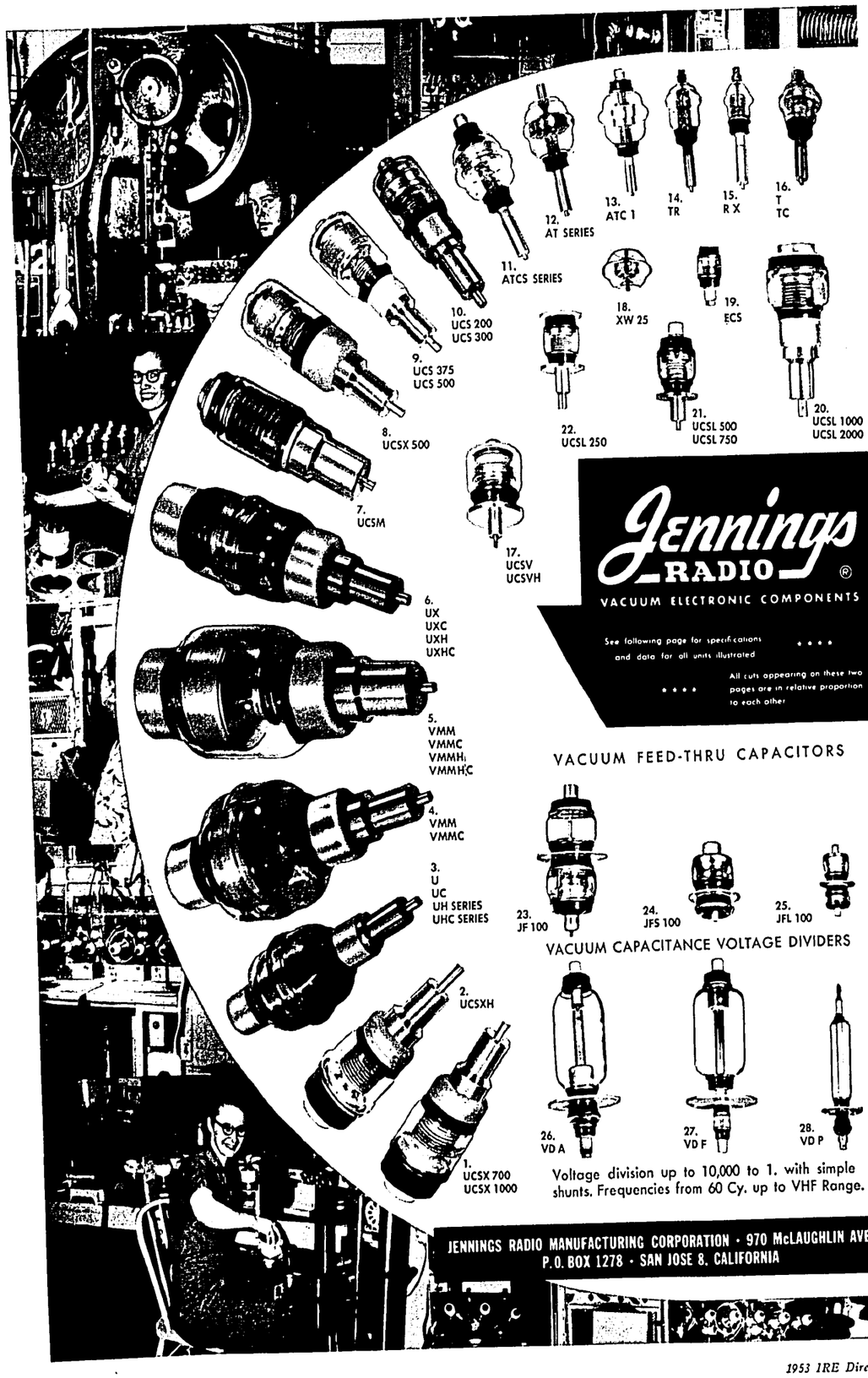
STEATITE PROTECTIVE CASING:
Glazed surface prevents high voltage leakage.

WINDINGS:
"Certified" low temperature coefficient resistance alloys properly "aged" to provide long term stability.

REPLACEABLE INTERNAL SECTIONS:
Eliminate complete loss of unit if damaged.

FERRULE TERMINALS:
Heavy nickel plated brass. Corrosive resistant. Fit standard fuse clips.

MORRISTOWN, NEW JERSEY



Jennings RADIO ®

VACUUM ELECTRONIC COMPONENTS

See following page for specifications and data for all units illustrated

All cuts appearing on these two pages are in relative proportion to each other

VACUUM FEED-THRU CAPACITORS

VACUUM CAPACITANCE VOLTAGE DIVIDERS

Voltage division up to 10,000 to 1. with simple shunts. Frequencies from 60 Cy. up to VHF Range.

JENNINGS RADIO MANUFACTURING CORPORATION · 970 McLAUGHLIN AVE.
P. O. BOX 1278 · SAN JOSE 8, CALIFORNIA



FIXED AND VARIABLE HIGH VOLTAGE VACUUM CAPACITORS AND VACUUM SWITCHES

VACUUM SWITCHES AND RELAYS

Switches available either mounted or unmounted.
If mounted as relays, may have either Bakelite insulation or all-glass 100 KV. insulation.
•Actuated by either 110-220 Volt A.C. or 6-110 Volt D.C. Solenoids.

Relays Available as		Overload Circuit Breakers
Normally open	SPDT	Single phase
Normally closed	DPDT	Three phase
Impulse lock	4PDT	Manual reset
		Automatic reset

R-2 — Automatic reset overload circuit breaker using R-2 switch with all-glass 100 KV insulation.

JENNINGS RADIO MANUFACTURING CORPORATION · 970 McLAUGHLIN AVE.
P. O. BOX 1278 · SAN JOSE 8, CALIFORNIA

VACUUM CAPACITORS & SWITCHES

Jennings RADIO

SPECIFICATIONS

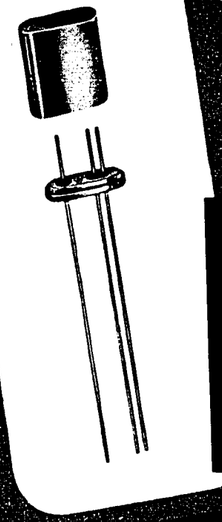
See preceding pages for all units.

	FIGURES	NICKEL TYPES	COPPER TYPES	CAPACITY MMFD.	PEAK VOLTAGE KILOVOLTS	RMS AMPS NICKEL	RMS AMPS COPPER	OVERALL LENGTH	MAXIMUM O.D.	CONTACT DIAMETER	MOUNTING CENTERS
VACUUM FIXED CAPACITORS	34, 33	VC	VCC	6, 12, 25, 50, 75, 100, 150	20, 30	14	60	6½	2⅝	1/8	5 1/8
	34, 33	VC	VCC	200, 250	20, 30	14	60	6½	2 1/8	1/8	5⅞
	31	W		6, 12, 25, 50, 100	20	10.5		4 7/16	2¼	3/8	3⅞
	30	X		5, 10, 15, 20, 25	17	7		3¼	1 7/16	23/64	2⅞
	18	XW		25	35	14		2 3/32	3	¼	1 1/8
	29	Y		1, 2, 3, 4, 5	17	7		3¼	1⅛	1/8	2⅞
	35	K		12, 25, 50	40, 50	14		8½	3	1/8	7¾
	49		JCS-1	25, 50, 75, 100, 150	7.5, 10, 15		42	3 3/32	2⅛	⅞	3¼
	48		JCS-2	10, 20, 25, 50	7.5, 10, 15		20	2 1/8	1½	1/8	2¼
	50		JCS	250	7.5, 10, 15		42	3¾	2⅝	⅞	3⅛
	52		JCS	500	7.5, 10, 15		42	4	3 7/16	53/64	3½
	53		JCS	1000	7.5, 10, 12		42	4⅝	3⅝	2	3⅞
	51		JCSH	75	35, 45		42	4	2 1/8	⅞	3⅜
	44		JCSL	100	3, 5		20	2½	1⅛	1/8	2 1/16
	45		JCSL	250	3, 5		20	2 9/16	1 1/8	1/8	2⅛
	46		JCSL	500, 750	3		42	3⅞	2⅛	⅞	3⅛
	47		JCSL	1000, 1500	2		42	3¼	2⅞	⅞	3¼
	47		JCSL	2000	20, 30		42	4	2⅞	⅞	3½
	32		JC-2	25, 50, 75, 100	35, 45, 55, 60		42	3 1/8	3½	1/8	3¼
	41		JC-3	20, 40, 50, 60	35, 45, 55, 60		140	8¼	3½	2 3/32	6¼
	40		JC-4	75, 100, 125	35, 45, 55, 60		175	9¼	5	3 11/16	7
	39		JC-5	200	10, 15, 20	21	225	11¼	7	4⅛	8¾
	36	M	MC	500, 750, 1000	25, 30	21	60	8⅜	5	2 3/32	6¼
	37	ML	MLC	500, 750, 1000	35, 40, 50	21	60	9¼	5	2 3/32	7¼
	36	MH	MHC	200 or less	10, 15	21	60	8½	5	2 3/32	6⅜
	38	MM	MMC	1500, 2000	35, 40, 45	21	125	9¼	6⅛	4⅛	6¾
	38	MMH	MMHC	450	10, 15		125	9¼	6⅛	4⅛	6¾
	43		MC-1	500, 750, 1000	10, 15		150	3¼	4⅛	2	2⅛
	42		MMC-1	2000	20	10.5	225	4	6 1/16	3⅛	4
	16	T		5-25	20		20	6⅜	2¼	½×⅛	4⅛
	16		TC	5-25	10, 15, 20	10.5		6⅝	2⅛	⅛	4 7/16
	15	RX		2-8	17	10.5		5½	1¾	⅛×⅜	3
	14	TR		2-8	10, 15		20	6⅛	2¼	3/16×1/16	3⅛
	19		ECS	2-8 (Adjustable)	20, 25, 30	10.5		2 7/16	1¼	1	2⅛
	12	AT		10-50, 15-75	20, 30			6½	3	½×⅜	4 7/16
	13		ATC	20-35, 10-50	7.5, 10, 15		20	6⅛	3⅛	⅛	4 7/16
	11		ATCS	10-110, 20-200	7.5, 10, 15		20	6⅛	3⅛	3/16×⅛	4 7/16
	10		UCS	5-200	7.5, 10, 15		42	8⅜	2⅝	⅞×2 1/32	4¼
	10		UCS	10-300	7.5, 10, 15		42	8¾	2 7/16	⅞×2 1/32	4⅜
	9		UCS	10-375	7.5, 10, 15		42	8¾	3⅛	⅞×2 1/32	4⅜
	9		UCS	25-500	7.5, 10, 15		42	9	3 7/16	⅞×2 1/32	4⅛
	—		UCSL	4-100	3, 5		20	4¾	1⅛	⅛×⅜	2⅛
	22		UCSL	4-250	3, 5		20	4	2 7/16	—	2½
	21		UCSL	5-500, 10-750	2, 3		42	5⅜	2 7/16	⅞	3⅜
	20		UCSL	7-1000	2, 3		42	4⅛	3 7/16	2 1/32	3½
	20		UCSL	50-2000	7.5, 10, 15		42	5⅛	3 7/16	2 1/32	3⅛
	17		UCSV	8-110	25, 35		60	4¾	3	⅞	3 7/16
	17		UCSVH	10-35	7.5, 10, 15		60	4⅛	3	⅞	3 7/16
	7		UCSM	4-500	7.5, 10, 15		80	10⅝	3⅝	2×3/8	5⅞
	8		UCSX	10-500	7.5, 10, 12		60	10 7/16	3½	⅞×3 1/16	5 7/16
	1		UCSX	25-700	7.5, 10, 12		60	9⅝	3¾	2×3 1/16	3 7/16
	1		UCSX	25-1000	35, 45		60	9⅛	3¾	2×3 1/16	5
	2		UCSXH	10-200	10, 15, 20	21	60	10¾	4½	2	5½
	3	U	UC	50-250	35, 45, 55, 60	21	60	11 7/16	5	2	6½
	3	UH	UHC	10-75	35, 45, 55, 60	21	60	11 7/16	5	2	6½
	3	UH	UHC	75-150	10, 15, 20	21	60	12	5	2	7 7/16
	6	UX	UXC	25-500	35, 45, 55	21	60	14	5	3 11/16	7⅛
	6	UXH	UXHC	25-150	10, 15	21	60	14⅜	5	3 11/16	8¼
	4	VMM	VMMC	50-1000	10, 15	21	100	14⅞	6½	4⅛	7¾
	5	VMM	VMMC	100-2000	35, 45, 55	21	125	15⅞	6⅛	4⅛	8⅜
	5	VMMH	VMMHC	25-450	50, 60		125	16	6⅛	4⅛	8¾
VACUUM SWITCHES	57		R-1	Vacuum Switch	50, 60, 70		65	6⅝	2	⅛	4 7/16
	60		R-2	Vacuum Switch	35		60	8½	2 7/16	⅛	6½
	56		R-3	Vacuum Switch	20		50	4½	1⅞	⅛×⅛	2⅞
	55		R-4	Vacuum Switch	20		65	4½	1⅞	⅛	2¾
	54		R-5	Vacuum Switch	40		50	3½	1 7/16	⅛×⅛	2 7/16
	58		R-7	Vacuum Switch	40, 50		65	5⅞	1 7/16	⅛	4
	59		RH-1	Vacuum Switch	50, 60		200	6¼	2⅝	1/4×2	4⅛
	—		RH-2	Vacuum Switch			200	9⅞	3	1/4×2	8
MISC.	23	JF	Feed-thru	100 mmfd.	15		42	6½	2⅝	⅛	5 1/8
	24	JFS	Feed-thru	100 mmfd.	7.5		42	3 1/8	2	⅞×⅛	3⅛
	25	JFL	Feed-thru	100 mmfd.	3		20	3 7/16	1¼	⅛	2⅞
	28		VD—Probe Capacitance Volt. Divider—1.1 mmfd input		20, 30			7½	1 7/16	3/8	4¾
	27		VD—Fixed Capacitance Volt. Divider—1.8 or 3.6 mmfd		50, 60			8½	2 7/16	7/16×1/8	5¾
	26		VD—Adjustable Capac. Volt. Divider		50, 60			8⅝	2 7/16	⅛	6

Current ratings based on 50°C. temp. rise above ambient
Switch current ratings approximately 50% at 10 megacycles

Correspondence invited for other capacities, voltages, and ratings.

JENNINGS RADIO MANUFACTURING CORP · 970 McLAUGHLIN AVE · P O BOX 1278 · SAN JOSE 8, CALIF



Constantin's latest achievement —

Glass to metal vacuum sealed transistor mounts that provide complete protection from moisture, dust, varying heat conditions and shock. Germanium can be sealed in vacuum or inert gas. A special soldering moat is a feature for easy assembly. Leads are spaced to fit standard sub-miniature sockets and can be supplied 1½" long for soldering directly to circuits.



AN CONNECTORS
Precision construction throughout. Glass to metal vacuum seal assures protection against varying atmospheric conditions. Available in most JAN specifications.



MULTIPLE HEADERS
Plug and standard types. Built to withstand thermal shock and provide stabilized atmospheres. Available in various configurations.



SINGLE TERMINALS AND END SEALS
Terminals available in all combinations of hooks, eyes, lubes, and pierced flats. Test rated from 1,000 to 15,000 volts R.M.S. and 5 to 25 amps. Single end seals available in various sizes for items requiring stabilized atmospheres.

HIGH COMPRESSION SEALS AVAILABLE



CRYSTAL HOLDERS
The highly rigid metal bridge unit is designed to withstand severe strain without deformation. The one piece sealing medium minimizes stresses on the pins which could produce internal strain.



CUSTOM ENGINEERED COMPONENTS
Constantin is capable of manufacturing any glass to metal sealed requirement. Free engineering assistance given upon request.

Hot tin plating at 530°F. facilitates easy soldering, thereby eliminating rejections during assembly. Special plating supplied on request. Glass to Kovar seals, made under Westinghouse patents, are ideal for use in extreme temperatures. Blueprints can be furnished upon request.

VACUUM COATING EQUIPMENT

COMBINATION BASE AND FINAL FREQUENCY CALIBRATION PLATING MACHINE FOR QUARTZ CRYSTALS Model 3

MANIFOLD TYPE FINAL FREQUENCY CALIBRATION UNIT TYPE FFQ Model 1

L. L. Constantin & Co.

CLAROSTAT

Products of The House of Resistors"

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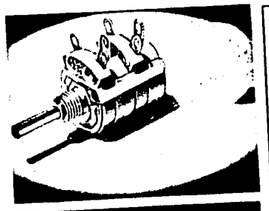
requirements as to corrosion, materials and plating, ... vibration, ... mechanical specifications incorporated in any

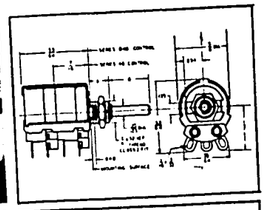
COMPOSITION-ELEMENT CONTROLS (Series 48)

5/8 DIA. FOR MINIATURIZATION

Linear, 500 ohms to 5 megohms.
Taper, 2,500 ohms to 2.5 megohms; 10% resistance at 50% C.W. rotation.
Rated at 0.2 watt for linear units.
300° rotation.
Shaft locking device may be incorporated upon request.
Single and multiple units available.

Engineering Bulletin No. 121



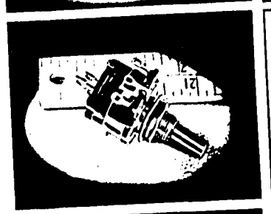


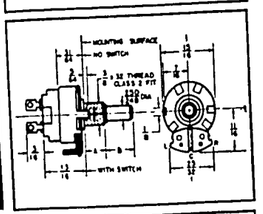
COMPOSITION-ELEMENT CONTROLS (Series 47)

15/16 DIA.

Linear, 500 ohms to 5 megohms.
Tapered, 1,000 ohms to 5 megohms.
Rated at 0.25 watt for linear units.
Standard taps at 30% or 70% of effective rotation.
300° rotation without switch; 330° with switch.

Engineering Bulletin No. 117





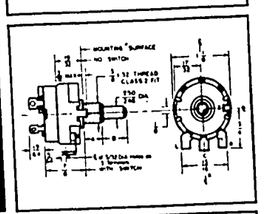
COMPOSITION-ELEMENT CONTROLS (Series 37)

1-1/8 DIA.

Linear, 500 ohms to 10 megohms.
Tapered, 1,000 ohms to 10 megohms.
Rated at 0.5 watt for linear units.
Standard taps at 37½%, 50% and 62½% of effective rotation.
300° rotation without switch; 330° with switch.

Engineering Bulletin No. 112



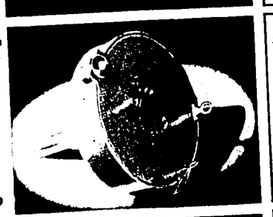


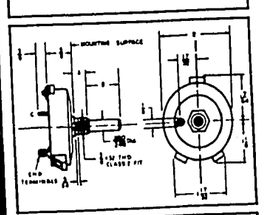
COMPOSITION-ELEMENT CONTROLS (Series 51)

2" DIA., HI-VOLTAGE, HI-RESISTANCE

Resistance range, 5,000 ohms to 50 megohms for linear units.
Rated at 1 watt.
Insulation, 10,000 volts D.C. to ground, 4,000 volts maximum across end terminals.

Engineering Bulletin No. 119



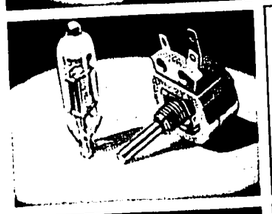


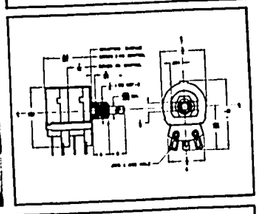
WIRE-WOUND CONTROLS (Series 49)

¾ DIA. FOR MINIATURIZATION

Linear, 10 to 10,000 ohms.
Rated at 1 watt.
Mechanical and Electrical rotation 300°.
360° Mechanical rotation available. Max. 355° Electrical.
Shaft locking device may be incorporated.
In single or multiple units.

Engineering Bulletin No. 104





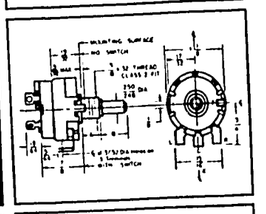
WIRE-WOUND CONTROLS (Series 43)

1-1/8 DIA.

Linear, 1 to 10,000 ohms.
Tapered, submit your requirements.
Rated at 2 watts, for linear units.
Mechanical rotation 300°. Electrical 280° without switch; 260° with switch.

Engineering Bulletin No. 116



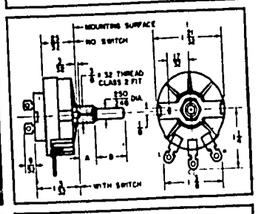


WIRE-WOUND CONTROLS (Series 58)

Linear, 1 to 50,000 ohms.
Tapered, 5 to 25,000 ohms.
Non-inductive 1 to 12,000 ohms, linear only.
Linear, 3 watts.
Mechanical rotation 300°. Electrical 280° without switch; 240° with switch.

Engineering Bulletin No. 118

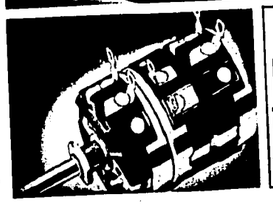


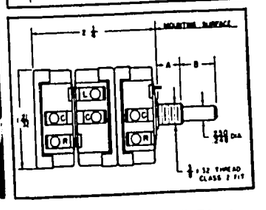


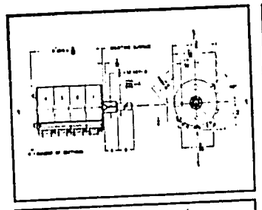
CONSTANT-IMPEDANCE PADS (Series CIT-58)

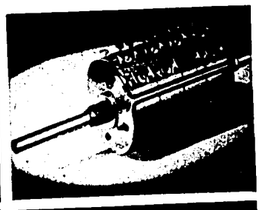
Attenuation zero to 30 db in first 90% of C.W. rotation, approx. linear. Infinite attenuation reached in last 10%. Impedance range from 2 to 10,000 ohms, standard values. Refer to bulletin. 2.5 watts continuous DC rating. Series CIB rated at 10 watts. "L" pads, Bridged "T" pads, Bridged "H" pads, available.

Engineering Bulletin No. 102, and Bulletin No. 111





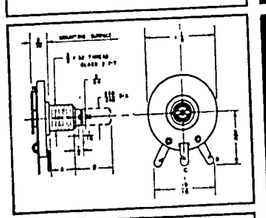


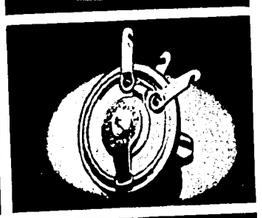


HIGH-PRECISION CONTROLS (Series 42a)

Up to 18 sections in one unit assembly. Single shaft. No back lash. Linear: 10 to 100,000 ohms standard. Max. resistance: 350 ohms per degree of rotation. Tapered, submit your requirements. Linearity up to ±0.5%. Power rating for linear units, 3 watts per section. Standard rotation: Mech, 290°; Elec. 280°.

Engineering Bulletin No. 142



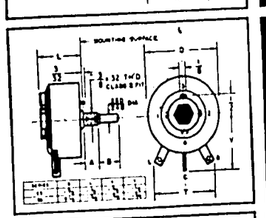


WIRE-WOUND CONTROLS (Series MH)

"HUMDINGER" **

Ultra-compact potentiometer or rheostat.
2 to 1,000 ohms, only linear resistance feasible. Rating, 1 watt.
Intermediate taps are special.
Metal dust-proof cover available.

Engineering Bulletin No. 103

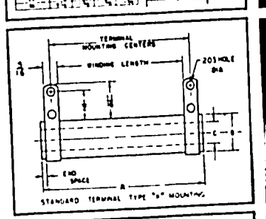


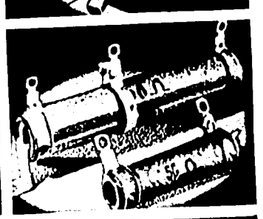


POWER RHEOSTATS (Series 25 & 50)

Full power rating even at ⅓ of rotation.
25-watt, ½ to 2,500 ohms; 50-watt, ½ to 5,000 ohms. Linear and tapered.
Tandem units available.
25G and 50G approved under MIL-R-6749 specifications.

Engineering Bulletin No. 115



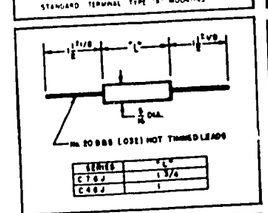


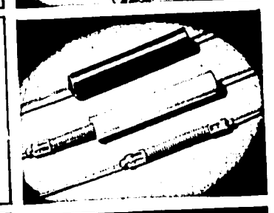
"GREENOHM" * POWER RESISTORS

Fixed, 4 to 200 watts; adjustables, 10 to 200 watts.
- 5% for values of 50 ohms and higher.
- 10% for values below 50 ohms.
- 1% special.

Intermediate taps, upon order. Widest choice of mountings and terminals. Non-inductive units made to specifications.

Engineering Bulletin No. 113

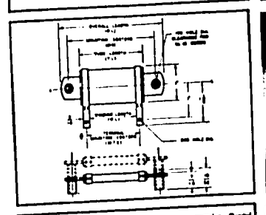


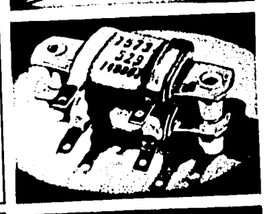


"GREENOHM JR." ** POWER RESISTORS (Series GJ)

C7GJ, 7-watt, 0.5 to 5,000 ohms.
C4GJ, 4-watt, 0.5 to 1,000 ohms.
Standard resistance tolerance ± 10%.
Breakdown voltage between surface and resistance element, 2500 volts A.C.
Ceramic tube casing. Inorganic materials throughout. Pigtail terminals, standard.

Engineering Bulletin No. 110



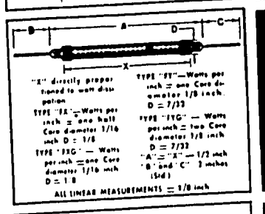


POWER RESISTORS (Series ZT)

STACK-MOUNTING

30, 40, 55, 65 and 75 watt ratings.
0.5 to 65,000 ohms maximum.
Mounting collars provide adequate free-air circulation for maximum heat radiation.

Engineering Bulletin No. 113

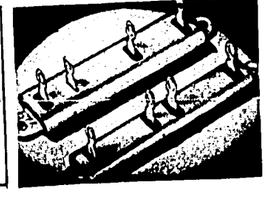




"GLASOHM" * FLEXIBLE RESISTORS (Series FXG and FYG)

Used as resistors and also as miniature heating elements.
Ratings per winding inch: FXG, 1-watt; FYG, 2-watt.
Clinch-grip ferrule ends with bare pigtail terminals. Other terminals, special.

Engineering Bulletin No. 105





METAL-CLAD MOLDED RESISTORS (Series MMB)

From 5 ohms to 15,000 ohms per winding inch.
Ratings: 5 watts per winding inch, mounted on metal. 2½ watts in free air.
Intermediate taps. Horizontal and vertical mountings.

Engineering Bulletin No. 109

CLAROSTAT

MFG. CO., INC.

DOVER, N. H.

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Printed in U.S.A.

CLAROSTAT

Large wall chart on ... bulletins of particular ... Submit your ... problems ... of our ...

History Making Issues

The secret ingredient in the amazing progress of radio-electronics is the speedy exchange of ideas through engineering publications. Radio scientists have made history by this idea-sharing method of advancement, through publishing.

Color Television • Transistors • UHF • Computers

Examples of this kind of publishing are the now historic issues of "Proceedings of the I.R.E." on "Color Television," October 1951; and "Transistors," November 1952; and "Ultra High Frequencies," January 1953. Each of these issues provided the practical and the research engineer with an "ahead-of-its-times" text book on those electronic developments which set the pattern for radio manufacturing for the next decade. Only a reliable engineering society journal could do this kind of publishing job.

Radio has developed in three stages: First came audible communication, the wireless "dot and dash," now perfected to the beauty of high-fidelity sound. Next came sight in images on the cathode-ray tube, with the glories of color already in development. Sound, sight, and now "thinking" achieved through radio controls and the electronic computer. In October 1953, "Proceedings of the I.R.E." devotes another of its history making issues to the Electronic Computer.

A publishing supremacy, all its own, has been won by "Proceedings of the I.R.E." It holds a place never surpassed either in volume or vital value of its editorial content. The result has logically been a high quality reader — the thinking engineer, whose approval you must win. To sell the radio industry, tell the radio engineer!



"Proceedings of the I·R·E"

Published by the

INSTITUTE OF RADIO ENGINEERS

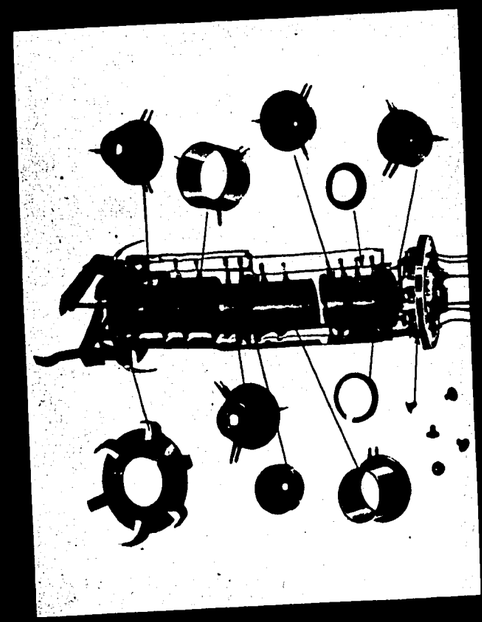
Advertising Department

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BRyant 9-7550

Radio • Communications • Television • Electronics

Johnson & Hoffman Mfg. Company Expands Facilities to Meet Increasing Demands for Cathode Ray Tube Parts & Electronic Stampings



This gun features Johnson & Hoffman parts and sub-assemblies which have been especially developed for this and other related designs.

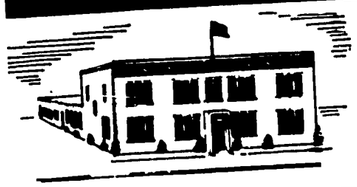
All leading Cathode Ray Gun and Tube manufacturers are specifying Johnson & Hoffman parts and sub-assemblies for their product requirement comprising Electro-Magnetic, Electro-Static, Internal Focusing Designs, both in Glass Post and Ceramic Constructions.

Our new modern fully staffed plant together with the latest in production equipment enables us as a completely independent supplier to quickly provide you with the highest quality parts either from our extensive line of standard designs or special parts engineered and designed to your requirements. With our completely equipped tool and die department in conjunction with high speed automatic production facilities together with a greatly expanded assembly section, we are prepared to undertake your most critical part and component problem from design to completed product.

Johnson & Hoffman Anodes, Grids and Lens Assemblies are produced on precision deep drawing machines from high quality strip material. They are entirely free of contaminent lodging seams and crevices. The absence of seams plus the exclusive high degree of smoothness and surface lustre obtained by our special processing procedures make them particularly desirable for tubes operating under high voltage conditions.

Depend on Johnson & Hoffman for your complete source of precision crafted parts and components.

Your inquiries will receive prompt and courteous consideration. Our service begins with your needs and ends with your complete satisfaction.



Johnson & Hoffman Mfg. Co.

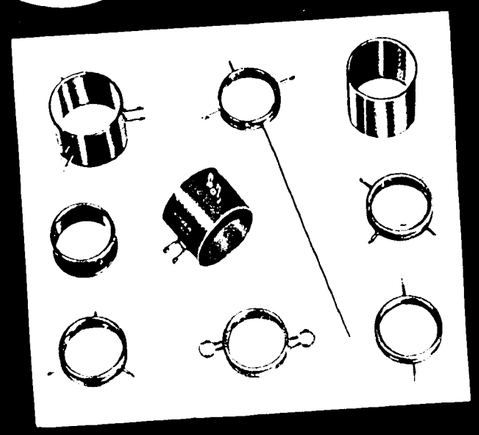
31 East Second Street, Mineola, L. I., N.Y.

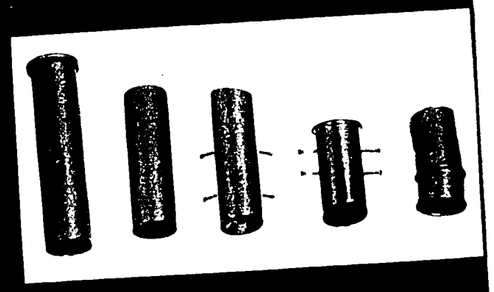
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ELECTRONIC AND MECHANICAL ENGINEERING CONSULTING SERVICE AVAILABLE

ELECTRONIC J&H PARTS

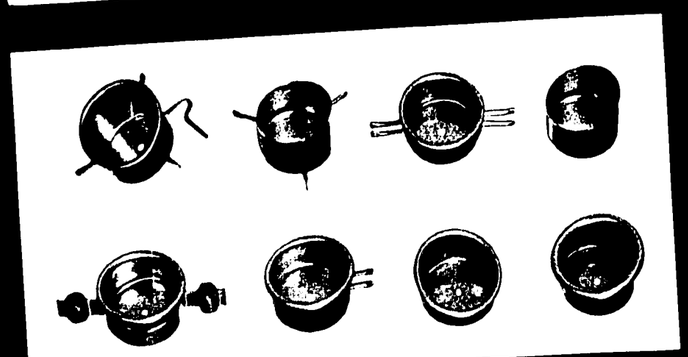
Preferred Electronic Parts • Components by J & H ••





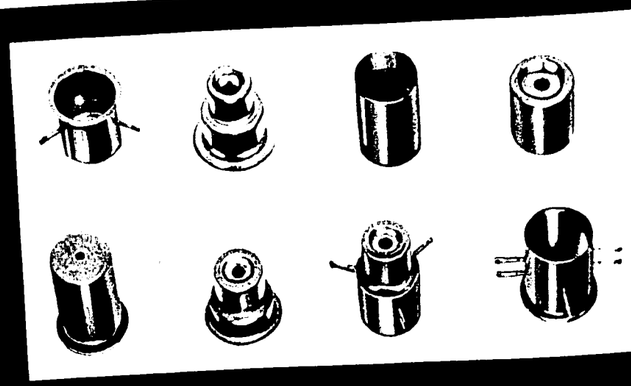
ANODES and ANODE ASSEMBLIES

FOCUS RINGS and ASSEMBLIES



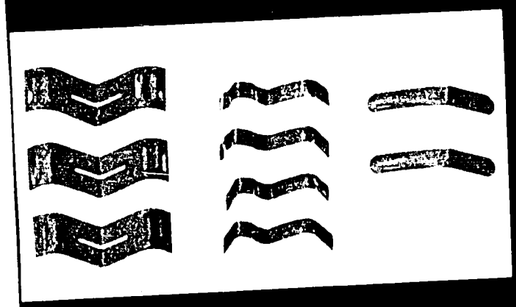


No. 2 GRIDS and NO. 2 GRID ASSEMBLIES

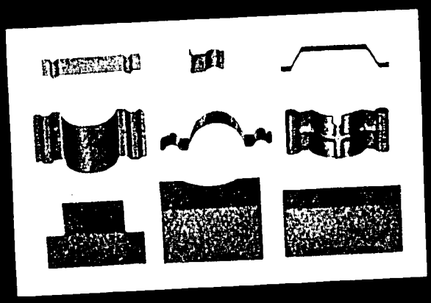


TOP and BOTTOM FOCUS LENS and LENS ASSEMBLIES

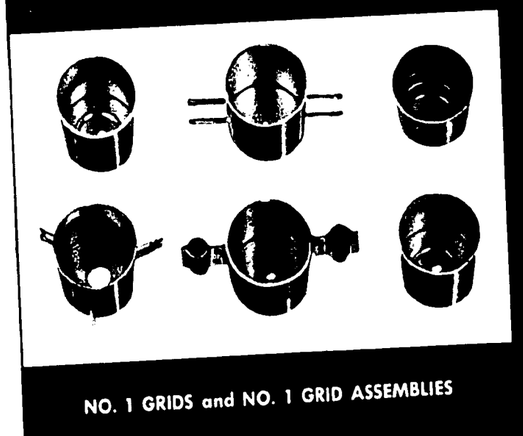
ELECTRONIC AND MECHANICAL ENGINEERING CONSULTING SERVICE AVAILABLE



TOP APERTURE BULB SPACER SNUBBERS

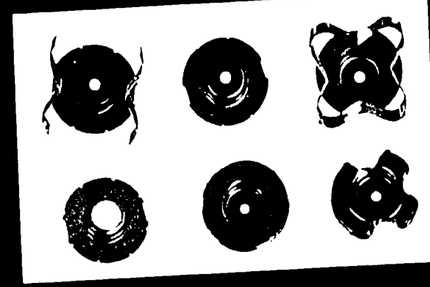


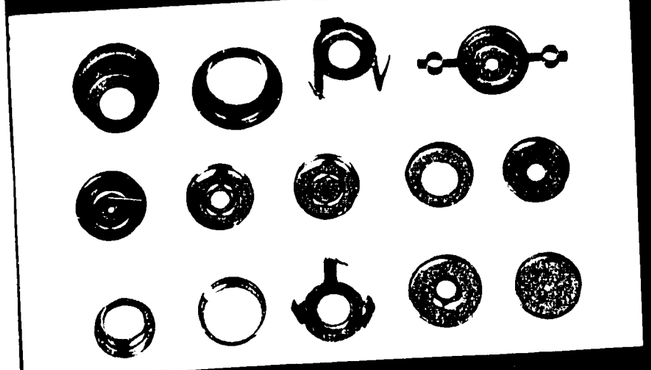
ANODE and GRID SUPPORT STRAPS, DEFLECTION PLATES, CONNECTORS



NO. 1 GRIDS and NO. 1 GRID ASSEMBLIES

TOP APERTURE BULB SPACERS





APERTURE CUPS, CATHODE SPACERS and RETAINERS



ELECTRONIC J&H PARTS

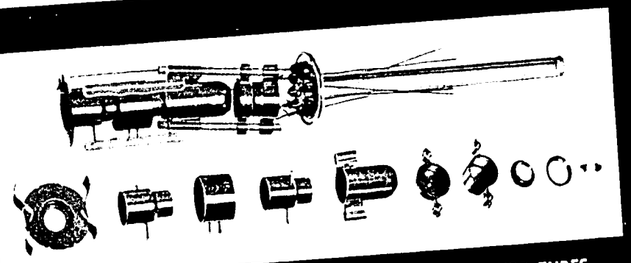
Johnson & Hoffman Manufacturing Co.

31 East Second Street, Mineola, L. I., N. Y.

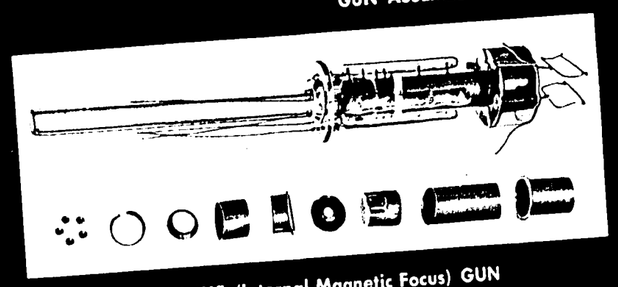
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ELECTRONIC AND MECHANICAL ENGINEERING CONSULTING SERVICE AVAILABLE

Johnson & Hoffman gun parts lend themselves to present Color Tube gun designs. We are also actively engaged in development work on special parts for advanced color tube gun applications.

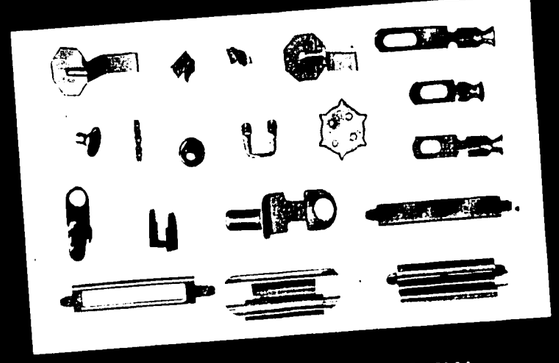


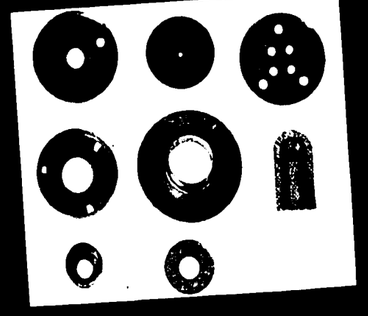
GUN ASSEMBLY FOR ELECTRO-STATIC TYPE TV PICTURE TUBES.

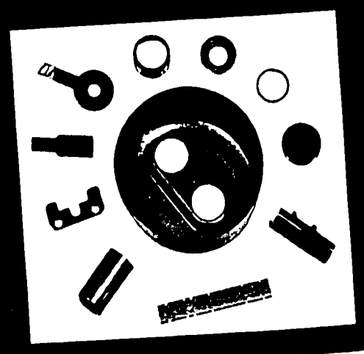


NEW IMF (Internal Magnetic Focus) GUN



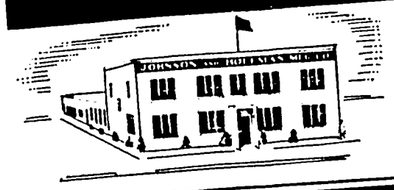






STANDARD PARTS AND SPECIAL PRECISION STAMPINGS

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TUBE TESTING AND PROCESSING EQUIPMENT: Peak Emission sets up to 2,000 amperes, 25KV. Hydrogen Thyratron pulsers for all existing types. Characteristic Test Sets for all JAN tube types. Aging and life-test racks. Rectifier test sets. Interelectrode Capacitance bridges.

RADAR EQUIPMENT: Modulators. Magnetron signal sources. Pulsed-Cavity sources.

LABORATORY INSTRUMENTS: Extended-range synchroscopes. Sweep calibrators. Special Amplifiers. Pulse Transformer test sets. Pulse generators.

*AVERAGE DELIVERY CYCLE, from purchase order to final installation, 8 weeks.

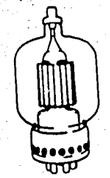
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Write, Wire, Phone — quotes in 48 hours if required.

DOUGLAS LABORATORIES, Inc.

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4-65A
4-125A
4-250A
4-400A
4-1000A
4PR60A
4W20000A
4X150A
4X150D
4X150G
4X500A
4X500F



TRIODES

2C39A
3W5000A3
3W5000F3
3W10000A3
3X2500A3
3X2500F3
3X3000A1
3X3000F1
6C21
25T
35T
35TG
75TH
75TL
100TH
100TL
152TH
152TL
250TH
250TL
304TH
304TL
450TH
450TL
592/3-200A3
750TL
1000T
1500T
2000T

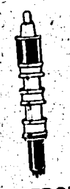
PENTODE

4E27A/5-125B



RECTIFIERS

2-01C
2-25A
2-50A
2-150D
2-240A
2-2000A
KY21A
RX21A
250R
253
866A
872A
8020 (100R)



KLYSTRONS

3K20, 000LA
3K20, 000LF
3K20, 000LK
3K50, 000LA
3K50, 000LF
3K50, 000LK

TRANSMITTING TYPE TUBES

	EIMAC TUBE TYPE	MAXIMUM RATINGS: Plate Dissipation Watts	Plate Voltage	Plate Current Milliamperes	Grid Dissipation Watts	Screen Voltage	Screen Dissipation Watts	ELECTRICAL CHARACTERISTICS: Filament, Volts	Filament, Amperes	Amplification Factor	Transconductance umhos
TETRODES	4-65A	65	3000	150	5	400	10	6.0	3.5	5	4000
	4-125A	125	3000	225	5	400	20	5.0	6.5	5.9	2450
	4-250A	250	4000	350	10	600	35	5.0	14.5	5.1	4000
	4-400A	400	4000	350	10	600	35	5.0	14.5	5.1	4000
	4-1000A	1000	6000	700	25	1000	75	7.5	21	7.0	10,000
TRIODES	4PR60A	60	20,000	†	†	1500	8	26	2.25	†	†
	4W20,000A*	20,000	8000	15,000	60	1500	200	10	30	5.5	75,000
	4X150A*	150	1250	250	2	300	12	6.0	2.6	5	12,000
	4X150D*	150	1250	250	2	300	12	26.5	.57	5	12,000
	4X150G*	150	1250	250	2	300	15	2.5	6.25	5.0	12,000
	4X500A*	500	4000	350	10	500	30	5.0	13.5	6.2	5200
	4X500F*	500	4000	350	10	500	30	5.0	13.5	6.2	5203
	2C39A	100	1000	125‡	2	...	..	6.3	1.0	100	22,000
	3W5000A3	5000	6000	2500	150	...	..	7.5	51	20	20,000
	3W5000F3	5000	6000	2500	150	...	..	7.5	51	20	20,000
	3W10,000A3	10,000	5000	10,000	100	...	..	10	30	20	55,000
	3X2500A3	2500	6000	2500	150	...	..	7.5	51	20	20,000
	3X2500F3	2500	6000	2500	150	...	..	7.5	51	20	20,000
	3X3000A1*	3000	6000	2500	50	...	..	7.5	51	5	11,000
	25T	25	2000	75	7	...	..	6.3	3.0	24	2500
	35T	50	2000	150	15	...	..	5.0	4.0	39	2850
	35TG	50	2000	150	15	...	..	5.0	4.0	39	2850
	6C21	300	30,000	15	55	...	..	8.2	16.8	†	5800
	75TH	75	3000	225	16	...	..	5.0	6.25	20	4150
	75TL	75	3000	225	13	...	..	5.0	6.25	12	3350
	100TH	100	3000	225	20	...	..	5.0	6.3	38	4500
	100TL	100	3000	225	15	...	..	5.0	6.3	14	3000
	152TH	150	3000	450	30	...	..	5 or 10	12.5 or 6.25	20	8300
	152TL	150	3000	450	25	...	..	5 or 10	12.5 or 6.25	12	7150
	250TH	250	4000	350	40	...	..	5.0	10.5	37	5600
	250TL	250	4000	350	35	...	..	5.0	10.5	14	2650
	304TH	300	3000	900	60	...	..	5 or 10	25 or 12.5	20	16,700
	304TL	300	3000	900	50	...	..	5 or 10	25 or 12.5	12	16,700
	450TH	450	6000	600	80	...	..	7.5	12.0	38	6650
	450TL	450	6000	600	65	...	..	7.5	12.0	18	5000
	592/3-200A3	200	3500	250	25	...	..	10.0	5.0	25	3600
	750TL	750	10,000	1000	100	...	..	7.5	21.0	15	3500
	1000T	1000	7500	750	80	...	..	7.5	15.5	35	9050
	1500T	1500	8000	1250	125	...	..	7.5	24.0	24	10,000
	2000T	2000	8000	1750	150	...	..	10.0	23.5	23	11,000
PENTODE	4E27A/5-125B	125	4000	200	5	750	20	5.0	7.5	5.0	2150

		Frequency Range Mc.	Collector Dissipation Watts	Beam Voltage	Beam Current Amperes	TV Peak Synchronizing Level	CW Power Amplifier
KLYSTRONS	3K20,000LA	470-580	20,000	14,000	1.7	5500	3000
	3K20,000LF	580-720	20,000	14,000	1.7	5500	3000
	3K20,000LK	720-890	20,000	14,000	1.7	5500	3000
	3K50,000LA	470-580	50,000	19,000	2.6	12,000	7200
	3K50,000LF	580-720	50,000	19,000	2.6	12,000	7200
	3K50,000LK	720-890	50,000	19,000	2.6	12,000	7200

*External Anode requiring forced-air cooling
**Water-cooled
†Pulse Modulator
‡Cathode Current

EITEL-McCULLOUGH, INC.
San Bruno, California

EIMAC TUBES!

Years of efficient, dependable performance have given Eimac tubes a product-reputation difficult to surpass. That is why the criteria of good design of any electronic equipment are products trademarked "Eimac."

RECTIFIERS

TYPE	FILAMENT VOLTAGE	FILAMENT CURRENT AMPS.	PEAK INVERSE VOLTAGE	CURRENT AMPS. PEAK PLATE	AVERAGE PLATE CURRENT MA.
HIGH VACUUM TYPES					
2-01C	6.3	0.4	1,000	0.010	
2-25A	6.3	3.0	25,000	1.0	50
2-50A	5.0	4.0	30,000	1.0	75
2-150D	5.0	13.0	30,000	3.0	250
2-240A	5.0	12.0	40,000	4.0	500
2-2000A	7.5	25.0	75,000	12.0	750
250R	10.0	10.5	60,000	2.5	250
253	5.0	10.0	15,000	2.5	350
8020(100R)	5.0	6.5	40,000	1.5	100
MERCURY VAPOR TYPES					
*KY21A	2.5	10.0	11,000	3	750
RX21A	2.5	10.0	11,000	3	750
866A	2.5	5.0	10,000	1	250
872A	5.0	7.5	10,000	5	1250

*Grid Controlled

VACUUM CAPACITORS

TYPE	VARIABLE CAPACITY	RATING RF PEAK	TYPE	FIXED CAPACITY	RATING RF PEAK
VVC60-20	10-60 mmfd	20-KV	VC6-20	6 mmfd	20-KV
	Split Stator		VC6-32	6 mmfd	32-KV
VVC2-60-20	5-30 mmfd	40-KV	VC12-20	12 mmfd	20-KV
	Parallel		VC12-32	12 mmfd	32-KV
	20-120 mmfd	20-KV	VC25-20	25 mmfd	20-KV
	Split Stator		VC25-32	25 mmfd	32-KV
VVC4-60-20	10-60 mmfd	40-KV	VC50-20	50 mmfd	20-KV
	Parallel		VC50-32	50 mmfd	32-KV
	40-250 mmfd	20-KV			

AIR SYSTEM SOCKETS

TYPE	FOR USE WITH TUBE TYPE
4X150A/4000	4X150A or 4X150D
4X150A/4010 (Grounded Cathode Socket)	4X150A or 4X150D
4-400A/4000	4-400A
4-1000A/4000	4-1000A

PREFORMED CONTACT FINGER STOCK

WIDTH
17/32"
31/32"
1-7/16"

A prepared strip of spring material slotted and formed into a series of fingers designed to make sliding contact.

HEAT DISSIPATING CONNECTORS

TYPE	HOLE DIA.
HR-1	.052
HR-2	.0625
HR-3	.070
HR-4	.1015
HR-5	.125
HR-6	.360
HR-7	.125
HR-8	.570
HR-9	.570
HR-10	.500

IONIZATION GAUGE

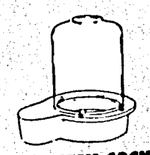
100 IG

An electronic vacuum pressure gauge. Filament voltage 3.5 to 7.5 volts.

VACUUM SWITCH

VS-2

Single pole double throw switch within a high vacuum adaptable for high voltage switching. Contact spacing .015". Switch will handle R-F potentials as high as 20 Kv. In DC switching will handle approximately 1.5 Amps. at 5 Kv.



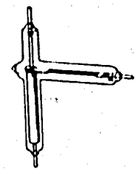
AIR SYSTEM SOCKETS

4-400A/4000
4-400A/4006*
4-1000A/4000
4-1000A/4006*
4X150A/4000
4X150A/4006*
4X150A/4010
*Replacement Chimneys



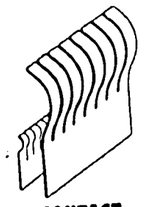
ACCESSORIES

HR Heat dissipating connectors
Preformed Contact Finger Stock



VACUUM SWITCH

VS-2
12V Coil
24V Coil



CONTACT FINGER STOCK

17/32"
31/32"
1-7/16"

VARIABLE VACUUM CAPACITORS

VVC60-20
VVC2-60-20
VVC4-60-20

ION GAUGE

100 IG Ion gauge

VACUUM CAPACITORS

VC6-20
VC6-32
VC12-20
VC12-32
VC25-20
VC25-32
VC50-20
VC50-32

Eimac TUBES

COMPLETE DATA AVAILABLE UPON REQUEST

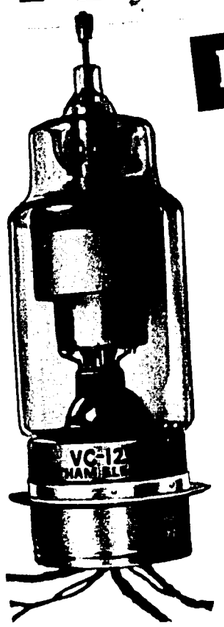
EITEL-McCULLOUGH, INC.
San Bruno, California

CHATHAM
ELECTRONIC TUBES

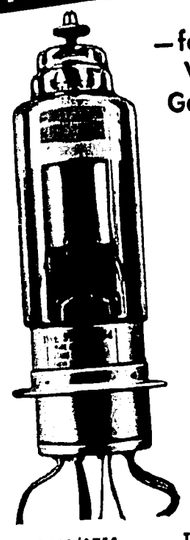
Hydrogen Thyratrons
—for Pulse Voltage Generation

ELECTRICAL DATA*				
Type	VC-1258	5949/1907	5948/1754	VC-1257
Maximum Peak Forward Anode Potential	1000 volts	25000 volts	25000 volts	38000 volts
Maximum Peak Anode Current	20 amps	500 amps	1000 amps	2000 amps
Maximum Average Anode Current	0.05 amps	0.50 amps	1.0 amps	2.0 amps
Maximum Heating Factor (epy x prr x ib)	1.0×10^8	6.25×10^9	9.0×10^9	—
Nominal Filament Power	12.6 watts	95 watts	190 watts	230 watts
Hydrogen Reservoir	No	Yes	Yes	Yes

*More detailed information on electrical and mechanical data will be supplied on request.



TYPE VC-1257
Hydrogen filled, zero bias thyratron with hydrogen generator for generation of pulse power up to 40 megawatts.



TYPE 5948/1754
Hydrogen filled, zero bias thyratron with hydrogen reservoir for generation of peak pulse power up to 12.5 megawatts.



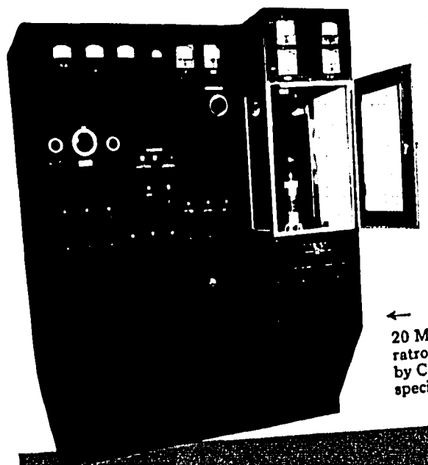
TYPE 5949/1907
Hydrogen filled, zero bias thyratron with hydrogen reservoir for generation of peak pulse power up to 6.25 megawatts.



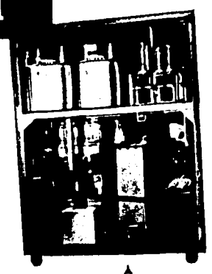
TYPE VC-1258
Zero bias miniature hydrogen thyratron for the generation of peak pulse power up to 10 KW.

• A NEW CONCEPT OF HYDROGEN THYRATRON DESIGN! The tubes illustrated represent a departure from conventional hydrogen thyratron designs and are a result of several years of concentrated development work. They are primarily employed in the generation of peak voltages with durations in the order of microseconds.

Custom-built Electronic Equipment

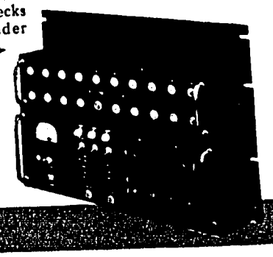


CHATHAM specializes in the development, design, and construction of custom-built electronic equipment to exactly meet customers' requirements. Our capable staff of engineers will furnish prompt estimates or, if desired, will call to discuss your problem personally. Call or write today.



5 Megawatt radar modulator built by CHATHAM to rigid government standards.

Pulse life test equipment built by CHATHAM checks receiver type tubes under pulse conditions. →



← 20 Megawatt Hydrogen Thyratron Test Equipment built by CHATHAM to customers' specifications.

ELECTRONICS
AND EQUIPMENT

Electronic Tubes



Ruggedized Type Tubes

❖ The following tubes fully conform to JAN specifications and can be supplied promptly, usually direct from stock:

5R4WGY 2D21W
6AL5W OC3W
6H6WGT OD3W
25Z6WGT 2050W



TYPE 719-A HIGH VACUUM CLIPPER DIODE

This tube is used primarily for clipper diode service in hard tube modulator circuits. Filament 7 volts, 7 amps... Inverse peak anode voltage 25 kv, Max., peak anode current 10 amps, Max., anode dissipation 75 watts.



TYPE 1Z2 RECTIFIER

A small bulb high voltage vacuum rectifier. Low cathode heating power and low dielectric losses make tube suitable for radio frequency supply circuits. Filament 1.5 volts, .290 amps... Inverse peak anode voltage 20,000, average plate current 2 ma.... peak plate current 10 ma.



TYPE 1B46 REGULATOR

A cold cathode glow discharge tube designed for voltage stability. DC operating voltage 82 volts, operating current range 1 ma minimum, 2 ma maximum. Regulation 3 volts.



TYPE 395-A COLD CATHODE GAS TRIODE

Requires no filament supply and is used in many grid controlled rectifier and relay applications. Maximum D.C. anode current— 10 ma. Maximum D.C. anode voltage—150 volts



TYPE 4B32 RECTIFIER

A rugged half-wave Xenon filled rectifier. Operates in any position throughout an ambient temperature range of −75°C to +90°C. Filament 5 volts, 7.5 amp... Inverse peak anode voltage 10,000 average anode current 1.25 amps.



TYPE 394-A THYRATRON

A Mercury vapor and Argon filled thyratron for grid controlled rectifier service. Operates over wide ambient temperature range. Heater 2.5 volts, 3.2 amps... Inverse peak anode voltage 1250, average anode current 640 ma.



TYPE 3B28 RECTIFIER

This rugged half-wave Xenon filled rectifier will operate in any position and throughout an ambient temperature range of −75°C to +90°C. Filament 2.5 volts, 5.0 amps... Inverse peak plate voltage 10,000, average anode current .25 amp.



Chatham Vacuum Switches

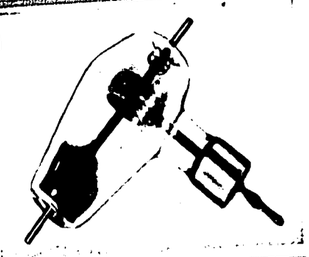
TYPE 1S22 (illustrated) is a mechanically actuated, single-pole, double-throw, glass vacuum switch. This and other types can be supplied.

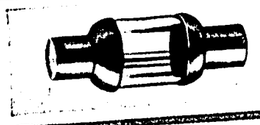
SPECIFICATIONS

HOLD OFF VOLTAGE: Internal—10,000 volts rms; External* (at 27,000 feet altitude)—10,000 volts rms; External* (at 40,000 feet altitude)—7,500 volts rms.

INTERRUPTING RATING, RESISTIVE LOAD: 1,000 operations life at 10,000 v, ac, rms—10 amp, ac, rms; 1,000,000 operations life at 10,000 v, ac, rms — 2 amp, ac, rms; 500,000,000 operations life at 10,000 v, ac, rms—0.1 amp, ac, rms.

NET WEIGHT (approx.)..... 2 ozs.
MAXIMUM LENGTH (overall)..... 3⅜ Ins.
MAXIMUM WIDTH (overall)..... 4½ Ins.
MAXIMUM THICK. (overall)..... 1½ Ins.
*at 50% humidity





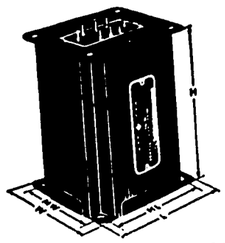
HIGH VOLTAGE VACUUM FUSES

Can be supplied by Chatham to exact customers' specifications if ordered in adequate quantity. Call or write for full particulars and quotes.



CHATHAM ELECTRONICS CORP.
EXECUTIVE AND GENERAL OFFICES: LIVINGSTON, NEW JERSEY
PLANTS AND LABORATORIES: NEWARK AND LIVINGSTON, NEW JERSEY

Kenyon "T" LINE TRANSFORMERS



DIMENSIONS OF "T" LINE TRANSFORMERS

Case No.	MOUNTING DIMENSIONS ML	MW	OVERALL DIMENSIONS Length (L)	Width (W)	Height (H)
1A	2-1/32	1-9/16	2-7/16	2	2⅞
2A	2⅛	1-13/16	2¾	2⅜	3-3/16
3A	2-7/16	1-15/16	3-1/16	3	3⅝
4A	3⅞	2-7/16	4½	3⅞	3⅞
5A	4-5/16	3-3/16	5	4½	5
5½A	4-5/16	3-27/32	5	5⅛	5
6A	4-5/16	4½	5	5-3/16	6⅜
7A	5½	4-5/16	6-5/16	5-11/16	7⅛
8A	5¾	4-13/16	6-9/16	6⅝	7-3/16
9A	6-15/16	5¾	7¾	8¼	10⅝
10A	8⅝	7-11/32	9½		

LOW IMPEDANCE SOURCE TO GRID TRANSFORMERS

Type No.	From	Primary Ohms	Secondary Ohms	Case No.	Weight lbs.	Weight ozs.	List Price
T-2 (Hum bucking type)	Any line	500-333-250-200-125-50	80,000 Single Grid	1A	1	1	$11.75
T-3 (Hum bucking type)	Any line	500-333-250-200-125-50	80,000 P.P. Grids	1A	1	1	12.10
T-6 (Multiple Shielded)	Any line	500-333-250-200-125-50	20,000 Single Grid	1A	1		15.95

LINE-TRANSFORMERS — LINE TO LINE AND LINE TO VOICE COIL

Type No.	Primary Ohms	Secondary Ohms	Maximum Level	Case No.	Weight lbs.	Weight ozs.	List Price
T-26 (Hum bucking type)	500-333-250-200-125-50	500-333-250-200-125-50	+ 24 D.B.	1A	1	1	$10.75
T-28	500-200	15-8-4	30 watts	4A	5	10	17.80

DRIVER TRANSFORMERS

Type No.	Primary to Match	Class AB or Class B Tubes	Ratio (pri. to ½ Sec.)	Case No.	Weight lbs.	Weight ozs.	List Price
T-251	Single 53, 6A6, 6N7, 56, 6C5	53, 6A6, 6N7	2.3:1	2A	1	14	$ 9.75
T-252	Single 30, 49, 89	19, 30's, 49's	1.7:1	1A		13	8.40
T-255	P.P. 56, 6C5, 53, 6N7	6L6's	2.9:1	2A	1	14	10.55
T-271	P.P. 45's, 2A3's, 6F6's	6L6's, 809's, TZ40's	3.7:1	3A	2	13	13.65
T-264	7 Watts	{ Any Line or Single or Push }		3A	2	12	14.55
T-263	18 Watts	{ Pull Plates to Class B Grids }		4A	5	12	21.80

PREAMPLIFIER OUTPUT TRANSFORMERS

Type No.	From	Secondary Ohms	Case No.	Weight lbs.	Weight ozs.	List Price
T-101	Single 56, 76, 6C5	200-500	1A	1	4	$ 8.35
T-102	P.P. 56, 76, 6C5	200-500	1A	1	4	8.90

OUTPUT TRANSFORMERS TO 500-200 OR 15-8-4 OHMS

Type No.	From	Primary Ohms	Case No.	Weight lbs.	Weight ozs.	List Price
T-104	Single 2A5, 6F6, 42, 47, 89	7,000	2A	1	14	$11.20
T-105	Class "A," P.P. 2A5's, 6F6's, 42's, 47's, 89's	14,000	2A	2		12.15
T-301	Class "A," P.P. 6L6's, Class AB 45's, 2A3's	5,000 or 3,000	4A	4	5	17.95

Type No.			Case No.	Weight lbs.	Weight ozs.	List Price
T-108	Will match any set of Push-Pull or Push-Pull Parallel or a single plate to 500-200 or speaker voice-coils. Low impedance connection for speaker voice coils range from .5 to 25 ohms.	15 watts	3A	2	13	$13.80
T-109		30 watts	4A	5	2	19.40

KEN-O-TAP MODULATION TRANSFORMERS

Type No.	Audio Watts	Class C. W. Sec.	Max. Pri. D.C.	Max. Sec. D.C.	Max D.C. Voltage	Primary Range Ohms	Secondary Range Ohms	Case No.	Weight lbs.	Weight ozs.	List Price
T-489	15	30	120	120	600	2000-20000	200-20000	3A	2	13	$13.15
T-493	40	80	250	250	750	2000-20000	200-20000	4A	5	10	19.10
T-494	75	150	250	300	1250	2000-20000	200-20000	5A	9		25.95
T-441	125	250	250	250	1500	2000-20000	200-20000	6A	15	8	36.05
T-496	300	600	250	300	2500	2000-20000	200-19000	8A	26	4	80.60
T-442	600	1200	400	400	3000	500-18000	200-19000	9A	45		90.10
						500-18000	200-19000				

FILAMENT TRANSFORMERS

Type No.	SECONDARY RATING				Case No.	Weight lbs.	Weight ozs.	List Price
T-365	10 V.-4 A. CT.		5000 V. Test		3A	2	13	$11.55
T-361	10 V.-8 A. CT.		5000 V. Test		4A	5	10	18.00
T-384	10, 10.5, 11 V.-5 A. CT.		2000 V. Test		4A	5		16.75
T-386	6.3 V.-3 A. CT.	2000 V. Test	5 V.-4 A. CT.	2000 V. Test	3A	2	13	13.15
T-368	6.3 V.-4 A. CT.	2000 V. Test	6.3 V.-4 A. CT.	2000 V. Test	4A	4	11	17.55
T-376	5 V.-3 A.	2000 V. Test	6.3 V.-4 A. CT. 2000 V. Test		4A	5	10	18.10
T-377	5 V.-3 A. 2000 V. Test	5 V.-6 A. 2000 V. Test	6.3 V.-1 A. CT. 2000 V. Test	6.3 V.5 A. CT. 2000 V. Test	5A	10	1	27.10

6.3 V.-4 A. CT. 2000 V. Test | 6.3 V.5 A. CT. 2000 V. Test

Kenyon Transformer Company

Kenyon "T" LINE TRANSFORMERS

PLATE TRANSFORMERS DESIGNED FOR BOTH CONTINUOUS AND INTERMITTENT DUTY

Type No.	Primary Conn.	Volts Secondary No. 1 D.C.	Volts Secondary No. 1 A.C.	55°C. Rise MA Cont.	55°C. Rise 15 Min. On 15 Min. Off MA Int.		Case No.	Weight lbs.	Weight ozs.	List Price
T-655	High	450	575-0-575	—	340		5A	10	1	$26.30
	Low	350	460-0-460	250	375					
T-656	High	750	925-0-925	—	320		6A	15	9	40.30
	Low	600	740-0-740	270	360					
T-665	High	1250	1470-0-1470	—	270		7A	23	4	60.60
	Low	1000	1180-0-1180	200	300		8A	32	2	66.65
T-666		1250	1460-0-1460	280	350					
							9A	50	8	86.35
T-652	High	1750	2080-0-2080	—	450		10A	82		149.15
	Low	1500	1760-0-1760	320	500					
T-663		2000	2360-0-2360	350	500	Primaries on these items for 115/230 volt series-parallel connection.	10A	82		154.55
T-673	High	3000	3400-0-3400	—	400					
	Low	2500	2840-0-2840	425	500		Spec.	135		219.40
T-674	High	3000	3400-0-3400	—	800					
	Low	2500	2840-0-2840	850	1000					

REACTORS

Type No.	Inductance At Rated D.C.	Rated D.C. MA	D.C. Resistance	Insulation Test R.M.S.	Case No.	Weight lbs.	Weight ozs.	List Price
T-155	280	10	5200	1500	2A	2		$ 8.80
T-156	30	25	800	1500	1A	1	4	6.65
T-157	10	50	200	1500	1A	1	4	6.45
T-153	20	90	360	1500	3A	2	12	9.65
T-154	12.5	165	220	1500	3A	3	2	11.00
T-151	7.5	250	100	1500	4A	5	10	15.05
T-152	7	200	140	1500	3A	2	13	10.40
T-164	13	250	120	1500	5A	10	1	22.15
T-166	10	300	120	1500	5A	10	1	22.15
T-159	10	500	70	1500	6A	15	9	33.80
T-160	11	300	120	3000	5A	10	1	22.15
T-167	11	400	70	3000	6A	15	9	33.80
T-175	10	200	140	5000	4A	5	10	15.15
T-176	10	300	103	5000	5A	10	11	24.60

Type No.	Inductance At Rated D.C.	Rated D.C. MA	D.C. Resistance	Insulation Test R.M.S.	Case No.	Weight lbs.	Weight ozs.	List Price
T-178	10	400	90	5000	6A	15	2	$35.15
T-177	11	500	90	5000	7A	21	1	47.85
T-161	7.5	600	50	5000	7A	21	4	46.40
T-180	10	500	60	7000	8A	26		61.55
T-181	5	1000	18	7000	9A	50	2	90.10
T-515	6/21	165/30	220	1500	3A	2	13	11.00
T-506	4/16	200/30	140	1500	3A	3	10	10.40
T-501	5/15	250/30	100	1500	4A	5	1	15.00
T-510	6/20	300/30	120	1500	5A	10	1	22.15
T-502	6/22	500/50	70	1500	6A	15	9	33.85
T-512	6/22	300/30	103	5000	5A	10	1	22.15
T-521	6/26	500/60	90	5000	7A	21	1	47.80
T-516	6/22	400/50	70	3000	6A	15	9	33.80

OPERATING VOLTAGES FOR 1500 VOLT TEST — UP TO 600 VOLTS D.C. OPERATING VOLTAGES FOR 5000 VOLT TEST — UP TO 2000 VOLTS D.C.
OPERATING VOLTAGES FOR 3000 VOLT TEST — UP TO 1000 VOLTS D.C. OPERATING VOLTAGES FOR 7000 VOLT TEST — UP TO 3000 VOLTS D.C.

FILAMENT TRANSFORMERS

Type No.	Secondary Rating		Case No.	Weight lbs.	Weight ozs.	List Price
T-388	2.5, 5, 6.3 V.-3A	1000 V. Test	1A	1	7	$ 8.75
T-352	2.5 V.-10 A. CT.	5000 V. Test	2A	1	14	9.55
T-360	2.5 V.-10 A. CT.	9000 V. Test	3A	2	13	11.70
T-389	2.5 V.-10 A. CT.	2000 V. Test	4A	4	14	16.80
T-354	5 V.-3 A. CT.	10000 V. Test	2A	1	14	9.35
T-390	5 V.-20 A. CT.	2000 V. Test	5½A	11	9	27.05
T-382	5, 5.1, 5.25 V.-16 A. CT.	2000 V. Test	4A	5	10	18.90
T-351	6.3 V.-3 A. CT.	2000 V. Test	2A	1	14	9.10
T-378	6.3, 7.5 V.-7 A. CT.	2000 V. Test	2A	2	13	12.10
T-387	6.3, 6.45, 6.6 V.-8 A. CT.	2000 V. Test	3A	2	13	12.55
T-395	6.3 V.-20 A. CT.	2000 V. Test	3A	2	13	21.90
T-396	6.3 V.-30 A. CT.	2000 V. Test	5A	9		30.05
T-397	6.3 V.-12 A. CT.	2000 V. Test	5A	12		17.60
			4A	5	12	

PLATE AND FILAMENT TRANSFORMERS

Type No.	High Voltage — Volts	M.A.	Filament No. 1 Volts	Amps	Filament No. 2 Volts	Amps	Filament No. 3 Volts	Amps	Filament No. 4 Volts	Amps	Case No.	Weight lbs.	Weight ozs.	List Price
T-249*	235-0-235	20	6.3 C.T.	0.6	6.3 C.T.	0.9					2A	2		$12.80
T-245*	320-0-320	40	5	2	6.3 C.T.	2					3A	2	13	14.30
T-205*	350-0-350	75	5	2	6.3 C.T.	3					4A	5	10	19.90
T-222*	250-0-250	50	5	2	6.3 C.T.	2					3A	2	13	13.70
T-206*	325-0-325	100	5	3	6.3 C.T.	3	6.3 C.T.	2			5A	9		27.05
T-212	420-0-420	125	5	3	6.3 C.T.	3	2.5 C.T.	4			5A	9	2	27.15
T-244*	425-0-425	165	5	3	6.3 C.T.	3	6.3 C.T.	3			6A	13	11	34.60
T-213	520-110-0-520	180	5	3	2.5	3	6.3 C.T.	3	6.3 C.T.	3	5A	10	6	32.05
T-215	360-125-0-360	200	5	3	2.5 C.T.	3	2.5 C.T.	10	6.3 C.T.	2.1	5A	10	10	32.15
T-247	590-0-590	200	5	3	6.3 C.T.	3	6.3 C.T.	3			5A	12	8	33.10
T-220*	125-0-125	200	5	3	6.3 C.T.	3	6.3 C.T.	3			4A	5		16.75
T-246	625-0-625	250	5	3	6.3 C.T.	3	6.3 C.T.	2			6A	15	9	39.10
T-223	600-0-600	300	5	6	6.3 C.T.	3					6A	15	9	39.60
T-221	High voltage secondary 520-390-105-390-520 to deliver 400 V. D.C. at 400 M.A. and 300 V. D.C. at 160 M.A.										7A	21	10	61.70

Filament No. 1 5 V.-6A | Filament No. 2 5 V.-3A | Filament No. 3 2.5 V.-3A | Filament No. 4 6.3 V. C.T.-4A | Filament No. 5 6.3 V. C.T.-4A

* Indicates unit designed for condenser input. All other units should be used choke input. If used with condenser input, the D.C. current rating of these items should be reduced to 70% of that specified.

POWER LINE AUTO TRANSFORMERS

Type No.	Input	Output	Volt-Amperes Capacity	Case No.	Weight lbs.	Weight ozs.	List Price
T-219	88 to 130 volts	115 volts	500	5A	10	1	$30.00

All power transformers are designed for 115 volt, 50 to 60 cycle operation. For any other voltage 50 to 60 cycle operation add 25% to list prices. For 115 volt 25 cycle operation, add 60% to list prices. For any other voltage 25 cycle operation add 100% to list prices. Case sizes for 25 cycle application are different from those specified for standard 115 volt 50 to 60 cycle operations.

Prices and Specifications Subject to Change Without Notice

840 Barry St., New York 59, N. Y.

B & W TEST INSTRUMENTS

1. DISTORTION METER, *Model 400.* A highly sensitive instrument having a wide range of applications in the audio measurements field. Noise and distortion measurements with a minimum input of .3 volts. Measures harmonics to 45,000 cycles. A variable filter provides single frequency suppression between 30 and 15,000 cycles.

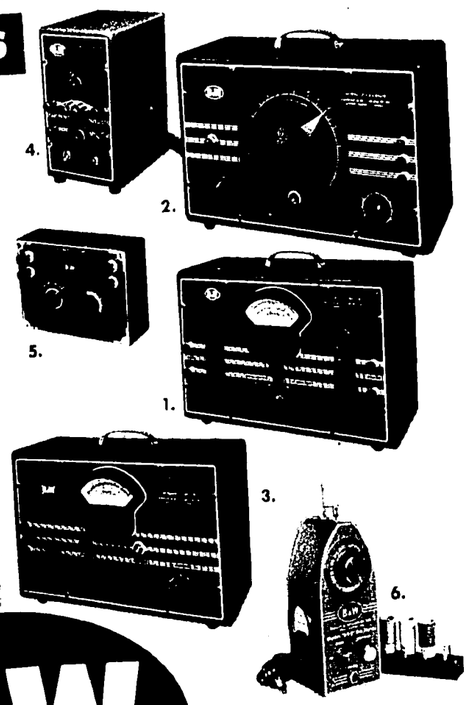
2. AUDIO OSCILLATOR, *Model 200.* This low-distortion field or laboratory instrument provides stable, accurately-calibrated audio frequencies from 30 to 30,000 cycles. 10 volts output—response better than ± 1 d. b. from 30 to 15,000 cycles with 500 ohm load.

3. FREQUENCY METER, *Model 300.* An indispensable instrument for accurate and direct measurement of unknown audio frequencies from 0 to 30,000 cycles in 6 ranges. Operates with a minimum of .25 volts input and any wave form with peak ratios of less than 8 to 1.

4. LINEAR DETECTOR, *Model 404.* Combines R-F detection and audio bridging circuits to complement any distortion meter lacking these features. When combined with the B & W Model 400, noise and distortion measurements can be made from AM carriers or in balanced and unbalanced audio circuits. Freq. range 400 KC to 30 MC.

5. SINE WAVE CLIPPER, *Model 250.* When driven by the Model 200 Audio Oscillator or equivalent it replaces a square wave generator in most tests. Provides a clipped sine wave for accurate analysis of audio circuit characteristics.

6. DIP METER, *Model 600.* A highly sensitive, accurately calibrated grid-dip oscillator, auxiliary signal generator or absorption wave meter. Frequency coverage 1.75 to 260 MC in 5 overlapping bands.



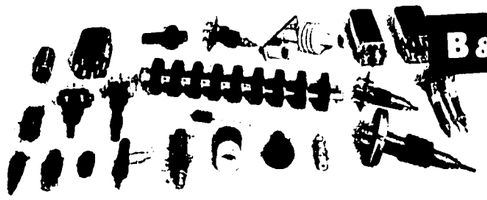
B&W

FILTERS—DISCRIMINATORS B & W high-pass, low-pass, and band-suppression filters and discriminators for R-F or audio filtering meet a broad range of special design and performance requirements. For extremes of temperature and humidity these units are available to meet Mil-T-27 specifications.

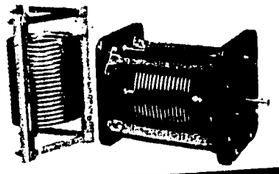


TOROIDS. B & W offers full facilities for the design and manufacture of Toroidal coils in ranges up to 200 KC, with inductance and Q values to specific requirements. Available in hermetically sealed cases, potted or unmounted.

B&W SPECIAL COMPONENTS

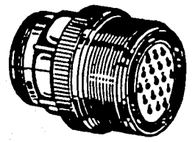


INDUSTRIAL COILS. Single-layer solenoid coils • Universal-wound coils of single, multiple pie, and progressive construction • R-F, I-F, and Oscillator coils • Traps, R-F and Delay line chokes—are but a few of many types B & W is equipped to design and build to meet specific needs.



EDGEWOUND COILS. B & W rotary and fixed heavy-duty edgewound copper inductors are available in stock or custom-built models for high-power transmitters, R-F heating equipment, antenna phasing networks and other radio and electronic apparatus. Various inductance and current ratings are available in both types. Fixed or rotating links can be supplied on special models.

BARKER & WILLIAMSON, INC.
237 Fairfield Ave., Upper Darby, Pa.

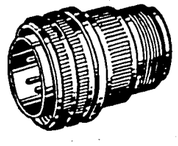

AN-3101 A/B

For your research, prototype, or experimental division . . .

Wilgreen Industries connector specialists will solve your deadline problems with 24 to 48 hour delivery on AN and UG connectors.

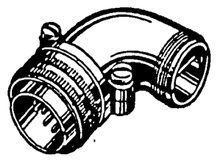
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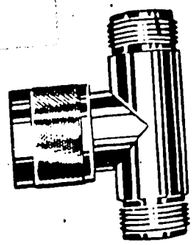
99 MURRAY STREET, NEW YORK 7, N Y • WOrth 4-2490-1-2


AN-3106 A/B

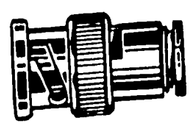
Many manufacturers have come to depend upon our prompt deliveries, from stock, instead of the promised four to sixteen weeks deliveries from the factory.

We carry a complete and diversified stock of AN and UG connectors at all times and are in a position to make deliveries within 8 to 48 hours, thereby eliminating all unnecessary deadline problems due to the lack of AN and UG connectors. A large portion of our inventory meets with current Army-Navy-Air Force specifications. Send for our listings of AN and UG connectors. Quotations submitted on request.


AN-3108 A/B


UG-107 B/U

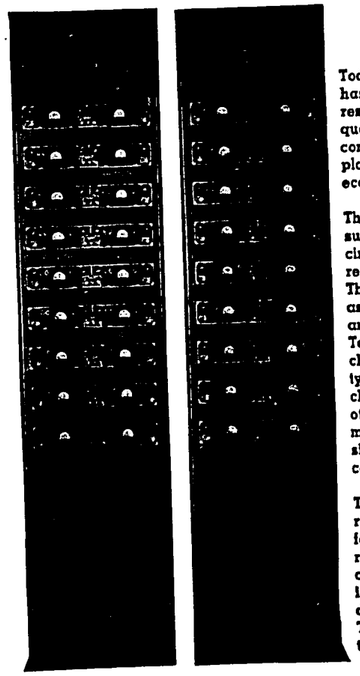

UG-306/U


UG-88/U

PROMPT ATTENTION TO "D.O." ORDERS

Commerce and the Military write THEIR SPECIFICATIONS to...

The Industry's Complete Line of High Quality Communications Equipment



MULTI-CHANNEL FREQUENCY SHIFT TELEGRAPH SYSTEMS

Today's constantly growing demand for greater, faster, more dependable communications has made the need for improved Multiplex equipment more acute than ever before. In response to this need, Northern Radio Company now makes available several new Frequency Shift Multi-Channel Telegraph Systems. Reflecting the heritage of Northern Radio's constant research and precision manufacture over the years, these multi-channel systems display novel concepts of design together with outstanding performance, fidelity and operating economy.

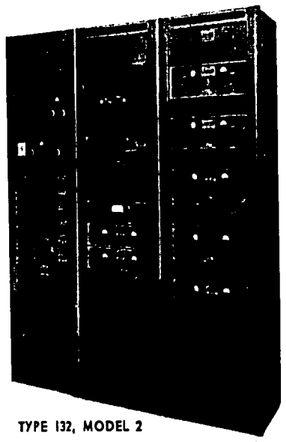
These Multi-Channel Telegraph Systems are audio carrier systems capable of multiplexing such circuits as telephone lines, VHF, UHF, or radio frequency links—or practically any type circuit from which a two-wire audio circuit can be derived. Designed to meet any speed requirements, these systems are fully electronic, without relays or moving parts to wear. They can be used for high-speed printer, Morse or time division Multiplex circuits, as well as such applications as Telemetering, Control Circuits and Servo-Mechanisms. Instantaneous and complete sending end channel control permits any binary code groups, either "Clear Text" or "Cryptographic," to be channelized without need for additional phasing or synchronizing equipment, while paralleling of channels will allow for transmission of other type codes, such as 3 element cable code. The completely independent operation of each channel, including its own power supply, localizes faults to one channel only, leaving other channels unaffected. Individual channel separation filters are used at both transmitting and receiving ends. This arrangement allows for sending telegraph or control signals over a circuit carrying, simultaneously, other forms of intelligence; or for two-way communications on the same line.

The audio frequency shift principle of transmission provides for high fidelity of signal reproduction over a wide range of signal levels as well as under severe noise or interference conditions. Circuit requirements of any speed, shift and center frequency can readily be met. The systems illustrated is for use on printer circuits up to 100 WPM channel capacity. The system arrangement is very flexible, permitting grouping of the basic units into various arrangements of Multiplex Systems. These systems can be made to accommodate a large variety of channel numbers and speeds to meet any individual requirements. The flexibility is further improved by the fact that the racks, power control units, and terminal connection panels are the same for both transmitting and receiving terminals.

RADIO MULTIPLEX SYSTEM

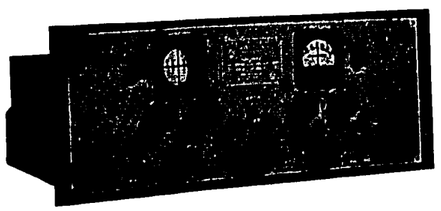
Multi-Channel Equipment for Standard Communications Frequencies.
Adapts existing transmitting and receiving facilities for radio multiplex.

The system illustrated is a four-channel unit, used for transmitting and receiving radio teleprinter, telegraph or other similar low speed keying intelligence, where a limited assigned carrier band-width may be utilized. The two bays at the right are the complete receiving units; left, the transmitter terminal and exciter facilities. The system may be adjusted for band widths of 3 to 12 kc and is intended to take advantage of periods of time where propagation conditions give signals which are better than the minimum required for one channel of normal frequency shift operation. Simple operation of key switches will insert as many channels as the conditions permit. These switches automatically maintain the pre-set bandwidth regardless of the number of channels in use. The system also provides front panel switching to standard 850 cycle frequency shift operation. However, experience indicates that when propagation conditions permit frequency shift operation, they will usually allow at least two channels of multiplex.



TYPE 132, MODEL 2

FREQUENCY SHIFT COVERTER



TYPE 107, MODEL 2

A dual channel unit, used with frequency shift receiving systems to convert the mark and space tones from the output of single or diversity receivers, into DC pulses capable of operating a tele-printer, tape recorder or other device so operated. Also used as a demodulator when receiving make and break CW or ICW signals.

2" oscilloscope tuning pattern indicates proper receiver adjustment of both mark and space frequencies, either during initial setup or under actual keying conditions. This pattern and a specially designed discriminator, coupled with a high degree of limiting, make it the outstanding performer in its field.

INPUT FS LIMITS 100 to 1000 cps. frequency shift. Mark frequency set at 2975 cps.

CW-ICW INPUT 400 to 7500 cps.

KEYING SPEED Up to 600 w.p.m.

OUTPUT: 1. Neutral DC pulses. 60 ma in 1800 ohm external load. One side grounded.

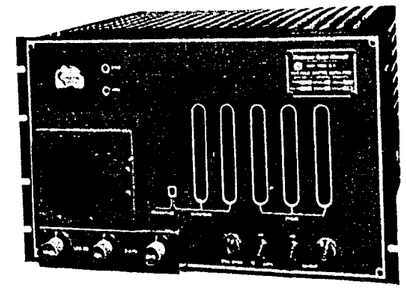
2. Polar DC pulses ± 30 ma in 1800 ohms load. Center grounded.

3. May be operated into any impedance from 100 to 100,000 ohms.

NORTHERN RADIO COMMUNICATIONS EQUIPMENT

NEW OSCILLATOR

• *One Cycle per Megacycle Stability*
• *Continuously Variable to ANY Frequency from 2 to 4 Megacycles*



TYPE 173, MODEL 1

The Northern Radio Company Variable Master Oscillator provides a continuously variable source of radio frequency energy with a stability of approximately 1 cycle per megacycle in the range of 2 to 4 megacycles. It has sufficient output to replace existing oscillators wherever a more stable and variable unit is required. It may be used as the basic control oscillator for diversity receivers, high frequency transmitters and other communications devices, or as a laboratory standard for test and measurement functions.

Its ease of operation and direct reading of frequency make it an outstandingly useful device where precise frequency control must be maintained by completely unskilled personnel. No curves, interpolations or calculations of any kind are required in its use. Frequency is set approximately to the desired value by rotating the oscillator dial. The last three digits of the frequency *automatically* pulls in to the value pre-set on the switches and holds with an accuracy that exceeds that of most temperature-controlled crystal oscillators.

The unit also provides a crystal controlled Beat Frequency oscillator for use in single or diversity receiving systems to provide stabilized BFO injection to the receivers.

An output is also provided from the high stability time base oscillator to make available its 100 KC frequency for use as a secondary standard. The stability of this output is one part in five million over any 12 hour period.

HIGH FREQUENCY OSCILLATOR

Output Frequency: 2—4 MC continuously variable.

Stability for any combination of temperature range from 0 to 50° C., and line voltage of 115 or 230 ± 10%: Approximately 1 cycle per megacycle.

Output Level: ½ watt into 75 ohm load. Level control on rear of chassis.

Readability: ± 2.5 cycles per second. Direct digital readout on mechanical and electronic counters.

Resettability: Absolute.

BEAT FREQUENCY OSCILLATOR

Output Frequency: 400—800 KC crystal controlled.
Output Level: 3.5 volts into 1000 ohm load. Level control on rear of chassis.
Crystal Holders: Premier Type PL218 or equal.

TIME BASE CRYSTAL OSCILLATOR

Output Frequency: 100 KC.

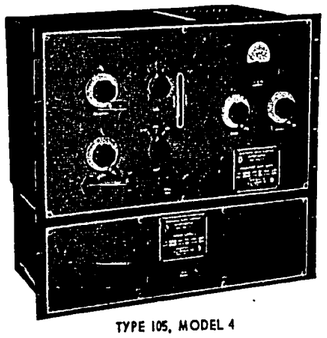
Stability for 0 to 50° C and ± 10% Line Voltage change: 0.2 parts per million for any 12 hour period. 1.0 part per million for thirty days.

Output Level: Approximately 2 volts.

Output Impedance: Approximately 100,000 ohms.

FREQUENCY SHIFT KEYER

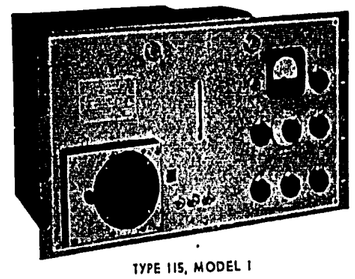
incorporates the following outstanding features:



TYPE 105, MODEL 4

Frequency shift dial adjusts "mark" and "space" frequencies equally above and below the carrier position, which remains fixed. • Simplified frequency setting permits only the upper side band tuning indication to be visible on the meter over substantially all of tuning range. • Direct reading frequency calibration of shift from 0 to 1000 cycles. • Direct reading frequency calibration of mixer and output tuning dials from 2.5 to 6.7 mc. • Direct reading of calibration of output frequency vernier ± 600 cycles. • Pulse shaping circuit to permit operation within assigned bandwidth with no adjacent channel radiation. • Highly stable temperature controlled oven with temperature control of ±0.1° C. at 60° with heaters on 4 sides of inner oven. • Component ratings according to JAN Specs provide greater assurance of trouble-free operation.

VARIABLE MASTER OSCILLATOR



TYPE 115, MODEL 1

Principally used in diversity reception to supply local common oscillator injection voltage to receivers. Crystal oscillator for BFO. The Variable High Frequency section gives stability equivalent to that of non-temperature controlled crystal oscillators. It is also equipped with three crystal controlled frequencies for operation of receivers on a fixed frequency basis. The variable high frequency oscillator is provided with local crystal oscillator for spot checking of twenty points within its range.

TECHNICAL DATA

Variable HFO output frequency	2-32 mcs continuous
Fixed Frequency crystals	2-4 mcs for output frequencies of 2-32 mcs
Output impedance	72 ohms coaxial cable
Output level	2 watts 2-4 mcs, 0.5 watts 4-32 mcs
Variable HFO Stability	20 cps per mc for ambient change ±25° C.
	5 cps per mc for ± 10% Line Voltage
	20 cps per mc for resettability
	20 cps per mc for readability

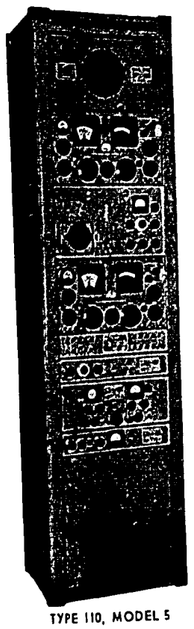
This unit can also be used as a transmitter exciter or for laboratory measuring purposes.

FOR FULL DATA ON THE COMPLETE LINE,
WRITE NOW FOR CATALOG PD-53

NORTHERN RADIO COMPANY, inc.
Pace Setters in Quality Communication Equipment
147 WEST 22ND STREET, NEW YORK 11, N. Y.
WATKINS 9-9117

NORTHERN RADIO COMMUNICATIONS EQUIPMENT

RADIO MULTIPLEX SYSTEMS ★ MULTI-CHANNEL TONE SYSTEMS ★ DIVERSITY RECEIVERS ★ STANDARD FREQUENCY SHIFT KEYERS ★ LOW FREQUENCY SHIFT KEYERS ★ FREQUENCY SHIFT CONVERTERS ★ TONE FILTERS ★ TONE KEYERS ★ DEMODULATORS ★ LINE AMPLIFIERS ★ MASTER OSCILLATORS ★ MONITORS



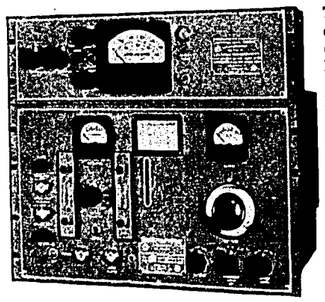
TYPE 110, MODEL 5

DUAL DIVERSITY RECEIVER

Used for dual spaced diversity reception in high speed radio tele-printer, telegraph or telephone service, using any common modulation, such as FS, CW, ICW, phone, etc. Complete receiver is housed in a rack type, fully enclosed cabinet. Provided with specially modified receivers, monitor speaker, IF monitor, master oscillator, and the necessary patching arrangements. Can be supplied with any combination of terminal equipment for reception of radio tele-printer, undulator tape and program service, or for remote use where the intelligence is transmitted via landline or UHF link.

Receiver is shown with terminal equipment as recommended for general communications usage. The units are (top to bottom) Monitor speaker, Receiver #1, Variable Master Oscillator, Receiver #2, Patching Panel, IF Monitor, Converter, Tone Keyer, Blank panels. For special features of this receiver see individual units described on the preceding pages.

FREQUENCY and SHIFT MONITOR SYSTEM



METER: TYPE 127, MODEL 2
MONITOR: TYPE 106, MODEL 4

This system consists of a Type 106 Frequency and Shift Monitor and a Type 127 Frequency Meter. It is designed as a secondary standard to monitor the frequency and amount of shift of transmitter carrier outputs. It is particularly intended to measure the frequency shift of a mark and space (FS) signal either when setting up for traffic or under normal keying conditions.

The Monitor's stability is better than 2 cycles per megacycle *over an ambient temperature range of* 0-50° C — using crystals having a temperature coefficient of only 3 parts/million/degree C. Range is 2.5-30 mc with 10 crystal-controlled frequencies (separate panel trimmers for each); use of external oscillator also provided for. Frequency Shift range is 10-10,000 cps. Less than 100 millivolts RF input needed for 2 volts audio output.

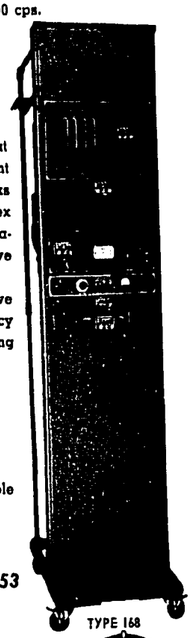
The Frequency Meter is specially designed with selectable normal and fast-acting damping factors, permitting frequency measurements of signals while keying. Its accuracy is 2% of full scale for the ranges 0-200, 500, 2000, 5000, 20,000 cps.

TEST BAY FOR TONE TELEGRAPH SYSTEMS

The Northern Radio Company Test Bay for Tone Telegraph Systems provides a complete terminal of apparatus for testing, alignment and maintenance of Multi-channel Frequency Shift Telegraph Systems.

When used with such equipment, it performs the following main Functions: (1) rapid and simple precision measurements of Mark, Space and Center Frequencies at both sending and receiving terminals; (2) precision Frequency adjustment of F/S Tone Keyers to specified channel Frequencies; (3) accurate tuning of F/S Converter Units; (4) rapid evaluation of signal distortion; (5) measurements of tone and telephone line levels at both receiving and transmitting ends; (6) measurement of telephone line attenuation; (7) over-all system checks and alignment; (8) performance tests of Tone Multiplex Systems and associated equipment; (9) quick localization of systems faults; and (10), monitoring of all wave forms such as keying, keyed tone, etc.

The Test Bay consists of Electronic Square Wave Keyer (Dotter), Cathode Ray Oscilloscope, Frequency Counter, Volume Level Indicator and Rack including blank panels, patch cords and test probes.



TYPE 168

TONE CHANNELING SYSTEMS

Complete package systems of Multi-Channel Tone Equipment (both AM and Frequency Shift) are available line or radio link systems.

FOR FULL DATA ON THE COMPLETE LINE, WRITE NOW FOR CATALOG PD-53

NORTHERN RADIO COMPANY, inc. *Pace Setters in Quality Communication Equipment*

147 WEST 22ND STREET, NEW YORK 11, N.Y. **WATKINS 9-9117**

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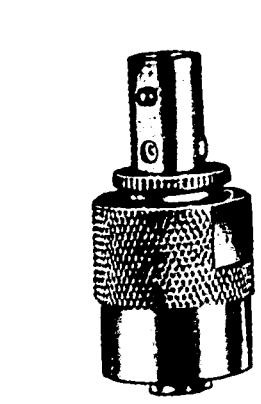
- √ ELECTRONIC . . .
- √ COMMUNICATIONS . . .
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- √ COMPUTER . . .
- √ ELECTRON TUBE . . .

PERSONAL INTERVIEWS ARRANGED IN YOUR CITY. A copy of our booklet "Challenge and Opportunity," describing the role of the engineer in RCA, will be mailed upon request. Please send a complete resume of your education and experience to:

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Specialized Employment Division, Dept. 216F
Radio Corporation of America
30 Rockefeller Plaza
New York 20, N.Y.

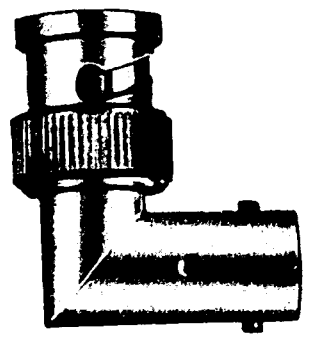
RCA

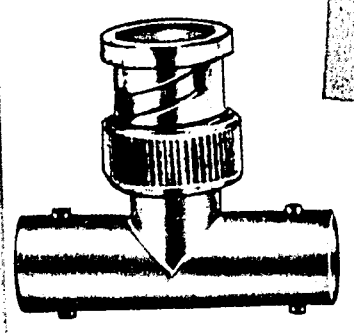
RADIO CORPORATION of AMERICA



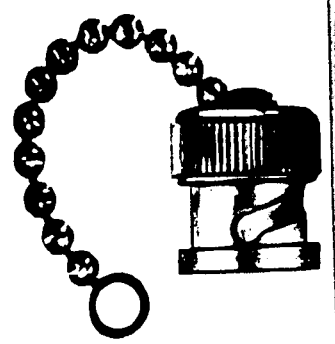


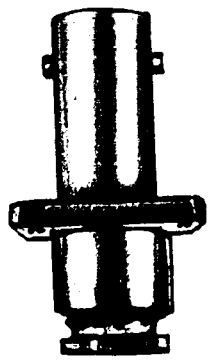
BNC CONNECTORS BY KINGS



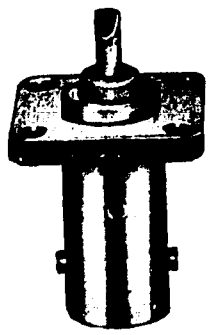


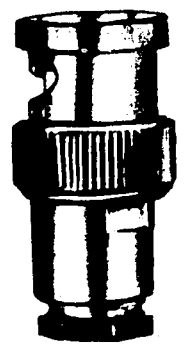
The B N C Connectors shown are small, lightweight Connectors designed for use with small cables such as RG-58/u, RG-59/u and RG-71/u. Widely used for video and aircraft test equipment, they are recommended for frequencies as high as 3000 M.C., where impedance matching is important. The B N C series is used successfully in the region of microwave frequencies.





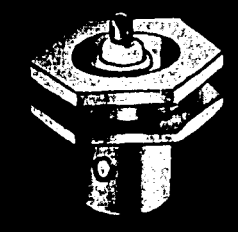
Whether your connector requirements call for the B N C series, N series, the new C series or special adaptations of standard connectors, you can rely on Kings. Our staff of highly specialized engineers invite your inquiries.



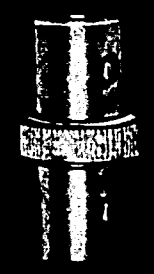


KINGS *Electronics* CO., INC.

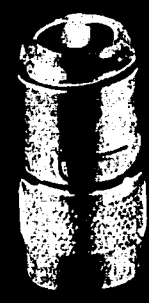
40 MARBLEDALE ROAD, TUCKAHOE, N. Y.



UG 569 U



UG 643 U





1953 IRE Directory



UG 572 U



UG 571 U



UG 564 U



CONNECTORS by KINGS

C Series Connectors are a greatly improved mechanical and electrical type of co-axial connector. They are constant impedance and are designed for use with 50 ohm, middle size RF cables.

The C Series like every co-axial connector made by Kings is the result of constant research and development. Engineering ingenuity and precision manufacture have put "Connectors by Kings" in the front-line of communications equipment for industry and the armed services.

If you have a connector problem consult Kings. You'll be glad you called on Kings first.

KINGS *Electronics* CO., INC.

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Sub-miniaturization!

Very soon, a tumbler-full of complex radio-electronic equipment will fly an airplane! Circuits have been flattened to the size of a post-card, and radio-tubes to match-heads. "Radio" becomes a part of every industry!

WHAT BECOMES SMALLER

Radio engineers call this program "sub-miniaturization", a self-contradictory word because as radio components are engineered down to thimble and pinhead size, electronic applications in industry become wider and greater. Already, military needs have stimulated radio-engineers to produce a signal system in the nose of a bomb, no larger than a man's hat which will direct and control tons of steel and dynamite. The wrist-watch radio is a practical reality.

WHAT GROWS LARGER

The industry radio has created is skyrocketing to new heights. Symbolic of the whole trend is the bristling array of antennae on the tops of homes and apartments and the jump in TV picture tube sizes from 6 to 21 inches. More than 1,000 technical meetings a year are held by IRE's 31,000 members in seventy-eight active sections in every part of the English Speaking world. The volume of published information required to feed this engineering progress is enormous.

For forty years, without need of change of name or direction, The Institute of Radio Engineers has published its "Proceedings of the I·R·E" — a monthly magazine by radio-electronic engineers, for radio engineers. It is an unabridged, accurate, working textbook-up-to-the-minute. 481 advertisers use its pages to keep their products before design men — to sell in the pre-specification stage of this dynamic industry.



"Proceedings of the I·R·E"

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MEETING YOUR ELECTRONIC REQUIREMENTS

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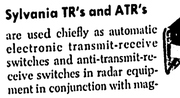
Sylvania Germanium Diodes
are long-life, lightweight, heaterless components for a wide variety of circuit applications such as computers and other electronic devices.



Sylvania Silicon Diodes
are used chiefly as first detectors in radar and other microwave super-heterodyne receivers.



Sylvania Magnetrons
operate in the microwave band in radar gear for military ships, planes and infantry and for commercial weather analysis and travel by sea and air.



Sylvania TR's and ATR's
are used chiefly as automatic electronic transmit-receive switches and anti-transmit-receive switches in radar equipment in conjunction with magnetrons.



Sylvania Rocket Tubes
are planar-electrode disc-seal triodes for use as oscillators and amplifiers with useable power at frequencies up to 3300 mc.



Sylvania Klystrons
are intended for use as c.w. oscillators or for pulsed operation at microwave frequencies.



Sylvania Pencil Tubes
are used as c.w. oscillators, amplifiers and in frequency multiplier operations at UHF.



Sylvania Hydrogen Thyratrons
are used for pulsing service at high repetition frequencies, high peak currents and high voltages and are designed for the fast action of radar equipment.



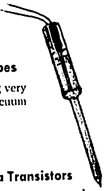
Sylvania Flash Tubes
are for use in flash photography, beacons, obstruction markers and signaling devices.



Sylvania Strobotrons and Trigger Tubes
provide a means for freezing the motion of rotating and reciprocating machinery and for high current control-pulse purposes.



Sylvania Glow Modulator Tubes
are used for facsimile reproduction of photographs and printed matter.



Sylvania Pirani Tubes
are used for measuring very low gas pressures in vacuum systems.



Sylvania Transistors
include both junction and point-contact types. Compact, hermetically sealed and shockproof, they are made with in-line base connectors for use in either plug-in or soldered circuits.

Complete information on all Electronic Division products is available at the following Electronic Division Sales Offices:

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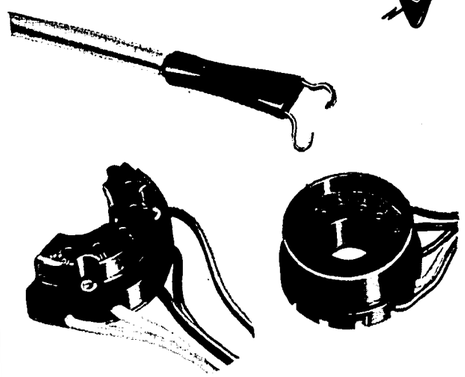
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SYLVANIA ELECTRONIC COMPONENTS

Precision parts engineered for highest quality and finest performance . . . custom-designed to your specifications.

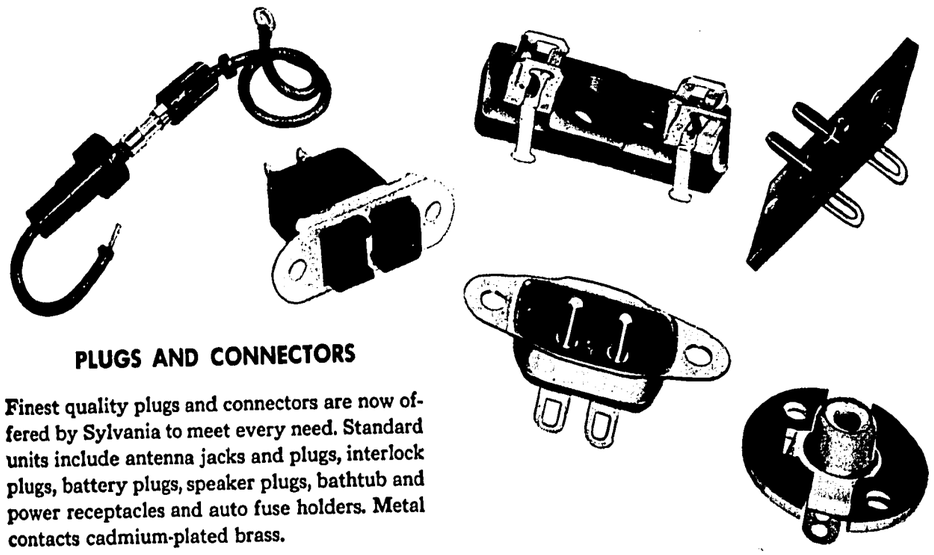
Today Sylvania offers you the ideal solution to any parts problem. Now, due to greatly increased production facilities and improved techniques, Sylvania is in a position to provide highest quality precision components to meet any volume requirements.

On these pages are illustrated a few representative types of the many hundreds of Sylvania electronic components now being produced. So, whether you need a few thousand parts or a million a month, put it up to Sylvania. Address your inquiries to Sylvania Electric Products Inc., Dept. 3A-48, 1740 Broadway, N. Y., N. Y.



CATHODE RAY TUBE SOCKETS

Are available in types to meet any equipment design specifications. Full-round and half-round duo-decal sockets furnished complete with color-coded lead wires. New spring-type anode connector furnished to meet the requirements of any manufacturer.



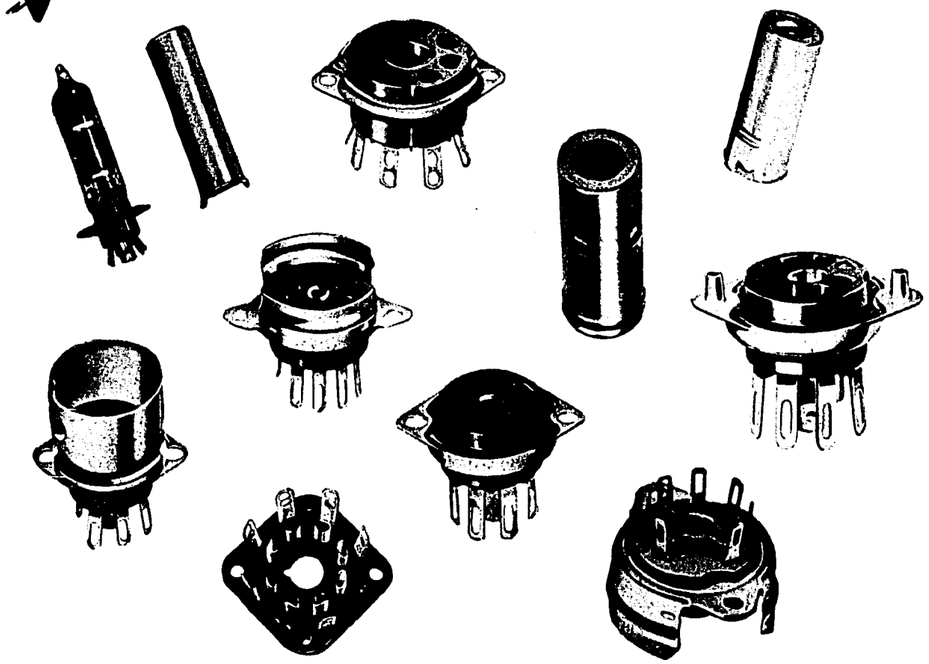
PLUGS AND CONNECTORS

Finest quality plugs and connectors are now offered by Sylvania to meet every need. Standard units include antenna jacks and plugs, interlock plugs, battery plugs, speaker plugs, bathtub and power receptacles and auto fuse holders. Metal contacts cadmium-plated brass.

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SYLVANIA ELECTRONIC COMPONENTS

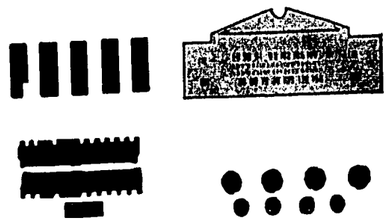


RADIO TUBE SOCKETS AND SHIELDS

Sylvania's complete line of tube sockets includes both molded and laminated types made to rigid specifications. Molded sockets are available for button type sub-miniature, 7 and 9 pin miniature and octal tubes, vibrators and GRC octals, UHF sockets and integral eyelet sockets. Sockets are supplied with either top or bottom mounting, a wide variety of saddles with or without ground lugs, and with or without center shield. Contacts are of brass, phosphor bronze or beryllium copper, cadmium or silver plated. Various socket insulators include general purpose phenolic, low-loss phenolic, or NEMA grade laminated phenolic. All made to Sylvania's highest quality standards.

MOLDED PLASTICS

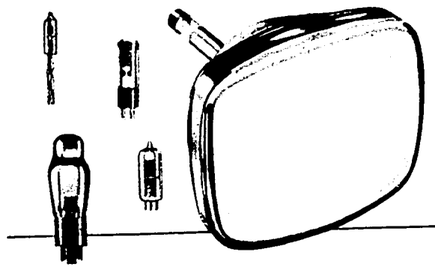
Sylvania is equipped to offer manufacturers the widest possible variety of injection or compression molded plastic parts of highest precision and durability. These include Push Buttons, Escutcheon Dials, Terminal Blocks, Knobs and many others. Tell us your problems and we'll be glad to suggest an economical solution.



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TO ASSURE TOP PERFORMANCE OF YOUR ELECTRONIC EQUIPMENT



1. INSTALL HIGH-QUALITY SYLVANIA TUBES

Quality tested and engineered to highest standards, Sylvania Tubes have earned a world-wide reputation for finest performance. Today, 7 of the 10 leading television set makers use Sylvania Picture Tubes and Sylvania Receiving Tubes.

2. CHECK WITH SYLVANIA TEST EQUIPMENT

In test equipment, too, Sylvania quality-built instruments and improved circuit engineering assure you of the last word in accuracy and dependability.

TELEVISION OSCILLOSCOPE

Type 400—An exceptionally high-gain wide-band oscilloscope designed for television. Accurately displays any TV pulse or wave-shape on a large, eye-saving 7" screen. Sensitivity: 0:01 v./in. Vert. response useful to 4.0 mc. Recommended for servicemen; laboratories; advanced schools and industry.



VOLTAGE CALIBRATOR



Type 300—Accurately measures peak to peak voltage of any wave-form displayed on scope. Uses voltage regulated clipper circuit to give extreme accuracy in spite of line voltage fluctuation. Switch feeds either calibrating voltage or signal voltage to scope. Essential instrument for better service shops and laboratories.

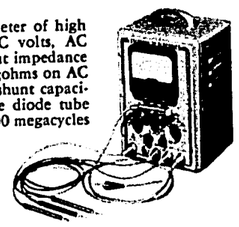
SWEEP GENERATOR

Type 500—No mechanical sweep. Uses reactance tube sweep in two ranges; 0-15 mc. for TV, 0.600 kc. for FM. Fundamentals from 2 to 230 mc. Special circuits to assure extreme linearity. Output 300 to 100,000 microvolts. Companion to 501 Marker.



POLYMETER

Type 2212 – A Vacuum Tube Voltmeter of high sensitivity for measuring ohms, DC volts, AC volts, RF volts and DC current. Input impedance is 17 megohms on DC volts, 2.7 megohms on AC and 2.3 megohms (with only 3 μμf shunt capacitance) on RF. Special subminiature diode tube in RF probe gives flat response to 300 megacycles on scales from 3 volts to 300 volts in five ranges. Zero center scales for FM. Illuminated meter. Accessory probes (type 225) for 30,000 volts DC.



HIGH VOLTAGE PROBES



These fine quality Sylvania DC Probes permit the measuring of high voltages by increasing the DC range of polymeters. Type 223 is 10,000 volt probe. Type 225 extends Polymeter range to 30KV.

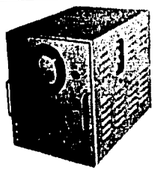
MARKER GENERATOR, TYPE 501

Provides 2 separate signals for marking an oscilloscope trace of response curves. Accurate adjustment of traps, frequency spotting, measuring band width, and correct adjustment of the popular 4.5 mc. intercarrier sound circuits. VFO covers 15 to 240 mc. range.



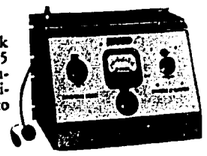
SYNCHROSCOPES

Type 402 and 402A—These are special-purpose, fast-sweep 5-inch cathode ray oscilloscopes. Especially designed to examine the detailed structure of extremely fast transient wave forms. Useful in high voltage pulse study, loran, and similar applications.



CAPACITANCE BRIDGE

Type 125A—Utilizing a 3-terminal network balancing circuit, this Sylvania Type 125 Capacitance Bridge provides for the accurate measuring of interelectrode capacitances of vacuum tubes. Range .01 μμf to 100 μμf.

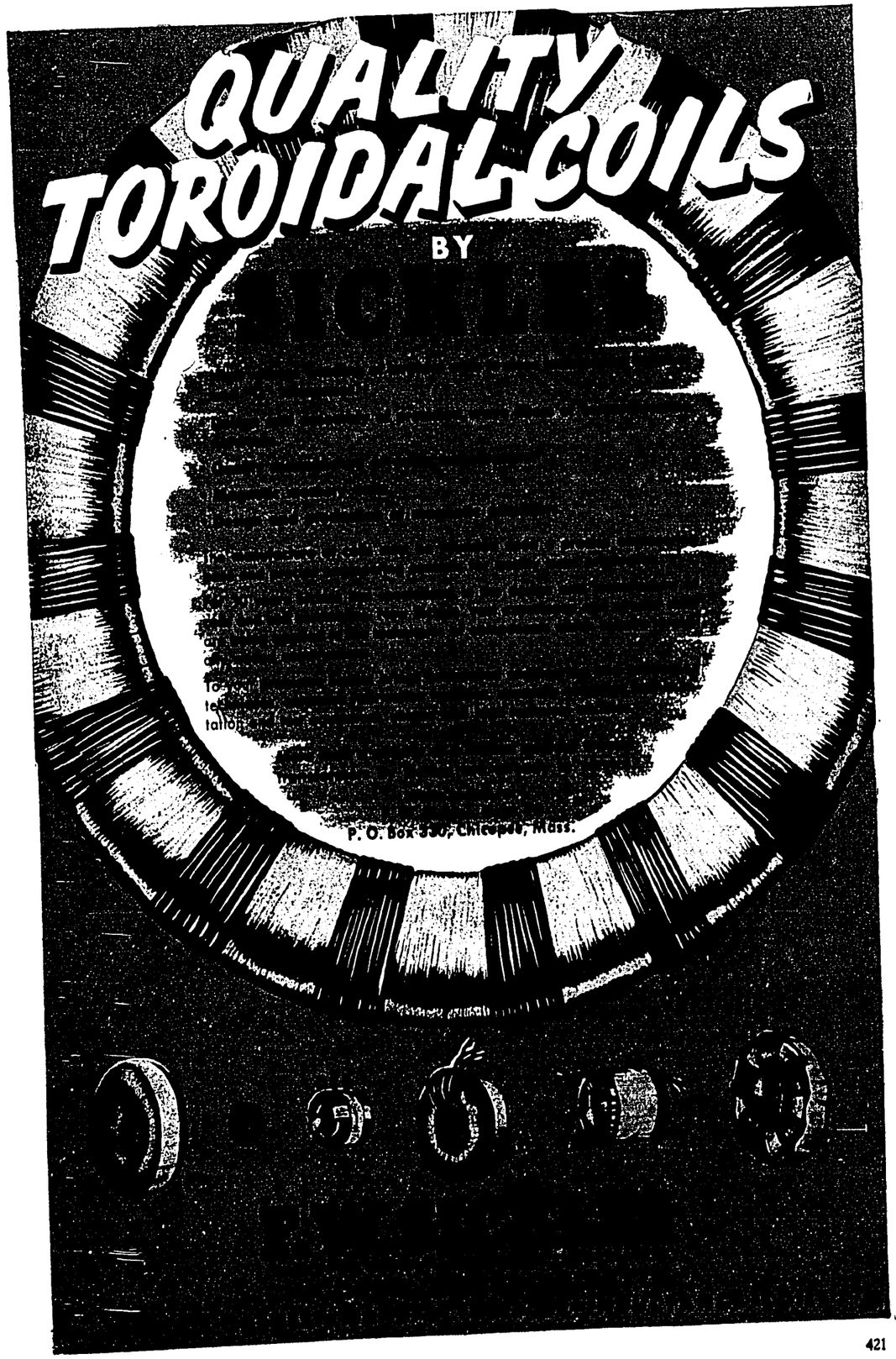


For further information concerning Sylvania Tubes or Test Equipment address:
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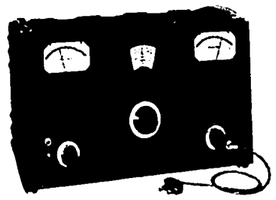


MEASUREMENTS CORPORATION

Laboratory Standards

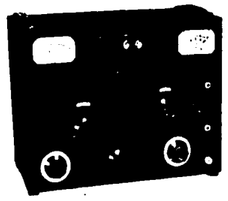
STANDARD SIGNAL GENERATOR MODEL 65-B

FREQUENCY RANGE	OUTPUT RANGE	MODULATION
75 Kc.—30 Mc.	0.1 microvolt to 2.2 volts	AM. 0 to 100% 400 cycles or 1000 cycles External mod., 50-10,000 cycles



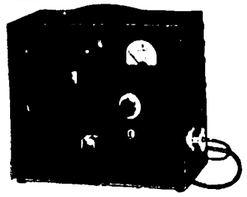
STANDARD SIGNAL GENERATOR MODEL 82

FREQUENCY RANGE	OUTPUT RANGE	MODULATION
20 cycles to 200 Kc. 80 Kc. to 50 Mc.	0-50 volts 0.1 microvolt to 1 volt	Continuously variable 0-50% from 20 cycles to 20 Kc.



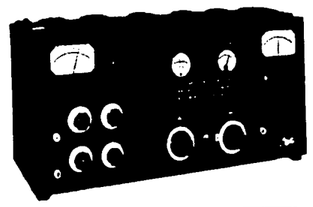
STANDARD SIGNAL GENERATOR MODEL 78

FREQUENCY RANGE	OUTPUT RANGE	MODULATION
15-25 Mc.; 195-225 Mc. 15-25 Mc.; 90-125 Mc. Other ranges on order	1 to 100,000 microvolts	AM. 8200-400 cycles 625—400 cycles Fixed at approximately 30%



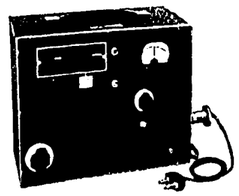
STANDARD SIGNAL GENERATOR MODEL 84

FREQUENCY RANGE	OUTPUT RANGE	MODULATION
300 Mc.—1000 Mc.	0.1 to 100,000 microvolts	AM. 0 to 30%, 400, 1000, or 2500 cycles. Internal pulse modulator. External mod., 50-30,000 cycles.



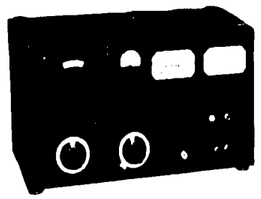
STANDARD SIGNAL GENERATOR MODEL 78-FM

FREQUENCY RANGE	OUTPUT RANGE	MODULATION
86 Mc.—108 Mc.	1 to 100,000 microvolts	Deviation 0-300 Kc 2 ranges FM. 400-8200 cycles External mod to 15 Kc



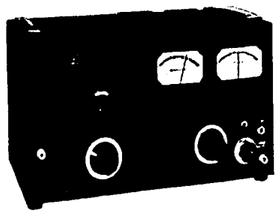
STANDARD SIGNAL GENERATOR MODEL 84-TV

FREQUENCY RANGE	OUTPUT RANGE	MODULATION
300 Mc to 1000 Mc	Continuously variable from 0.1 microvolt to 1.0 volt	Continuously variable 0 to 30% External modulation 20 to 20,000 cycles.



STANDARD SIGNAL GENERATOR MODEL 80

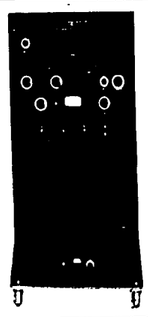
FREQUENCY RANGE	OUTPUT RANGE	MODULATION
2 Mc.—400 Mc.	0.1 to 100,000 microvolts	AM 0 to 30% 400 cycles or 1000 cycles External mod., 50-10,000 cycles



STANDARD SIGNAL GENERATOR MODEL 90

FREQUENCY RANGE	OUTPUT RANGE
20 Mc.—250 Mc	0.3 microvolt to 0.1 volt

MODULATION
Continuously variable, 0 to 100% Sinusoidal modulation 30 cycles 5 mc. Composite TV modulation.



MEASUREMENTS CORPORATION BOONTON, N. J.

MEASUREMENTS CORPORATION

An unseen value in the choice of any product is the experience represented in its design, development and manufacture. Throughout the world, Measurements' reputation for accuracy and reliability is your guarantee of the utmost in satisfactory service.

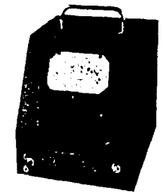
PULSE GENERATOR MODEL 79-B

FREQUENCY RANGE	PULSE WIDTH	OUTPUT
60 to 100,000 cycles	Continuously variable from 0.5 to 40 microseconds	Approx. 150 v. positive with respect to ground. "Sync Output" 75 v. positive with respect to ground.



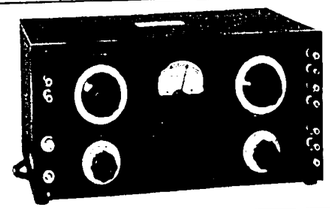
VACUUM TUBE VOLTMETER MODEL 67

VOLTAGE RANGE	FREQUENCY RANGE	INPUT IMPEDANCE
.0005 to 300 volts peak-to-peak	5 to 100,000 sine-wave cycles per second	1 megohm shunted by 30 mmfd.



SQUARE WAVE GENERATOR MODEL 71

FREQUENCY RANGE	WAVE SHAPE	OUTPUT
Continuously variable 6 to 100,000 cycles	Rise time less than 0.2 microseconds with negligible overshoot	Step attenuator 75, 50, 25, 15, 10, 5 peak volts fixed and 0 to 2.5 volts continuously variable.



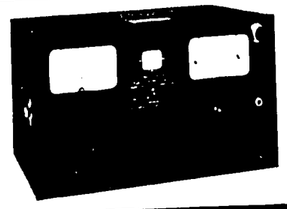
INTERMODULATION METER MODEL 31

INTERMODULATION RANGE	FREQUENCIES (CYCLES)	ANALYZER INPUT VOLTAGES
0.5% to 30%	LF 60 cps HF 3000 cps	Full scale ranges of 3, 10, 30 volts RMS



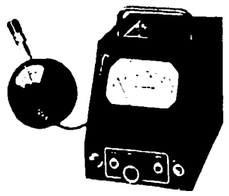
U.H.F. FIELD STRENGTH METER MODEL 58

FREQUENCY RANGE	INPUT VOLTAGE RANGE
15 Mc. to 150 Mc.	1 to 100,000 microvolts in antenna. 1 to 100 microvolts on semi-logarithmic output meter, balanced resistance attenuator with ratios of 10, 100 and 1000 ahead of all tubes.



MEGACYCLE METER MODEL 59

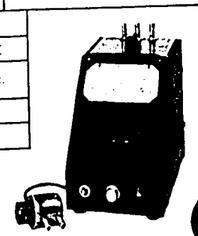
FREQUENCY RANGE	FREQUENCY ACCURACY	MODULATION
2.2 Mc. to 400 Mc.	Within ± 2%	CW or 120 cycles fixed at approximately 30%. Provision for external modulation



VACUUM TUBE VOLTMETER MODELS 62 & 62-U.H.F.

VOLTAGE RANGE	FREQUENCY RANGE	INPUT IMPEDANCE
0-1, 0-3, 0-30 and 0-100 volts AC or DC	30 cycles to over 150 Mc.	Approximately 7 mmfd.

MODEL 62 U. H. F.	
VOLTAGE RANGE	FREQUENCY RANGE
0-1, 0-3, 0-30 and 0-100 volts AC or DC	100 Kc. to 500 Mc.
INPUT IMPEDANCE	
Approximately 2 mmfd.	



CRYSTAL CALIBRATORS MODELS 111 & 111-B

FREQUENCY RANGE	FREQUENCY ACCURACY	HARMONIC RANGE
250 Kc.—1000 Mc.	0.001%	.25 Mc Oscillator: .25-450 Mc. 1 Mc. Oscillator: 1-600 Mc. 10 Mc. Oscillator 10-1000 Mc.

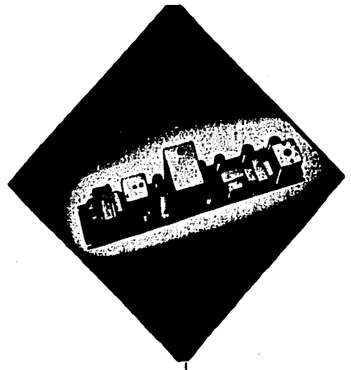
MODEL 111-B	
FREQUENCY RANGE	FREQUENCY ACCURACY
100 Kc.—1000 Mc.	0.001%
HARMONIC RANGE	
1 Mc. Oscillator: 1 — 450 Mc. 1 Mc. Oscillator. 1 — 600 Mc. 10 Mc Oscillator 10—1000 Mc	

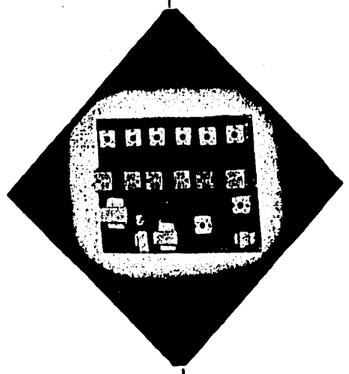


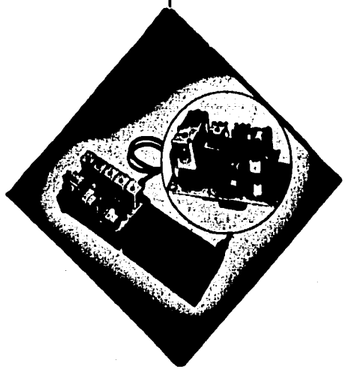
MEASUREMENTS CORPORATION BOONTON, N. J.

HAMMARLUND

DATA TRANSMISSION-SELECTIVE CALLING AND SUPERVISORY CONTROL EQUIPMENT







POINT TO POINT SIGNALING

The Hammarlund Standard Duplex Signaling Unit consists of a tone generator and receiver designed to operate over wire lines, telephone or power line carrier, and radio or microwave communications circuits for signaling, dialing, slow speed telemetering, supervisory controls or other information. Transmitters and receivers are available for 36 frequency channels between 2000 and 6475 cps. This equipment is being used by military and governmental agencies, pipeline and power companies, railroads and other groups requiring remote on-off switching, continuous indication of operating conditions, and automatic detection of wire line or power source failures along their systems.

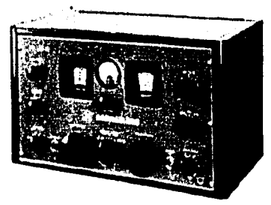
PROTECTION THROUGH SUPERVISORY CONTROL

The Hammarlund "Multi-Gate" Remote Supervisory and Control System is engineered to provide highly efficient, fully reliable operational controls of important remote equipment such as used by refineries, pipelines, utilities, railroads, civil defense and other commercial, as well as military, groups. Because of a unique design by which a single tone activates a receiver, which in turn will then accept a second tone to operate a relay, this equipment can be used where disturbances on connecting wire or radio circuits make ordinary tone-operated remote controls impractical. Up to 21 individual on-off functions can be handled over a single circuit employing only 7 audio signaling tones.

SELECTIVE CALLING OR SIGNALING

Hammarlund Selective Calling equipment, added to 2-way radio systems used to control large fleets of vehicles, or distant fixed stations, adds privacy, speed, safety, quietness and convenience to day-in-day-out operations. By the push of a button the dispatcher within 0.8 of a second selects the station which he wants to contact. Only the selected operator or group of operators can receive the call. If the operator of the car or station being called doesn't answer, an indicator lamp remains lighted to show he was called. This simple equipment can be added to any present installation, or incorporated in any type of installation now projected.

COMMUNICATION RECEIVERS



The New "HQ-140-X"

The "HQ-140-X" is a new superheterodyne type receiver that provides amateurs and other short wave listeners with all the advantages of modern professional design and circuitry. In addition, it incorporates those outstanding features that have made Hammarlund "HQ's" famous for quality and performance. This receiver retains the high degree of sensitivity and selectivity of the "HQ-129-X," and in addition features notably improved frequency stability and image ratio. It covers a continuous range of frequencies from 540 kc to 31 mc, or from 555 meters to 9.7 meters, in six bands.

Band spread tuning is supplied on the four higher frequency bands, with actual calibration in the 80, 40, 20, 15, and 10 meter amateur bands. Many types of noise and other interference have been substantially reduced by the outstanding noise limiter and the special Hammarlund patented crystal filter.

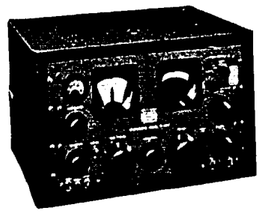
FEATURES

TUNING RANGES: .54—1.32 mc, 1.32—3.2 mc, 3.2—5.7 mc, 5.7—10 mc, 10—18 mc, and 18—31 mc.

CALIBRATED BAND SPREAD: 3.5—4 mc, 7—7.3 mc, 14—14.4 mc, 20.9—21.6 mc, and 28—30 mc.

TUBE LINE-UP: 6C4 Oscillator, 6BA6 RF Amplifier, 6BE6 Mixer, 6BA6 1st IF Amplifier, 6BA6 2nd IF Amplifier, 6BA6 3rd IF Amplifier, 6AL5 combination detector, AVC and noise limiter, 12AU7 1st AF Amplifier and BFO, 6V6GT/G Audio Power Output, OC3/VR105 Voltage Regulator and 5U4G Full Wave Rectifier.

The "SP-600-JX"

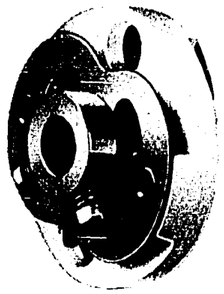


The "SP-600-JX" communications receiver, now also available to hams, is a masterpiece of receiver design and already is world-known for its outstanding construction and performance. This professional receiver, with its six bands covering the frequency spectrum from 540 kc to 54 mc, is being used in large quantities by the military and governmental agencies, as well as by commercial services, for both single and diversity reception.

This magnificent receiver is a 20 tube dual conversion superheterodyne. The power supply is an integral part of the receiver chassis. Operation on any of six crystal controlled fixed frequency channels within the range of the receiver is immediately available. This designates it as the perfect receiver for point-to-point and network operations. Pre-arranged day and night fixed frequencies. With crystal control you can select your desired channels immediately.

Stability is .001 to .01 percent depending on frequency to which receiver is tuned, image rejection is 80 db to 120 db down, and spurious responses are at least 100 db down. Sensitivity is 1 microvolt CW and 2 microvolts AM while selectivity for the three calibrated crystal and three non-crystal ranges is from 200 cycles to 13 kc. Radiation is negligible with no cross-talk in multi-receiver installations.

"FC" and "FNC" COUPLINGS

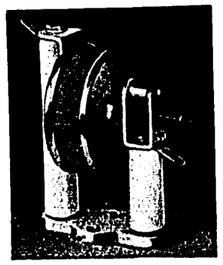


FEATURES—The "FC-46-S" is an insulated flexible coupling designed to provide for mechanical ganging of shafts even though angularly misaligned. The smallest dimensions have been incorporated consistent with the rugged construction necessary for general service. A high degree of electrical isolation is achieved through the use of silicone treated steatite insulation. Flash-over voltage is approximately 5000 V. R.M.S. Brass hubs and spring temper phosphor bronze flexible arms are nickel plated. An exclusive and important feature of this coupling is its characteristic of uniform side-thrust through 360° of rotation. This eliminates tendency to vibrate at high speeds, minimizes bearing wear and assures accurate tracking.

The "FNC-46-S" is a non-insulated coupling for use where electrical continuity between shafts is required. The flexible arms are held securely to a nickel plated brass ring instead of an insulator.

STANDARD STOCK TYPES	
CODE FC-46-S	Insulated flexible coupling
CODE FNC-46-S	Non-insulated flexible coupling

"NZ-10" CAPACITORS

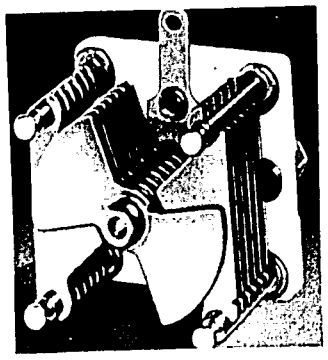


FEATURES — The "NZ-10" is a compact transmitter neutralizing capacitor designed for easy and accurate adjustment. The rotor is attached to a fine-thread lead screw which may be adjusted with smooth and precise action by a screwdriver and locked securely by a readily accessible clamping screw. A stop prevents shorting of plates at maximum capacity. Long leakage paths to ground from both rotor and stator are provided. Glazed steatite insulators and smoothly rounded aluminum plates minimize flashover.

SPECIFICATIONS—Capacity is adjustable from 2.3 to 10 mmf. Peak voltage rating is 3000 V. at maximum capacity (minimum gap) position.

HAMMARLUND

"BFC" CAPACITORS



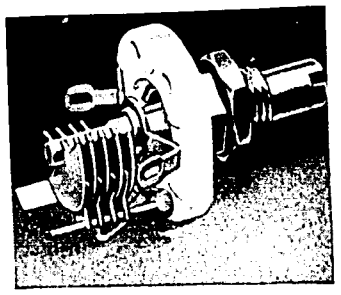
FEATURES—The "BFC" "butterfly" type capacitor has very low minimum capacity, low inductance and isolated rotor for use in VHF applications as a series capacitor with no rotor contact. Mechanical and electrical symmetry and stator terminal locations minimize circuit inductance.

CONSTRUCTION—Brass rotors and stators are soldered and nickel-plated. The contact wiper is heavily silver-plated beryllium-copper. Tapped studs on the silicone treated steatite front panel permit mounting the capacitor without grounding the rotor. The sleeve type bearing is nickel-plated brass.

SPECIFICATIONS—Straight line capacity. 90° rotation from minimum to maximum capacity position. Air gap is 0.030" nominal. Tested at 1200 V. R.M.S., 60 cycles between rotor and each stator. *High Speed Ball-Bearing Models Also Are Available.*

CODE	CAPACITY SECTION		SERIES CAPACITY		PLATES	
	Max.	Min.	Max.	Min.	Rotor	Ea. Stator
BFC-12	14.5	3.4	7.6	2.2	4	3
BFC-25	27.3	4.8	14.1	2.9	7	6
BFC-38	40.1	6.2	20.6	3.6	10	9

"MAC" CAPACITORS



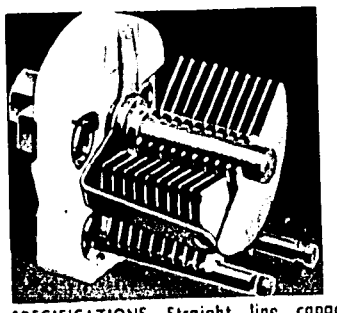
FEATURES—The "MAC" provides the low minimum capacity essential for use as a trimmer in the VHF range. It was engineered to achieve the smallest dimensions practical to meet the requirements of a miniaturized component.

CONSTRUCTION—Its silicone treated steatite base is only $\frac{3}{4}$" x $\frac{5}{8}$". Rotor and stator are soldered assemblies and are of brass, silver-plated. Rotor and stator terminals are positioned to permit short leads. The threaded bearing is provided with flat sides to permit single hole mounting.

SPECIFICATIONS—Straight line capacity. Screwdriver adjustment. Air gap is 0.017" nominal. Tested at 750 V. R.M.S., 60 cycles.

CODE	CAPACITY		PLATES	CODE	CAPACITY		PLATES
	Max.	Min.			Max.	Min.	
MAC-5	5.0	1.4	5	MAC-15	14.2	2.2	15
MAC-10	8.7	1.7	9	MAC-20	19.6	2.7	21

"APC" CAPACITORS



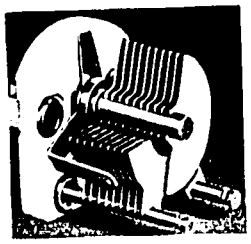
SPECIFICATIONS—Straight line capacity characteristic. Hexagonal collar on slotted shaft permits rotor adjustments. Air Gap is 0.015" nominal. Tested at 600 V. R.M.S., 60 cycles.

FEATURES—The "APC" trimmer capacitor originated by Hammarlund over twenty years ago is still widely recognized as the standard capacitor of its type. Its use is indicated in all classes of equipment where a compact, high quality air dielectric trimmer is required. It was designed to resist effects of temperature, moisture and vibration. Silicone treated steatite insulation is used to insure high leakage resistance.

CONSTRUCTION—Brass rotor and stator are soldered to brass supports. Nickel-plated phosphor bronze wiper assures positive rotor contact. All metal parts are nickel-plated. Terminals are hot-tin dipped. Tapped brass mounting studs fastened to silicone treated steatite base permit mounting capacitor without grounding the rotor.

CODE	CAPACITY		PLATES
	Max.	Min.	
APC-25	25.	3.0	7
APC-50	50.	3.9	14
APC-75	75.	4.6	20
APC-100	100.	5.5	27
APC-140	140.	6.7	37

"MAPC" CAPACITORS



FEATURES—The "MAPC" capacitor is representative of Hammarlund's efforts to meet the demand for smaller dependable components. It is a scaled-down version of the popular "APC" with everything reduced except the quality and performance characteristics. For example, an "MAPC" is about half the size and weight of an "APC." Lower minimum capacities and low inductance make the "MAPC" suitable for VHF use.

CONSTRUCTION—The standard "APC" construction is used in this capacitor. Rotors and stators are fabricated by soldering brass plates to supporting members and nickel-plating the assemblies. Nickel-plated phosphor bronze wiper assures positive rotor contact. Tapped brass mounting studs fastened to silicone treated steatite base permit mounting capacitor without grounding rotor.

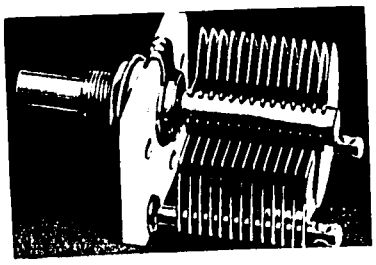
CODE	CAPACITY		PLATES
	Max.	Min.	
MAPC-15	15.	2.3	6
MAPC-25	25.	2.6	10
MAPC-35	35.	2.9	14
MAPC-50	50.	3.2	19
MAPC-75	75.	3.9	29
MAPC-100	100.	4.5	38

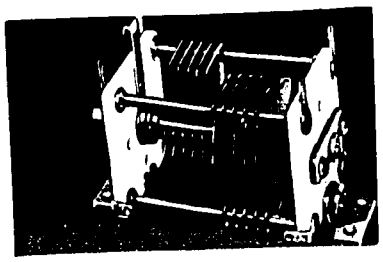
SPECIFICATIONS—Straight line capacity. Screwdriver or socket wrench adjustment. Air gap is 0.0135" nominal. Tested at 600 V. R.M.S., 60 cycles.

"HFA" and "HFBD" CAPACITORS

SINGLE SECTION CAPACITOR—The "HFA" is a single section tuning capacitor similar to "HF" except that larger plates permit wider air-gaps for the same capacitance values. Resultant higher break-down ratings extend the use of the capacitor into the high frequency low-power transmitter field. A threaded sleeve bearing permits single hole mounting and the bracket supplied may be used for base mounting. A lug type terminal soldered to the bearing provides an efficient rotor connection.

DOUBLE SECTION CAPACITOR—The "HFBD" is a dual, balanced rotor transmitting capacitor employing front and rear panels plus a ball-thrust rear bearing, but otherwise incorporating constructional features identical to the smaller "HFA." An insulated shaft extension safeguards operating personnel from the high voltages which may be applied to the rotor. The small size, rugged construction, balanced rotor and range of capacitance values and breakdown voltages make this capacitor ideally suited to many applications.



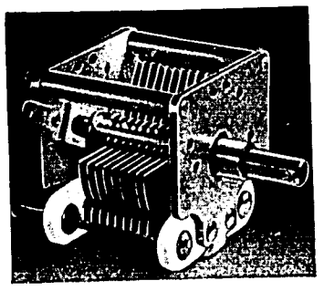


SPECIFICATIONS—Straight line capacity. Air gaps and test voltages are as indicated in table. However, "HFBD" breakdown voltages are doubled and capacitance values approximately halved when stator sections are connected in series.

CODE	CAPACITY		SPACING	PLATES/ SECTION
	Max.	Min.		
HFA-100-A	102.	4.5	0.020	19
HFA-140-A	145.	6.0	0.020	27
HFA-10-B	9.	2.3	0.030	3
HFA-15-B	16.	2.8	0.030	5
HFA-25-B	25.	3.0	0.030	7
HFA-50-B	50.	4.3	0.030	14
HFA-100-B†	100.	7.5	0.030	27
HFA-15-E	16.	4.0	0.070	9
HFBD-50-C	50.	9.0	0.050	11
HFBD-100-C	105.	14.0	0.050	23
HFBD-35E*	37.	9.5	0.070	11
HFBD-65-E*	63.	12.5	0.070	19

60 Cycle Test Voltage:
"HFA"—"A" 800 V. R.M.S. "B" 1200 V. R.M.S.
"E" 1750 V. R.M.S. "HFBD"—"C" 1500 V. R.M.S.
"E*" 3000 V. R.M.S., plates have rounded edges.
†Has front and rear supporting panels.

"RMC" CAPACITORS



FEATURES—The "RMC" was designed specifically for applications requiring an "MC" type tuning capacitor with very rigid construction. Its sturdy frame consists of heavy gauge aluminum end panels held together by three aluminum tie rods. It has a brass sleeve front bearing and a single ball thrust rear bearing for smooth tuning and a high degree of resetability. The rotor contact is a forked silver-plated beryllium-copper spring wiping against a wide disc on the rotor.

CODE	CAPACITY		PLATES
	Max.	Min.	
RMC-50-S	50.	7.3	7
RMC-100-S	105.	9.5	14
RMC-140-S	143.5	11.0	19
RMC-325-S	327.	17.5	43

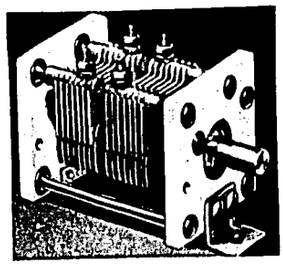
SPECIFICATIONS—Straight line capacity. Air gap is 0.0245" nominal.

"VU" CAPACITORS

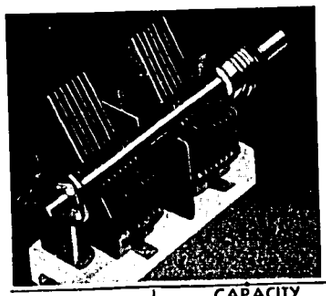
FEATURES—A uniquely designed UHF tuning capacitor using completely original concepts. With it, conventional "lumped constant" circuits, rather than tuned cavity techniques, can be efficiently used up to 500 mc. Capacitor sections are in series to eliminate rotor wiper and the design utilizes Pyrex balls to form precision bearings and to completely isolate the rotor. Thus, noise generated by rubbing metal-to-metal contacts and variable resistance paths in the bearings have been totally eliminated. Circuit connections are made to threaded studs on each stator. This permits vacuum tube and inductor to be mounted adjacent to and on opposite sides of the capacitor to minimize circuit inductance.

CODE	SERIES CAPACITY		PLATES/ SECTION
	Eff.	Min.	
VU-20	22.5	3.35	11
VU-30	31.5	3.5	15
VU-45	45.0	3.8	21

SPECIFICATIONS—The capacity characteristic approaches a straight line frequency curve. Air gap is .0168" nominal. Tested at 700 V. R.M.S., 60 cycles, between rotor and each stator.



"MC" and "MCD" CAPACITORS

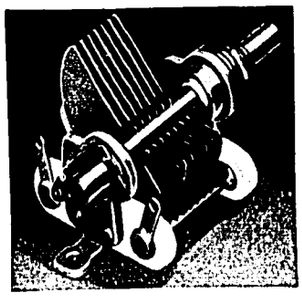


FEATURES—The "MC" is a versatile single section tuning capacitor designed to give a choice of mountings, connections and capacity characteristics. "MC-S" capacitors have a straight line capacity characteristic. "MC-M" units have offset plates resulting in a "Midline" characteristic which more equally spaces frequencies. "MC-X" units are wide-spaced for high voltages. The "MCD" is a split-stator panel-mounted capacitor.

SPECIFICATIONS—Straight line or "midline" capacity characteristic. Single-spaced types have 0.0245" nominal air gap and are tested at 1000 V. R.M.S., 60 cycles. Wide-spaced ("X") types have 0.0715" nominal air gap and are tested at 1750 V. R.M.S., 60 cycles.

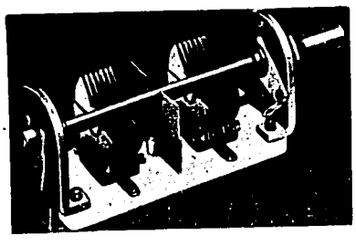
CODE	CAPACITY		PLATES/ SECTION
	Max.	Min.	
MC-20-S	20.	5.5	3
MC-35-S	35.	6.0	5
MC-50-M	50.	6.3	7
MC-50-S	50.	6.5	7
MC-75-M	80.	7.3	11
MC-75-S	80.	8.0	11
MC-100-M	100.	7.7	14
MC-100-S	100.	8.3	14
MC-140-M	140.	9.0	19
MC-140-S	140.	10.0	19
MC-200-M	200.	10.3	27
MC-250-M	250.	12.0	34
MC-325-M	320.	13.5	43
MC-20-SX	20.	6.8	7
MC-35-MX	32.	7.8	11
MC-35-SX	32.	8.5	11
MC-50-MX	53.	10.5	19
MC-50-SX	53.	11.5	19
MC-100-SX	100.	16.5	35
MCD-50-M	50.	5.5	7
MCD-100-M	100.	6.3	14
MCD-100-S	100.	7.0	14
MCD-140-M	140.	7.8	19
MCD-35-MX	31.	6.0	11
MCD-35-SX	31.	6.8	11

M—Midline plates X—Wide-Spaced S—Straightline plates



"HF" and "HFD" CAPACITORS

SINGLE SECTION CAPACITOR—The "HF" is a single section tuning capacitor employing "APC" rotor and stator design. Extra long sleeve bearing and positive contact nickel-plated phosphor-bronze wiper make this unit ideally suited to high frequency applications. Silicone treated steatite insulation. Single hole or base mounting.

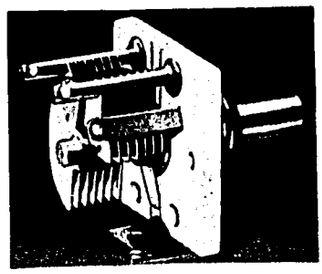


DOUBLE SECTION CAPACITOR — The "HFD" dual capacitor, like the "HF" singles, incorporate advanced features providing for maximum efficiency at high frequency. Aluminum front and rear end panels are mounted on a heavy silicone treated steatite base. Wide front and rear bearings with individual silver-plated beryllium-copper wipers for each section assure long life and maximum contact efficiency. Single hole panel mount or base mounting.

SPECIFICATIONS—Straight line capacity. Single spaced types (HF and HFD) have 0.015" air gap and are tested at 600 V. R.M.S., 60 cycles. Wide spaced types (HF-X and HFD-X) have 0.045" air gap and are tested at 1400 V. R.M.S., 60 cycles.

CODE	CAPACITY		PLATES/ SECTION
	Max.	Min.	
HF-15	17.5	2.8	5
HF-35	36.	3.2	10
HF-50	52.	3.7	14
HF-100	102.	5.3	27
HF-140	142.	6.3	37
HF-15-X	15.	3.6	10
HF-30-X	30.	5.2	20
HFD-50	52.	3.6	14
HFD-100	102.	5.0	27
HFD-140	142.	6.0	37
HFD-15-X	16.	3.8	11
HFD-30-X	28.5	5.0	19

D—Split stator X—Wide-Spaced

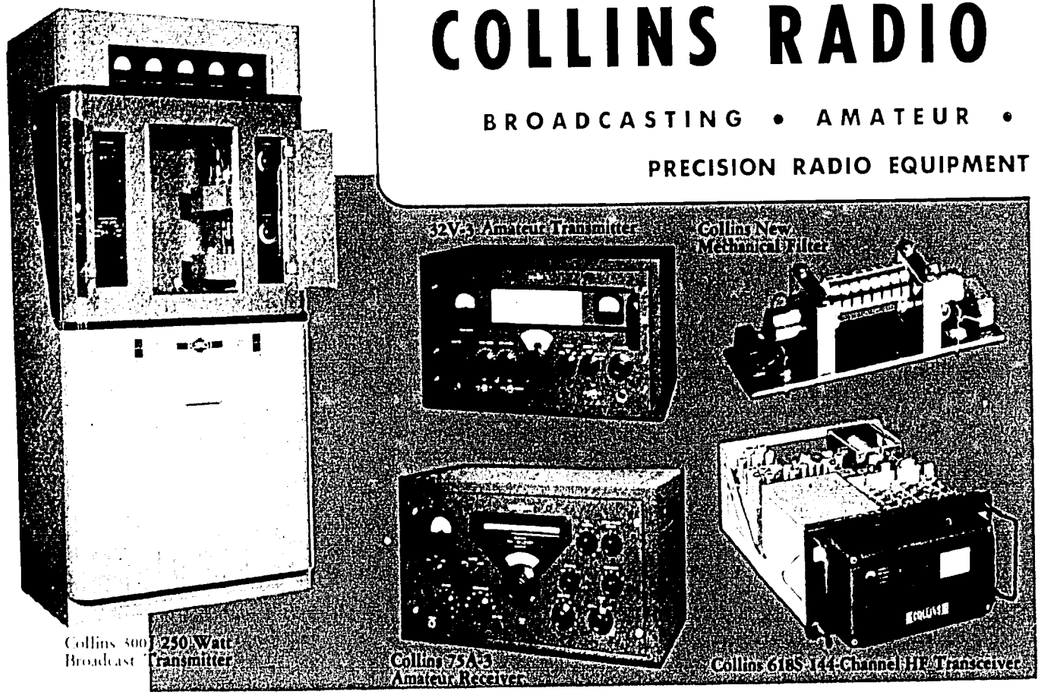


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BROADCASTING • AMATEUR •

PRECISION RADIO EQUIPMENT



BROADCAST TRANSMITTERS

AM

800J	250-100 watts
20V	1000-500 watts
21F	5000-1000 watts
21M	10,000-5000 watts

SPEECH EQUIPMENT AND ACCESSORIES

Collins complete line for AM and FM broadcasting is listed in the new *Collins Speech Equipment Catalog*. It pictures and describes a wide variety of high quality speech input consoles, remote equipment, rack mounted audio units, test and control apparatus, transducers, power supplies, meter and jack panels, terminal boards, cabinets — everything needed in building a new station or modernizing an old one. *Collins Speech Equipment Catalog* should be kept in the files of all broadcast engineers as a standard reference work. Your nearest Collins office will be glad to supply a copy to your station upon request.

AMATEUR EQUIPMENT

75A-3 Receiver incorporates the new Collins Mechanical Filter — a new concept in receiver performance. Either 3 kc or 800 cycle bandwidth selected by a front-panel switch. AM signals can be tuned to accept the carrier and either one of the sidebands at will while the other sideband is rejected. Ideal for reception of single sideband signals. It is an extremely stable double conversion superheterodyne receiver, covering the 160, 80, 40, 20, 15, 11 and 10 meter bands. Permeability tuned; crystal controlled hf oscillator; dial calibrated directly in frequency; extremely sensitive with great tuning accuracy and high signal to noise ratio; 50 db image rejection on all bands; automatic noise limiter; amplified, delayed AVC with quick recovery; miniature tubes.

Price including 3 kc mechanical filter, less speaker . . $540.00
10" speaker in matching cabinet 20.00

KW-1 Transmitter, one kilowatt input AM phone and CW; covers 160, 80, 40, 20, 15, 11 and 10 meter bands; designed to avoid TVI with additional attenuation in the antenna network and filtered control leads; completely shielded r-f assembly; usual excellent Collins audio with speech clipper and high level low pass filter for bandwidth limitation; single control exciter tuning; single bandswitch for entire transmitter; tuning dial similar to 75A-3; output 50 ohms (2.5 to 1 standing wave ratio); PA tubes conservatively operated at one kilowatt. Price $3,850.00

32V-3 Transmitter, 150 watts input CW, 120 watts phone; Collins 70E-8A VFO controlled, bandswitching, gang tuned; designed for maximum reduction of TVI by means of added tuned circuits in the exciter and an added L section in the unbalanced pi output network plus double shielding and filtering of essential leads. Price . . $775.00

35C-2 Low Pass Filter inserted in well shielded transmission line from 32V-1, 2, or 3, provides approximately 75 db attenuation of harmonic emissions at the television frequencies. Price $40.00

INDUSTRIAL COMPONENTS

Autotune, a Collins patented automatic rotary positioning device used for accurate remote control of communication receivers and transmitters by means of adjustable positions. It can also be used for the control of many types of industrial equipment.

Autopositioner, a mechanism which will set a shaft accurately to any one of several fixed positions by remote control. It is fast and quiet and is built for long service.

Instrument Type Motors, high efficiency hysteresis type motors are available in both 1" and 2" frame sizes for special applications to airborne and ground communication transmitters and receivers.

Mechanical Filter gives a close approach to the ideal rectangular selectivity curve by using resonant mechanical elements, rather than tuned electrical circuits. Many operating frequencies and band widths are available. When used in a receiver's IF strip, the carrier and one sideband of an AM signal can be accepted while the other sideband is rejected. 3 kc bandwidth filter is ideal for AM or SSB.

AVIATION EQUIPMENT

618S 144-Channel HF Transceiver, 100 watt power output on 144 crystal controlled channels. Automatically tuned elements insure maximum flexibility and high power output.

51R-3 VHF Receiver, for navigational use of the omnidirectional range.

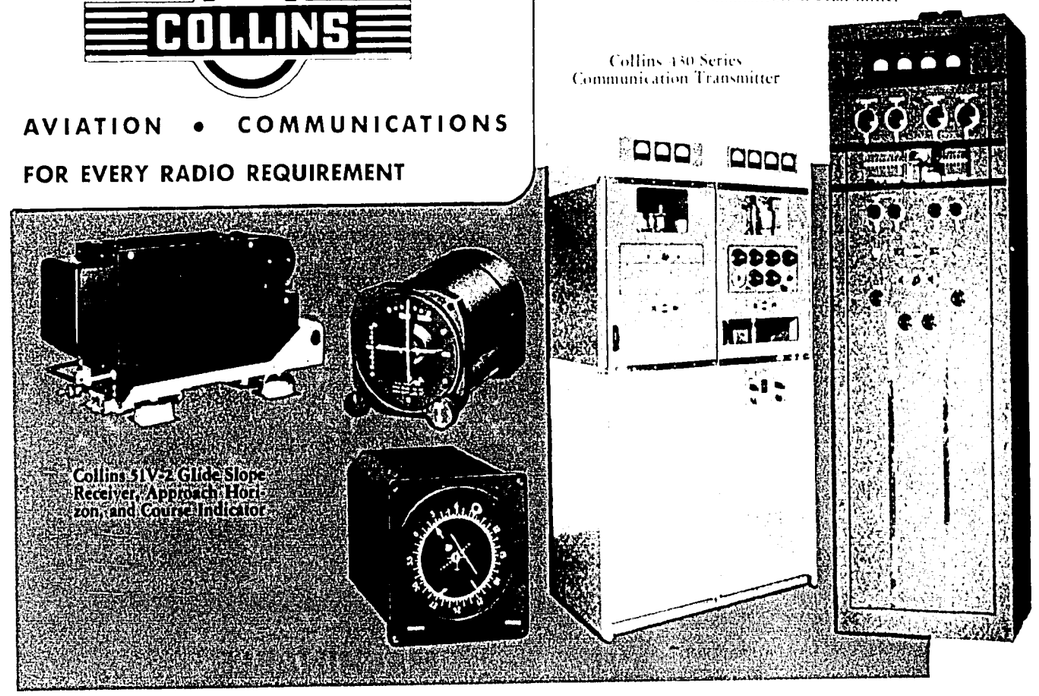
17L-3 180-Channel VHF Airborne Transmitter, frequency range 118.0 to 135.9 megacycles. All 180 channels easily selected on a simple, positive remote control system. Power output conservatively rated at 8 watts.

51V-2 Glide Slope Receiver, designed for reception of 90-150 cps tone modulated glide slope signals on any of the twenty channels in the UHF range.

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AVIATION • COMMUNICATIONS

FOR EVERY RADIO REQUIREMENT



17M 360-Channel VHF Airborne Transmitter, full 360 channels in the range of 118.0-135.9 mc. 50 watt power output with phone emission. Meets ARINC Spec. #520.

51X 360-Channel VHF Airborne Communications Receiver companion to 17M Transmitter. Complete new design to meet ARINC Spec. #520 for 50 kc bandwidth. Has the sensitivity, selectivity and spurious response rejection characteristics required for flight and airport traffic control.

51Z Marker Beacon Receiver is completely dependable, highly selective and free from spurious response. Operates lights with minimum "twilight" indication.

37J-3 VHF Airborne Navigation Antenna, for use with the 51R-3 navigation receiver. Drag, 2.65 pounds at 250 m.p.h.

37R-1 VHF Airborne Communication Antenna, for use with Collins VHF two-way communications system.

37P Airborne Glide Slope Antenna mounts on nose of aircraft, and provides greatly improved pickup and receiver performance.

Integrated Flight System simplifies ILS approaches by presenting precisely computed steering information in conjunction with simplified pictorial type instruments. Instrumentation also simplifies enroute navigation.

Navigation System, the Collins NC-101, provides the pilot continuous position information by automatically computed triangulation, using two VOR systems.

478C IFS Test Equipment, bench tester for ILS Computer, automatic pilots and other flight director equipments.

479T-2 Signal Generator, a precise ramp-test equipment for airborne VOR localizer and glide slope receivers.

479S-3 Audio Signal Generator is used in precision bench testing of omni-range, localizer and glide slope receivers. Output signals for VOR, localizer, and glide slope audio circuit investigations are provided.

GROUND STATION EQUIPMENT

231D-20 Autotune Transmitter, frequency range 2-26 mc. 2.5 to 3 kilowatts phone, 3 kilowatts CW.

430 Series Transmitters, 1 or 2 kilowatts, conservatively rated, phone, CW or ISK. Simultaneous transmission on two or more frequencies if desired. Transmission on any of ten instantly selectable, pre-set channels over entire range from 2-30 mc. Unitized chassis construction combines production economies with custom requirements.

16F-14 Autotune Transmitter, frequency range 2-20 mc. 500 watts phone, 500 watts CW.

30K-4 Transmitter, 2 channels, pretuned to any frequency between 2 and 30 mc. 500 watts CW, 250 watts phone.

32RA-9 Transmitter, 1 channels, pretuned to any frequency between 1.5 and 15 mc. 75 watts CW, 50 watts phone.

51J-3 Receiver provides continuous coverage from 500 kc to 30 mc, with very high stability and tuning accuracy.

51M-6 VHF Rack Mounting Receiver, single channel, pretuned to any frequency between 118 and 136 mc.

51N-2 Receiver, single channel, for A1, A2, and A3 reception, pretuned to any frequency between 2 and 24 mc. Mechanical filter kits available.

242F VHF Transmitter, rack mounted, providing single frequency operation between 118.0 and 136.0 mcs. 50 watts power into 52 ohms.

In requesting complete technical information on any Collins product please specify equipment you want.

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glass-bonded mica

MYCALEX glass-bonded mica is the only CERAMOPLASTIC

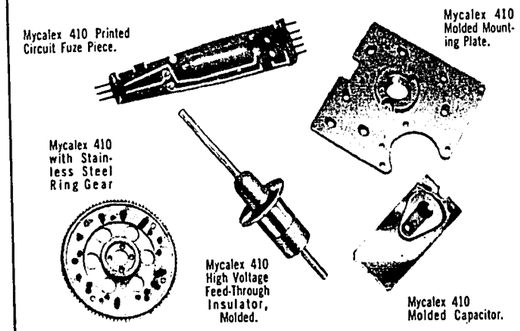
Mycalex glass-bonded mica has ceramic rigidity, much of ceramic temperature endurance, plus more dimensional precision and stability than any ceramic. Mycalex glass-bonded mica can be molded and machined like a plastic, but with greater precision, greater dimensional stability, complex insert inclusions, and higher temperature endurance than any plastic. Having the best features of both ceramics and plastics plus some special ones of its own, Mycalex glass-bonded mica is the only Ceramoplastic.

PROPERTIES

- Electrically stable. Does not lose its properties.
- Low electrical loss factor.
- High dielectric strength.
- High arc resistance. Cannot carbonize.
- Can be molded to closer dimensional tolerances than any ceramic or plastic.
- Can be machined, ground or lapped to as close tolerances as any metal.
- Persistent dimensional stability. Free from warpage, cold flow or age distortion.
- Inserts can be molded into molded grades, cemented into machined holes in machined grades.
- Metal parts can be cemented onto all grades. One Mycalex glass-bonded mica part can be cemented to another.
- Has nearly the same coefficient of thermal expansion as the most commonly used insert alloys. Holds inserts tight over wide temperature ranges.
- Unaffected by humidity.
- Impervious to water, oil, organic solvents.
- High temperature endurance.
- High thermal shock endurance.
- Dimensional stability persists despite cycles of high and low temperature.
- Radiation Resistant.

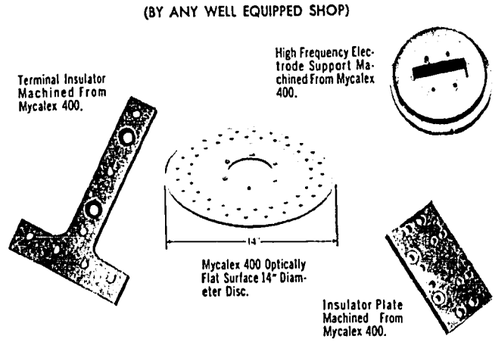
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Operating temperature limit 650° F., natural mica, moldable with or without inserts, low machinability.	Operating temperature limit 900° F., synthetic mica, moldable with or without inserts, low machinability.	Moldable but not readily machinable general capacitor dielectric with dielectric constant indicated by KM number such as 10, 20, 30 or 40.	Operating temperature limit 700° F., natural mica, readily machinable, not moldable, inserts must be cemented in.	Operating temperature limit 1000° F., synthetic mica, readily machinable, not moldable, inserts must be cemented in.	Machinable general capacitor dielectric with dielectric constant indicated by K number such as 10, 15 or 20.

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MACHINING BOOKLET AND CATALOG
Our Engineers Handbook & Catalog tells the whole story and is yours for the asking. And if you want to machine Mycalex then ask also for the free booklet "From One Machinist To Another."



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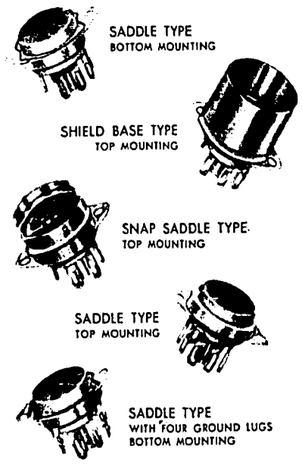
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glass-bonded mica

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WHAT MYCALEX glass-bonded mica CAN CONTRIBUTE TO ELECTRICAL DESIGN

Electrical components of given capacities can be made smaller, more compact, and lighter in weight when the high thermal endurance, structural strength, dimensional precision, dimensional stability, and almost ideal insulating ability of Mycalex glass-bonded mica are employed. Tight inserts eliminate corona and produce tight seals. Printed circuit elements can be tied into inserts.

SWITCHES, COMMUTATOR PLATES BY MYCALEX ELECTRONICS CORPORATION

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Top view of a Mycalex 410 commutator. Made to the specifications of Raymond Rosen Engineering Products, Inc., for Air Materiel Command and other government projects. Only Mycalex glass-bonded mica could provide the mechanical, dimensional and electrical properties that such precision products require.



Rear view of the same commutator. It is precision injection-molded, has 180 or 108 contacts and three coin silver slip rings. These tight inserts will take repeated soldering and violent temperature change with no loosening. Mycalex Electronics Corporation is ready to produce similar complex combinations of metal and insulation to your designs.
Just write us.

OUR ENGINEERS ARE READY TO ADVISE YOU

If you will send us sketches, blue prints or models of any products in which Mycalex glass-bonded mica might be used as electrical insulation, our engineers will be glad to make suggestions in regard to the most economical and effective ways to employ our products in your designs.

MYCALEX CORPORATION IS THE WORLD'S LARGEST MANUFACTURER OF glass-bonded mica PRODUCTS

Mycalex Corporation of America is a direct development of the very inception of glass-bonded mica as an engineering material.

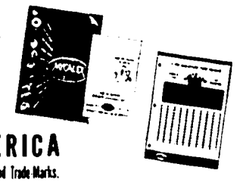
We undoubtedly have machined, on contract, more designs of pieces and more thousands of pieces of glass-bonded mica than any other manufacturer. This is in spite of the fact that we are persisting in and accelerating our effort to teach others how to machine this machinable material.

We certainly have molded more designs and more thousands of glass-bonded mica parts than any other manufacturer. This we know to be true because only a few manufacturers mold this material at all and the rest of the industry combined does not match our steadily employed molding facilities.

Our reason for making these statements about the position of Mycalex Corporation of America in the glass-bonded mica industry is to emphasize the quality of the free engineering suggestion service which we offer to all who might use Mycalex glass-bonded mica in their products.

THE WHOLE STORY IS YOURS FOR THE ASKING

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Our Engineers Handbook & Catalog is yours for the asking. If you want to machine Mycalex then ask also for the free booklet "From One Machinist To Another." Specific Data Sheets on Mycalex Tube Sockets are available.



MYCALEX CORPORATION of AMERICA

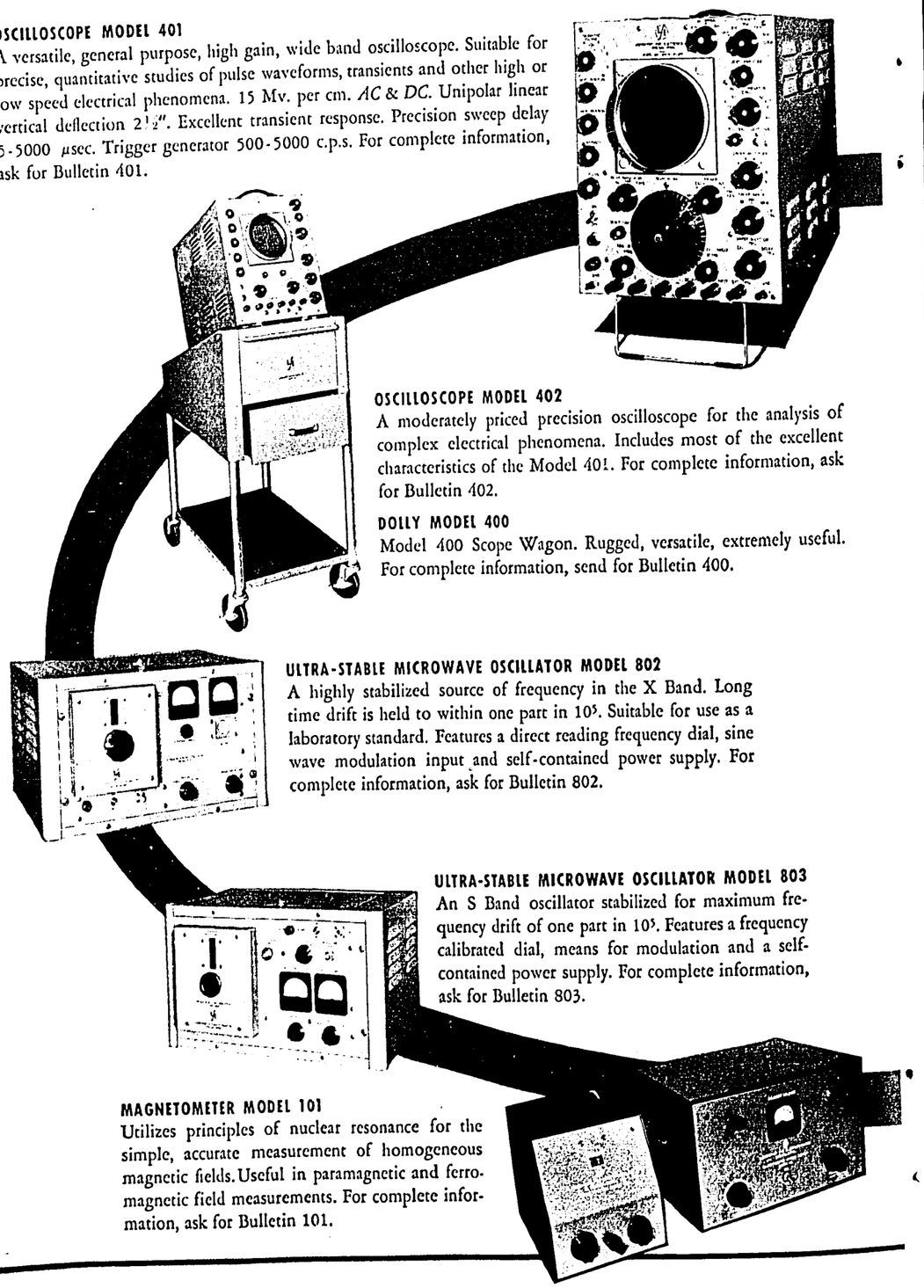
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OSCILLOSCOPE MODEL 402
A moderately priced precision oscilloscope for the analysis of complex electrical phenomena. Includes most of the excellent characteristics of the Model 401. For complete information, ask for Bulletin 402.

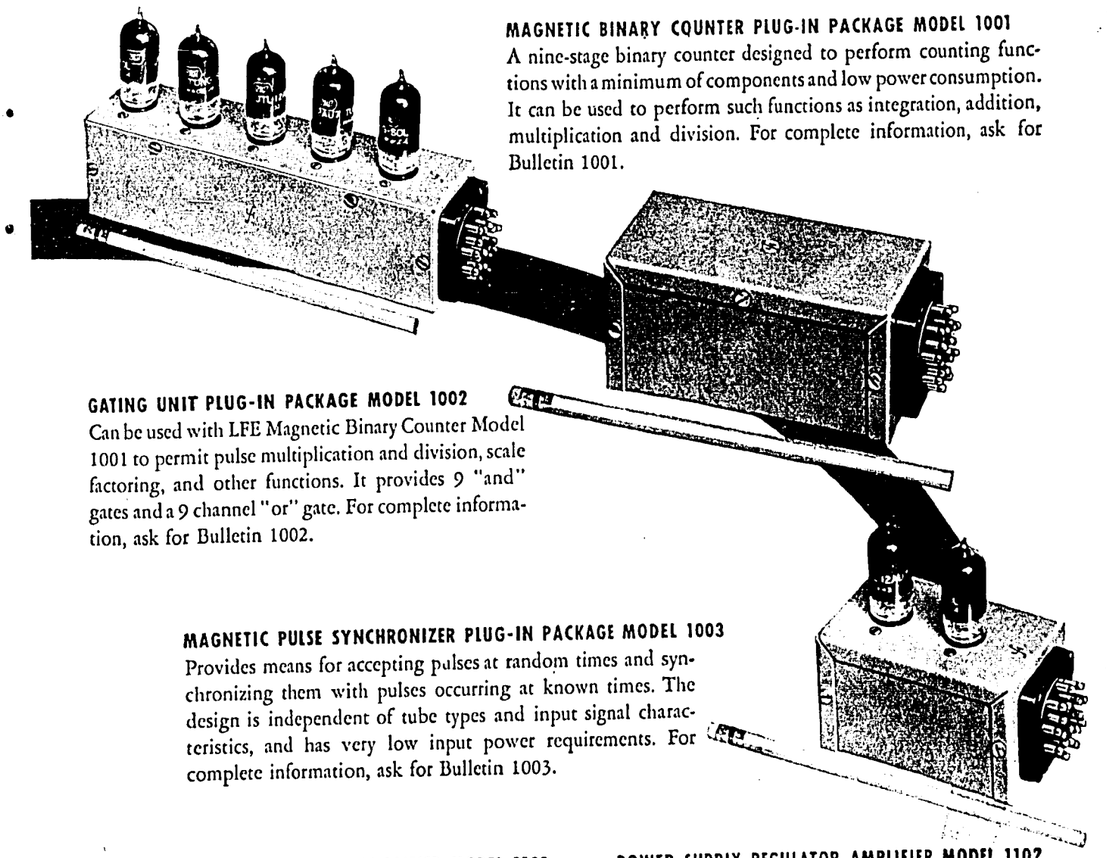
DOLLY MODEL 400
Model 400 Scope Wagon. Rugged, versatile, extremely useful. For complete information, send for Bulletin 400.

ULTRA-STABLE MICROWAVE OSCILLATOR MODEL 802
A highly stabilized source of frequency in the X Band. Long time drift is held to within one part in 10^5. Suitable for use as a laboratory standard. Features a direct reading frequency dial, sine wave modulation input and self-contained power supply. For complete information, ask for Bulletin 802.

ULTRA-STABLE MICROWAVE OSCILLATOR MODEL 803
An S Band oscillator stabilized for maximum frequency drift of one part in 10^5. Features a frequency calibrated dial, means for modulation and a self-contained power supply. For complete information, ask for Bulletin 803.

MAGNETOMETER MODEL 101
Utilizes principles of nuclear resonance for the simple, accurate measurement of homogeneous magnetic fields. Useful in paramagnetic and ferromagnetic field measurements. For complete information, ask for Bulletin 101.

RESEARCH, ENGINEERING AND PRODUCTION OF PRECISION ELECTRONIC EQUIPMENT



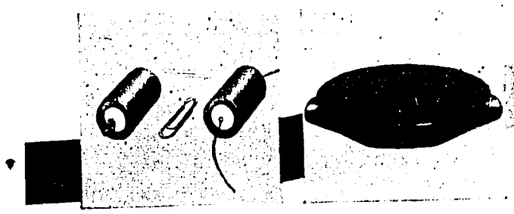
MAGNETIC BINARY COUNTER PLUG-IN PACKAGE MODEL 1001
A nine-stage binary counter designed to perform counting functions with a minimum of components and low power consumption. It can be used to perform such functions as integration, addition, multiplication and division. For complete information, ask for Bulletin 1001.

GATING UNIT PLUG-IN PACKAGE MODEL 1002
Can be used with LFE Magnetic Binary Counter Model 1001 to permit pulse multiplication and division, scale factoring, and other functions. It provides 9 "and" gates and a 9 channel "or" gate. For complete information, ask for Bulletin 1002.

MAGNETIC PULSE SYNCHRONIZER PLUG-IN PACKAGE MODEL 1003
Provides means for accepting pulses at random times and synchronizing them with pulses occurring at known times. The design is independent of tube types and input signal characteristics, and has very low input power requirements. For complete information, ask for Bulletin 1003.

STABILIZED D.C. OPERATIONAL AMPLIFIER MODEL 1101
This compact plug-in unit has been designed to provide high gain and low drift to meet the stringent need of real time computation. It has low phase shift and wide bandwidth resulting in excellent performance at high solution speeds. The Model 1101 may be used with any standard commercial chopper having a make-before-break contact. For complete information, ask for Bulletin 1101.

POWER SUPPLY REGULATOR AMPLIFIER MODEL 1102
A plug-in packaged control amplifier for series regulated D.C. power supplies. It is designed to control any type of series tube or tubes as dictated by output current requirements. Provides excellent voltage stability, 60 db. ripple rejection, and low output impedance. For complete information, ask for Bulletin 1102.



SOLID DELAY LINES
Utilize fused quartz as the ultrasonic delay medium. Offer the following advantages in obtaining precise delay intervals for pulses or pulsed modulated signals: Wide ranges of delay, low attenuation, low spurious response, wide bandwidth, smooth pass band, wide temperature range, minimum size and weight and rugged construction. Typical applications include video integration, computers, time markers, moving target indication. For complete information, ask for Bulletin SDL.

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PROVEN DEPENDABLE QUALITY

Components

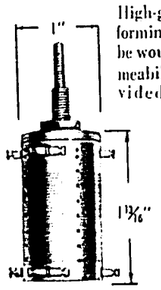
COIL FORMS



XR-50

These mica-filled bakelite coil forms may be wound as desired to provide a permeability tuned coil. The form winding length is 11/16" and the form winding diameter is ½ inch. The iron slug is ⅜" dia. by ½" long.

XR-51 same but with brass slug.



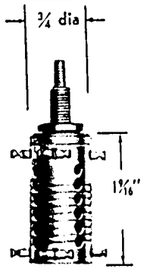
High-grade ceramic coil forms conforming to JAN specifications. May be wound as desired to provide a permeability-tuned coil. Extra lugs provided

XR-60 Grooved for #26 wire with iron slug

XR-61 Grooved for #26 wire with brass slug

XR-62 Not grooved, winding length 1¼" with iron slug

XR-63 Not grooved, winding length 1¼" with brass slug

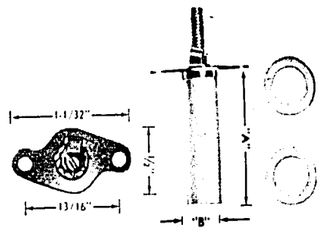


XR-70 Grooved for #19 wire with iron slug

XR-71 Grooved for #19 wire with brass slug

XR-72 Not grooved, winding length 1" with iron slug

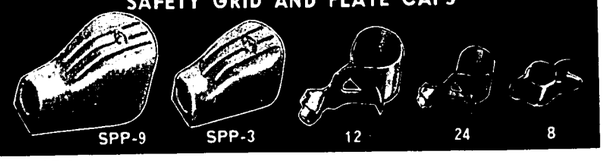
XR-73 Not grooved, winding length 1" with brass slug



Small ceramic coil forms designed primarily for high frequency applications and conforming to government specifications. Coil form is Grade L4 ceramic (JAN 1-10); base is silver-plated brass; core is brass or iron. Supplied with two nylon rings to separate coils if more than one is wound on same form. Small holes in rings can be used to secure leads.

TYPE	CORE	"A" DIM.	"B" DIM.
XR 80	BRASS	1¼"	17/64"
XR 81	IRON	1¼"	17/64"
XR 82	BRASS	1⅝"	17/64"
XR 83	IRON	1⅝"	17/64"
XR 90	BRASS	1¼"	⅜"
XR 91	IRON	1¼"	⅜"
XR 92	BRASS	1⅝"	⅜"
XR 93	IRON	1⅝"	⅜"

SAFETY GRID AND PLATE CAPS



SPP-9
Ceramic insulation. Fits 9/16" diameter.

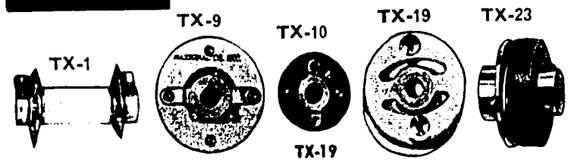
SPP-3
Ceramic insulation. Fits ⅜" diameter. National Safety Grid and Plate Caps have a ceramic body which offers protection against accidental contact with high voltage caps on tubes.

GRID AND PLATE GRIPS

Type 12, for 9/16" Caps
Type 24, for ⅜" Caps
Type 8, for ¼" Caps
National Grid and Plate Grips provide a secure and positive contact with the tube cap and yet are released easily by a slight pressure on the ear.

Write Dept. 800 for complete catalog or detail drawings of parts advertised

COUPLINGS



TX-1, Leakage path 1".

TX-9

This small insulated flexible coupling provides high electrical efficiency when used to isolate circuits. Insulation is steatite. 1⅝" diam. Fits ¼" shaft.

TX-10

A very compact insulated coupling free from backlash. Insulation is canvas bakelite. 1-1/16" diam. Fits ¼" shaft.

TX-19

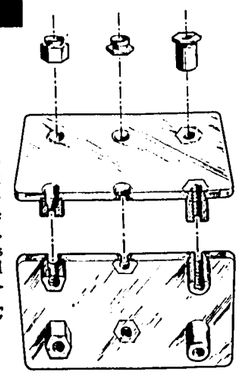
A steatite insulated flexible coupling for ¼" shafts. Conservatively rated at 5000 volts peak. Diameter 1⅝", length 1". Length and flashover voltage can be increased by turning collars outboard.

TX-23

A deluxe insulated flexible coupling designed for coupling ¼" shafts. Will handle a maximum radial misalignment of 1/16" also 2 degrees maximum angular misalignment.

CAPTIVE NUTS

National Captive Nuts of stainless steel may be pressed into aluminum and certain types of brass sheet metal to provide integral flush-mounted tapped holes in a wide variety of sizes. Four basic types have been designed for metal thicknesses of 1/16", 3/32", ⅛", 3/16" and ¼".



DIALS, MECHANISMS AND KNOBS

HRS (gray or black)
The HRS series knobs are a popular easy to grip knob. They are molded of high quality plastic and have 1⅝" dia. chrome plated bevel skirts fit ¼" shafts available in the following scales:

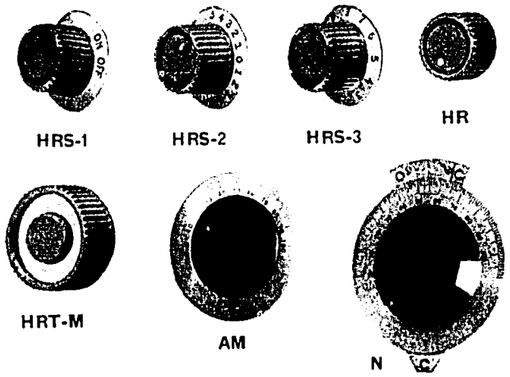
HRS-1	ON-OFF	through 30°
HRS-2	5-0-5	through 180°
HRS-3	0-10	through 300°
HRS-4	Single etched line	
HRS-5	0-10	through 180°

HR (gray or black)
An HRS type knob without the chrome plated skirt but with a white dot for spotting relative control settings.

HRT-M
This smaller version of the HRT — now available in choice of gray or black — is 1-7/16" in diameter.

AM Dial
The original "Velvet Vernier" mechanism in a metal skirted dial 3" in dia. ratio 5 to 1. It is available with 2, 3, 4, 5 or 6 scale and fits ¼" shaft. Mechanisms also available separately.

N Dial
The four-inch N and AD Dials have engine divided and die stamped scales respectively. The N Dial has a decimal vernier; the AD Dial employs a pointer. The planetary drive has a ratio of 5 to 1, and is contained within the body of the dial. 2, 3, 4, 5 or black scale. Fits ¼" shaft. **Specify scale.**

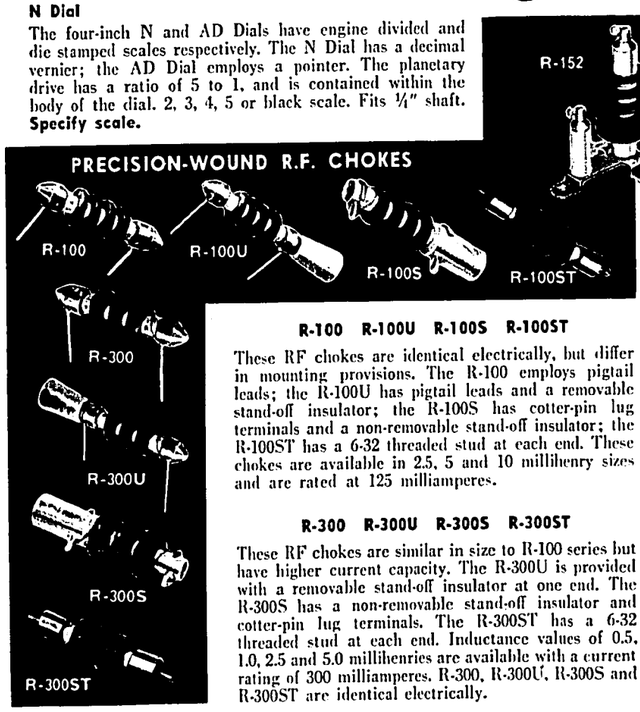


HRM KNOB



This straight knurl brass, satin chrome finished knob with arrowhead fits ¼" shaft. See catalogue for description.

PRECISION-WOUND R.F. CHOKES

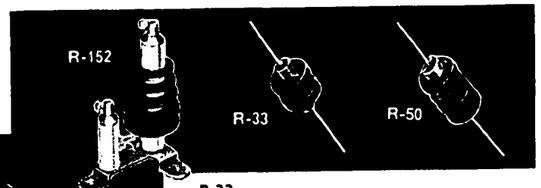


R-100 R-100U R-100S R-100ST

These RF chokes are identical electrically, but differ in mounting provisions. The R-100 employs pigtail leads; the R-100U has pigtail leads and a removable stand-off insulator; the R-100S has cotter-pin lug terminals and a non-removable stand-off insulator; the R-100ST has a 6-32 threaded stud at each end. These chokes are available in 2.5, 5 and 10 millihenry sizes and are rated at 125 milliamperes.

R-300 R-300U R-300S R-300ST

These RF chokes are similar in size to R-100 series but have higher current capacity. The R-300U is provided with a removable stand-off insulator at one end. The R-300S has a non-removable stand-off insulator and cotter-pin lug terminals. The R-300ST has a 6-32 threaded stud at each end. Inductance values of 0.5, 1.0, 2.5 and 5.0 millihenries are available with a current rating of 300 milliamperes. R-300, R-300U, R-300S and R-300ST are identical electrically.



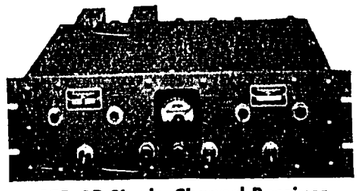
R-33
The R-33 series chokes are 2-section RF chokes available in 10, 50, 100 and 750 microhenry sizes. Also available in this series is a single layer solenoid choke of 1 microhenry inductance. All are rated at 100 milliamperes. The chokes are wound on a ⅜" long form and range in diameter up to 5/16" maximum.

R-50
R-50-1
The R-50 series chokes are 3 and 4-section RF chokes and available in 0.5, 1, 2.5, and 10 millihenry sizes. They are rated at 100 milliamperes. The chokes are wound on a 1" long form and have a maximum diameter of 15/32". The 10 millihenry R-50-1 choke is wound on an iron core.

R-152
For use in the range between 2 and 4 Mc. Ideal for high power transmitter stages operated in the 80 meter amateur band. Inductance 4 m.h., DC resistance 10 ohms, DC current 600 ma. Coils honeycomb wound on steatite core.

Commercial Electronic Equipment

The National Company has designed and built many types of electronic equipment to rigid specifications for military, scientific and commercial purposes. The U. S. Navy, and other government agencies, as well as the nation's largest airports are among the many users of National equipment. Send inquiries to the Commercial Division.



SCR-3B Single-Channel Receiver

NATIONAL COMPANY, INC.
61 Sherman St., Malden, Mass.

ADDRESS EXPORT INQUIRIES TO
EXPORT DIV., DEPT. DR—53

WRITE FOR COMPLETE CATALOG AND SPECIFICATIONS OE COMMUNICATION RECEIVERS · COMPONENTS

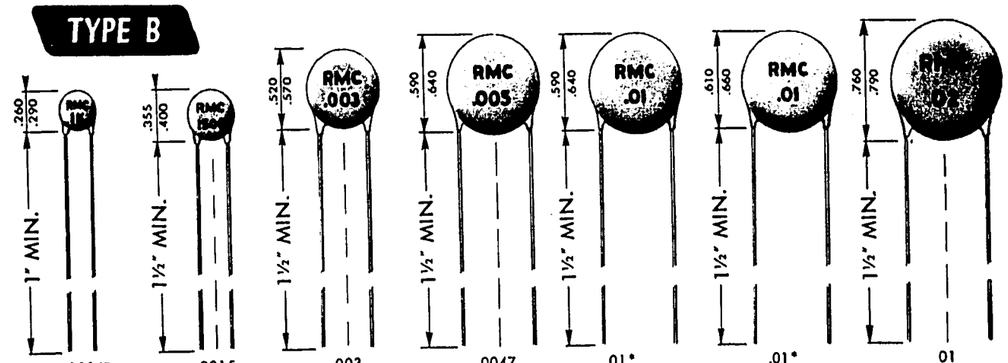
National
NC
NATIONAL COMPANY, Inc.
MALDEN MASSACHUSETTS

Write for drawings DEPT. 800 NATIONAL CO., 61 SHERMAN ST., MALDEN, MASS.

APPROVED AND USED
BY LEADING MANUFACTURERS

"Heavy Duty" By-Pass DISCAPS

TYPE B



.00047	.0015	.003	.0047	.01*	.01*	.01
.00068	.002	.004*	.005	±20%	.02*	.02
.0008	2x.001	.005*	2x.002	.02*		2x.004
.001		2x.0015		+80%−20%		
		2x.002*				

*Rated 600 V.D.C.W. Flash test 1200 V.D.C.

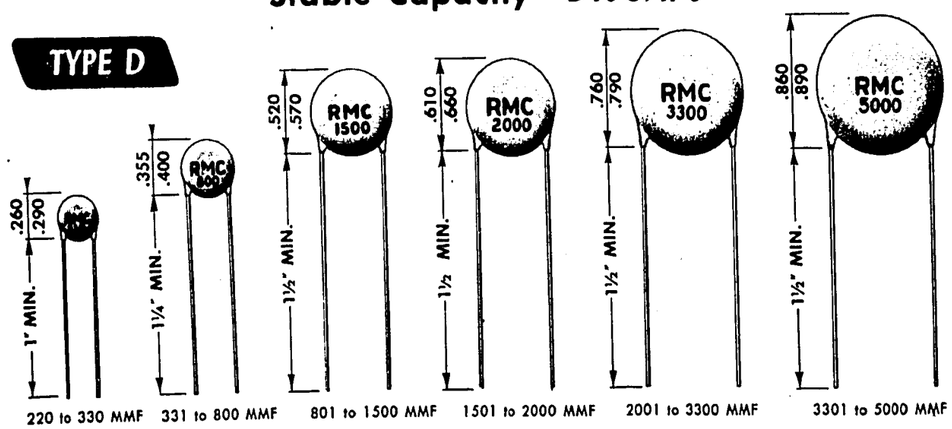
SPECIFICATIONS

TYPE B BY-PASS SERIES—GUARANTEED MINIMUM VALUE

POWER FACTOR: 1.5% Max. @ 1 KC (initial)
POWER FACTOR: 2.5% Max. @ 1 KC (after humidity)
WORKING VOLTAGE: 1000 V.D.C.
TEST VOLTAGE (FLASH): 2000 V.D.C.
LEADS: No. 22 tinned copper (.026 dia.)
INSULATION: Durez phenolic—vacuum waxed
INITIAL LEAKAGE RESISTANCE: Guaranteed higher than 7500 megohms
AFTER HUMIDITY LEAKAGE RESISTANCE: Guaranteed higher than 1000 megohms

"Stable Capacity" DISCAPS

TYPE D



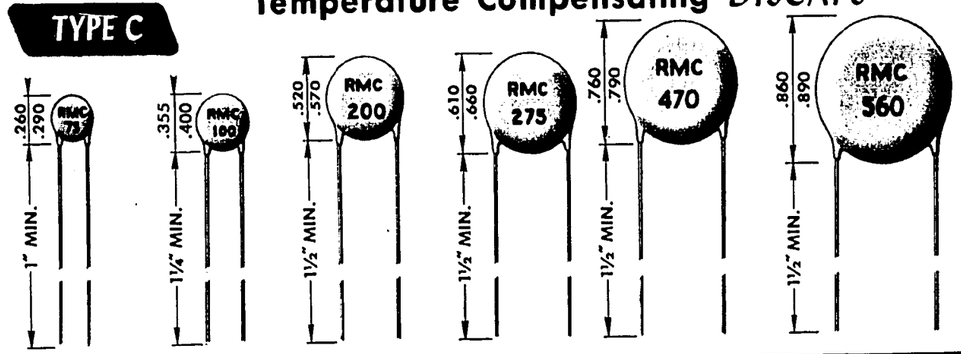
220 to 330 MMF | 331 to 800 MMF | 801 to 1500 MMF | 1501 to 2000 MMF | 2001 to 3300 MMF | 3301 to 5000 MMF

SPECIFICATIONS

POWER FACTOR: 1% Max. @ 1 K C (initial)
POWER FACTOR: 2.5% Max @ 1 K C, after humidity
WORKING VOLTAGE: 1000 V.D.C.
TEST VOLTAGE (FLASH): 2000 V.D.C.
LEADS: No. 22 tinned copper (.026 dia.)
INSULATION: Durez phenolic—vacuum waxed
INITIAL LEAKAGE RESISTANCE: Guaranteed higher than 7500 megohms
AFTER HUMIDITY LEAKAGE RESISTANCE: Guaranteed higher than 1000 megohms
CAPACITY TOLERANCE: ±20% at 25° C or G.M.V.

Temperature Compensating DISCAPS

TYPE C

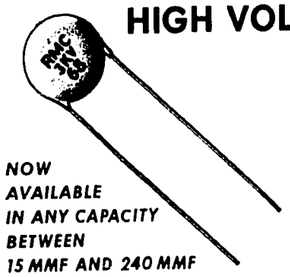


TC	1/4 Dia.	5/16 Dia.	1/2 Dia.	5/8 Dia.	3/4 Dia.	7/8 Dia.
P-100	1- 3 MMF	4- 9 MMF	10- 30 MMF	—	—	—
NPO	2- 12	13- 27	28- 60	61- 75 MMF	76-100 MMF	101-150 MMF
N- 33	2- 15	16- 27	28- 60	61- 75	76-100	101-150
N- 80	2- 15	16- 27	28- 60	61- 75	76-120	121-150
N- 150	2- 15	16- 30	31- 60	61- 75	76-140	141-150
N- 220	3- 15	16- 30	31- 75	76-100	101-150	151-190
N- 330	3- 15	16- 30	31- 75	76-100	101-150	151-190
N- 470	3- 20	21- 40	41- 80	80-120	121-200	201-240
N- 750	5- 25	26- 56	57-150	151-200	201-280	281-350
N-1400	15- 50	51-100	101-200	200-250	251-330	331-560
N-2200	47- 75	76-120	121-200	201-275	276-470	471-560

SPECIFICATIONS

POWER FACTOR: Less than .1% at 1 megacycle
WORKING VOLTAGE: 1000 V.D.C.
TEST VOLTAGE (FLASH): 2000 V.D.C.
CODING: Capacity, tolerance and TC stamped on disc
INSULATION: Durez phenolic-vacuum waxed
INITIAL LEAKAGE RESISTANCE: Guaranteed higher than 7500 megohms
AFTER HUMIDITY LEAKAGE RESISTANCE: Guaranteed higher than 1000 megohms
LEADS: #22 tinned copper (.026 dia.)
TOLERANCES: ±5% ±10% ±20%

HIGH VOLTAGE DISCAPS—*Designed for Deflection Yokes*



NOW AVAILABLE IN ANY CAPACITY BETWEEN 15 MMF AND 240 MMF

SPECIFICATIONS

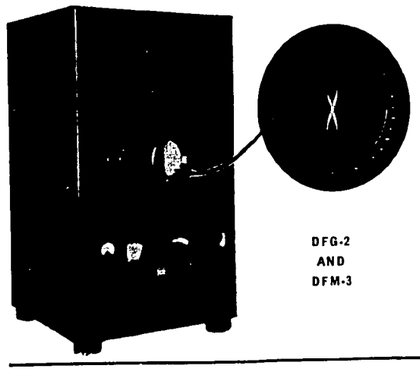
POWER FACTOR: .1% Max. @ 1 M C (initial)
POWER FACTOR: 2.5% Max. @ 1 M C, after humidity
WORKING VOLTAGE: 2000, 3000, 4000, 5000 V.D.C.
TEST VOLTAGE: 4000, 6000, 8000, 10,000 V.D.C.
LEADS: No. 22 tinned copper (.026 dia.)
INSULATION: Durez phenolic—vacuum waxed
INITIAL RESISTANCE: Guaranteed higher than 7500 megohms
AFTER HUMIDITY LEAKAGE RESISTANCE: Guaranteed higher than 1000 megohms
AVAILABLE TOLERANCE: ±5% ±10% ±20%

SEND FOR SAMPLES AND TECHNICAL DATA

DISCAP CERAMIC CONDENSERS

RADIO MATERIALS CORPORATION
GENERAL OFFICE: 3325 N. California Ave., Chicago 18, Ill.
FACTORIES AT CHICAGO, ILL. AND ATTICA, IND.
DISTRIBUTORS: Contact Jobber Sales Co., 146 Broadway, Paterson 1, N. J.

RADIO FREQUENCY SYSTEMS AND INSTRUMENTATION



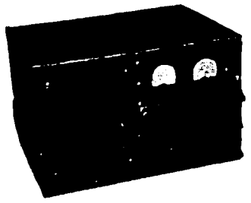
DFG-2
AND
DFM-3

RADIO DIRECTION FINDERS FOR EVERY APPLICATION

LF, HF and VHF models can be supplied for every application. When requesting information, describe intended use.

STANDARD MODELS

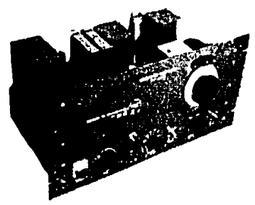
MODEL	FREQ. RANGE	ANTENNA	INDICATION
DFG-1	0.54-20 Mc	Crossed Adcock with goniometer	Aural-Null
DFG-2	0.54-30 Mc	4-element spaced aerial	Automatic Visual Indication
DFM-1	0.54-30 Mc	Rotatable Loop	Aural-Null
DFM-2	0.54-20 Mc	Crossed Loops with goniometer	Aural-Null
DFM-3	0.54-30 Mc	Crossed Loops with goniometer	Automatic Visual Indication



MODEL 2400 CRYSTAL CONTROLLED SIGNAL GENERATOR

Positive crystal control from 150 Kc to 150 Mc; precision zero-leakage measurement of output level from 1 to 100,000 microvolts; and metered modulation free from FM distortion. These features of the Model 2400 Signal Generator make it possible to preset channels "on-the-head," to know receiver sensitivity without guessing, and to standardize squelch threshold control settings. Ideal for testing and aligning airline radio equipment, radar IF strips and TV tuners. Write for additional information.

MODEL 1232B SECONDARY FREQUENCY STANDARD—Rack Mounted



Here is a versatile precision instrument every laboratory needs for frequency comparison, measurement and synthesis, useful from 1 KC TO ABOVE 1000 MC. Oven-controlled crystal oscillator in special circuit provides accuracy better than 1 part per million. Self-contained crystal-controlled interpolation feature permits fast, direct measurement of frequency. Harmonics delivered are strong and uniform in amplitude. Standard harmonic intervals are 1, 2, 5, 10, 50 and 100 Kc. Output level for 100 Kc harmonics: 100 millivolts from 100 Kc to 5 Mc; 50 millivolts to 75 Mc; 25 millivolts or more to 85 Mc.

SERVOTHERM INFRARED RADIATION INSTRUMENTATION



1312
BOLOMETER
1321
PREAMPLIFIER

SERVOTHERM THERMISTOR BOLOMETERS

are small, rugged, fast sensitive infrared radiation detectors, suitable for spectrophotometric, industrial, and military applications. Furnished with SERVOFRAX window, sensitivity extends from 1 to 13 microns wavelength (other windows also available). Typical time constant, 5 milliseconds maximum. Write for data sheets TDS-1312 and TB-1312.



1322 PREAMPLIFIER

SERVOTHERM LOW-FREQUENCY PREAMPLIFIERS

are low-noise, low-microphonic, stabilized miniature preamplifiers for audio frequencies and down to ½ c.p.s. at microvolt and millivolt input levels. Suitable for use in radiation measurement, geophysical, electromedical, etc. Model 1321 also serves as bolometer mount. Model 1322 is a potted plug-in style.



1350 AMPLIFIER
1330 POWER
SUPPLY

RECORDING AMPLIFIER Model 1350 includes a.c. amplifier, decade attenuator, and detector. Will drive 5 ma. recorder to record envelope of 15 to 1500 cycle carrier (as used in spectrophotometry). Designed for use following 1321-2 preamplifiers, or wherever a 5-5000 c.p.s. amplifier or amplifier/detector is required.

SERVOTHERM POWER UNIT is a superior regulated power supply having extremely low noise at frequencies down to 3 c.p.s., especially designed to power a Servotherm Bolometer and Preamplifier. Will also power one Recording Amplifier. Operates from 115 volts 60 cycles.



1360 PYROMETER

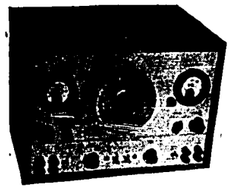
SERVOTHERM RADIATION PYROMETER is used for remotely measuring or controlling thermal radiation of objects to over 1000° C. (four ranges). Time constant under .025 seconds, field of view 1° × 1°. Optical head may be located any distance from object, and fits standard tripod. Pyrometer Model 1360 includes optical head with Servotherm bolometer and preamplifier, Recording Amplifier, Power Unit, and connecting cable.



SERVOFRAX LENSES

SERVOFRAX GLASS transmits infrared and far infrared radiation from 0.6 to 13 microns wavelength. Chemically and physically stable, it is superior to other available materials. Index of refraction is 2.4 and transmission 72% in the 2-8 micron region. Raw glass and finished lenses are available. Write your requirements.

SERVO ANALYSIS AND SYNTHESIS EQUIPMENT



1100 SERVOSCOPE

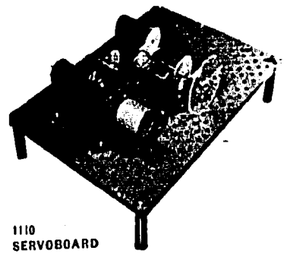
SERVOSCOPE is a signal generator with synchronized phaseable sweep. Produces sub-audio sine waves, square waves, and modulated carrier signals for testing servos and other very low frequency amplifying or control systems. Transfer characteristics, frequency and phase response, and step-function response may be quickly evaluated. Hundreds of Servoscopes are saving their cost to our customers by speeding up otherwise tedious measurements.

Output 0-25 volts. Synchronized sweep 0-150 volts. Operates on 50 to 800 c.p.s. carrier.

Accuracy, frequency 1½%, phase 1°. Input 115 V. 60 c.p.s.

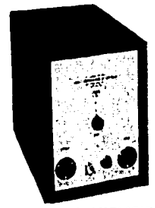
Model 1100A—0.1 to 20 c.p.s.

Model 1100B—0.15 to 30 c.p.s.



1110
SERVOBOARD

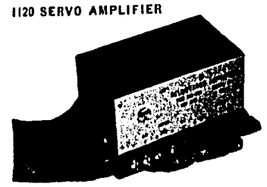
SERVOBOARD is a set of precision mechanical parts, including an ample assortment of gears, shafts, bearings, hangers and mounting plate, which, when coupled to the necessary motors, tachometers, synchros, potentiometers and amplifiers, rapidly builds a flexible experimental mechanical assembly of a servo system, computer or regulator. The Servoboard was developed as an aid to the design of servomechanisms by providing means for quickly synthesizing the electromechanical parts of the control system. Components may be located in an infinite number of positions because of the hairpin clamp method of assembly employed.



1120 SERVO AMPLIFIER

SERVO AMPLIFIERS with self-contained power supplies:

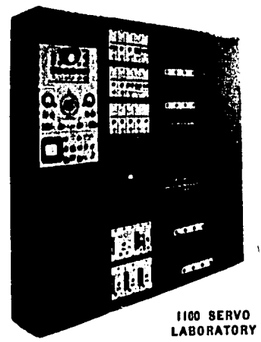
MODEL 1120 is a 60 c.p.s. amplifier with built-in 90° phase shift. Three matched inputs permit operation as a position servo with tachometer stabilization or as a rate servo. Output 10 watts.



1121 SERVO AMPLIFIER

MODEL 1121

A small and light 400 c.p.s. amplifier. Three inputs (two a.c. high gain and one d.c. low gain) are provided. Output, 10 watts continuous, 18 watts reversing or intermittent. Also available without cover for installation as a component.



1100 SERVO
LABORATORY

SERVO LABORATORY

This analysis and synthesis equipment includes a selected list of equipments required in the Servo Test and Development Laboratory. These equipments are grouped in a carefully arranged package to permit the servo designer readily to synthesize a wide variety of systems from standard components and test them with maximum efficiency and time economy. Complete flexibility is provided by standardized interchangeable, plug-in electronic components and efficient and versatile mechanical breadboards. Electrical interconnections are facilitated by terminating the various circuits in jack panels which can be quickly cross-connected by patch cards as desired. Many sizes and arrangements of Servo Laboratory equipment are available—write your requirements.

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

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SERVO CORPORATION OF AMERICA
Dept. IRE-53 • NEW HYDE PARK, N. Y. • FIELDSTONE 7-2810

Electron Tubes

"ACROSS THE BOARD"

—for industry and the armed forces

RCA offers you a comprehensive line of quality-engineered tubes—designed to fill the exacting requirements of a wide range of industrial and defense applications. Look to RCA as a dependable source for your tube needs.

RCA will be glad to help you select the right tube type for your design requirements. For this help—and for technical information on specific tube types

—write RCA, Commercial Engineering, Section 44R, Harrison, N. J. Or simply get in touch with the RCA field engineers at your nearest field office:

(EAST) Humboldt 5-3900
415 S. 5th St., Harrison, N. J.

(MIDWEST) Whitehall 4-2900
589 E. Illinois St., Chicago, Ill.

(WEST) Madison 9-3671
420 S. San Pedro St., Los Angeles, Calif.

RADIO CORPORATION of AMERICA
ELECTRON TUBES
HARRISON, N. J.



RCA Measuring Instruments

... for research, production, and servicing



Television Calibrator
WR-39C

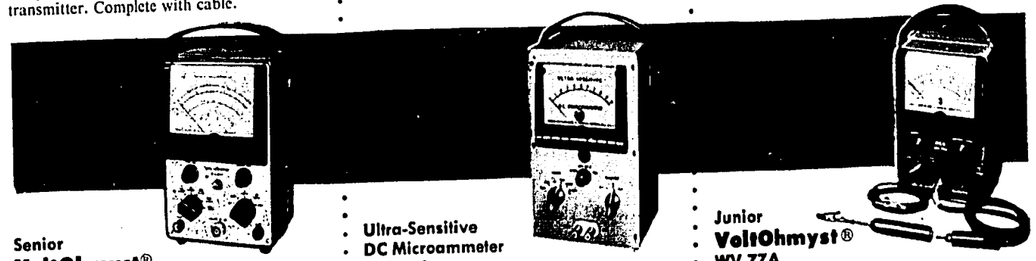
Variable-frequency oscillator provides fundamental output over entire if and rf ranges, with crystal-controlled check points at 2.5-Mc and 0.25-Mc intervals. Provides 4.5-Mc crystal-oscillator signal for inter-carrier alignment and for dual markers at TV carrier frequencies. Harmonic output useful in the UHF range. The WR-39C is a heterodyne frequency meter, a crystal standard (with 3 crystals supplied), a bar-pattern generator, and a TV re-broadcast transmitter. Complete with cable.

Television Sweep Generator
WR-59C

Covers all VHF TV channels on preset fixed positions. Continuous tuning range from 300 Kc to 50 Mc covers video and intermediate frequencies. Precision-type vibrating capacitor provides up to 12-Mc maximum sweep width, flat within ±1 db, with good linearity. Has balanced output dual-piston attenuator for varying output voltage from 0.1 volt to 5 microvolts. Includes blanking for zero-reference line on 'scope. Complete with cables.

Master VoltOhmyst®
WV-87A

Has big 7½" meter. Measures dc voltages accurately in high-impedance circuits, with ac present. Also reads rms values of sine waves and peak-to-peak values of complex waves or recurrent pulses, with dc present. Measures resistance from 0.1 ohm to 1000 megohms, current from 10 microamperes to 15 amperes. Features ±1% tolerance multiplier and shunt resistors, a meter movement having an accuracy within ± 2% and a tracking error of only ± 1%. AC operated. Complete with cables and probes.



Senior
VoltOhmyst®
WV-97A

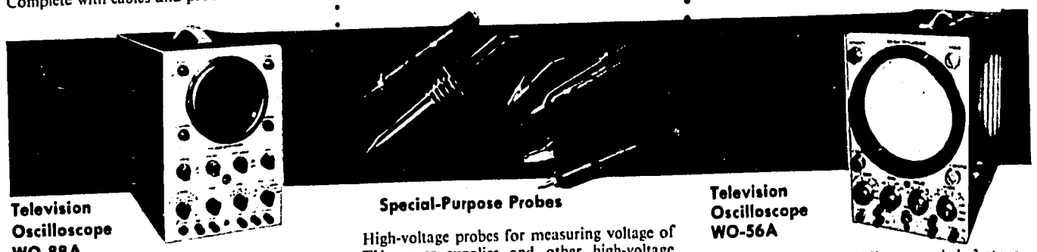
Directly measures complex waves from 0.2 volt to 2000 volts, peak-to-peak. Has an over-all accuracy for dc measurements of ±3% full scale. Measures dc voltage from 0.02 volt to 1500 volts . . . rms values of sine-wave voltages from 0.1 volt to 1500 volts. Has 7 non-skip ranges for both resistance and voltage. Frequency response flat from 30 cps to approximately 3 Mc up to 150V range. AC operated. Complete with cables and probes.

Ultra-Sensitive
DC Microammeter
WV-84A

Reads from 0.0002 microampere to 1 milliampere in six ranges. Also useful for measuring extremely high values of resistance, or as a high-resistance voltmeter with a maximum sensitivity of 100 megohms per volt. Accuracy, ±5% or better . . . invaluable for conducting experiments involving minute values of direct current. Battery operated.

Junior
VoltOhmyst®
WV-77A

Measures dc from 0.05 volt to 1200 volts; ac from 0.1 volt to 1200 volts rms; and resistance from 0.2 ohm to 1 billion ohms; five overlapping ranges in each case. Uses electronic bridge circuit, 200-microampere meter movement and ±1% carbon-film multiplier resistors. Over-all accuracy, ±3% for dc measurements on plus setting. Frequency response flat from 30 cps to 3 Mc up to 60V range. AC operated. Complete with cables and probes.



Television
Oscilloscope
WO-88A

Uses 5" CR tube and direct-coupled, push-pull, vertical amplifier. Frequency-compensated and voltage-calibrated attenuators. Front-panel source of 1-volt peak-to-peak calibrating voltage. Graph screen scaled for direct reading of peak-to-peak voltage. Response flat to dc, less than 3 db down at 500 Kc. Deflection sensitivity, 25 rms millivolts per inch. Input resistance, with low-capacitance probe, 10 megohms shunted by 9.5 mmf. Complete with cables.

Special-Purpose Probes

High-voltage probes for measuring voltage of TV power supplies and other high-voltage sources. *WG-289* has microphone-type connector; *WG-290* has phone-tip connectors. *WG-264* Crystal-Diode Probe, for measuring ac voltages from 10 Kc to 250 Mc. *WG-291* Demodulator Probe, for observing envelope of modulated waveforms. *WG-222* DC/Direct Probe of slip-on type, with built-in 1 megohm resistor. Slide switch permits measuring resistance, dc voltage, and ac voltage without changing probes.

Television
Oscilloscope
WO-56A

Uses 7" CR tube and direct-coupled, 3-stage, push-pull, vertical and horizontal amplifiers. Dual controls for "coarse" and "fine" adjustments. Frequency-compensated and voltage-calibrated attenuators on both amplifiers. Response flat within —2 db from dc to 500 Kc, within —6 db at 1 Mc. Vertical deflection sensitivity, 10.6 rms millivolts per inch. Magnetic shield on CR tube. Cables included.

RADIO CORPORATION of AMERICA
TEST EQUIPMENT
HARRISON, N. J.

STAC



FIXED RESISTORS

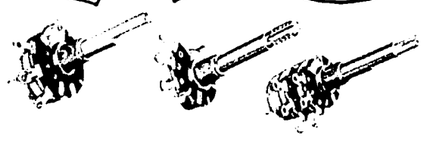
JAN-R-11 TYPES

Styles RC10, RC20, RC21, RC30, RC31, RC41, and RC42.

Write for Stackpole Bulletin J-2.

½-, 1-, and 2-Watt Sizes in all RTMA Preferred Values

Fully insulated and moisture-protected by phenolic sleeves, Stackpole resistors are available in all standard and many special values for radio, television, military and commercial uses. In addition, Stackpole offers special resistors for automotive, lightning arrestor, capacitor discharge, surge and other uses. *Write for Stackpole Catalog RC-9.*

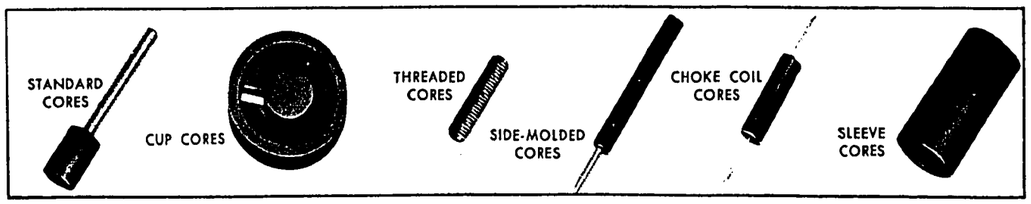


VARIABLE RESISTORS

VERSATILE SWITCHES

Small, reliable line switches are made in ratings and circuitry for every need including auto radio applications.

Stackpole offers a dependable selection of volume and tone controls, potentiometers, etc. for radio, TV, instruments, and other equipment. Single, ganged, and concentric shaft designs are available in values from 500 ohms to 5 megohms and in ratings from .5 watt. Types range from the midget LR control for TV to the conservatively rated .6 watt Type LP for heavier duty wear. Special taps, extended bushings or other features can be supplied. *Write for Catalog RC-9.*



IRON CORE HEADQUARTERS

The widespread use of high Q coils with a consequent reduction in complicated circuitry has resulted in no small part from Stackpole engineering that has made new and better iron cores available at attractive prices. Stackpole production includes practically all types in common use—including cores for high- and low-frequency coils and transformers, chokes, and side-molded types for permeability tuning—as well as numerous types and adaptations made for special uses.

For all styles—standard or special—Stackpole manufacturing techniques assure iron cores of outstanding dependability and uniformity. *Write for Catalog RC-9.*

Fixed Composition CAPACITORS



47 TYPES

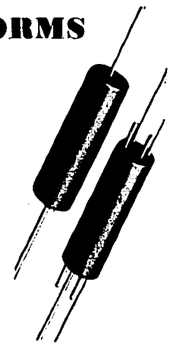
0.1 to 10.0 mmf. 5%, 10%, and 20% tolerances.

Type GA

Unmatched for low cost, high stability, and scarcely larger than ½-watt resistors, Stackpole "GA" capacitors are the most efficient way to couple or by-pass R-F circuits. Sturdily molded of high-dielectric constant material, these low-value capacitors have physical and electrical advantages that save assembly and testing time in virtually every R-F circuit. *Write for Catalog RC-9.*

MOLDED COIL FORMS

for fast, low cost assembly

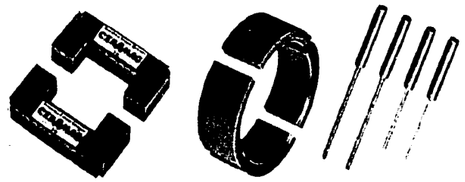


Inexpensive Stackpole molded coil forms permit smaller coils and pave the way for simplified point-to-point wiring with a minimum of soldered connections. Either axial or hairpin leads, securely anchored, are available. Types can also be supplied with iron core sections, thereby increasing Q materially, decreasing the amount of wire for a given inductance, and reducing stray magnetic fields. Write for details and samples to specifications.

KPOLE

Ceramag®

THE REALLY UNIFORM FERROMAGNETIC CORES



Lower Losses with Higher Efficiency . . . Lighter Weight—Smaller Sizes Much Higher Permeability

Standard Stackpole Ceramag Cores provide permeabilities on the order of 10 to 1 or higher by comparison with conventional iron cores. In addition, they have less corona effect and operate much cooler due to eddy current losses resulting from their high resistivity.

The remarkable uniformity of Ceramag Cores has long made them first choice of leading television producers. Typical applications include use as cores for flyback transformers, cathode ray tube deflection yokes, width control; low-loss inductors; I-F pulse and coupling transformers; and various others where Ceramag offers distinct advantages. Details on standard and special Ceramag grades are covered in *Bulletin RC-9A.*



LOW COST SWITCHES

for instruments, radios, appliances, toys, small motors and similar uses

Dress up your product—add to its convenience and "saleability" with these sturdy, low-cost slide switches! Over 20 fractional amperage and new 3 amp. types for fractional HP motors are available. Most types can be supplied with or without detent, spring-return, or other features to match your specifications *exactly.* Modifications, including adaptations for rotary or plunger action, can be produced economically. *Write for new Stackpole Switch Bulletin RC-9B.*

CARBON & GRAPHITE SPECIALTIES



Solve Friction, Temperature, Corrosion, Shaft Sealing, Arcing, and many other problems

Anodes • Battery Carbons • Bearing Materials • Brazing Furnace Boats • Brushes of all types for rotating electrical equipment • Carbon and Graphite and Molded Metal Contacts • Chemical Carbons • Clutch Rings • Dash Pot Plungers • Electric Furnace Heating Elements • Electrolytic Anodes • Friction Segments • Glass Molds • Carbon Ground Rods • Mercury Arc Rectifier Anodes • Metal-Graphite Contacts • Power Tube Anodes • Rail Bonding Molds • Rare Metal Contacts • Resistance Welding and Brazing Tips • Seal Rings (for gas or liquid) • Special Molds and Dies • Salt Bath Rectification Rods • Spectrographite • Trolley and Pantograph Shoes • Voltage Regulator Discs • Water Heater and Pasteurization Electrodes • Welding Carbons • Welding Plates and Paste •

CARBON-GRAPHITE DATA BOOK

Newly revised and enlarged, Stackpole Catalog 40A contains helpful data on carbon, graphite, and carbon-graphite properties and their engineering uses.





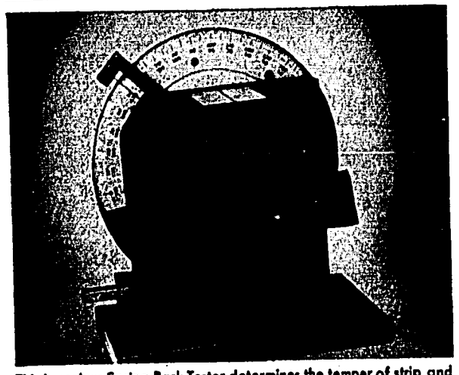
GET THIS BIG 48 Page CATALOG

Just out, the new Catalog RC-9 gives detailed specifications on the latest Stackpole Electronic Components described on these pages. Write on your business letterhead for your copy.

ELECTRONIC COMPONENTS DIVISION

STACKPOLE CARBON COMPANY, ST. MARYS, PENNSYLVANIA

Superior TUBE COMPANY

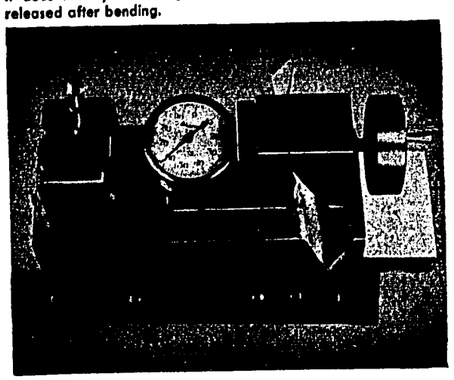


This ingenious Spring Back Tester determines the temper of strip and sheet metals for electronic parts in thicknesses of 0.020" or less. It does this by measuring the "spring-back" when specimen is released after bending.

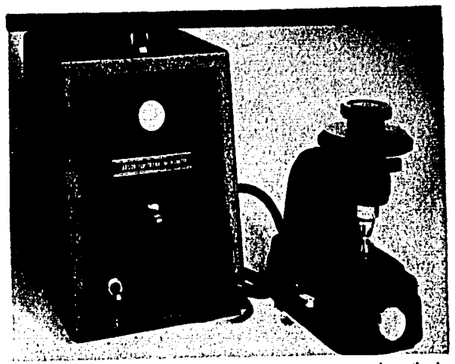
A Few



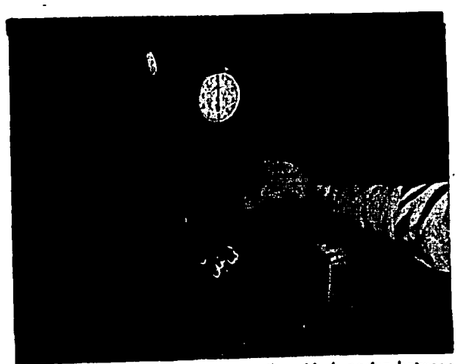
Used to check bowed, bent and offset cathodes for degree of deformation, this Optical Comparator also checks the width and location of circumferential beads.



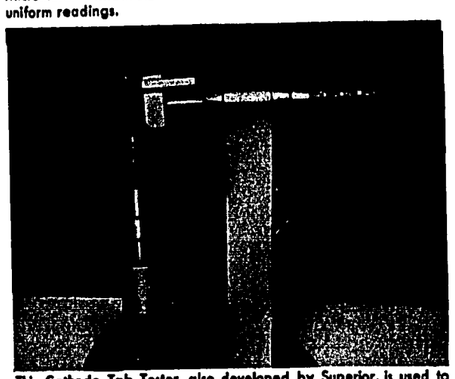
Cup-Testing Apparatus determines the amenability of very thin nickel strip to deep forming. The *combination* of temper, grain size, and ductility of the raw material is measured accurately.



Sensitive to .00005", this Electronic Micrometer reads cathode tolerances with repeated exactness. Light walls of Lockseam Cathodes tend to spring slightly when mechanical micrometers are used—and readings, therefore, are not exact. The Electronic Micrometer standardizes this measurement variable and supplies uniform readings.



The "E" Dimension Gauge measures the critical spacing between the ceramic surface and the surface of the emitting cap in Disc Cathodes. Tolerance limits must be accurate to ± 0.0005" since the dimension controls cut-off voltage and adds uniformity to the characteristics of cathode-ray tubes.



This Cathode Tab Tester, also developed by Superior, is used to "Production Control Test" the strength of tabs on Lockseam Cathodes. The tab is bent back and forth by the Tester until failure results. If it breaks before a specified minimum number of 90° bends are completed, the material is rejected.

Superior Specialties: SEAMLESS AND LOCKSEAM NICKEL CATHODES, CATHALOY CATHODES, DISC CATHODES, ANODES AND GRID CUPS, FABRICATED TUBULAR PARTS.

Superior TUBE COMPANY

of the Critical Tests Superior Tubing Must Meet

Every day we query these and other super-accurate machines about Superior tubing *and* the analyses from which we make it.

Answers—precise to the 3rd and 4th decimal place—enable us to deliver:

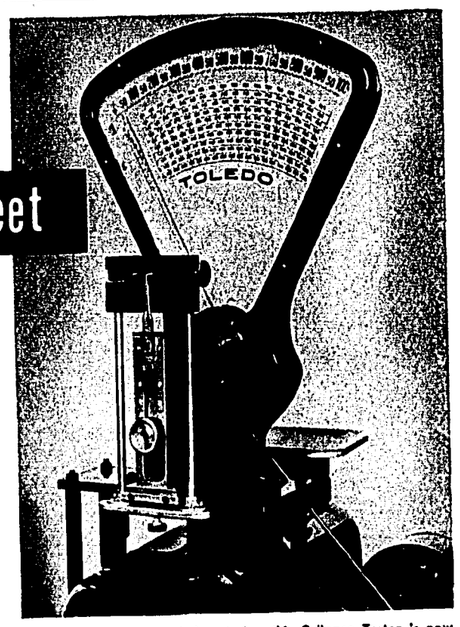
- **An eyebrow-raising assortment of tubular parts for the electronics industry.**
- **Unfailing quality and dependability in each of these products.**

Superior customers have often taken these things for granted. But Superior's Quality Control Program cannot take anything for granted! Rigid controls, beginning at the original melt, continue through every stage of drawing and fabrication. Result: Parts that stand up to the toughest and most precise electronics applications!

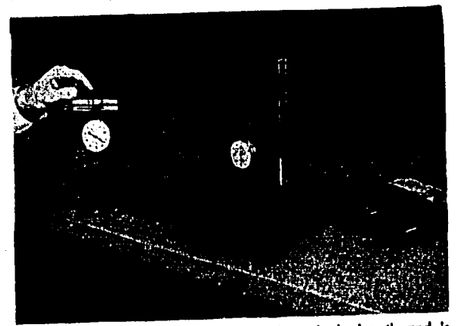
We could show only a few typical parts on these pages. So we've elected, instead, to detail our full line in literature which is yours for the asking.

If, however, you use cathodes in your work, we can supply Seamless or WELDRAWN† tubing for these parts or Lockseam* cathodes made from strip in either Nickel or Cathaloy** metals . . . round or shaped to specified lengths, plain or beaded (embossed). Also anodes, grid cylinders and cups, disc cathodes, and other tubular parts for cathode ray gun structures.

Superior will be glad to work with you in developing, designing and producing the parts you need. If you have a tubing problem, get in touch with us now. The handy coupon will bring you full information, and preliminary consultation costs you nothing. There's no obligation.



Developed in Superior Laboratories, this Collapse Tester is now accepted by A.S.T.M. The instrument is used to determine the degree of resistance to bending in finished cathodes.



The Flat-Faced Hand Micrometer checks cathode length and is accurate to .001". Conical Faced Barrel Micrometer checks wall thickness to tolerances of .0001". The Flat Faced Barrel Micrometer checks O.D. and bead dimensions, can be read to .0001". The Ultra Precision Barrel Micrometer measures shaped cathodes (O.D.) and beads and is readable to .00004". The "Go" and "No Go" pin gauges measure the inside diameter of round cathodes.

†Reg. U.S. Trademark, Superior Tube Co.
*Manufactured under U.S. Patents.
**U.S. Trademark applied for.

Superior
THE NAME IN SMALL TUBING

All analyses .010" to ⅝" O.D.
Certain analyses in Light Walls up to 2⅛" O.D.

CATHALOY is a new line of nickel cathode alloys for both Seamless and Lockseam type cathodes. It meets exacting requirements for low impedance, high emission and long life—assures tube reliability, increased mechanical strength, full service.

Superior Tube Company, Electronics Division
2512 Germantown Ave., Norristown, Penna.
I am interested in tubing for the following part(s).

.....

.....

Please send me full technical data on Superior tubing suitable for such applications.

Name.....

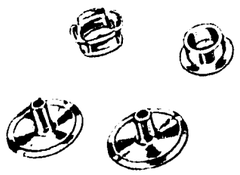
Title.....

Company .....

Address.....

City.....Zone.....State.....

Tailor-Made Fasteners in Volume Quantities



MINIATURE BATTERY CONNECTORS

For use with small "B" batteries; afford quick and positive polarized electrical connections and worthwhile space savings on such small equipment as portable radios or hearing aids.

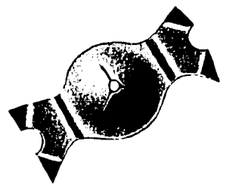


FEMALE ANODE CONNECTORS

Made from cold rolled steel and plated to specification, this part provides the high voltage connection to a metal picture-tube strap, or allied connections.

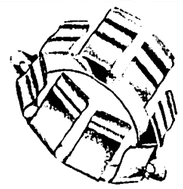
FISHTAIL RATCHET PLATE

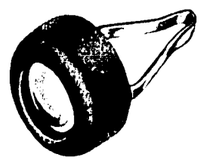
Made in a wide range of sizes to hold on smooth metal, die-cast or plastic studs. For use on refrigerators, radio cabinets, washing machines and other products to hold medallions, nameplates, etc.



VIBRATOR GROUNDING FASTENERS

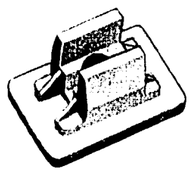
Holds 1 ½" dia. beaded or non-beaded vibrator in any position to radio chassis. Vibrator Can grounded to frame. Holding prongs designed to hold several types of Cans.





RUBBER FOOT

Snap-in Rubber Foot for Record Changers and Phonograph Mountings eliminates threaded member, lock washer and nut thereby speeding assembly time and reducing costs.



NYLON SNAP-IN NUT

Designed for the attachment of shelf supports or channels to porcelained sheet metal liners. Used with sheet metal screws they provide high pull-out values and no chippage.

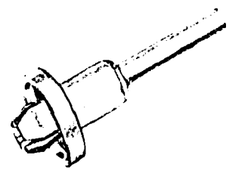
INDICATOR-LIGHT PLUG BUTTONS

Snap-in type for electrical appliances. Removable. Jeweled or plain glass. Some plastic. Designed in a wide range of colors, shapes and sizes.



SHELF SUPPORTS

Plastic Shelf Supports designed to snap into porcelained hole. Driven pin expands Trimount section securing fastener without porcelain chippage. Variety of shapes and sizes.





PLUG BUTTONS

Made to snap into hole sizes ¼" to 3". Can be embossed with ornamental or functional designs Removable Supplied with various finishes, in a variety of shapes and sizes.



TUBING AND WIRING CLIPS

For use in electrical and hydraulic systems. Holds wires and tubing firmly, without chafing, under extreme vibration. Made in hundreds of sizes.

TRIMOUNT STUDS

Designed to hold two or more thicknesses of material together. Easily installed by hand Insure vibration proof attachment. Permanent or removable attachment Wide variety of shapes and sizes.



DOT

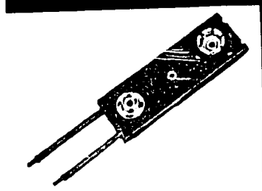
Parts illustrated are representative of the thousands of different specialized fasteners and allied devices designed and manufactured in volume by United-Carr and its subsidiaries for leading manufacturers of electronic equipment. United-Carr's wide and varied experience with special fastening problems in the automotive, aviation and appliance fields provides an unequaled background of technical knowledge which may well be applicable to your special needs.

UNITED-CARR

FASTENER CORP.

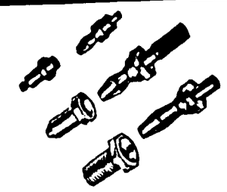
CAMBRIDGE 42, MASSACHUSETTS

Ucinite Electrical Assemblies



BATTERY CONNECTORS

Wired snap-on units for use with batteries equipped with United-Carr electrical snap fasteners. Wiring to customer's specifications.

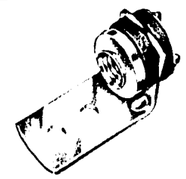


BANANA PINS

Four sizes of plugs with one-piece beryllium copper springs. Adaptable mounting ends in threaded, staking, or solder lug types. Similar Mating Jacks also available.

SHOCK MOUNTS

Offered in several sizes—brackets and durometer of rubber bushings can be varied. With threaded Teenuts or plain bushings. Insulated versions if needed.



ANODE CONNECTORS

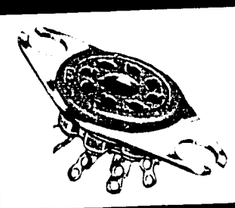
Plug button contacts for positive, firm connections. Corona resistant neoprene or silicon shields in straight or right angle types. Wiring to customers specifications.





TUBE CAPS

Positive gripping, heat treated steel springs in corona resistant metal housing. Insulated or non-insulated. Wired to specifications. Type shown has silicon shield for special application.



TUBE SOCKETS

Ceramic octals and special types. Ring or saddle mounting. Open ended plates for shock mounting with rubber grommets. J A N types.

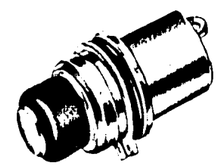
SWITCHES

Oak type switches manufactured as a licensee. Variety of rotary and push-button assemblies to specifications.



SNAP SWITCHES

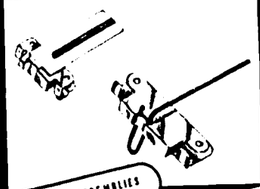
Precision, momentary contact push-button switches. Small and dependable. Several circuit arrangements. Water tight version shown.





TEST JACK

Ucinite's quality jack for .080 probes. Beryllium copper contacts. Nylon insulation in colors. Metal shell for firm dependable mounting

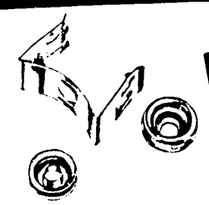


POINTERS

Slide pointers. Two sizes of carriages adjustable to variations in rails and adaptable to any indicator design.

METAL STAMPINGS

Volume production in Metal stampings. Years of engineering and tooling skill available to solve your particular problem



ELECTRICAL ASSEMBLIES

Ucinite

RADIO AND AUTOMOTIVE

With years of specialized experience in the electronics field and complete facilities for the volume production of small metal stampings as well as the assembly of metal to plastic and ceramic components, Ucinite is fully equipped to supply you with special electrical parts and assemblies...designed, assembled, wired and marked to your specifications. For complete design, engineering and production service, call your nearest Ucinite field engineer.

The UCINITE Company

DIVISION OF UNITED-CARR FASTENER CORP.

Newtonville 60, Massachusetts

Something New Has Been Added!

The 21 IRE Professional Groups show the expansion pattern of a modern engineering society in meeting the diversified needs of its members in the ever widening science of radio-electronics.

Membership in a Professional Group is open to any paid-up member of the I.R.E. The cost is only an annual extra publications fee, usually $2. This fee is shown in the descriptions that follow.

An IRE Member may join as many Professional Groups as serve his interest and wishes. Such membership serves to associate him with other engineers of the same specialized interests within the radio-electronic field.

The 21 Professional Groups are listed below, together with a brief definition of each, the name of the Group Chairman, and publications to date. * Means still available.

Aeronautical and Navigational Electronics

The application of electronics to operation and traffic control of aircraft and to navigation of all craft.

Dr. K. Charlton Black, Chairman, Polytechnic Research & Development Co., 55 Johnson Street, Brooklyn 1, N.Y.

Fee $2. 8 Transactions, 4 Newsletters. *4, 5, 6, & 8, and Newsletters.

Antennas and Propagation

Technical advances in antennas and wave propagation theory and the utilization of techniques or products of this field.

Mr. P. S. Carter, Chairman, c/o RCA Laboratories, Rocky Point, L.I., N.Y.

Fee $4. Four transactions published. *4

Audio

Technology of communication at audio frequencies and of the audio portion of radio frequency systems, including acoustic terminations, recording and reproduction.

Mr. Marvin Camras, Chairman, Armour Research Foundation, Chicago, Ill.

Fee $2. Published 14 Transactions, 4 Newsletters. *5, 7, 9 up.

Broadcast & Television Receivers

The design and manufacture of broadcast and television receivers and components and activities related thereto.

Mr. Dorman D. Israel, Chairman, Emerson Radio and Phonograph Corp., 111 Eighth Avenue, New York 11, N.Y.

Fee $2. Transactions *1, *2, *3

Broadcast Transmission Systems

Broadcast transmission systems engineering, including the design and utilization of broadcast equipment.

Mr. Lewis Winner, Chairman, 52 Vanderbilt Avenue, New York 17, N.Y.

Fee $2. *Convention Report.

Circuit Theory

Design and theory of operation of circuits for use in radio and electronic equipment.

Dr. Chester H. Page, Chairman, National Bureau of Standards, Washington 25, D.C.

Fee $2. *PGTC-1 Transaction.

THE INSTITUTE OF RADIO ENGINEERS 1 East 79th Street, New York 21, N. Y.

IRE's 21 Professional Groups

Communications Systems

Radio and wire telephone, telegraph and facsimile in marine, aeronautical, radio-relay, coaxial cable and fixed station services.

Col. John Hessel, Chairman, Signal Corps Engineering Laboratories, Fort Monmouth, N.J.

Fee $2. *Vol. CS-1, No. 1

Component Parts

The characteristics, limitations, applications, development, performance and reliability of component parts.

Mr. Floyd A. Paul, Chairman, Supervisor, Electronic Reliability Sec., Dept. 3230, Northrup Aircraft, Inc., Hawthorne, Calif.

Fee not yet established.

Electron Devices

Electron devices, including particularly electron tubes and solid state devices.

Mr. Leon S. Nergaard, Chairman, RCA Laboratories, Princeton, N.J.

Fee $2. Transactions *1, *2 and *3

Electronic Computers

Design and operation of electronic computers.

Mr. John H. Howard, Chairman, Burroughs Corp., 511 North Broad Street, Philadelphia, Pa.

Fee $2. Transactions 1, 2, and *Vol. EC-2, No. 2

Engineering Management

Engineering management and administration as applied to technical, industrial and educational activities in the field of electronics.

Brig. Gen. Tom C. Rives, Chairman, General Electric Company, Syracuse, N.Y.

Fee $1. *Convention Report

Industrial Electronics

Electronics pertaining to control, treatment and measurement, specifically in industrial processes.

Mr. Eugene Mittelmann, Chairman, 549 Washington Ave., Chicago 6, Ill.

Fee $2. *Convention Report

Information Theory

Information theory and its application in radio circuitry and systems.

Dr. William G. Tuller, Chairman, Melpar, Inc., 452 Swann Ave., Alexandria, Va.

Fee $2. Transaction 1.

Instrumentation

Measurements and instrumentation utilizing electronic techniques.

Mr. Ivan G. Easton, Chairman, General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.

Fee $1. Transactions 1, *2. *Convention Report

Medical Electronics

The application of electronics engineering to the problems of the medical profession.

Mr. L. H. Mongomery, Jr., Chairman, Vanderbilt University Sch. of Medicine, Nashville, Tenn.

Fee $1. *Convention Report

Microwave Theory and Techniques

Microwave theory, microwave circuitry and techniques, microwave measurements and the generation and amplification of microwaves.

Mr. Andre G. Clavier, Chairman, Federal Telecommunication Laboratories, 500 Washington Ave., Nutley, N.J.

Fee $2. *Vol. MTT-1, #1

Nuclear Science

Application of electronic techniques and devices to the nuclear field.

Dr. Lloyd V. Berkner, Chairman, Associated Universities, Inc., Brookhaven National Lab., Upton, N.Y.

No fee established yet.

Quality Control

Techniques of determining and controlling the quality of electronic parts and equipment during their manufacture.

Mr. Leon Bass, Chairman, General Electric Co., Syracuse, N.Y.

Fee $2. Transactions *1, *2

Radio Telemetry and Remote Control

The control of devices and the measurement and recording of data from a remote point by radio.

Mr. Martin V. Kiebert, Jr., Chairman, Bendix Aviation Corp., Teterboro, N.J.

Fee $1. *Convention Report

Vehicular Communications

Communications problems in the field of land and mobile radio services, such as public safety, public utilities, railroads, commercial land transportation, etc.

Mr. W. A. Shipman, Chairman, Columbia Gas System Service Corp., 120 E. 41 St., New York, N.Y.

Fee $2. Transactions 1, *2, *3

Ultrasonics Engineering

Ultrasonic measurements and communications, including underwater sound, ultrasonic delay lines, and various chemical and industrial ultrasonic devices.

Mr. A. L. Lane, Chairman, 706 Chillum Road, Hyattsville, Md.

No fee established yet.

Hello Again!

204 of the Advertisers in the 1953 IRE DIRECTORY have greeted you before as exhibitors in the 1953 Radio Engineering Show. To help you remember what you saw in their exhibits we have listed them below with the page on which their ad appears.

Firm	Page
A'G'A Div., Elastic Stop Nut Corp.	3
Ace Eng. & Mach. Co., Inc.	309
Aerovox Corp.	362-363
Air Marine Motors, Inc.	177
Aircraft Transformer Corp.	1
Airtron, Inc.	244
Alden Electr. & Imp. Rec. Co.	125
Alden Products Co.	150-151
Alfax Paper & Eng. Co.	125
American Lava Corp.	4
American Phenolic Corp.	2
Ampex Electric Corp.	364-365
Anton Electric Labs., Inc.	226
Applied Science Corp. of Princeton	238
Arco Electronics, Inc.	Catalog
Astron Corp.	136
Atomic Instrument Co.	229
Ballantine Laboratories, Inc.	304
Barker & Williamson, Inc.	408
Bart Laboratories Co., Inc.	259
Bendix Aviation Corp., Eclipse-Pioneer Div.	366-367
Bendix Aviation Corp., Red Bank Div.	176
Berkeley, Div. Beckman Instruments, Inc.	8
Bliley Electric Co.	12
Bodnar Industries, Inc.	269
Bogue Electric Mfg. Co.	13
Bomac Labs., Inc.	382-383
Boonton Radio Corp.	332
Brand & Co., William	15
Braun Tool & Instr. Co., Inc., H.	261
Browning Laboratories, Inc.	326
Buggie, Inc., H. H.	153
Burlington Instrument Co.	173
Burroughs Corp., New Products Div.	Catalog
Bussmann Mfg. Co.	166
Cambridge Thermionic Corp.	254
Cannon Electric Co.	148
Cargo Packers, Inc.	260
Centralab, Div. Globe-Union, Inc.	Catalog

(Continued on page 451)

For the "Firsts" in Fluorocarbons

SEE U.S.G.

TEFLON* and KEL-F† STOCK and FABRICATED PARTS

The United States Gasket Company offers the most complete line of sheets, rods, tape, tubing, bars, cylinders and fabricated parts — custom-molded and machined to specifications.

This means one source for all your requirements—with uniform high quality assured by the most modern specialized facilities for low-cost, close-tolerance production. Ask for Catalog No. 300 and 500.

TEFLON "ALLOYS"

Chemelec Mixtures, which are "alloys" of Teflon, offer the product engineer a whole new family of materials. These alloys retain most of the outstanding qualities of pure Teflon and add new properties to meet particular material requirements.

If you want TEFLON "alloyed" with metal, glass, ceramics, carbon, mica, quartz, alnico, asbestos, silicate, calcium, or boron, etc., bring us your problems. Ask for Catalog No. MI-400.

SOLDERABLE TEFLON

Chemelec Multi-Bond Metal Faced Teflon permits the bonding and hermetic solder sealing of this dielectric material to metal components.

The bond between metal surface and the Teflon is microcrystalline in nature—an interlocking metal-permeated surface layer of the fluorocarbon.

Metal facings include practically all the ferrous and nonferrous metals, the ferro-magnetic group and the precious metals. Catalog No. MI-424.

CEMENTABLE TEFLON

Chemelec Multi-Bond Cementable Teflon is a specially prepared fluorocarbon which will adhere to metal, glass, wood, fibre, asbestos, plastics, leather, ceramics, or other substances by the use of suitable commercial cement.

A broad field of electrical, mechanical and chemical applications is opened to product engineers. Write for Catalog No. MI-443.

UNITED STATES GASKET COMPANY

FLUOROCARBON PRODUCTS DIVISION
CAMDEN 1, NEW JERSEY

Representatives in Principal Cities Throughout the World

*duPont Trademark
†M.W. Kellogg Trademark

Answer to VHF, UHF and Microwave Requirements



7-PIN MINIATURE TUBE SOCKETS



9-PIN MINIATURE TUBE SOCKETS



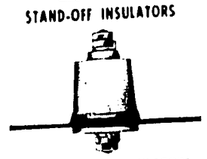
CRYSTAL SOCKETS



9-PIN CONNECTORS



STAND-OFF INSULATORS



FEED-THROUGH INSULATORS AND TERMINALS

TEFLON* INSULATED CHEMELEC COMPONENTS

- **LOW LOSS FACTOR** — Less than 0.0005.
- **STABLE DIELECTRIC CONSTANT**—2.0 (60 cycles to 30,000 megacycles).
- **HIGH SURFACE RESISTIVITY**—3.5 x 10^{13} ohms. Won't carbonize under arcing or DC plate.
- **WIDE SERVICE TEMPERATURE RANGE** —110° F to +500° F.
- **ZERO WATER ABSORPTION**—ASTM Test.
- **DURABLE** — withstands thermal and mechanical shock and vibration in assembly and service.
- **CHEMICALLY STABLE**—Inert, nongassing, immune to corrosive atmospheres, fungi, oils, solvents.

Write for Catalogs: Miniature Tube Sockets, No. SO-428; 9-pin Connectors, No. CN409-M; Crystal Sockets, No. CS-441; Stand-off Insulators, No. TE-401; Feed-Through Insulators and Terminals, No. CF-400.

UNITED STATES GASKET COMPANY

FLUOROCARBON PRODUCTS DIVISION
CAMDEN 1, NEW JERSEY

Representatives in Principal Cities Throughout the World

*duPont's trademark for its fluorothylene resin.

Hello Again!

204 of the Advertisers in the 1953 IRE DIRECTORY have greeted you before as exhibitors in the 1953 Radio Engineering Show. To help you remember what you saw in their exhibits we have listed them below with the page on which their ad appears.

(Continued from page 150)

Firm	Page
Chatham Electronics Corp.	404-405
Chester Cable Corp.	20
Chicago Telephone Supply Corp.	376-377
Ciba Co., Inc.	24
Cinch Mfg. Corp.	384-385
Clarostat Mfg. Co., Inc.	394-395
Coil Winding Euipment Co.	291
Collins Radio Corp.	428-429
Communication Measurements Lab., Inc.	312
Constantin & Co., L. L.	393
Continental Carbon, Inc.	199
Continental-Diamond Fibre Co.	Catalog
Cornell-Dubilier Electric Corp.	6
Crosby Laboratories, Inc.	114, 282
Crucible Steel Co. of America	10
Dale Products, Inc.	452-453
Decade Instrument Co.	321
DeJur-Amsco Corp.	152, 168
Dialight Corp.	182
Driver Co., Wilbur B.	32
DuMont Labs., Inc., Allen B.	29
Eby, Inc., Hugh H.	207
Edison, Inc., Thomas A.	194
Eitel-McCullough, Inc.	402, 403
Elastic Stop Nut Corp. of America	36
Electra Mfg. Co.	201
Electricel Industries, Inc.	14
Electro Motive Mfg. Co., Inc.	40
Electro Tec Corp.	44
Electronic Associates, Inc.	318
Electronic Mechanics, Inc.	278
Electronics Parts Mfg. Co., Inc.	33
Erie Resistor Corp.	18
Fairchild Camera & Instr. Corp.	Catalog
Federal Telephone & Radio Corp.	368-373
Federated Semi-Conductor Co.	204
Finn & Co., Inc., T. R.	37
Ford Instrument Co.	235

(Continued on page 452)

Hello Again!

204 of the Advertisers in the 1953 IRE DIRECTORY have greeted you before as exhibitors in the 1953 Radio Engineering Show. To help you remember what you saw in their exhibits we have listed them below with the page on which their ad appears.

(Continued from page 451)

Firm	Page
Freed Transformer Co., Inc.	Catalog
Fusite Corp.	50
General Ceramics & Steatite Corp.	52, 54, 349
General Electric Co., Wiring Device Dept.	41
General Instrument Corp.	60
General Precision Lab., Inc.	116
General Radio Co.	380-381, Cov. IV
Gombos Co., Inc., John	154
Grant Pulley & Hardware Co.	142
Gray Research & Dev. Co., Inc.	118
Guardian Electric Mfg. Co.	62
Hammarlund Mfg. Co., Inc.	424-427
Haydon Co., A. W.	178
Heiland Research Corp.	232
Heldor Mfg. Corp.	276
Helipot Corp.	Catalog
Heminway & Bartlett Mfg. Co.	47
Heppner Mfg. Co.	64
Hermetic Seal Products Co.	66
Hewlett-Packard Co.	Catalog
Hickok Electrical Instr. Co.	170
Hudson Tool & Die Co., Inc.	30
Hughes Aircraft Co.	68
Illinois Condenser Co.	70
Indiana Steel Products Co.	171
Industrial Hardware Mfg. Co.	205
Instruments Specialties Co., Inc.	271
Insuline Corp. of America	134
JFD Mfg. Co., Inc.	140, 242
Jennings Radio Mfg. Corp.	390-392
Kalbfell Laboratories, Inc.	257
Kay Electric Co.	314
Kenyon Transformer Co.	406-407
Kepco Laboratories, Inc.	224
Kester Solder Co.	78
Keystone Products Co.	216

(Continued on page 453)

DALE PRODUCTS

CAREFULLY CRAFTED for MATCHLESS PERFORMANCE

DALOHM

DEPOSITED CARBON RESISTORS for ACCURACY and STABILITY

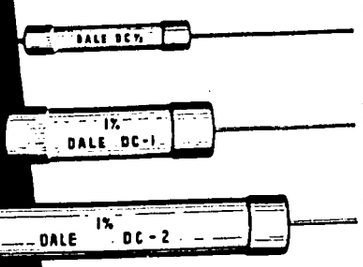
Years of intensive research and development bring you all the accuracy and stability of a wire wound resistor with the economy of a deposited carbon resistor.

Dalohm deposited carbon resistors are manufactured under rigid controls in a special furnace developed exclusively by Dalohm engineers. This process eliminates soot, insuring still greater stability.

Pure carbon in crystalline form is bonded to a selected ceramic core and then sealed against moisture with a special silicone coating material having a high dielectric strength, excellent thermal conductivity, and high resistance to abrasion.

Temperature coefficient 200 PPM per degree C for the lower resistance ranges; up to 500 PPM per degree C for higher resistance ranges. 1% accuracy.

THREE RESISTANCE RANGES

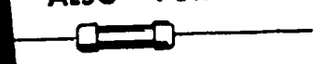


DC-½ — ½ Watt
1 Ohm to 5 Megohms

DC-1 — 1 Watt
1 Ohm to 10 Megohms

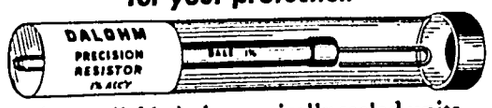
DC-2 — 2 Watts
5 Ohms to 50 Megohms

ALSO—FOR MINIATURE INSTALLATIONS



DCS-½ — ½ Watt
1 Ohm to 2 Megohms

Individually packed in plastic tubes for your protection



Also available in hermetically sealed units and special small sizes for transistor applications.

Write, Wire or Phone George Risk, 1318 28th Ave., Columbus, Nebraska, for price and delivery. Phone 2139.

CAREFULLY CRAFTED for MATCHLESS PERFORMANCE

DALE PRODUCTS

Silicohm

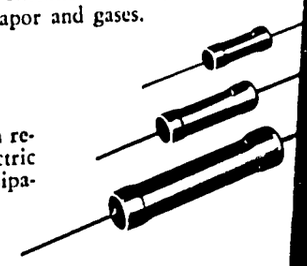
TM REG U S PAT OFF

MINIATURE POWER RESISTORS for those TIGHT SPECIFICATIONS

Silicohm miniature power resistors are carefully designed and skillfully made for all applications where the equipment must survive the most severe environmental, shock and vibration conditions. They are completely welded from terminal to terminal, coated with special silicone material, and impervious to moisture, salt ions, vapor and gases.

RS TYPES

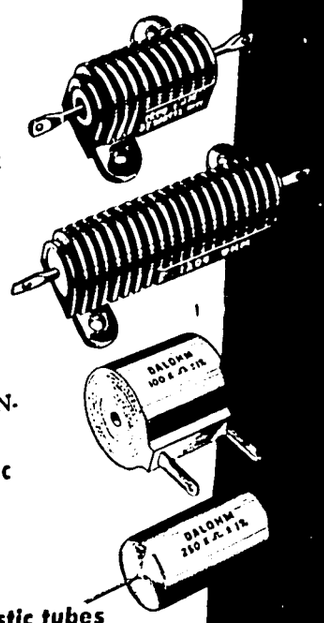
Silicone sealed offering maximum resistance to abrasion, high dielectric strength, and maximum heat dissipation.



RH TYPES

Silicone sealed in a die-cast, black anodized radiator finned housing and mounts on sub-panel for maximum heat dissipation.

- Temperature coefficient 0.00002/degree C
- Ranges from 0.1 Ohms to 55,000 Ohms, depending on type
- Tolerance 0.05%, 0.1%, 0.25%, 0.5% (above 1 Ohm); 1%, 3%, 5% (all ranges)

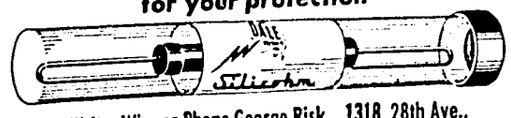


WW TYPES

For critical applications. Exceed JAN-R-93A or MIL-R-93A specifications.

- Temperature coefficient 0.00002/degree C
- Ranges from 0.05 Ohms (.05 to 1 Ohm on lug type only) to 3 Megohms
- Tolerances as low as 0.05%

Individually packed in plastic tubes for your protection



Write, Wire or Phone George Risk, 1318 28th Ave., Columbus, Nebraska, for price and delivery. Phone 2139.

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(Continued from page 452)

Firm	Page
Kings Electronics Co.	414-415
Knights Co., James	55
Laboratory for Electronics	432-433
Lambda Electronics Corp.	57
Lavoie Laboratories, Inc.	328
Littelfuse, Inc.	58
Machlett Laboratories, Inc.	222
Magnetic Amplifiers, Inc.	167
Magnetics, Inc.	160
Makepeace Co., D. E.	80
Marion Electrical Instr. Co.	234
McGraw-Hill Book Co.	340
Measurements Corp.	284, 422-423
Mepco, Inc.	388-389
Metal Textile Corp.	279
Mica Fabricators Association	279
Microwave Development Labs., Inc.	284
Midland Mfg. Co., Inc.	82
Millen Mfg. Co., Inc., James	336
Mycalex Corp. of America	430-431
N.R.K. Mfg. & Eng. Co.	65
National Co., Inc.	434-435
Ney Co., J. M.	209
Northern Radio Co., Inc.	410-412
Optical Film Engineering Co.	69
Oster Mfg. Co., John	181
Panoramic Radio Products, Inc.	115
Paramount Paper Tube Corp.	157
Par-Metal Products Corp.	141
Photo Chemical Products, Inc.	187
Plastoid Corp.	34
Polymer Corp. of Pa.	278
Polytechnic Research & Dev. Co., Inc.	374-375
Potter & Brumfield	192
Precision Apparatus Co., Inc.	330
Premier Metal Products Co.	133

(Continued on page 454)

Hello Again!

204 of the Advertisers in the 1953 IRE DIRECTORY have greeted you before as exhibitors in the 1953 Radio Engineering Show. To help you remember what you saw in their exhibits we have listed them below with the page on which their ad appears.

(Continued from page 453)

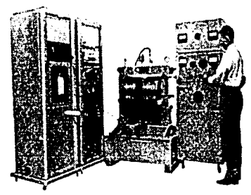
Firm	Page
Presto Recording Corp.	110
Production Tool & Fixture Co.	295
Radell Corp.	38
Radio Corp. of America	88, 413, 440-441
Radio Materials Corp.	436-437
Radio Receptor Co., Inc.	190, 202
Raytheon Mfg. Co.	228
Rex Corp.	280
Robinson Aviation, Inc.	90
Sanborn Co.	320
Secon Metals Corp.	296
Servo Corp. of America	438-439
Servomechanisms, Inc.	237
Shallcross Mfg. Co.	98
Shielding, Inc.	313
Sickles, Co., F. W.	421
Simpson Electric Co.	174
Smith, Inc., Herman H.	Catalog
Sola Electric Co.	225
Spencer-Kennedy Laboratories	306
Sperry Gyroscope Co.	Catalog
Standard Electric Time Co.	325
Standard Piezo Co.	92
Stern Co., Roger M.	39
Stevens Mfg. Co.	213
Stevens Mfg. Co., Inc., George	83
Stupakoff Ceramic & Mfg. Co.	139, 189, 203, 255, 265, 277, 295, 297, 303, 378-379
Superior Electric Co.	Catalog
Surprenant Mfg. Co.	252
Switchcraft, Inc.	104
Sylvania Electric Products Inc.	417-420
Technitrol Engineering Co.	221
Technology Instrument Corp.	198, 334
Telechrome, Inc.	120, 285
Tel Instrument Co.	120
Tensolite Insulated Wire Co., Inc.	253
Thor Ceramics, Inc.	256
Trad Television Corp.	338

(Continued on page 455)

NUCLEAR RESONANCE

HIGH-RESOLUTION SPECTROMETER

Research functions in the nuclear-resonance field are served by the Varian Model V-4300 High-Resolution Spectrometer capable of spectra identifications as illustrated below. These are derived from the variations in chemical bonding which result in slight shifts in the resonant frequency of the various protons present in a compound.





The standard instrument operates at a fixed crystal-controlled frequency of 30 mc and is used for studies of narrow lines, chemical shifts and fine structure in the resonances from hydrogen and fluorine nuclei.

VARIABLE-FREQUENCY SPECTROMETER

Varian Model V-4200 is also available. It operates over a range of frequency from 2 to 16 mc and with magnetic fields up to 14 kilogauss. This broad coverage permits observation of nuclear-resonance signals from practically every isotope possessing a finite magnetic moment.

HIGH-HOMOGENEITY ELECTROMAGNET

Large volumes of homogeneous magnetic field are provided for such applications as nuclear- and paramagnetic-resonance work, Zeeman studies, and beam deflection, by the Varian Model V-4012 Laboratory Electromagnet (center unit), which has 12-in. diameter pole pieces. Operating with a standard 1¾-in. air gap, the magnet provides a field uniform to at least 1 part in 50,000 throughout a volume not less than 1 cu. in. With a magnet input of 4 kw, various pole configurations give a range of field from 7,000 to 37,500 gauss.

Other Varian magnets include the V-4008, an 8-in. pole-diameter electromagnet and the V-4007, a 6-in. unit, both similar to the Model V-4012, as well as several types of large laboratory permanent magnets.

POWER SUPPLIES AND ASSOCIATED UNITS

Special highly-regulated power supplies are available for magnet operation. Illustrated (right unit) is the Model V-2100 Power Supply which is capable of holding magnet current to 1 part in 10^5 for a 10 per cent line-voltage change. This unit also features negligible long-time drift and circuitry for injection of (a) field sweeping voltages and (b) nuclear-resonance field-regulating voltages.

Varian also manufactures the Model V-4400 Magnetic-Field Meter and Stabilizer which utilizes the gyromagnetic properties of atomic nuclei to reduce measurement of magnetic field to a direct measurement of frequency—simultaneously providing an error signal which can be used to activate field-stabilization equipment.

COMPLETE LABORATORY FACILITIES

Further advances in the art are being explored in the Varian Nuclear Resonance Applications Laboratory. This advanced facility is staffed with experienced chemists and physicists and fully equipped with the most highly developed instruments.

VARIAN FIELD ENGINEERING REPRESENTATIVES

Bivins & Caldwell
High Point, North Carolina

Burlingame Associates
Boston 16, Massachusetts
New York 13, New York
Philadelphia, Pennsylvania
Syracuse, New York
Washington 9, D. C.

Alfred Crossley & Associates
Chicago 40, Illinois
Dayton 2, Ohio
St. Paul 14, Minnesota

Harris-Hanson Company
St. Louis, Missouri

Earl Lipscomb Associates
Dallas, Texas
Houston 5, Texas

Arthur H. Lynch & Associates
Fort Myers, Florida

Neely Enterprises
Albuquerque, New Mexico
Hollywood 46, California
Phoenix, Arizona
Sacramento, California
San Diego 6, California
San Francisco 18, California

M. P. Odell Company
Cleveland 15, Ohio

S. Sterling Company
Detroit 35, Michigan

VARIAN associates

FIELD REPRESENTATIVES IN 21 CITIES

KLYSTRONS

TUNABLE REFLEX TYPES FOR X-BAND RADARS AND BEACONS

Rugged construction for high-shock applications; integral leads for high-altitude unpressurized operation; low-voltage low-noise operation with rapid warmup—on frequency in 30 seconds—production lots, quantity prices.

Type	Local Oscillator Frequency, kmc	Local Oscillator Resonator Voltage, v	Local Oscillator Power Output, mw	High Power Resonator Voltage, v	High Power Power Output, mw	Terminations	Tuner
V-260	8.5-10.0	200	15	350	125	3-pin base	slotted shaft
V-270	8.5-10.0	200	15	350	125	integral leads	slotted shaft
V-280	8.5-10.0	150	12	350	140	3-pin base	lock-nut
V-290	8.5-10.5	150	12	350	140	integral leads	lock-nut

FOR MICROWAVE RELAY SYSTEMS

Long life; low distortion; low long-time drift in tubes for transmitter and local-oscillator microwave-relay service in the frequency bands tabulated.

Type	Frequency kmc	Power Output, mw	Resonator Voltage, v	Tuner
X-26 (A to F)	5.925-7.725	1000 25	750 300	slotted shaft
V-53	10.7-11.7	50	300	slotted shaft
V-54	10.5-12.2	100	350	lock nut

FOR LABORATORY MEASUREMENTS, SPECIAL USES

Excellent microphonic characteristics; smooth-operating shaft tuners have minimum chatter and backlash; X-13 in production lots, quantity prices.

Type	Frequency kmc	Power Output, mw	Resonator Voltage, v	Tuner
X-12	12.4-17.5	30	600	micrometer
X-13	8.2-12.4	250	500	micrometer
V-55	8.2-11.5	600	500	lock nut
V-58	8.5-10.0	620	500	slotted shaft

TWO-RESONATOR OSCILLATOR AND AMPLIFIER TYPES

Fixed-frequency x-band radar and beacon tubes for severe service. Non-microphonic characteristics; molded silicone-rubber connections and integral leads for high-altitude unpressurized operation (except X-21); power outputs as high as 8 watts c-w, 500 watts pulsed.

Type	Frequency kmc	Power Output, w	Resonator Voltage, v	Gain db
X-21 (oscillator)	9.1-11.0	5	1300	...
V-23 (oscillator)	9.1-11.0	5	1300	...
V-27 (amplifier)	9.1-11.0	8	1300	10
V-62 (amplifier)*	9.1-11.0	8	1300	10
V-63 (oscillator)	8.5-9.4	5	1300	..

*V-62 has control grid for amplitude modulation

MULTIPLIER AND MULTI-RESONATOR-AMPLIFIER TYPES

For high-power uhf transmitters, the V-42 series comprises six 15-kilowatt amplifiers covering the entire uhf television band. Linear operation up to 12 kw sync output with 60 watts drive. Gain is 27 db.

For high-power pulse transmitters the V-45 and V-82 in combination permit low-level crystal control with peak power of 8 kw at 2½ per cent duty cycle. The V-45 is a 5 to 1 frequency multiplier (1862 to 9310 mc) operating at a resonator voltage of 700 v. The V-82 is a pulse amplifier with a high-level power gain of 57 db operating at 9310 mc with a resonator voltage of 18 kv. (Total output presently committed, delivery 1954).

Special Varian klystrons are regularly being engineered to meet unusual application requirements. New types are constantly being developed.

For more detailed information on Varian products write Section ADCP, Varian Associates, Palo Alto, Calif., or your nearest field engineering representative.

List of Field Engineering Representatives on Facing Page

VARIAN associates

FIELD REPRESENTATIVES IN 21 CITIES

Hello Again!

204 of the Advertisers in the 1953 IRE DIRECTORY have greeted you before as exhibitors in the 1953 Radio Engineering Show. To help you remember what you saw in their exhibits we have listed them below with the page on which their ad appears.

(Continued from page 451)

Firm	Page
Transformer & Electr. Specialties Co.	221
Triad Transformer Corp.	89
Truscon Steel Div., Republic Steel Corp.	126
Tung-Sol Electric, Inc.	94
Ulanet Co., George	211
U. S. Gasket Co.	450-451
United Transformer Co.	Catalog
University Loudspeakers, Inc.	105
Vacuum-Electronic Engineering Co.	294, 311
Varian Associates	454-455
Vector Electronic Co.	205
Vectron, Inc.	308
Victory Engineering Corp.	203
Wang Laboratories	230
Waterman Products Co.	386-387
Weston Electrical Instruments Corp.	172
Wind Turbine Co.	128
Workshop Associates Div., Gabriel Co.	112

Visit

these exhibitors and many others at the

1954 Radio Engineering Show

March 22-25, 1954

Kingsbridge Armory

New York City

Index to Catalogs

(Inserted in the order listed below)

Adams & Westlake Co.

Arco Electronics, Inc.

Burroughs Corp.

Centralab, Div. of Globe-Union, Inc.

Continental-Diamond Fibre Co.

Fairchild Camera & Instrument Corp.

Freed Transformer Co., Inc.

Helipot Corp.

Hewlett-Packard Co.

Schweber Electronics

Herman H. Smith, Inc.

Sperry Gyroscope Div.

Superior Electric Co.

Yardney Electric Corp.

United Transformer Co.

How to Use Our Business and Product Sections

The Business and Product Sections of this Directory are included for the service of members so that this book will be complete as an index of an industry-distinguishing Engineers, the Businesses they have founded and the Products they have created for radio, television, communications, and electronics.

The following 4 Parts of the IRE DIRECTORY are:

Part		Page
	Pink Section—Guide to Products	i-viii
2	Company List of Radio-Electronic Manufacturers	3
3	Product Index of Engineering Equipment and Parts	97-360
4	Catalogs and Complete-Data-Spreads Section	361
	—Advertisers Index—Facing Cover III—	

Part 2

2570 firms have supplied us voluntarily with information about the components, equipment and services which they render the radio-electronic industry. The manufacturers are listed alphabetically in this section beginning on page 3 and ending on page 96. 1225 non-manufacturers such as distributors and representatives are listed under heading 10, a special directory. This index therefore gives the names of manufacturers of specific products available for purchase, with their addresses and code numbers indicating 100 types of products which they offer.

The completeness of this list depended on information voluntarily supplied us. Our most vigorous efforts may not have made it complete, but the excellent cooperation received from most of the industry is directly responsible for the up-to-dateness of our product data. We will welcome additions and suggestions for the 1954 edition.

Part 3

The Product indexes start on page 97 and continue through 359. In both the alphabetical and the product indexes advertisers who have made it financially possible to provide a really comprehensive Directory to IRE members, have been listed in bold face type with a cross index to the page on which their display advertisement appears—giving complete information on their products and services. Non-advertisers have been listed in the product indexes giving firm name and state only. For full address the reader must turn to the alphabetical index for these companies.

To find the advertisers of a given product, let us say "Amplifiers" look this product up in the Pink Section, just after Part 1—Members. You will see that it is classification Number 01. A full listing of Amplifier manufacturers starts on page 97. Turn to this classification in part 3.

As a service to engineers, both buyer and seller, we have included a list of 1225 firms and individuals who are distributors. Each name is further classified by number to indicate its place in the field—representative, distributor, exporter, etc. This is class #10, starting on page 343.

There are several other helpful indexes. Advertisers are given on the page facing the back cover, and an index to 1953 Radio Engineering Show Exhibitors is on pages 450-455.

To get a comprehensive picture of what a given firm manufactures for engineers in our field, you will find in the alphabetical index of companies that all their products are listed by code number after the firm's name and address. We have tried vigorously to make this truly a useful "Radio Engineers Directory."

Part 4

Part 4 is one of the most informative and valuable sections of this Directory. Here manufacturers are supplying engineers with the maximum amount of detailed information possible through the use of multiple page spreads of their products (see pages 361-455). This is followed by a complete catalog file supplied by 15 manufacturers. These catalogs are filed in alphabetical order. The purpose of this section is to give the engineer a complete and ever available catalog file right in his IRE Directory where he can always see it easily and quickly. We believe that the services of this section will be of the utmost help to you.

Please submit all changes, corrections, additions and classification questions to Industry Research Div., Institute of Radio Engineers, 1475 Broadway, New York 36, N.Y.

Why

are more and more industries

specifying Adlake Mercury Relays

for Timing and Control functions?

Because...

Every Adlake Relay gives you these PLUS Features:

- **HERMETICALLY SEALED**—dust dirt, moisture, oxidation and temperature changes can't interfere with operation.
- **SILENT AND CHATTERLESS**
- **REQUIRES NO MAINTENANCE**
- **ABSOLUTELY SAFE**
- **MERCURY-TO-MERCURY CONTACT**—prevents burning, pitting and sticking.

...and every Adlake Relay is tested...and guaranteed... to meet specifications!

For complete details of the broad ADLAKE Relay line send for your copy of the new ADLAKE Relay Catalog Address The Adams & Westlake Company 1953 N Michigan Elkhart, Indiana In Canada write Powerlite Devices Limited of Toronto

Index to Catalogs

(Inserted in the order listed below)

Adams & Westlake Co.

Arco Electronics, Inc.

Burroughs Corp.

Centralab, Div. of Globe-Union, Inc.

Continental-Diamond Fibre Co.

Fairchild Camera & Instrument Corp.

Freed Transformer Co., Inc.

Helipot Corp.

Hewlett-Packard Co.

Schweber Electronics

Herman H. Smith, Inc.

Sperry Gyroscope Div.

Superior Electric Co.

Yardney Electric Corp.

United Transformer Co.

For complete information

Consult any Adlake office or representative

General Offices:
The Adams & Westlake Company
Elkhart, Indiana

Representatives and Sales Offices

BOSTON 11
Leo. C. Pelkus & Company
683 Atlantic Avenue

CHICAGO 2
The Adams & Westlake Company
319 W. Ontario St.

HOUSTON 3
The William E. Brice Company
1512 Pease Avenue

LOS ANGELES 22
The A. W. Nash Company
2112 S. Atlantic Blvd.

NEW YORK 5
The Adams & Westlake Company
50 Church St.

NEW YORK 6
E. W. Rowland Associates
110 Washington Street

PHILADELPHIA 44
W. Henry Cordray
18 W. Chelton Avenue

ST. LOUIS 5
Wells-White Company
311 Connor Building
6625 Delmar Boulevard

SAN FRANCISCO 3
W. C. Matheson Company
226 Ninth Street

SEATTLE 1
C. B. Parsons & Company
3026 First Ave

s from the broad Adlake Line

MODEL

arrangement:
or Normally closed
e—Single throw

ilable in:
w operate—Quick release
w operate—Slow release
k operate—Slow release
operate—Quick release

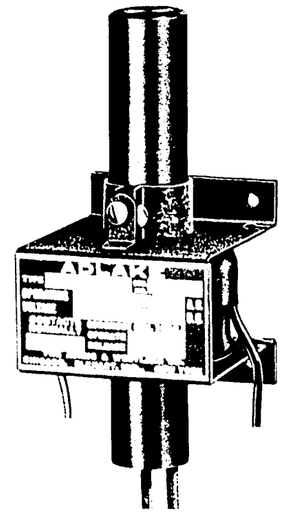
e delay: 20 minutes

e delay relays to 15 amps.
ys to 50 amps.
ve, 115 v, 60 cy.
40 volts A.C. (25-50-60 cy.)

1101 MODEL

Available with same features as Companion 1040 Model

Complete information on all relays illustrated available on request.



MODEL

e Pole Load Relay
with time delay contacts)

2 contacts Normally open or
2 contacts Normally closed
Double pole—Single throw

ntact rating:
ntacts up to 15 amperes.
lays to 50 amperes.
uctive 115 v, 60 cy.

oltage Coil:
, 50, 60 cy. or 220 v. d.c.

1140 MODEL

"MIGHTY MIDGET"

Contact Arrangement: Normally open or normally closed—Single pole—Single throw

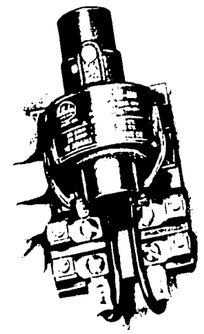
Available in: Quick acting load type only.

Contact rating: { 30 amperes non-inductive / 115 volts, 60 cy.

Voltage Coil: Up to 440 v, 60 cy. and 220 v. d.c.

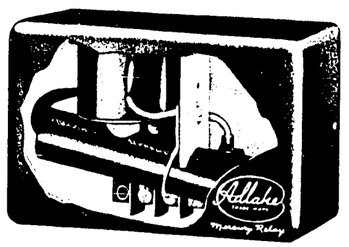
Maximum Size: Height 3⅛"-4¼"—width $2\frac{17}{32}$—projection 2⅜".

Equipped with compression type terminals to simplify installation.



...SENSITIVE RELAY

bad conditions)
or normally closed
w
ve, 115 volts, 60 cy.
30 volts, 60 cy.
, less than 1 watt
"—projection 2⅛"



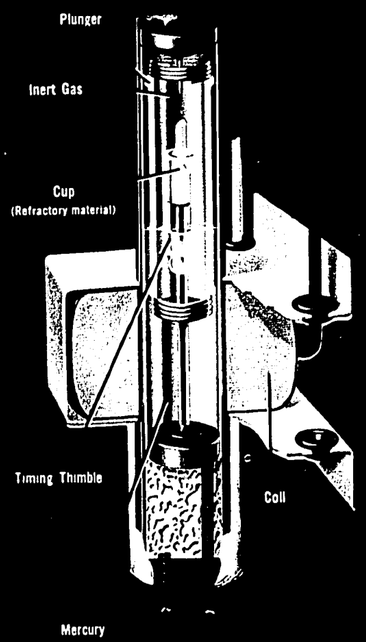
Every Adlake Relay gives you these PLUS Features:

- **HERMETICALLY SEALED**—dust dirt, moisture, oxidation and temperature changes can't interfere with operation.
- **SILENT AND CHATTERLESS**
- **REQUIRES NO MAINTENANCE**
- **ABSOLUTELY SAFE**
- **MERCURY-TO-MERCURY CONTACT**—prevents burning, pitting and sticking.

...and every Adlake Relay is tested...and guaranteed... to meet specifications!

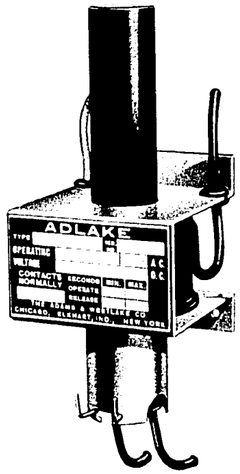
For complete details of the broad ADLAKE Relay line send for your copy of the new ADLAKE Relay Catalog Address The Adams & Westlake Company 1953 N Michigan Elkhart, Indiana In Canada write Powerlite Devices Limited of Toronto

Here's Why Adlake Relays give SURE, POSITIVE ACTION!



When relay is energized, coil pulls plunger down. Mercury enters thimble, gradually displacing inert gas, which escapes through ceramic plug. When thimble has been filled, mercury-to-mercury contact is established . . . assuring positive snap action under all conditions!

5 Popular Models from the broad Adlake Line



1040 MODEL

Contact arrangement:
Normally open or Normally closed
Single pole—Single throw

Available in:
Time delay types of { Slow operate—Quick release; Slow operate—Slow release; Quick operate—Slow release }

Load type: Quick operate—Quick release

Maximum time delay: 20 minutes

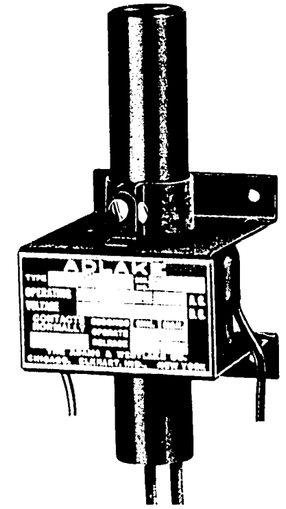
Contact rating: Time delay relays to 15 amps.
Load relays to 50 amps.
Non-inductive, 115 v, 60 cy.

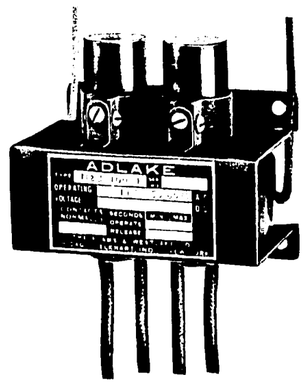
Voltage Coil: Up to 440 volts A.C. (25-50-60 cy.)

1101 MODEL

Available with same features as Companion 1040 Model

Complete information on all relays illustrated available on request.





1123 MODEL

Double Pole Load Relay
(Also available with time delay contacts)

Contact Arrangement: { 2 contacts Normally open or; 2 contacts Normally closed; Double pole—Single throw }

Contact rating:
Time delay contacts up to 15 amperes.
Load relays to 50 amperes.
Non-inductive 115 v, 60 cy.

Voltage Coil:
Up to 440 v., 50/60 cy. or 220 v. d.c.

1140 MODEL

"MIGHTY MIDGET"

Contact Arrangement: Normally open or normally closed—Single pole—Single throw

Available in: Quick acting load type only.

Contact rating: { 30 amperes non-inductive; 115 volts, 60 cy. }

Voltage Coil: Up to 440 v, 60 cy. and 220 v. d.c.

Maximum Size: Height 3⅛"-4¼"—width 2 17/32—projection 2⅜".

Equipped with compression type terminals to simplify installation.



5000 MODEL ... SENSITIVE RELAY

(Designed for rapid operation under load conditions)

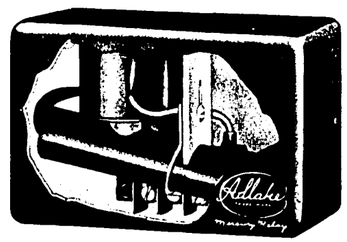
Contact Arrangement: Normally open or normally closed
Single pole—Single throw

Contact rating: 5 amperes, non-inductive, 115 volts, 60 cy.

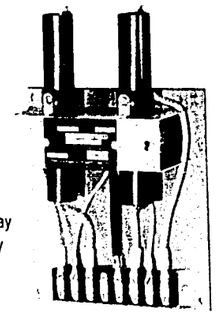
Voltage Coil: Up to and including 230 volts, 60 cy.

Coil Input: 115 volts, 60 cy.—.007 amp., less than 1 watt

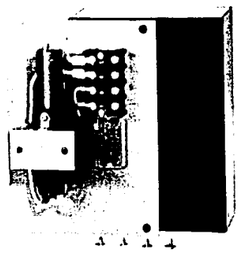
Maximum Size: Height 3 13/32"—width 5¼"—projection 2⅜"



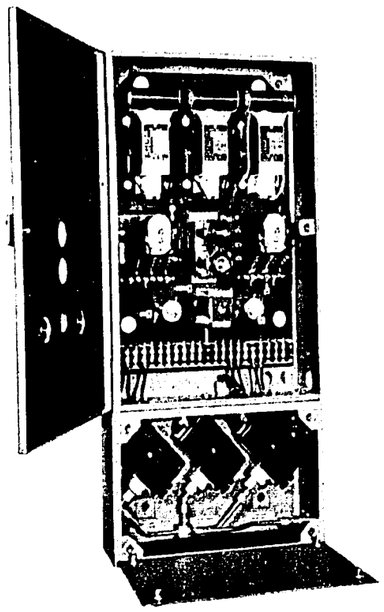
ADLAKE *Custom-Built* ASSEMBLIES



Power Relay Assembly



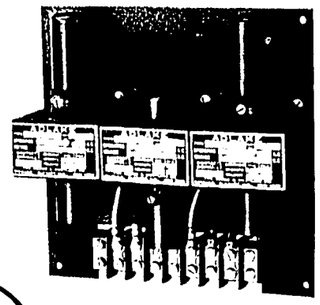
Lighting Control



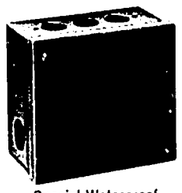
Complete Control Units

The Adams & Westlake Company's Engineering Department is completely equipped to serve your special needs. ADLAKE service includes developing and building complete control systems, custom-built terminal boxes, junction boxes, and similar special assemblies.

Whatever your particular relay problem may be, please feel free to present it to us



Delayed Action Control



Special Waterproof Junction Box

Adlake TRADE MARK

96th year of serving the transportation and building industries

THE Adams & Westlake COMPANY

Established 1857 • ELKHART, INDIANA • New York • Chicago

Manufacturers of ADLAKE Hermetically Sealed Mercury Relays

ELMENCO MOLDED MICA CAPACITORS

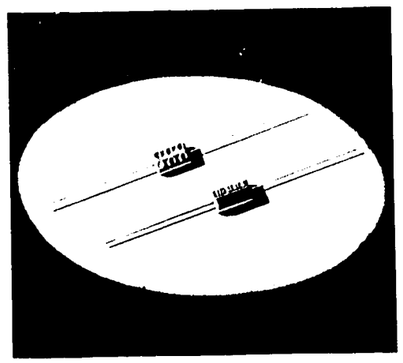
ANY VALUE—ANY TOLERANCE, AVAILABLE FOR IMMEDIATE DELIVERY!

ELMENCO fixed mica dielectric capacitors are compact, precision made. Manufactured in accordance with American military standards to meet Army and Navy JAN-C-5 Specifications. All impregnated and JAN, color coded unless otherwise specified. Standard specification limits are shown below.

Moulded in low loss bakelite, tested at double the working voltage. Tests for dielectric strength, insulation resistance, temperature co-efficient and capacitance drift, humidity and life tests according to JAN and RCM STANDARDS. All units are wax dipped for salt water immersion seal.

Known the world over for their reliability under all operating conditions, ELMENCO CAPACITORS are chosen by manufacturers who want successful performance and long life from their products.





CM 15 MINIATURE MICA CAPACITOR

"THE SMALLEST MOLDED MICA CAPACITOR MADE!"

ELMENCO TYPE 605

MAX. DIM.
½" x $\frac{3}{32}$" x $\frac{7}{16}$" thick*

*Thickness in capacities above 300 mmf is $\frac{7}{32}$".

CAPACITY RANGE
1 to 520 mmf 300VDCW
1 to 400 mmf 500VDCW

Tolerances as low as ±0.5%

Temperature and drift characteristics per JAN-C-5 characteristic "F" for most capacity values.

ARCO ELECTRONICS INC.

103 LAFAYETTE ST., N. Y. 13, N. Y.

West Coast Branch
ARCO CAPACITORS INC. — 5281 WEST PICO BLVD.
LOS ANGELES, CALIF.

JAN-C-5 CAPACITORS

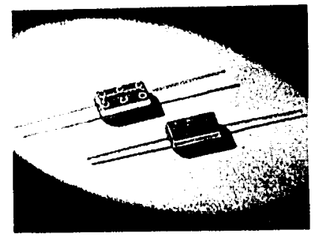
CM 19

ELMENCO TYPES

503J—regular foil
603J—silvered

MAX. DIM.
$\frac{11}{16}$" x $\frac{7}{16}$" x $\frac{7}{32}$" thick

CAPACITY RANGE
2 to 1000 mmf 500VDCW



CM 20

ELMENCO TYPES

503M—regular foil
603M—silvered

MAX. DIM.
$\frac{33}{32}$" x $\frac{7}{16}$" x $\frac{7}{32}$" thick

CAPACITY RANGE
2 to 2000 mmf 500VDCW

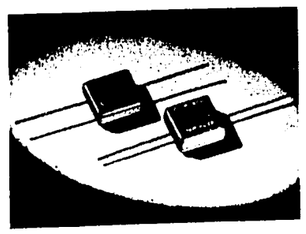
CM 25

ELMENCO TYPES

501M—regular foil
601M—silvered

MAX. DIM.
$1\frac{7}{64}$" x $\frac{7}{16}$" x $\frac{7}{32}$" thick

CAPACITY RANGE
5 to 2000 mmf 500VDCW



CM 30

ELMENCO TYPES

502J—regular foil
602J—silvered

MAX. DIM.
$\frac{11}{16}$" x $\frac{11}{16}$" x $\frac{9}{32}$" thick

CAPACITY RANGE
470 to 6200 mmf 500VDCW

CM 35

MAX. DIM.
$\frac{11}{16}$" x $\frac{11}{16}$" x $1\frac{1}{4}$" thick

ELMENCO TYPES

502L—regular foil
602L—silvered

CAP. RANGES
470 to 10,000 mmf 500VDCW
470 to 15,000 mmf 300VDCW

NOTE: Capacity Ranges Indicated In Most Cases Exceed Those Specified In JAN-C-5.

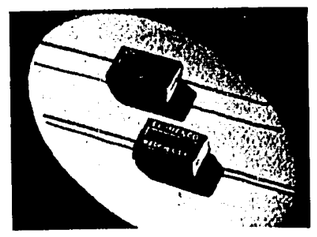
CM 40

ELMENCO TYPES

504L—regular foil
604L—silvered

MAX. DIM.
1" x $\frac{5}{8}$" x $1\frac{1}{2}$" thick

CAPACITY RANGE
2700 to 10,000 mmf 500VDCW



FOR FURTHER SPECIFICATIONS WRITE FOR FREE CATALOG

ELMENCO HI-VOLTAGE MICA CAPACITORS

FOR TELEVISION-TRANSMITTING & INDUSTRIAL

DC WORKING VOLTAGES: FROM 1000 TO 2500 VOLTS

Molded in CM-20, CM-35 and CM-40 Cases

Demand for smaller units in higher voltages designed to meet the requirements for TELEVISION, POWER AMPLIFIERS, LOW POWER TRANSMITTERS, and various INDUSTRIAL USES has increased. ELMENCO designed and produced units listed below are especially adaptable to compact circuits where space is an important factor. Their acceptance has been overwhelming by the various manufacturers of TELEVISION RECEIVERS.
In many cases, these units will do the work of capacitors molded in CM-45, CM-50, and CM-55 cases without breaking down. NO SPECIAL MOUNTINGS ARE NECESSARY; just wire right into the circuit.

The capacitors are molded in low-loss bakelite and tested at double the branded voltage. They are tested for dielectric strength, insulation resistance, temperature coefficient, capacitance drift, susceptibility to humidity, and length of life, according to RCM Standards. All units are wax-dipped for protection against salt water immersion.

CASE SIZE	DC WORKING VOLTAGE	CAPACITY	RANGE MMF
VCM 20	2500	5	240
	2000	5	390
	1500	5	620
	1000	5	1000

CASE SIZE	DC WORKING VOLTAGE	CAPACITY	RANGE MMF
VCM 35, 40	2500	240	1600
	2000	390	2000
	1500	620	2400
	1000	1000	5100

ELMENCO PAPER TUBULAR CAPACITORS

ELMENCO CP type paper tubular capacitors are sealed in STEATITE TUBES which serve to insulate the capacitor electrically as well as against moisture and heat. The capacitor insert is impregnated with MINERAL OIL, thereby assuring long life at 85° C operating conditions. This feature insures successful operation at the high ambient temperatures existing in small, compact enclosures.
The NON-INDUCTIVELY wound paper and foil units are sealed in the CERAMIC TUBES by means of baked SYNTHETIC RESIN END FILLS which cannot melt at any conceivable operating temperature. The end fills will not dissolve in wax, permitting the capacitors to be potted without damage to the insert. Leads are of tinned copper 2¼" long.

Many of the large TELEVISION, TRANSMITTER and HIGH VOLTAGE AMPLIFIER manufacturers have found these capacitors to be of highest quality. Breakdown tests have exceeded the required standards.

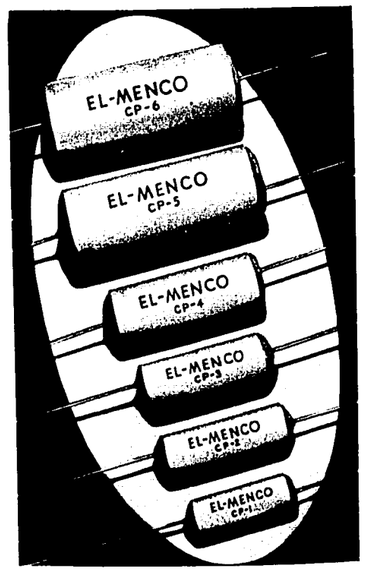
DIMENSIONS FOR CP TYPE CAPACITORS

	DIAMETER	LENGTH
CP-1	⅜"	1 ⅛"
CP-2	⅜"	1 ⅜"
CP-3	⅞"	1 ⅜"
CP-5	⅞"	1 ⅝"
CP-5	⅝"	2 ⅛"
CP-6	⅞"	2 ⅛"

STANDARD TOLERANCE ON ABOVE UNITS IS ± 20%.

DC WORKING VOLTAGE	CAPACITY RANGE M F D
1000	.001 to .082
600	.001 to .25
400	.001 to .25
200	.001 to .5

FOR FURTHER SPECIFICATIONS WRITE FOR FREE CATALOG



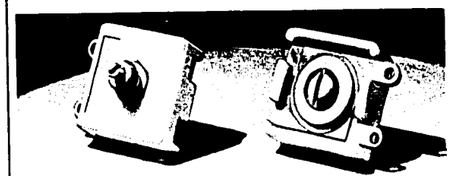
MINERAL OIL IMPREGNATION

NON-INDUCTIVE WINDING SYNTHETIC RESIN END SEALS STEATITE CASE

ARCO ELECTRONICS INC., 103 Lafayette St., N. Y. 13, N. Y.

West Coast Branch: ARCO CAPACITORS INC., 5281 West Pico Blvd., Los Angeles, Calif.

VARIABLE COMPRESSION TYPE MICA CAPACITORS



SINGLE SECTION PADDERS

ELMENCO PADDING CONDENSERS have been acclaimed by engineers as the finest development in adjustable mica condensers.
The construction is such as to completely enclose and protect the delicate edges of the mica films, made of the finest quality clear India ruby mica. The phosphor bronze adjusting plates assure permanent resilience and freedom from mechanical fatigue. All parts are heavily plated to resist corrosion.

TYPE 30

350 Volts DC Flash-Test — 175 WVDC

PART NUMBER	NUMBER OF PLATES	GUARANTEED RANGE: At 1½ Inch Pounds Cap. Will Be More Than MMF.	GUARANTEED RANGE: At 2½ Turns Open Cap. Will Be Less Than MMF.
302	2 Pl.	130	15
303	3 Pl.	340	65
304	4 Pl.	550	100
305	5 Pl.	760	190
306	6 Pl.	970	275
307	7 Pl.	1180	360
308	8 Pl.	1390	450
309	9 Pl.	1600	550
310	10 Pl.	1890	650
311	11 Pl.	2110	780
312	12 Pl.	2330	880
313	13 Pl.	2605	1150
314	14 Pl.	2830	1300
315	15 Pl.	3055	1400

Screw is insulated from top plate my mica washer. Above maximum capacity values are based on using 1½ to 1¾ Mil Mica films.

TYPE 30-M PADDER

500VDCW

Ranges up to 2525

Types 50 (1 1/16 x 1 1/16)
60 (¾ x ¾)
DUAL PADDERS

Further Specifications Upon Request



TYPE 46 TRIMMER

***Metal Mounting Brackets* for these trimmers can be supplied from stock**

Bracket for mounting 2 Trimmers
Bracket for mounting 3 Trimmers
Bracket for mounting 4 Trimmers
Bracket for mounting 5 Trimmers
Bracket for mounting 6 Trimmers

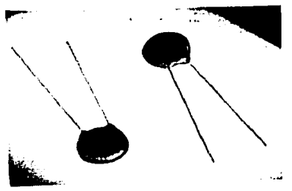
TYPE 46 TRIMMER ¾" x 5/16"

The base is made of the lowest dielectric loss ceramic material available and the mica is clear India Ruby.
The soldering lugs may be bent in any position without affecting capacity setting due to the rigid construction of adjusting plates.
ELMENCO TRIMMING CONDENSERS are treated for resistance to humidity and for permanence of capacity setting.
Trimmers shown here are standard sizes and capacities.

TYPE 46W NUMBER PART	PLATES NUMBER OF	GUARANTEED RANGE: At Tight Cap. Will Be More Than MMF.	GUARANTEED RANGE: At 2½ Turns Open Cap. Will Be Less Than MMF.
460	1¼ Pl.	15	1.5
461	1¾ Pl.	30	2.7
462	2 Pl.	80	5
463	3 Pl.	180	9
464	4 Pl.	280	25
465	5 Pl.	380	50
466	6 Pl.	480	80
467	7 Pl.	580	110
468	8 Pl.	680	140
469	9 Pl.	780	170

CERAMIC CAPACITORS

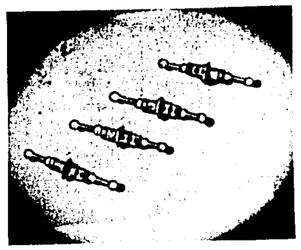
Silver High "K" disc ceramics are used primarily for coupling and by-pass in RF and higher frequency circuits, ELMENCO ceramic capacitors are wax impregnated with low-loss phenolic coating. Insulation resistance far exceeds the 10,000 megohm minimum requirements. Voltage rating is 1500VDCT, 500VDCW. 90% relative humidity test for 100 hours. Radial leads are 1¼" minimum No. 22 tinned copper wire.



Capacity and Tolerance Stamped on Capacitor

Maximum Dimensions:
.575" diameter
.150" thickness
General Purpose Disc
Capacity range 1000 to 12,000 mmf.
Neg. Temperature 750 Disc
Capacity range 47-150 mmf.

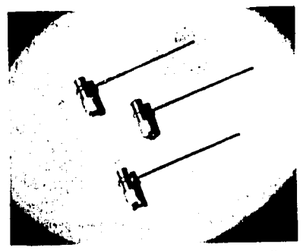
FOR FURTHER SPECIFICATIONS WRITE FOR FREE CATALOG



FEED THRU CAPACITORS

Compact rugged ceramic feed through capacitors are designed for high frequency coupling with a minimum of inductive reactance through elimination of wire leads. These units are three dot RMA coded and rated at 500VDCW.

Part No.	Cap. (mmf.) (Guar. Min. Val.)
CCF-501	500
CCF-102	1000
CCF-152	1500
CCF-202	2000



VARIABLE CERAMIC TRIMMER

Adjustable ceramic trimmer capacitor for high frequency applications. Silvered Steatite tubes ⅝" in length provide capacity ranges listed below upon insertion of 6-32 screw.

Part No.	Cap. Range mmf.
CV-1	0.5-3
CV-2	1-4
CV-3	2-6

ARCO ELECTRONICS INC.
103 Lafayette St., New York 13, N. Y.

West Coast Branch
ARCO CAPACITORS INC. — 5281 WEST PICO BLVD.
LOS ANGELES, CALIF.

HANDY ARCO KITS — *AVAILABLE FOR IMMEDIATE DELIVERY!*



Contains 5 each of 46 capacity values—range 1—510 mmf. ±5% tolerance. Closest tolerance is ±0.5 mmf.



Actual Size
1-300 mmf.
$\frac{1}{32}$" x $\frac{1}{2}$" x $\frac{3}{16}$"
301-510 mmf.
$\frac{9}{32}$" x $\frac{1}{2}$" x $\frac{7}{32}$"
For Television, Radio and other Electronic Applications.
1—420 mmf. cap. at 500vDCW.
1—510 mmf. cap. at 300vDCW.
Temperature Co-efficient ±60 parts per million per degree C for most capacity values.
6-dot color coded.

MOLDED MICA KITS



JAN-C-5 SILVERED (ILLUSTRATED)

This kit contains the complete range of ELMENCO silvered molded mica capacitors from 5 mmf. to 10,000 mmf. manufactured in accordance with JAN-C-5 specifications. All units are of letters "C", "D" or "E" characteristics as specified and letter "J" (5%) tolerance and are JAN color coded.

JAN-C-5 REGULAR FOIL

This kit contains the complete range of ELMENCO regular foil molded mica capacitors from mmf. to 10,000 mmf. manufactured in accordance with JAN-C-5 specifications. All units are of the letter "B" characteristic and letter "K" (10%) tolerance and are JAN color coded.

CM20 HIGH VOLTAGE

Contains 10 each of 50 capacity values ranging from 5-1000 mmf. in working voltages from 2500-1000.

PAPER TUBULAR KITS



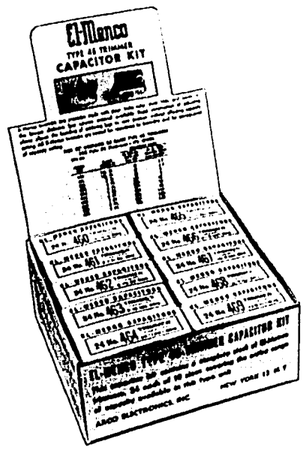
STANDARD KIT (ILLUSTRATED)

Contains 5 each of 25 capacity values from .001 to .5 in working voltages from 600 to 200.

1000 VOLT KIT

Contains 5 each of 17 capacity values from .001 to .05 —working voltage 1000.

VARIABLE CAPACITOR KIT



TYPE 46 TRIMMER (ILLUSTRATED)

Contains 24 each of capacity values listed on previous page in table form.

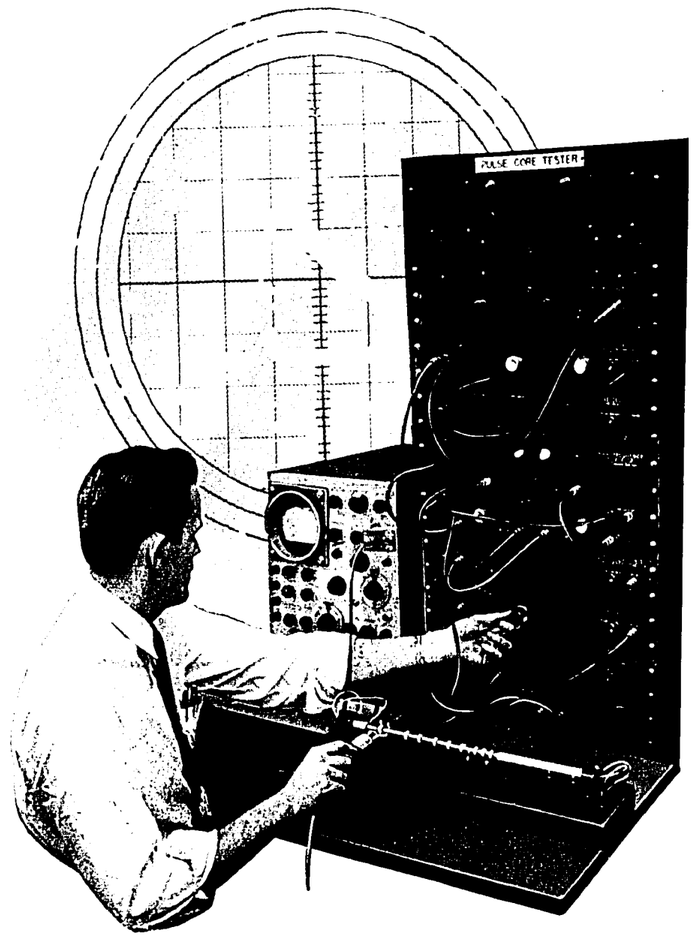
TYPE 30 PADDER KITS

Contain 12 each of capacity values listed on previous page in table form.

FOR FURTHER SPECIFICATIONS WRITE FOR FREE CATALOG

ARCO ELECTRONICS INC.
103 LAFAYETTE ST., N. Y. 13, N. Y.
West Coast Branch
ARCO CAPACITORS INC. — 5281 WEST PICO BLVD.
LOS ANGELES, CALIF.

"UNITIZED" PULSE CONTROL EQUIPMENT



Saves valuable research and testing time

Always in the past, it has been necessary to custom design pulse test equipment for each individual application—this has proved a most costly and time-consuming engineering operation. But now the major portion of this work can be eliminated through the use of Burroughs "Unitized" Pulse Control Equipment. These standardized units are complete within themselves and each performs one basic operation, such as generating, mixing, gating, counting, etc. The units can be arranged and rearranged in almost any manner necessary to simulate actual conditions of usage for the component part being tested.

FOR APPLICATIONS IN RADAR, TELEMETERING DIGITAL COMPUTING, TELEVISION AND NUCLEAR PHYSICS

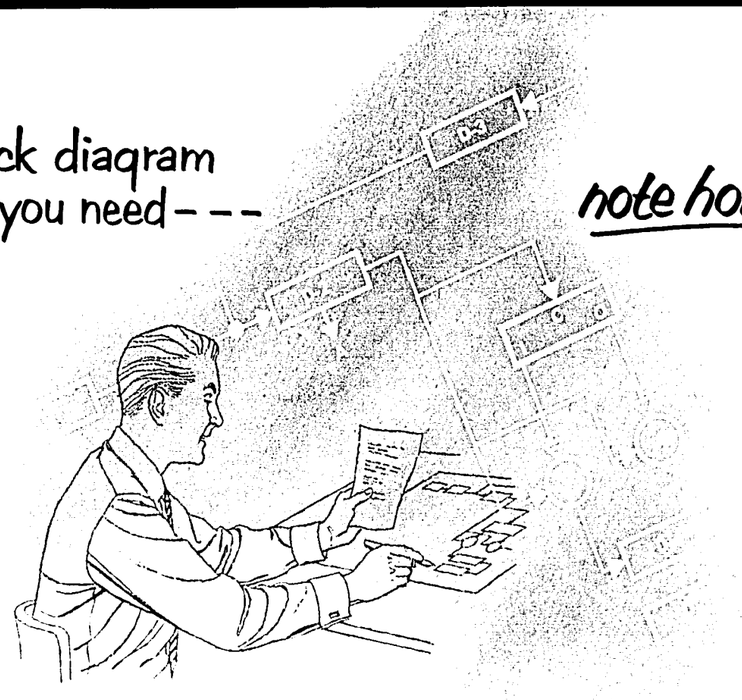
AS AN EXAMPLE—MEASURING THE BEHAVIOR OF MAGNETIC CORES

Pictured here is a Burroughs Core Tester BCT-300 designed to swiftly and accurately measure the "switching time" and "squareness ratio" of toroidal cores. The unit is made up of eight standard Pulse Control units (one Low Frequency Pulse Generator 1004C, a Flip-Flop 1101C, a Coincidence Detector 1201B, and five Pulse Delay units 1301C) mounted in a rack with other accessory equipment. The output of this unit may be observed on a standard laboratory oscilloscope. Power is supplied from a 9101C power supply.

This BCT-300 is typical of the many possible applications of Burroughs "Unitized" Pulse Control Equipment. Pertinent characteristics and specifications of the individual units will be found on the following pages.

ELECTRONIC INSTRUMENTS DIVISION
Burroughs

Plan a block diagram of the circuit you need - - -



note how

"UNITIZED" PULSE CONTROL EQUIPMENT

shown here can be mounted on a 19-inch rack and arranged to fit your specific requirements

PULSE GENERATOR

Type 1004C — Generates 0.1 microsecond pulses at frequencies continuously variable from 15 to 650,000 cycles per second, in five overlapping bands. Output circuit is designed to match 93-ohm RG-62/U cable.

A symmetrical multivibrator is used to control the frequency. The output amplitude, which is not affected by changes in frequency, can be varied from 10 to 32 volts and the polarity of the output pulse is reversible.

Type 1002B — Generates 0.1 microsecond pulses (approx.) at frequencies continuously variable from 0.2 megacycles to 4.5 megacycles in four overlapping bands.

A calibrated, L-C controlled, sine-wave oscillator controls the frequency. The output amplitude, which is only affected by frequency changes in the ranges above 2 megacycles, can be varied from 10 to 32 volts and the polarity of the output pulse is reversible.

Type 1003A — This unit consists of three separate pulse generators mounted on a single panel, each section of which is capable of generating 0.1 microsecond pulses in three different ways.

1. Single pulse push-button operation.
2. The output pulse is generated by coincidence action of a push-button and a positive synchronizing pulse.
3. The output circuit acts as a pulse standardizing circuit when fed by external pulses. The output circuit is directly triggered by an input pulse with no push-button action.

Two inputs for each pulse generator are provided: one, "Synchronizing Input," for synchronization of push-button pulses; the other, "Low-frequency Input," for triggering the output circuit directly, without the use of the push-button. Positive pulses are available with output amplitudes adjustable from 0 to 35 volts.

PULSE GATER

Type 1501B — This unit comprises a gate generator with a manually adjustable gate length and an independent coincidence detector. The duration of a gating pulse is continuously adjustable from 0.3 microseconds to 5,000 microseconds in four overlapping ranges. The Pulse Gater replaces a Pulse Delay Unit, a Flip-Flop, and a Coincidence Detector for the purpose of generating pulse trains.

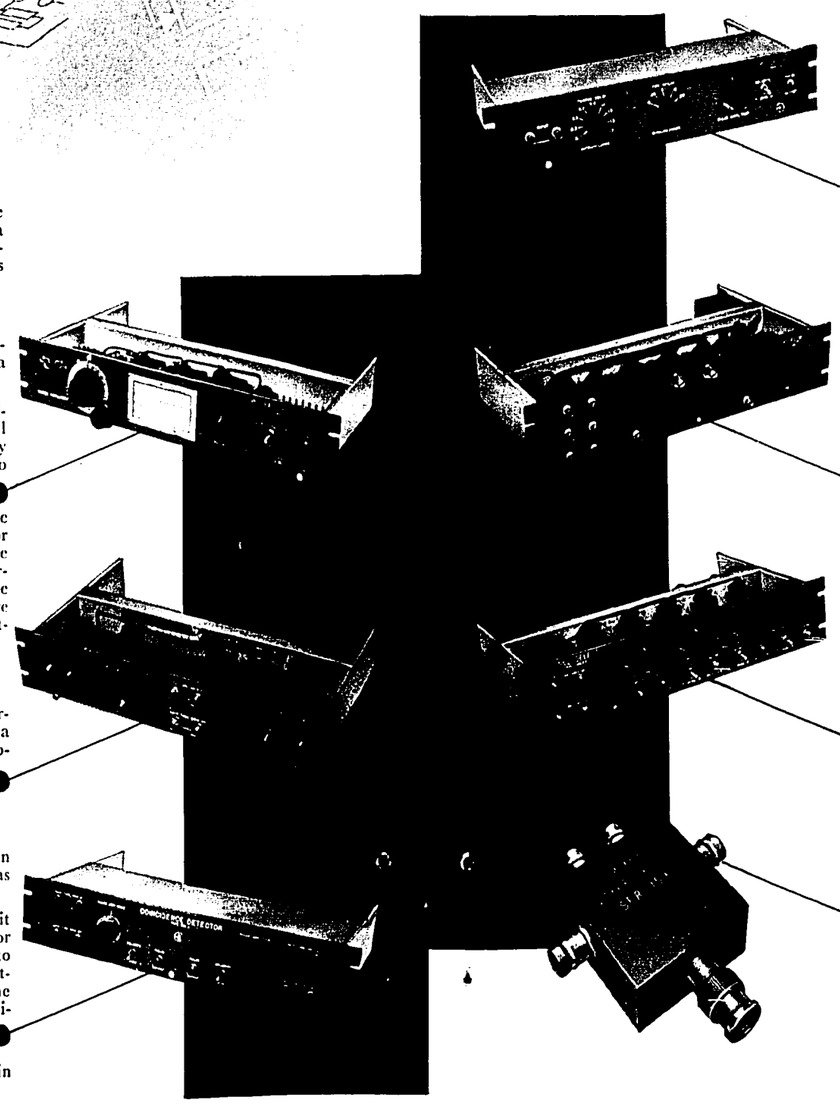
COINCIDENCE DETECTOR

Type 1201B — Two independent coincidence detectors are mounted on one panel. These units are designed to sense coincidence between the output signal of a flip-flop and 0.1 microsecond pulses. Two inputs are provided for each unit. Grid No. 1 is designed to accept 0.1 microsecond pulses with minimum amplitudes of 13 volts. Grid No. 3 is designed to accept the output of Type 1101C flip-flop or equivalent.

Type 1202A — Two separate coincidence detectors are mounted on one panel. Each is designed to sense coincidence between the output voltage levels of as many as five flip-flops.

The principal difference between this unit and the Type 1201B coincidence detector is that the Type 1201B is designed to sense coincidence between a flip-flop output and 0.1 microsecond pulses, while the Type 1202A is designed to sense coincidence between output of one flip-flop and as many as four other flip-flops.

As many as six inputs may be driven in parallel from a single flip-flop output.



PULSE DELAY

Type 1301C — In this unit, a 0.1 microsecond input pulse triggers a single-shot multivibrator of controllable period, and a 0.1 microsecond pulse of reversible polarity is regenerated at the end of the multivibrator period. The delay of the 0.1 microsecond output pulse is continuously adjustable in five overlapping ranges from 1 microsecond to a maximum of about 80,000 microseconds.

In addition, a rectangular pulse with a duration equal to the delay period between the 0.1 microsecond input and output pulses is brought out to a jack on the front of the panel through a d-c coupled cathode follower so that it can be used for observing the time delay oscilloscopically.

Type 1302A — This unit delays 0.1 microsecond pulses by means of a tapped delay line in 0.05 microsecond steps from 0.1 to 1.9 microseconds. Reversible output polarity of variable amplitude is also provided.

Type 1303B — This unit, which provides a fixed delay of 0.1 microsecond is designed to be connected in cascade with RG-62/U coaxial cable without mismatch. Input and output cable connectors are mounted on a flanged box 4½ x 3 x 1¾ inches.

FLIP-FLOP

Type 1101C — The flip-flop is a bistable circuit designed specifically to provide an output voltage level to be used as a gate in coincidence circuits. The unit contains a pentode Eccles-Jordan circuit capable of being switched at rates up to 2.5 megacycles per second with 0.1 microsecond pulses.

There are three inputs — zero, one, and complement—operating with minimum amplitudes of 12 volts. Two output jacks marked "Zero Gate" and "One Gate" supply either 0 volts or −23 volts at an impedence level of approximately 680 ohms.

There are two neon lights on the front of the panel which indicate the position of the flip-flop. There is also a terminal block on the rear of the unit which can be used to operate indicator lights installed at a remote point for visual monitoring.

GATED CHANNEL SELECTOR

Type 1402C — This unit is designed to sense coincidence between the output signal of a flip-flop and 0.1 microsecond pulses and to feed the output to four separate jacks. The input section is similar in action to that of coincidence detector, Type 1201B. Each of the output pulse positions has its own amplitude control and three-position toggle switch which is used to select pulse polarity or reject the output pulse. The ability of the unit to select any or all of the four output circuits in any combination permits the unit to be set up for a parallel binary code, where each output can be used to represent a single binary digit. The unit is also useful for feeding as many as four terminated lines from a single source.

MIXERS

Type 1601A—This mixer has four input positions which feed a common output through crystal diodes. Four standard input connectors and one output connector are mounted on a box 2½ x 2½ x 1 inch.

Type 1602A—This mixer is a panel-mounted twin mixer functionally equivalent to two of Type 1601A except with five input connectors and one output connector for each mixer.

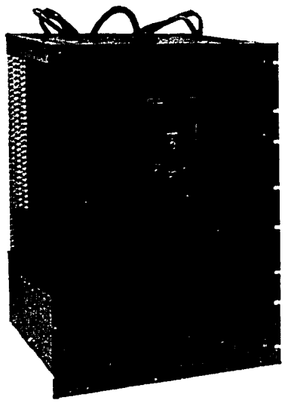
ELECTRONIC INSTRUMENTS DIVISION

Burroughs

Burroughs Accessory

PULSE CONTROL EQUIPMENT

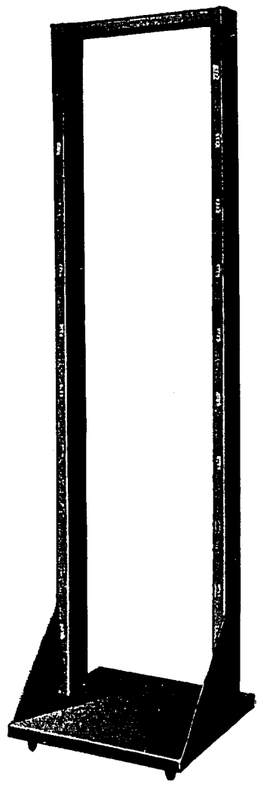
-necessary for fast circuit assembly



◀ POWER SUPPLY—Type 9101C

This unit is a magnetically regulated d-c power supply providing the seven voltages necessary for the operation of several pulse generators, flip-flops, coincidence detectors, etc. Each d-c voltage is automatically regulated to within ±1 per cent of the selected voltage for load variations from 10 per cent load to full load, and for a-c line input variations of ±8 per cent. Two separate transformers, each with tapped primaries and two secondaries, supply a total of 50 amperes of heater current at 6.3 volts.

The unit, which is operated from a 115-volt, 60-cycle, 20-ampere single-phase power source, has each of the seven output voltages interlocked by relays, thus providing protection from loss of voltage in any of the supplies, and has fuses for over-current protection.



MOUNTING RACK—Type 7002A ▶

This is a standard 19-inch relay rack with plug-in power outlets available along each side. Approximately 70 inches of mounting space are available. Overall dimensions of the swivel-caster unit are 73¼ x 20 x 21. It is finished to match the remaining units in the line.

A few current users of "Unitized" Pulse Control Equipment

Massachusetts Institute of Technology
University of Michigan
Consolidated Engineering Corporation
National Union Radio Corporation
The Catholic University of America
Stanford Research Institute
Magnetics Research Company

Originally created to speed up and simplify the building of electronic test equipment at the Burroughs Research Center, "Unitized" Pulse Control Equipment is now being used by many leading organizations in electronic research.

More than 500 of these pulse control panels were used in the construction of the high speed digital computer now in operation at the Burroughs Research Center. They represent the primary reason why it was possible to complete this unique machine in only nine months.

Incidentally, the services of the Burroughs computer are now available, on a fee basis, to interested organizations, both public and private. Typical computer users and their solved problems are: Westinghouse Aviation Gas Turbine Div. —*Turbojet engine design and performance calculations*. Philco—*Antenna calculations*. Bell and Howell—*Optical ray tracing*. Hydrocarbon Research, Inc.—*Stresses in pipe*. Roger Bellows & Associates—*Correlation of psychological tests on personnel*.

• • •

For full information and consultation regarding Burroughs "Unitized" Pulse Control Equipment, the Burroughs Digital Computer, or other problems related to electronics or magnetics, call or write Department 20, Electronic Instruments Division, Burroughs Corporation, 511 N. Broad St., Philadelphia 23, Pa.

ELECTRONIC INSTRUMENTS DIVISION
Burroughs

QUICK FACTS ON Centralab

CRL ®

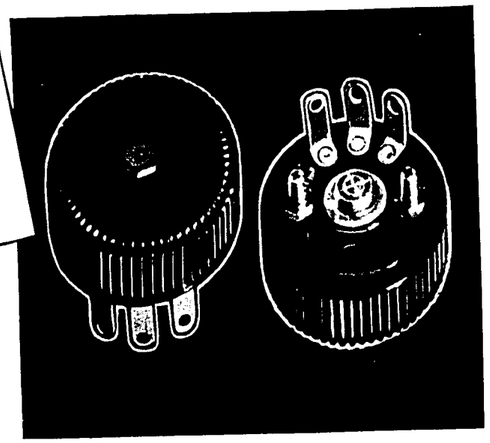


Electronic components that make a big difference in electronic design manufacture and performance

SEE NEXT 7 PAGES FOR DETAILS

1 VARIABLE

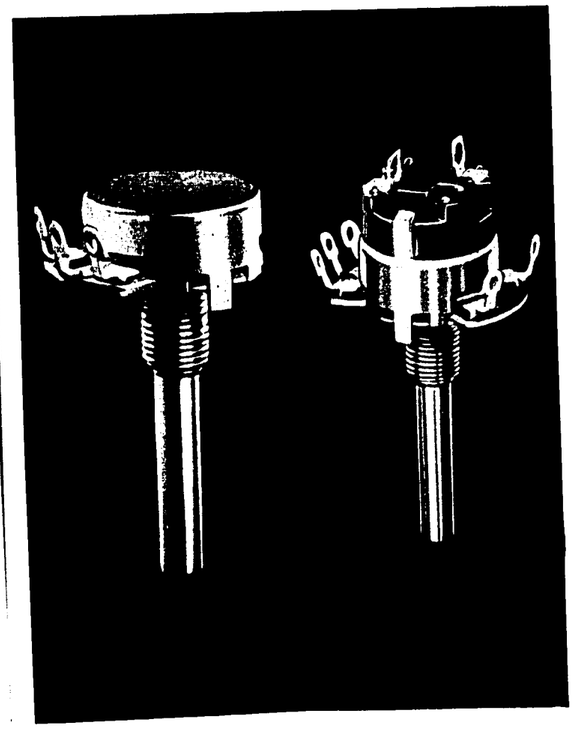
• Whatever your need in modern standard or miniature size variable resistors, switches, ceramic capacitors, printed electronic circuits or special ceramic products — you'll find Centralab your best source of supply. Use this quick reference guide for facts on standard or special adaptations. For free technical bulletins . . . see corresponding numbers covering each component. For engineering assistance, write factory direct — stating your problem.



Model 1 Radiohm® — world's smallest resistor with the longest list of uses

Widely used as standard for hearing aids plus many other commercial and military miniature applications. Its ⅝" diameter makes it no larger than a dime. Shielded from dust, lint, etc. Rated at ⅒ watt. Available in a resistance range of 500 ohms to 10 megohms, with 7 standard tapers. Plain or switch types. New Hi-Torque model has rotational torque of 3.0 ounce-inches. Knob or slotted shaft types.

For technical details ask for Bulletin 42-158.



Model 2 Radiohm®

plain or switch types

Precision controls that are only 15/16" in diameter. Rated at ½ watt. Velvet smooth, low noise level operation. Shafts of various types and lengths to your specifications. Ratings from 500 to 15 megohms. Standard or special tapers. Resistance tolerances to meet your requirements. Plain or switch types, 1-5-8 amps. Phenolic base resists humidity. Many switch combinations provide wide variation at minimum cost.

Ask for Bulletin 42-164.

RESISTORS

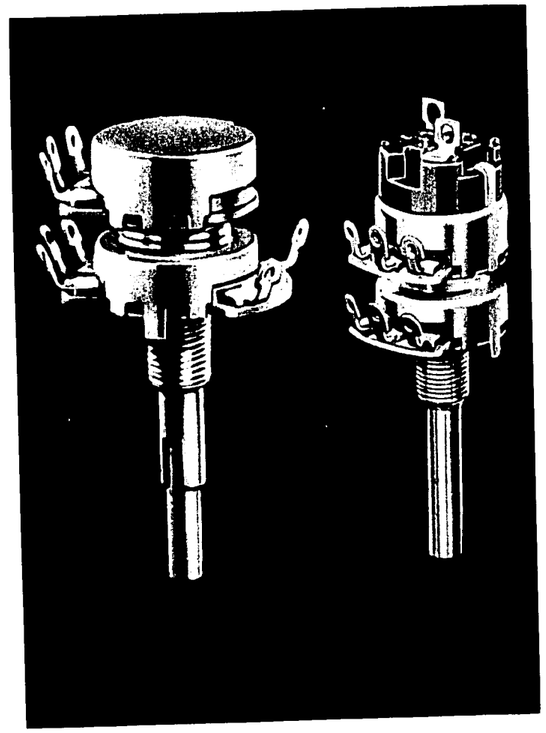
. . . most complete line to cut down size, weight and cost

Model 2 Radiohm®

dual and twin types

Size — 15/16" diameter. Rated ½ watt. Two- or three-ganged. Single or concentric shafts, of various types and lengths to meet your specifications. Tap or plain tapers. Ratings from 500 to 15 megohms. Resistance tolerances to meet your requirements. Plain or switch types, 1-5-8 amps. Many switch combinations provide wide variations for design and application. Meet JAN R9-1 characteristic U requirements.

Ask for Bulletin 42-164.

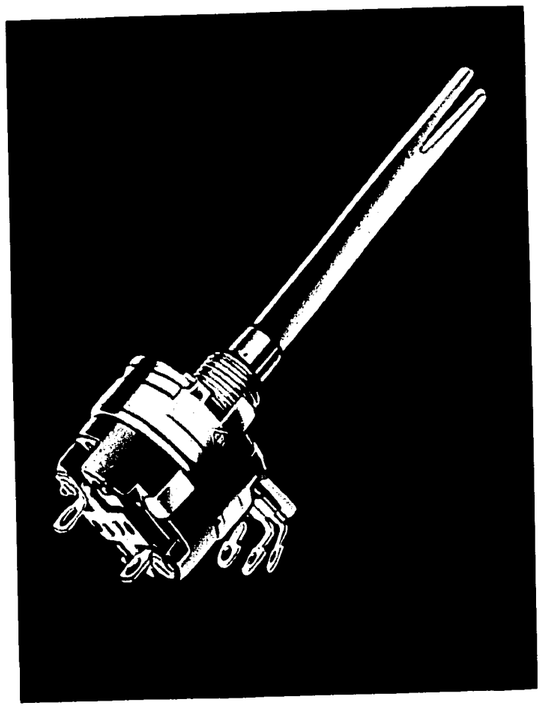


Quick delivery EXPRESS Radiohms®

for immediate production needs

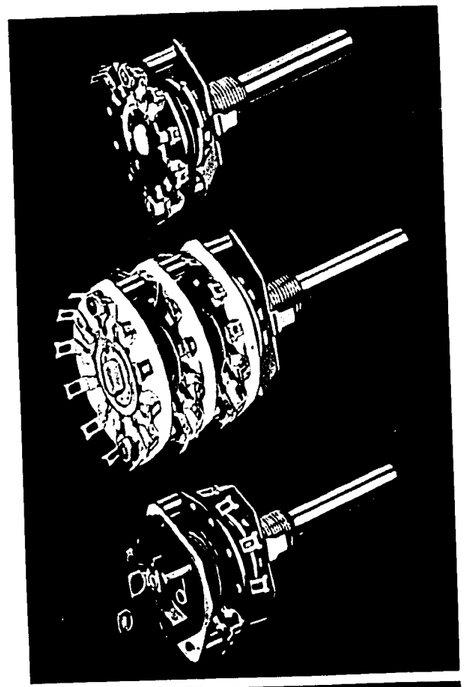
A real time saver! Ideal for the manufacturer needing variable resistors on short notice. Delivery in a few days. Control elements are stocked items. When order is received, desired shafts are staked directly to control elements. Shafts fit standard RTMA split-knurl and many spring-type push-on knobs. Rated ½ watt. Available in two values ½ and 1 megohm, audio taper (C2) with SPST a-c line switch. Values meet 75% of requirements for switch-type variable resistors.

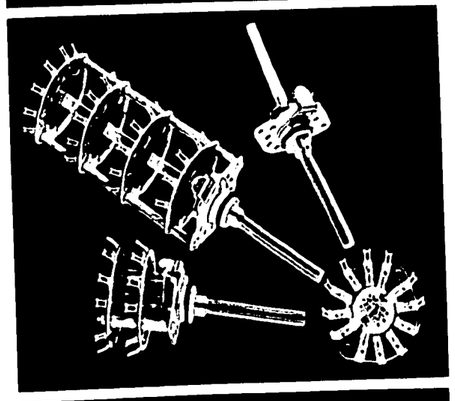
Ask for Bulletin 42-163.

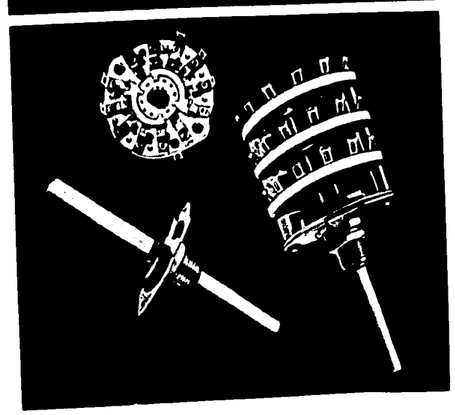


2 SWITCHES

. . . a lot more switch in a lot smaller package







Miniature Switches

for low-current, high-frequency applications

SERIES 20

Bolted-Construction type (20a)

Unusually small rotary switches. Only 1⁵⁄₁₆" dia. Give you quality and flexibility not heretofore available in miniatures. Available in multiple sections with phenolic or steatite insulation. Can be supplied in 2 to 12 positions. 30° positive indexing. Steatite is grade L-5. Meets JAN I-8 specs.

Staked-Construction type (20b)

Available in up to two sections with phenolic insulation. Same positions and size as bolted switch. Both types can be supplied with a a-c line switch, added as a rear section. Phenolic is grade LTS-E5 or JAN P-13.

For complete details ask for Bulletin 42-156.

Material specifications on clips, contacts, shafts, etc. and other hardware same as standard switches below.

Standard Switches

for a wide variety of electronic applications

Available in standard or special switching combinations in single or multiple sections. Cadmium nickel plated parts as well as silver plated brass clips and contacts are standard. Silver alloy clips and contacts available on special order. Salt-spray specifications can be substituted on special order. Switches have double-wiping contacts. 30°-60° indexing. Various index and clip types for your specific application. Phenolic is grade LTS-E5. Ceramic has extra-heavy current carrying ability. JAN-approved grade L-5 Steatite insulation is non-hygroscopic.

Miniature Switches

for low-current, high-frequency applications

SERIES 30

Last word in conserving panel and chassis space! Dual combinations of 1⁵⁄₁₆" diameter switches and ⁵⁄₁₆" diameter variable resistors. Furnished in three types. Same switching combinations as Series 20.

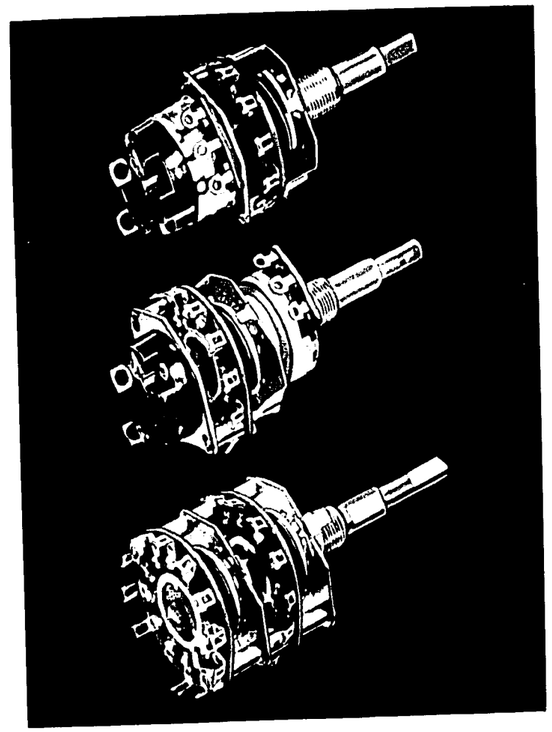
Series 30a — Rotary switch mounted in front, control mounted in rear.

Series 30b—Control mounted in front, rotary switch mounted in rear.

Series 30c — Two rotary switches independently operated by concentric shafts.

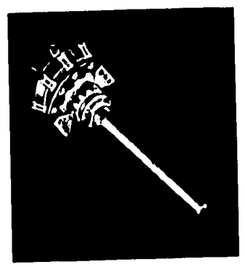
For complete details ask for Bulletin 42-157.

other hardware same as standard switches below.



Tone Switches

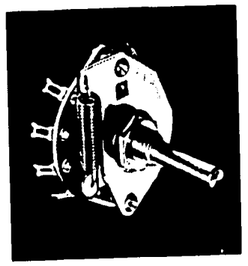
Widely used in radio-phono and allied sound equipment. Available with 3-4-6-8-9 or 10 clips, in SPST, SPDT, DPST and DPDT Models. Shorting and non-shorting contacts. Positive index. Can be supplied with a-c line switch. Specifications same as standard phenolic switches.



Spring Return Switches

PA and intercom switch types. Coil spring design means smoother action, more positive indexing — longer life. Available with one or two spring return positions. 30° index. Index spring is tested for a minimum life of 150,000 cycles.

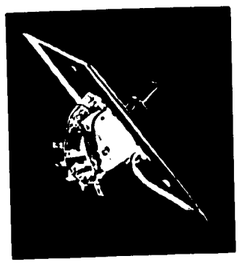
Ask for Bulletin 995.



Lever Switches

For smoother action, positive indexing on speech input equipment, etc. Spring tested for minimum 150,000 switching cycles. 8 basic indexing combinations. Available in positive, spring return or combination. Shorting and non-shorting types, 2 to 4 poles, 2 and 3 positions. Mounting plates available.

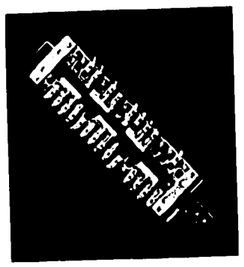
Ask for Bulletin 42-141.



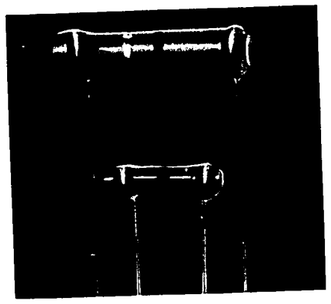
Slide Switches

For improved performance. Flat horizontal design saves space, reduces lead inductance. Wide silver-plated brass contacts. Length variable from 5 to 20 clips per side. Double-wipe clips assure constant pressure. Positive coil spring index — with 2, 3 or 4 positions.

Ask for Bulletin 953.



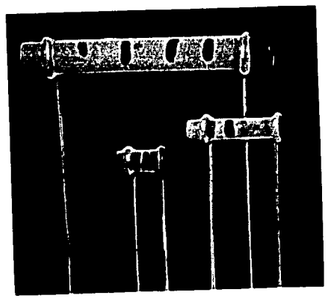
3 CAPACITATORS



BC Tubular

Ideal for use in r.f. by-pass, audio coupling applications and general circuit use. Available from 1 mmf to 10,000 mmf. Centralab's own Ceramic-X body withstands temperatures to 2200° F . . . makes capacitor impervious to moisture and low power factor. Insulated or non-insulated.

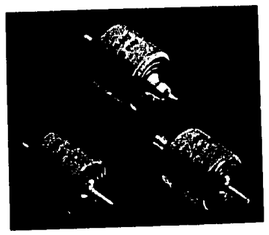
Ask for Bulletin 42-3R.



TC Tubular

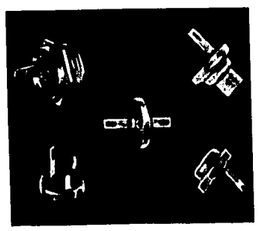
Temperature compensating tubulars. Complete range of T.C. characteristics. Comply to preferred values as set up by RTMA. Meet JAN-C-20A specifications. Special values can be furnished, upon order. Temperature coefficient, voltages, capacity and tolerance match latest RTMA color codes.

Ask for Bulletin 42-18.



HI-VO Kaps

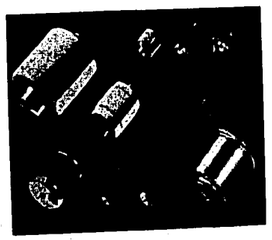
Safest high-voltage capacitors available. Centralab's TV Hi-Vo Kaps are the standard for the TV industry, including UHF. 10 KV, 20 KV and 30 KV d-c. Will withstand continuous overload up to twice rated working voltage. Small diameter 1" to 1.4" maximum. Ask for Bulletin 42-10R.



Stand-Off and Button Style

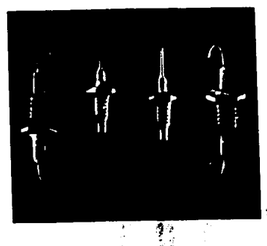
Type S1 Tubular Stand-Off (50 to 2500 mmf) by-passes r.f. to ground in many HF, UHF and VHF circuits. Type S2 (5000 to 10,000 mmf). One end threaded for panel mounting. Ask for Bulletin 42-121R.

Button style "Zippers" (•) — a long-life replacement for old-style mica "Buttons." Available in 5 different types. Used for by-passing in low-power, high-frequency applications. Ask for Bulletin 42-122R.



Transmitting and High Voltage, High Accuracy

Ideal for standard or mobile gear requiring close-held oscillator frequencies. Extremely low power factor and stable retrace characteristics. Eleven terminal styles. Capacitance: 3 to 1000 mmf, 5 KV to 40 KV d-c. Ask for Bulletin 42-102R.



Feed-Thru (FT) and Miniature Feed-Thru (MFT)

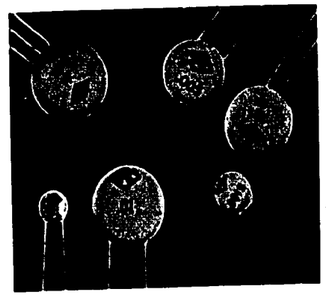
Designed for single-hole mounting with ground to chassis or shield. Type FT (500 to 2300 mmf) has .050" straight or hooked terminals for easy soldering. Bushing mounted. Type MFT (50 to 1000 mmf) eyelet-mounted. Smallest available in the widest capacitance range. Both types rated 500 v d-c.

. . . closer tolerances, greater choice of values

BC Discs

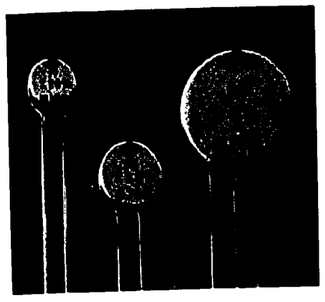
Ultra-compact — designed and pioneered by Centralab specifically to solve high-capacity, low-inductance, and small-space requirements. Available in single-non-shielded dual and shielded dual types. Tolerances to meet your requirements.

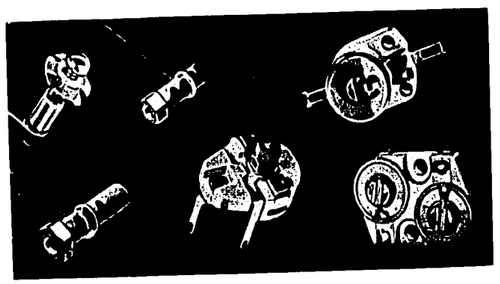
For complete technical data ask for Bulletin 42-4R.



TC Discs

Extremely thin — only .156" max. Available in sizes ¼", ⅜", 9/16" and ⅝" diameter. TC Tolerances— ± 30 PPM/°C or ± 15% whichever is greater, and in accordance with JAN and RTMA test procedure for values less than 10 mmf. Insulation resistance 10,000 megohms or greater.





Ceramic and Steatite Trimmers

Several types designed for greater stability to shock or vibration. Smaller, lighter, easier to mount in any position. Readily adjustable with screwdriver to full capacity range in 180° rotation. Rated 500 v d-c w. Available in dual or gauged units. Built to JAN-C-81. Examples:

Type 821 Miniature Ceramic Trimmer
Capacity ranges: 2.5 to 50 mmf maximum.

Type 823 Ceramic Trimmer
Medium-heavy steatite base. Eight capacity ranges: 5 to 125 mmf maximum.

Type 822 Ceramic Trimmer
Medium weight steatite base. Five capacity ranges: 1.5 to 50 mmf maximum.

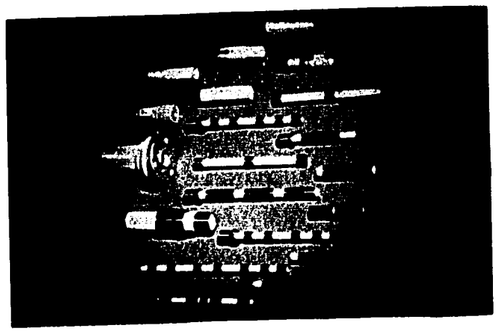
Type 829 Tubular Ceramic Trimmer
For TV and VHF. Body only .215" dia. Five capacity ranges: .5 to 10 mmf max. Bulletin 42-59.

Ask for Bulletin 42-101 on 821, 823, 822 types.

4 FINE CUSTOM CERAMICS

engineered to give you exact electrical and physical properties

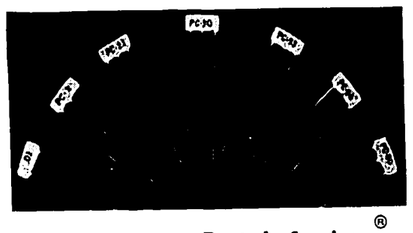
Centralab modern engineered ceramics are a *new* answer to old design problems. They simplify a great number of industrial and electronic applications. A great variety of forms can be extruded, molded or pressed . . . drilled, ground and tapped . . . even metalized. All operations can be done to measured tolerances and very economically. You can choose from many exact formulas — comprising three basic types of materials — Steatite, Centradite, Zirconite. Steatite meets JAN-I-8 and JAN-I-10 requirements for Grade L-5 without exception.



5 PRINTED ELECTRONIC CIRCUITS ...pioneered by Centralab
...more than 25,000,000 in use

Small Plate Components

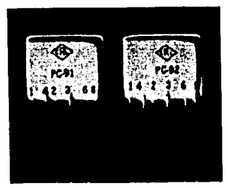
Smallest standard PEC's made by Centralab — excellent for miniature use. Immediately available. Minimum dimensions 1 7/32" x 7/32" x 7/64". Capacitors 150 v d-c w. Resistors ½ watt. Single capacitors; dual capacitors; single resistors; dual resistors — in combinations; resistor-capacitor in series; resistor-capacitors in parallel. "Filpec," balanced diode load filter — has two capacitors and one resistor. ...offers a new approach to radio and TV manufacturing. Ask for Bulletin 42-132.





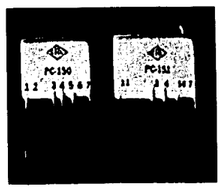
Triode Couplates®

Require only 4 soldered connections. Replace 5 components normally used in audio circuits. Are complete midget assemblies of 3 capacitors and 2 resistors bonded to a dielectric ceramic plate. Resistors — ⅛ watt; Capacitors — 400 v d-c w. Ask for Bulletin 42-127.



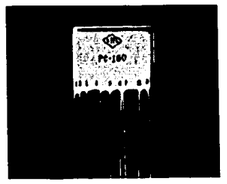
Pentode Couplates®

Require only 6 soldered connections. Completely new interstage coupling circuits of 3 capacitors and 3 resistors and a small 6-lead ceramic base. Compared with predecessors they actually reduce soldered connections 50%. Only 1 3/32" x 13/16" x 1 1/64". Three standard values available. Ask for Bulletin 42-128R.



AUDET®

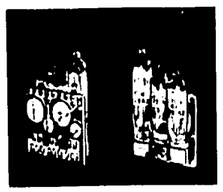
Extremely popular for miniature use. Furnish all values of all components generally found in output stage of a-c, d-c radio receivers. Provide 4 capacitors and 3 resistors — with only 7 leads. Resistors ½ watt; capacitors, 400 v d-c w. Ask for Bulletin 42-129.



PENDET*

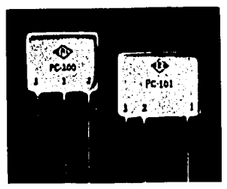
Another Centralab "first" in Printed Electronic Circuits. Consists of 5 capacitors and 4 resistors in a single plate with only 9 leads. Similar to the popular Audet. Couples the diodetriode and pentode tubes in output stage of a-c, d-c sets. Available in two standard values. Ask for Bulletin 42-149.

*Trade Mark



AMPEC®

Latest outgrowth of Centralab's constant research in PEC development. Excellent for subminiature high gain audio use. 3-stage speech amplifier smaller than cover of ordinary book matches. Size: 1 3/32" x 15/16" x 1 1/32". Capacitors, 100 v d-c w. Resistors, ½ watt. For data on Model 2 and Model 3 — ask for Bulletins 42-117R and 42-130R.



Vertical Integrators

Over 7,000,000 in use by major TV manufacturers. Assure big savings in assembly of TV vertical integrator networks. One type consists of 4 resistors and 4 capacitors brought out to 3 leads . . . reduces former 16 soldered connections to 3. Ask for Bulletin 42-126.

You can put your confidence in Centralab electronic components. Each is the result of more than 20 years' experience, research development, production and close cooperation between Centralab and leading manufacturers in the field. For complete information — including taper curves, physical dimensions, engineering, specifications, write direct, stating bulletins of interest. Or, if you prefer, contact your nearest Centralab representative. He will be glad to help you without obligation.

Centralab
ERL®

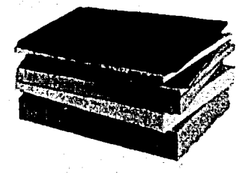
A Division of Globe-Union Inc.

900 EAST KEEFE AVENUE • MILWAUKEE, WIS.

IN CANADA, BOX 208, AJAX, ONTARIO

THE NAME TO REMEMBER . . .

CDF



ONE SOURCE FOR ALL . . .



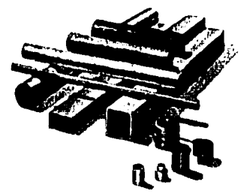
DIAMOND VULCANIZED FIBRE and VULCOID Low-cost, light weight electrical insulation of great mechanical adaptability. Fibre resists arc, can be drawn and formed. Vulcoid is an exclusive C-D-F resin-impregnated vulcanized fibre.

DILECTO LAMINATED PLASTICS

Sheets, tubes, rods made from a variety of base materials and resins. Laminated Dilecto is designed for your mechanical electrical application and is easily fabricated, by you or by C-D-F.

CELORON MOLDED INDUSTRIAL PRODUCTS

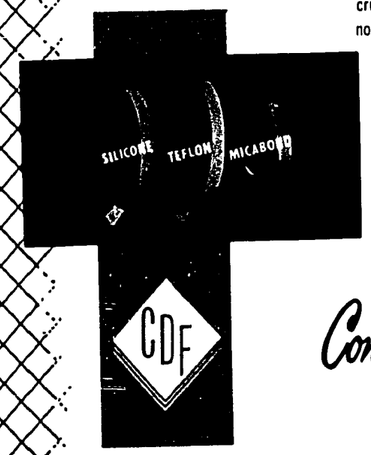
Macerated canvas or paper, skillfully molded into gears, insulators, structural parts. Sheet stock easily machined.



C-D-F SPIRAL TUBING

A complete line of round, square, rectangular kraft-paper spiral tubing for coil forms and transformers. Impregnated or plain. Stiff, sturdy, crush-resistant. Constant-torque grade now available.

MICABOND Plate, tape, segments, v-rings, fabricated parts of selected mica, the universal insulator against heat. C-D-F can help you build a better motor!



TEFLON Supported or unsupported sheets, tapes, specialties . . . developed by C-D-F from duPont's tetrafluorethylene resin. Resistant to high heat, corrosives, arc, moisture.

C-D-F INSULATING TAPES A complete line of high-heat, dielectric strength tapes including Silicone varnished fiberglas and rubber fiberglas, Teflon, Mylar Micabond combinations.

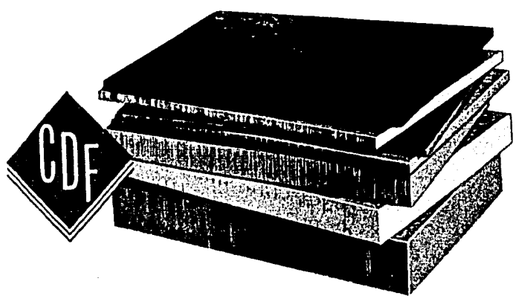
Continental-Diamond Fibre Company

NEWARK, DELAWARE, U.S.A.

C F–54

LOW COST | HIGH STRENGTH

DIAMOND VULCANIZED | FIBRE



C-D-F first made Vulcanized Fibre in 1895, today is a recognized leader in its widespread development. Fibre is made from pure cotton rag paper, chemically treated so that the fibres adhere completely and form a permanently solid mass. The finished sheets have a bonelike consistency, are tough, hard and smooth.

Vulcanized Fibre is an inexpensive, lightweight, electrical insulator of great mechanical adaptability. This hard, dense, bonelike material is tough, resilient and strong. Its great physical strength, high dielectric strength coupled with arc resistance, arc quenching characteristics and adaptability to machining and forming operations have found for it many applications in modern industry.

Machining and punching of Fibre are economical operations. Many C-D-F grades may be readily drawn and formed into a variety of shapes. Repeated moistening and drying during fabrication does not alter the nature or quality of the material.

3 IMPORTANT SHEET GRADES WITH GOOD INSULATING QUALITIES

BONE A high density (1.40 specific gravity) hard material used for intricately machined parts where dimensional changes must be minimized. Has high mechanical strength, resistance to wear and compressibility. Used in clutch discs, gears, slot sticks, rubbing blocks and for famous C-D-F Railroad Track Insulation.

Thickness	Sheet Sizes
1/32 to 3/16"	46" x 70"
over 3/16 to 3/8"	48" x 80"

Color: Gray

COMMERCIAL A tough, pliable, strong material for general use. Has medium density, with good mechanical properties and high dielectric strength under dry conditions along with excellent punching and machining characteristics. One of the strongest materials per unit weight known, this fibre can be used and formed into thousands of low-cost, dependable parts.

Thickness	Sheet Sizes
.004 to 2"	48" x 84"

Colors: Red, gray, black.

DIAMOND INSULATION A hard-surfaced fish paper for armature slot and field coil insulation. Easy to bend, form, punch. Made with extra strong fibres, this insulation has high dielectric strength, will stand extreme bending without cracking. Free from metal. Rolls and ribbon rolls for automatic machines made up to 1/32" thick in various widths to order.

Thickness	Sheet Sizes
.004 to 1/8"	48" x 84"

Color: Gray

3 FIBRE SPECIALTIES WITH LONG LIFE AND SUPERIOR VALUES

FIBRE TUBING is a strong, high density material of approximate Bone quality. Excellent machining, forming, spinning qualities. Used as lead cord plug insulators, fuse tube housings and liners, bushings, grommets, and for many screw machine specialties.
Standard lengths: 22 to 36"
ID: 1/8 to 4 3/8"
60" lengths with ID of 5/8 to 2", made in quantities.
Wall Thicknesses: 1/32 to 1/4". Over 1/4 to 1/2" made by telescoping process.
Colors: Red, gray, black.

FIBRE RODS are lathe-turned from sheet stock bars. Machined surfaces on edges are not as smooth as fibre tubing. Used for screw machine specialties, insulating handles, spacers.
Diameters to 1/2" supplied in Bone. Gray.
Diameters to 2" supplied in Commercial.
Colors: Red, gray, black.
Random lengths 60 to 72" in diameters 1/8 to 1".
36 to 72" in diameters 1 to 2".

RECEPTACLES Vulcanized fibre weighs half that of aluminum and provides an ideal material for the construction of sturdy, long-lasting materials handling equipment with a minimum of dead weight. C-D-F fibre is smooth, oil and grease proof; it will not crack or shatter under heavy impacts. Get trucks, trays, boxes, baskets, roving cans, barrels from C-D-F. Write for Vulcanized Fibre Receptacle catalog showing complete line.

	Thickness	Size	Colors
ABRASIVE: Medium density fibre with high tensile and tear strength. Excellent glue penetration. This tough, flexible, C-D-F fibre is widely used for abrasive discs.	.010 to .040"	47 to 52" wide, in rolls up to 1,000 lbs.	Blue, chocolate, gray, olive, and combinations
BOBBINS: A dense, hard, high impact product with excellent machining properties. Used for bobbin spool heads.	1/8 to 3/8"	45 to 50" wide, 84" long	Black, gray, red
FLEXIBLE: Medium density, flexible (glycerine or glycol plasticized) fibre produced in varying degrees of flexibility. Used for all types of washers, last tops, gaskets.	1/32 to 1/4"	48 to 54" wide, 84" long	Black, gray, red
FORMING: Medium density, lightly calendered fibre with mechanical and electrical properties comparable to Commercial, but with outstanding forming quality, high impact strength. Used for forming welders' helmets, athletic equipment.	.045 to 3/32"	46 to 52" wide, 84" long	Black, gray, red
PATTERN: Low density, smooth but very lightly calendered fibre tending to remain relatively flat. Used for patterns.	1/16 to 3/64"	48 to 54" wide, 84" long	Red
RUBBER BACKING: Low density, porous, uncalendered fibre with good flexibility and tear resistance. May be laminated to rubber for heel backing, etc.	.010"	54" wide rolls or 84" long sheets	Black, tan, white
SHUTTLE: Medium density, high ply adhesion fibre with excellent mechanical properties and good abrasion resistance. Suitable for surfacing wood shuttles and similar parts.	3/32 to 7/64"	48" wide 84" long	Black, gray, red
3 BT: Medium density bright, clean grade that may be formed. Used for spoons, forks, instrument parts and similar sanitary requirements.	.005 to 1/16"	50" wide 84" long or in rolls	High white
TAG: Medium density exceptionally smooth, clean fibre tag stock that may be written on with ink or printed. Will not feather.	.005 to .020"	50" wide 84" long or in rolls	High white
TRUNK AND CASE: Medium density, tough, high mechanical strength fibre with good bending, punching, piercing qualities. Surface adaptable to varnishing and lacquering. Smooth or embossed grain finishes. Used for trunks, suitcases, laundry cases, box and truck sidings.	.015 to 1/8"	47 to 52" wide, 84" long	Black, chocolate, light granite, gray, mahogany, olive red, russet, walnut
BUILT-UP: A laminated fibre that is well bonded under heat and pressure. Various grades of fibre may be used in the build-up. It has less tendency to warp, better dimensional stability than regular fibre of the same thickness.	3/8 to 2" 2 to 4 1/4"	39 x 46" 11 x 11"	Black, gray, red

Property	Sheet thickness, tube wall or rod diameter	SHEETS Bone CW	SHEETS Bone LW	SHEETS Commercial CW	SHEETS Commercial LW	TUBES	RODS Bone	RODS Commercial
Tensile Strength	Up to 1/8"	6500	8500	6000	8000	6500	8500	8000
	Over 1/8 to 1/2	6000	8000	5500	7500	6500	8000	7500
	Over 1/2	....	....	5000	7000	6500	....	7000
Flexural Strength	Up to 1/2"	13,000	15,000	12,000	14,000		15,000	14,000
	Over 1/2	....	....	11,000	13,000		....	13,000
Compressive & Axial Strengths	Up to 1/8"					10,000		
	Over 1/8 to 5/16					9,000		
	All thicknesses or diameters	30,000		20,000			8,000	6,000

(max. change in weight, %)

	Bone Sheets 2 hrs.	Bone Sheets 24 hrs.	Bone Rods 2 hrs.	Bone Rods 24 hrs.	Commercial & Diamond Insulation Sheets 2 hrs.	Sheets 24 hrs.	Tubes 2 hrs.	Tubes 24 hrs.	Rods 2 hrs.	Rods 24 hrs.
1/32 to 1/16"	50	60			55	65	50	75		
1/16 to 3/16			35	75					40	80
1/8 to 1/4							20	50		
1/8 to 3/8	20	50			25	60				
1/4 to 5/16							10	25		
5/16 to 1/2			15	50					20	60
3/8 to 1/2	10	25								
3/8 to 1					15	35				
1/2 to 1									10	30
1 to 2					8	20			8	25

Thickness	Bursting Strength, psi	Tearing Strength, grams MD	Tearing Strength, grams CD	Dielectric Strength, VPM
.005"	75	100	120	200
.007	105	190	220	
.010	150	250	300	300
.015	225	375	450	250
.020	325			

Dielectric Strength, VPM	Bone & Commercial Sheets, Tubes, Rods
Up to 1/16"	175
1/16 to 1/8	150
1/8 to 3/8	100
3/8 to 1/2	50
Over 1/2	25,000

	Bone	Commercial & Diamond Insulation
Under .010"		.90
.010 to 3/32		1.15
1/32 to 1/2	1.30	
3/32 to 3/8		1.20
3/8 to 1		1.10
1 to 1 1/4		1.05
Over 1 1/4		1.01
Rockwell Hardness	R-80	R-50
Ash Content, %	All grades	
Red	7	
Gray and black	3	
Silica Content, %	.3	
Zinc Chloride, %	.2	

Standard Sizes	Sheets	Rods	Tubes
Approx. Size or Length	38" x 43" & 40" x 45"	Random Lengths about 36"	Random Lengths 22 to 36" I.D. 3/16 to 4 3/8" inc.
Thickness	1/32 to 1/8" 1/8 to 1" inc.	3/32" to 1/4" inc.	1/16 to 5/16" wall and diameter limitations: 3/32" wall over 1/4" I.D. 3/16" wall over 3/4" I.D. 1/8" wall over 3/8" I.D. 7/32" wall over 1" I.D. 5/32" wall over 7/16" I.D. 9/32" wall over 2" I.D.

PROPERTIES Property	Normal Deviation	1/32"	1/16"	1/8"	1/4"	3/8"	1/2"	5/8"	3/4"	1"	COMPARATIVE PROPERTIES Commercial Vulcanized Fibre 1/16"	Paper Base (xx) Phenolic 1/16"
Arc Resistance, seconds	± 25	110	110	110	110	110	110	110	110	110	140	4
Specific Gravity	± 10	1.35	1.35	1.35	1.35	1.30	1.30	1.20	1.20	1.10	1.25	1.35
Moisture Absorption, % 24 hrs.	± 25	35	30	15	6	5	4	4	4	4	60	.9
Tensile Strength, —MD thousands of psi. CD	± 25	13 / 8	12.5 / 7.5	12 / 7.5	11 / 7	10 / 7	9 / 6.5	8.5 / 6.5	8.5 / 6	8 / 5.5	11	12 / 10
Flexural Strength, —MD thousands of psi. CD	± 25	25 / 20	24 / 19	23 / 17	20 / 16	17 / 13	16 / 13	15 / 13	14 / 11	12 / 9	16	19 / 17
Shearing Strength, —MD thousands of psi. CD	± 20	14 / 12	14 / 12	12.5 / 11	12 / 10							
Compressive Strength, thousands of psi.	± 20	36			36						25	34
Izod Impact Strength MD (Edgewise)	± 20						1.0				2.00*	0.50*
Dielectric Strength, VPM	± 20	575	475	425	275	200	170	150	100	60	175	700

*This test value based on 1/2" thickness

VULCOID
RESIN-IMPREGNATED FIBRE

Only C-D-F supplies Vulcoid in sheets, tubes, rods, and fabricated parts. Made from Diamond Vulcanized Fibre that has been uniformly impregnated with a special resin, Vulcoid is a material approved and identified by the Underwriters' Laboratories as Class A Insulation. Natural greenish-tan in color, it is economical, easy to machine and punch. Property-wise, Vulcoid is an intermediate grade between Commercial Fibre and XX phenolic Dilecto.

USES

requiring arc resistance and mechanical strength
Contact and instrument panels, knife switch guides, arc deflector spacer bushings

requiring dielectric strength and moisture resistance
Electrical fixture insulation, wiring devices, plugs, receptacles

requiring moisture and arc resistance
Motor and transformer lead bushings and terminal blocks

LAMINATED PLASTICS

DILECTO

Dilecto, a phenol fibre manufactured by C-D-F, was developed to meet the need for a non-metallic light weight material that is moisture resistant, mechanically strong, and adaptable to all fabricating operations. Certain electrical grades have high dielectric strength, low loss factor and high insulation resistance. Other grades have high mechanical strength or superior arc resistance. Dilecto is made in numerous grades, each one with a combination of proven characteristics built into the material for the specific job.

Dilecto is a laminated material made from either paper; heavy or fine weave cotton cloth; asbestos paper, woven fabric or mat; or woven glass fabric. The base selected is coated with a synthetic resin (either phenolic, melamine, or silicone) which has first been dissolved in a solvent. Drying ovens remove the solvent and the resin-impregnated sheets are cut to size, piled to the required sheet thickness. Under heat and pressure the resin flows, cures into a homogeneous material resulting in a finished product that is infusible and insoluble.

The selection of the proper base material, the proper resin in the correct proportion, is C-D-F's job, but the end user must realize how important it is that *he* fully understands what dividend results can be gained mechanically, and electrically, and from a cost standpoint, by getting the very best C-D-F material for the project. Here is a brief yet complete listing of Dilecto sheet grades. Rod and tubing are similar to sheet stock in most properties.

X

For Mechanical Applications When Electrical Properties Are Secondary.

X-13—The highest mechanical strength of the paper base phenolic laminated materials. A general purpose grade with good impact strength, high tensile and flexural strength. Relatively non-hygroscopic and will not absorb oil. Not recommended for drilling and tapping parallel to laminations.

XK-70—A flexible grade X-13. Sheet stock used for wire wound core strips in controls.

XF—A paper base grade that can be post-formed into special shapes by reheating and molding, using inexpensive cold molds. Crepe paper base material adds greatly to formability. A substitute for formed fibre parts.

P

For Punching (Paper-based Grades).

XP-13—A fairly flexible (.015 to ¼") grade with good dielectric strength, easily cold punched up to 1/16". Dimensionally stable under normal atmospheric conditions. Not recommended for drilling and tapping parallel to laminations.

Uses: Washers, terminal boards, plug and socket bases, switch bases, panels.

XP-6—A combination of XP-13 with Diamond Insulation fish paper for superior arc resistant qualities. Known as "switch insulation".

XP-90—A stock that can be punched cold up to ⅛" thicknesses. Not as strong or moisture resistant as XP-13.

XXP-13—A paper base phenolic electrical grade with excellent punching qualities and good mechanical strength. Paper-based phenolic. Suitable except when low losses under high humidity are required. Used for washers, condenser and switch rotor and stator insulation.

XXXP-26—A hot punching grade with high insulation resistance and low dielectric losses under high humidity conditions. Green color.

XXX

For High Humidity Applications with Minimum Cold Flow.

XXX-13—A paper-based phenolic laminate with high resin content. Dimensionally stable, with excellent moisture resistance and low cold flow. Good machining qualities. High dielectric strength parallel to laminations. Used for radio frequency insulation, jack spacers, coil forms, high voltage switch gear, etc.

XXX-61—Special stock for jack spacers and other requirements where lowest cold flow is needed.

A

For Applications Requiring Resistance to Heat.

A-13—Asbestos paper bonded with a phenolic resin. Better flame resistance than cellulosic paper-based grades. Good dimensional stability under humidity. Not so good from a machining, punching, electrical standpoint. Not recommended for primary electrical insulation at commercial power frequencies for voltages in excess of 250 volts.

AA-13—Asbestos fabric bonded with phenolic resin. Better heat resistance plus greater moisture resistance, dimensional stability and impact strength than grade A-13.

FA-72—Felted asbestos mat base with phenolic resin. Better machining and punching than A-13 or AA-13. High mechanical strength with poor electrical properties.

XX

For Electrical Applications Requiring Mechanical Strength.

XX-13—A hard paper-based material, laminated with phenolic resin, possessing high dielectric strength, excellent moisture resistance, good machinability. Moderate mechanical strength makes XX grades suitable for radio and switch board panels, terminal blocks, relay insulation, coil forms, insulating support rings, bushings.

XX-26—Special grade made from high strength paper. Greater mechanical strength than XX-13.

XXHV-2—Higher dielectric strength parallel to laminations and lower 60 cycle power factor than standard grades. Used for high voltage applications, transformer tap changers and rectifier rotor insulation. At 80° C. in oil, XXHV-2 withstands 50KV for five minutes, 75KV for one minute without failure.

SPECIALTIES

LDC—A light weight fabric bonded with a maximum penetration resin. This sheet stock is recommended for greater dimensional stability under severe conditions of exposure to extremes of atmospheric temperatures and humidity. Used in pneumatic drill rotor blades, small gears, friction plates, wherever slight swelling would mar operation.

CBW—Combination black and white stock for engraved signs and name plates.

MEC-5—A medium weave staple filament nylon fabric base with stable electrical properties under high humidity. Fungus resistant. Good mechanical and impact strength. Used in radar and communications equipment.

C

For Mechanical Applications Requiring Toughness Plus Impact Strength.

C-313—Fine weave .315 canvas sheeting base.

C-813—Standard medium weave.

C-1513—Heavy weight canvas base with higher impact strength than C-313 or C-813.

CRD—Non-woven cotton fabric with random distribution. Good machining properties. Used in textile bobbin heads.

CF-1—Post-forming sheet stock. Canvas base. Non-after-glow.

C-855—Medium weave industrial gear stock.

C-1556—Heavy weight fabric base industrial gear stock.

For Chemical and Special Applications.

C-92—Special alkali resistant material with low water absorption. Used in plating tanks and oil refining equipment.

L-92—Fine weave grade fabric base with excellent machining qualities. Widely used for plating applications. Alkali resistant.

MC—Medium weave cotton fabric base, with melamine resin. Used as structural members in plating barrel tank panels. Good arc resistance.

CV-345—Fine weave fabric base. Valve stock. Used for pump valve discs or seats. Used under conditions less severe than exposure to steam, chemicals, abrasives. Widely used for paper machine parts, such as suction box covers and doctor blades.

CV-845—Same as above. Medium weave fabric base.

GB

For Applications Requiring Heat Resistance and High Mechanical Strength.

GB-112D—A fine weave continuous filament fiber glass cloth bonded with phenolic resin. High impact, tensile, flexural strengths. Excellent dimensional stability in humid surroundings. Fine machining possible. Withstands 300° F. continuous operating temperature. Uses: armature slot wedges.

GB-128D—Made with medium weave fiber glass cloth. Not recommended for threading.

GB-261D—A coarse weave staple fiber glass with a special phenolic resin. Superior electrical qualities. Material has better ply adhesion and can be threaded.

For High Heat Applications.

GB-112S—Fine weave continuous filament woven glass fabric and Silicone resin. High arc and flame resistance, low dielectric losses. Withstands 200° C. continuously or 250° C. intermittently. Recommended for high frequency applications under high humidity and arcing conditions.

GB-112M—High mechanical strength plus excellent arc and flame resistance. Melamine resin.

GB-28M—Medium weave glass fabric with melamine resin. Highest mechanical strength plus excellent arc and flame resistance. Self extinguishing.

GB-261S—Coarse weave. Same major qualities as GB-112S, with better bond strength. May be drilled parallel to laminations.

GM-PE—Glass mat filled polyester resin bonded laminate. A mechanically strong low-cost product with continuous heat resistance up to 300° F. (Class B Insulation)
Good arc resistance and non-tracking properties. Sheets only.

Diamond Dilecto—Thin layers of resin treated vulcanized fibre bonded under heat and pressure to form Diamond Dilecto. Better moisture resistance than vulcanized fibre plus high impact strength and good arc resistance.

GB-AL—Laminate made from special glass fabric base, bonded with polyester resin. Designed for high mechanical strength plus excellent ballistic properties. This is the material similar to that developed by C-D-F for the Marine Corps famed armor vests. It has civilian safety as well as military protective applications.

CE & LE

For Electrical Uses Requiring Greater Toughness than Paper-based Grades.

CE-300—Fine weave fabric base. Not recommended for primary electrical insulation at commercial power frequencies for voltages in excess of 600 volts.

CE-313—Made with a purified cotton fabric base for superior electrical qualities, this grade has high moisture resistance and dimensional stability.

CE-800—Medium weave fabric base.

CE-815—Standard CE using purified fabric. Has lower cold flow than CE-800.

LE-13—Same fabric as L-400 but with improved electrical properties and appearance. Good in moisture resistance. (See CE-300)

L

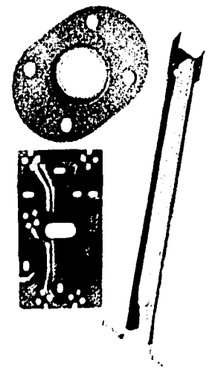
For Mechanical Applications Requiring Fine Machining.

L-400—Fine-weave cotton fabric base with phenolic binder. Suitable for small gears; machines clean and to close tolerances particularly in thicknesses under ½".

ML—Light weight fine weave cotton fabric base, with melamine resin. Better arc resistance than phenolic laminates.

LV-445—Light weight fine weave fabric base. Standard valve stock.

POST-FORMING



Certain Dilecto grades may be formed to special shapes by heating and placing in an inexpensive cold mold. Outstanding is CF-1, a canvas-based laminate which has excellent mechanical strength, abrasion resistance, and is easily machined and punched. Special chemicals in the varnish give CF-1 no apparent after-glow once an ignited specimen has been extinguished (product complies with SAE-Aeronautical Material Specification AMS-3605, latest revision).

Other Dilecto post-forming grades include XF (paper-based); GB-SF with Silicone resin, supplied in semi-cured state; MEC-1F (nylon-based).

Write for technical bulletins, samples, engineering service.

METAL CLADS

For printed circuits C-D-F is a major supplier of metal clad stock with superior bond strength between laminate and copper foil. The C-D-F adhesive used does not degrade the electrical properties of the base laminate and has high heat resistance.

Grades available with metal foil, one or both surfaces:

GRADE XXXP-24
GRADE XXXP-26
GRADE GB-112T

Other grades may be supplied having copper or aluminum foils on one or both surfaces, as required by the applications.

Some grades, except glass fabric base Silicone and Teflon laminates, may be supplied with fire resistant additive.

Write for complete Technical Bulletin, samples, test information.

DILECTO SHEETS

NEMA Grade	C-D-F Sheet Grade	U. S. Military Type—Mil-P-	Specific Gravity	Rockwell Hardness, M	Tensile Strength, thousands of psi. LW	Tensile Strength, thousands of psi. CW	Flexural Strength, thousands of psi. LW	Flexural Strength, thousands of psi. CW	Compressive Strength, thousands of psi. Flatwise	Bonding Strength, lbs.	Izod Impact Strength Notched in ft. lbs. per 1" of notch. Flatwise LW	Izod Impact Strength Notched in ft. lbs. per 1" of notch. Flatwise CW	Izod Impact Strength Notched in ft. lbs. per 1" of notch. Edgewise LW	Izod Impact Strength Notched in ft. lbs. per 1" of notch. Edgewise CW	Water Absorption, %, 24 hrs. 1/16"	Water Absorption, %, 24 hrs. 1/8"	Max. Constant Operating Temp., C.	Dielectric Strength, VPM ST	Dielectric Strength, VPM Step by Step	Perpendicular Laminations	Dissipation Factor 1 megacycle As Rec.	Dissipation Factor 1 megacycle Wet	Dielectric Constant, 1 megacycle As Rec.	Dielectric Constant, 1 megacycle Wet	Loss Factor, 1 megacycle As Rec.	Loss Factor, 1 megacycle Wet	Arc Resistance, seconds	Insulation Resistance, megohms
X	X-13		1.38	110	20	16	30	25	40	950	3.5	2.0	0.7	0.6	3.5	2.0	120	800	550	0.042			5.5		0.23		10	100
	XK-70		1.30	60	8	7	15	14	20				0.9	0.7	3.5	2.0	90	650	500	0.04			4.3		0.17			
	XF		1.35	105	9	8	14	13	32				0.95	0.85	2.4	1.6	105	450	300	0.032	0.036	4.5	4.8	0.15	0.17	8	100
P	XP-13	78-HSP	1.34	95	12	9	16	12	25				0.6	0.55	3.0	1.9	120	650	450	0.038	.042	4.6	5.2	0.17	0.22	10	100
PC	XP-90		1.34	75	11	9	12	10	22				0.65	0.6	5.0	2.6	90	650	450	0.055		5.0	3.0	0.27		7	35
XXP	XXP-13		1.33	105	12	9	15	13	26				0.5	0.45	1.55	0.95	120	700	500	0.035	.04	4.0	4.6	0.14	0.18	4	500
XXXP	XXXP-26	3115PBE-P	1.30	110	16	13	21	18	28				0.40	0.35	0.6	0.38	120	800	650	0.026	.027	4.2	4.3	0.11	0.12	10	50,000
XX	XX-13	3115-PBG	1.35	110	15	11	19	17	35	950	1.1	1.0	0.5	0.45	1.4	0.9	120	650	450	0.034	.036	4.7	4.8	0.16	0.17	4	1,000
XX	XX-26		1.35	110	22	16	32	25	42	950			0.8	0.7	1.8	1.0	120	700	500	0.038	.039	5.2	5.3	0.20	0.21	4	500
	XXHV-2		1.30	110	11	9	15	14	35	900	0.6	0.5	0.3	0.3	1.0	0.7	120	700	500	0.038	.042	5.1	5.45	0.18	0.23	4	250
XXX	XXX-13	3115-PBE	1.32	110	15	12	20	17	35	1100	0.9	0.8	0.53	0.42	0.75	0.45	120	650	450	0.034	.035	4.6	4.65	0.16	0.17	4	1,000
XXX	XXX-61		1.32	112	16	13	23	19	35	1100	0.9	0.8	0.5	0.4	1.0	0.7	120	650	450	0.034	0.035	4.6	4.65	0.16	0.17	4	10,000
A	A-13		1.70	110	11	8	17	15	40	850	1.9	1.8	.9	0.8	1.25	0.85	135	225	135							4	
AA	AA-13		1.70	105	12	9	21	17	40	2000			5.0	4.0	1.2	0.65	170	75	45							4	
	FA-72		1.60	115	21	17	36	25	45	1400	5.0	4.0	3.5	2.5	1.5	0.8	155	95	60							4	
C	C-313		1.35	105	11	9	20	17	40	2100	3.0	2.7	1.8	1.5	1.5	0.9	105	525	325	0.06		6.0		0.36		4	25
C	C-813	15035-FBG	1.35	105	11	9	20	18	39	2200	3.6	3.4	2.3	2.1	2.0	1.2	105	450	275	0.06		6.0		0.36		4	25
C	C-1513	15035-FBM	1.36	105	12	10	21	19	39	2200	4.7	4.5	3.4	3.2	1.75	1.15	105	200	120	0.10		7.0		0.7		4	25
	CRD		1.34	103	15	14	22	22	40	1400			1.7	1.6	1.6	1.5	105	450	250	0.08	0.125	5.0	5.2	0.4	0.65	4	25
	CF-1		1.35	100	10	10	22	20	32				2.2	2.0	2.5	0.8	105	500	300	0.05	0.06	5.2	5.6	0.26	0.32	4	50
C	C-855		1.35	105	11	9	20	18	39	2200	3.6	3.4	2.3	2.1	2.0	1.1	105	350	225	0.06		6.0		0.36		4	25
C	C-1556		1.36	105	12	10	22	18	39	2000	5.0	4.5	2.6	2.2	1.8	1.3	105	200	120	0.10		7.0		0.70		4	25
	C-92		1.29	105	9	7	18	15	35		2.7	2.4	1.7	1.5	1.5	1.0	105	120								4	25
	MC		1.45	110	9	7	17	15	40	2200			1.4	1.2	4.0	2.5	120	200	125							125	10
	CV-345		1.35	114	11	9	19	17	40	2000	2.4	2.3	1.5	1.4	1.4	0.8	105	550	350	0.05	0.06	5.2	5.6	0.26	0.32	4	100
	CV-845		1.35	114	11	10	19	18	40	2100	2.4	2.2	1.8	1.6	1.3	0.75	105	500	300	0.05	0.06	5.2	5.6	0.26	0.32	4	1,000
CE	CE-300		1.35	110	10	8	18	16	38	1900	2.8	2.4	1.6	1.4	1.6	1.0	105	550	350	0.05	0.06	5.2	5.6	0.26	0.32	4	100
	CE-313		1.34	110	12	10	19	17	40	2000	2.3	2.0	1.5	1.3	1.3	0.8	120	550	350	0.05	0.05	5.0	5.3	0.23	0.26	4	500
CE	CE-800		1.35	110	10	9	18	17	38	2100	2.5	2.3	1.9	1.8	1.6	1.0	105	500	300	0.05	0.058	5.2	5.6	0.26	0.32	4	100
	CE-815		1.33	112	9	8	19	17	38	1900	2.5	2.3	1.6	1.4	1.3	0.8	120	500	350	0.05	0.053	5.0	5.3	0.25	0.28	4	500
LE	LE-13	15035-FBE	1.33	110	11	9	21	18	36	2000	2.5	2.0	1.6	1.2	1.1	0.7	105	550	350	0.05	0.058	4.8	5.2	0.24	0.30	4	100
L	L-400	15035-FBI	1.36	105	12	10	23	18	37	2000	3.7	3.0	1.9	1.6	1.5	0.9	105	200	120	0.07		7.0		0.70		4	25
	L-92		1.30	110	13	8.5	21	17	35				1.3	1.0	1.3	0.8	105	160								4	15
	ML		1.50	115	19	11	26	16	44	1800			0.6	0.55	2.4	1.6	120	500	350	0.04	0.05	7.3	8.0	0.29	0.40	140	100
	LV-445		1.34	114	12	10	22	18	39	1900	2.4	1.9	1.5	1.1	1.2	0.8	105	550	350	0.053	0.058	4.8	5.2	0.25	0.30	4	100
G-3	GB-112D		1.65	105	25	22	24	20	50	1100	11.0	8.0	8.5	7.0	2.0	1.5	140	700	600	0.018		5.0		0.09		4	5,000
G1-G2	GB-261D		1.55	105	16	11	22	19	40	1300	9.0	7.0	7.5	6.5	1.0	0.5	135	440	360	0.01	0.019	4.2	4.3	0.04	0.08	4	10,000
G-7	GB-112S	997-GSG	1.68	100	27	22	30	27	45	900	2.5	2.4	1.0	9.5	0.27	0.20	200	400	350	0.001	0.004	3.4	3.7	0.004	0.015	255	10,000
	GB-112M		1.90	120	34	25	40	35	50				9.0	7.5	2.0	1.5	175	650	500	0.016		7.3		0.12		190	50
G-5	GB-28M	15037GMG	1.95	120	37	30	48	40	70	1700	15.	14.0	10.0	8.0	1.7	1.2	175	500	350	0.012	0.07	7.2	8.0	0.09	0.56	195	50
G-6	GB-261S	997GSG	1.70	100	20	15	24	20	40	1100			9.5	8.0	0.35	0.2	200	200	185	0.002	0.009	3.7	4.0	0.008	0.04	275	2,000
	GM-PE		1.75	100	22	20	35	25	46	900	20.0	17.0	16.0	14.0	0.60	0.40	150	360	300	0.015	0.06	5.0	5.5	0.07	0.33	150	5,000
	LDC		1.35	107	15	11	22	16	40	2000	2.5	2.0	1.5	1.0	0.9	0.6	105	450	300	0.05	0.053	4.8	5.0	0.24	0.26	4	100
	CBW	78-NDP	1.40	100	15	12	22	19	38						0.95	0.65											
N-1	MEC-5	15047NPG	1.16	110	9	8	12	10	40	1300	6.0	5.0	3.5	2.5	0.32	0.17	75	400	350	0.036	0.039	3.7	3.9	0.13	0.15	7	500,000
	Diamond Dilecto		1.40	90	15	9	24	20	38	1100	10.	9.0	2.7	2.0		11.0		500	380	0.055		6.0		0.33		100	

NOTES: Tests were conducted in accord with American Society for Testing Materials Methods for Sheet Electrical Insulation. All values shown are averages and should be used for comparison purposes only.

Flatwise impact test and bonding strength values are based on ½" thick material. All other tests are based on ⅛" thick material except where indicated.

Wet power, dielectric constant and loss factor values are based on samples immersed in fresh water for 24 hours at 25°C. Insulation Resistance values were based on samples conditioned for 96 hours at 90% relative humidity at 35°C. Dielectric Strength tests were made flatwise on 1/16" material at 60 cycles under oil. ST = Short-Time ASTM Test. For detailed specifications refer to publications of National Electrical Manufacturers Association which will be furnished on request.

SHEET SIZES

With the exceptions noted, all grades of Dilecto can be made at the following C-D-F plants in the sheet sizes indicated:

C-D-F Bridgeport, Pa. (B)
39 x 46"
46 x 70"

C-D-F Newark, Del. (N)
38 x 38" 38 x 42"

C-D-F Valparaiso, Ind. (V)
38 x 42" 38 x 96" 48 x 48"

Exceptions: Bridgeport: Grades LE-13, L-400, and other fine weave cotton fabric base grades are not available in sheet widths exceeding 39".

Newark: Grade A-13 is available only in 36 x 36" sheet sizes.

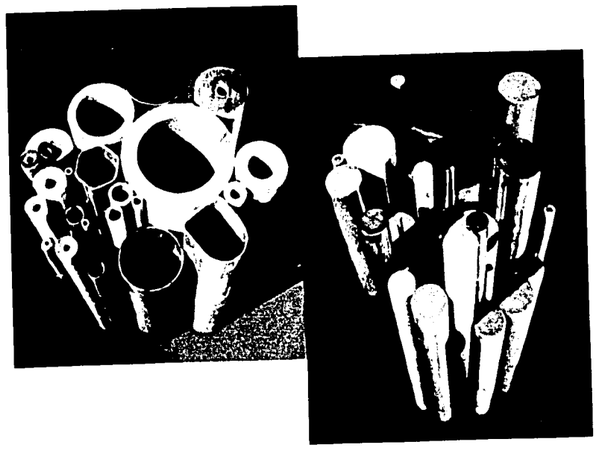
These are standard sizes regularly in production. Consult us about special orders.

GRADE	THICKNESS	COLOR	PLANT SUPPLYING
X-13	.010-2	Black, Natural, Black with natural core	B-N-V
XK-70	.010-¼	Natural	N-V
XF	.025-¼	Black, Natural	N
XP-13	.010-¼	Black, Natural, Chocolate with natural core	B-N-V
XP-90	.010-¼	Natural	N
XXP-13	.015-¼	Black, Natural, Chocolate with natural core	B-N-V
XXXP-26	.015-¼	Natural Green	N-V
XX-13	.010-2	Black, Natural*	B-N-V
XX-26	.015-2	Natural Green	N
XXHV-2	.015-2	Natural	N
XXX-13	.015-2	Black, Natural*	B-N-V
XXX-61	.015-2	Natural	N
A-13	.025-2	Natural	B-N-V
AA-13	1/16-2	Natural	B-N-V
FA-72	.025-2	Natural	N
C-313	.015-2	Black, Natural	B-N-V
C-813	1/32-10	Black, Natural*	B-N-V
C-1513	1/32-10	Natural	N
CRD	.015-2	Black, Green, Natural, Red	N
CF-1	1/32-¼	Natural	N-V
C-855	1/32-⅜	Natural	B
C-1556	over ⅜-10	Natural	B
C-92	1/32-2	Natural	N
MC	.025-2	Ivory	N
CV-345	.015-2	Natural	N
CV-845	1/32-2	Natural	B-N-V
CE-300	.015-2	Black, Natural	B-N-V
CE-313	.015-2	Natural	B-N
CE-800	1/32-2	Black, Natural	B-N-V
CE-815	1/32-2	Natural	N
LE-13	.015-2	Black, Natural*	B-N-V
L-400	.015-2	Black, Natural*	B-N-V
L-92	.015-2	Natural	N
ML	.015-2	Ivory	N
LV-445	.015-2	Black, Natural	N-V
GB-112D**	.010-.025	Natural	N
GB-261D	1/32-2	Natural	N
GB-112S	.010-2	Natural Ivory to Cream	N
GB-112M	.010-1	Natural Grayish White	N
GB-28M	.015-3½	Natural Grayish White	N
GB-261S	1/16-½	Natural Ivory to Cream	N
GM-PE	1/32-1	Natural	N
LDC	.015-2	Natural	N
CBW	1/32-¼	Black, white core	N
MEC-5	.010-1	Natural	N
Diamond Dilecto	1/16-2	Gray	B

* Natural is only color supplied for U. S. Military Type grades.

** Heavier thicknesses of glass base phenolic laminates are available in grade GB-28D. Consult Newark Sales Office.

DILECTO TUBES - RODS



TUBES AND RODS

Dilecto tubing finds wide usage in the radio and electrical equipment field because of its excellent insulating and mechanical properties. Impregnated paper or fabric is rolled on a mandrel between heated pressure rolls, then either oven baked or press cured in a heated mold to set up the resin.

MOLDED TUBING is dense and homogenous because of the heat and pressure applied throughout the molding operation. The hard smooth surface is easily machined and remains unaffected by excessive humidity. Dimensionally stable, C-D-F molded tubing has a low loss factor.

ROLLED TUBING is wound with the application of heat and pressure, but the final cure is effected with heat only. Because of the absence of mold seams it has even better dielectric strength than molded tubing. The high mechanical strength of rolled tubing permits its use for piping chemicals and gases when inside pressures are high.

RODS are made by rolling impregnated paper or fabric on mandrels, removing the mandrels and molding the material in hydraulic presses. Rods are also available from turned sheet stock.

	MOLDED TUBES Lengths approx. 18 to 144"				ROLLED TUBES Lengths approx. 18 to 96"*			MOLDED RODS
Grade	Corres. Sheet Grade	Min. Wall	ID	OD	Min. Wall	ID	OD	approx. 38 to 46" OD
X-79	X-13	1/16	⅛-9	¼-9½	.015	1/16-48	3/32-50	Not Made
XX-79	XX-13	1/16	⅛-9	¼-9½	.015	1/16-48	3/32-50	⅛-2
A-79	A-13	1/16	3/16-9	5/16-9½	1/16	3/16-48	5/16-50	¼-2
AA-79	AA-13	¼	⅛-9	⅝-9½	⅛	1-48	1¼-50	½-2
FA-72	FA-72	1/16	5/16-9	5/16-9½		Not Made		¼-2
CE-379	CE-800	1/16	¼-9	⅜-9½	1/16	¾-48	½-50	¼-4
CE-879								
L-79	L-400	1/32	⅛-9	3/16-9½	1/32	3/16-48	¼-50	3/16-4
LE-79	LE-13	1/32	⅛-9	3/16-9½	1/32	3/16-48	¼-50	3/16-4
LDC	LDC	1/32	⅛-9	3/16-9½		Not Made		3/16-4
GB-128D	GB-128D	1/16	⅛-9	⅜-9½	1/16	⅜-9	½-11	¼-2
GB-261D	GB-261D	⅛	⅛-9	⅜-9½		Not Made		½-2
GB-112M	GB-112M	1/32	3/16-9	¼-9½	1/32	⅜-48	¼-48	3/16-1
GB-112S	GB-112S		Not Made		.015	0.10-6	0.13-7	⅛-2**
GB-28M	GB-28M	1/16	¼-9	⅜-9½	1/16	⅜-48	½-50	¼-2
Diamond Dilecto	Diamond Dilecto		Not Made		1/16	1-10½	1⅛-11½	Not Made
MEC-5	MEC-5	1/32	⅛-4	3/16-5	.015"	3/16-10	7/32-11	3/16-2

*Rolled tubes with ID under ⅛" are supplied in lengths from 16 to 18".
**Available only in rods machined from sheet stock.

Above are representative grades of Dilecto tubing and rod. Since these and other C-D-F sheet grades are often available in a variety of forms and fabricated parts, write for complete Dilecto catalog.

ROLLED DILECTO TUBING WITH A DIAMOND FIBRE LINER

"Canite" combination tubing protects electric circuits and transmission lines from damage by current overload and line faults, gives high dielectric strength with sufficient strength to withstand impact shock from pressure developed by electric discharge. Weather and moisture resistant; are resistant and are quenching.

Naturally, skill is required to bond the Diamond Vulcanized Fibre liner to the rolled laminated Dilecto outer shell and Continental-Diamond Fibre's experience in manufacturing both materials results in an exceptional combination product. If you need a material like this combining certain electrical and mechanical properties, consult your C-D-F sales engineer. Write C-D-F, Newark, giving application and requirements.

SPIRAL TUBING

PAPER TUBES • FORMED AND NOTCHED

A high strength plastic made from paper or fibre that is spirally wound, available as plain untreated tubing, or impregnated with phenolic resin or insulating varnishes, and carefully cured at high temperatures. It can be used to replace rolled or molded laminated phenolics with the properties of Spiral Tubing often satisfactory enough to effect considerable cost savings. Small sizes and very thin walls are not a special problem. Excellent moisture resistance and dimensional stability for many applications. Write for 8-page Technical Folder ST-53.



PAPER → **SPIRALLY WOUND** → **THEN IMPREGNATED** → **AND CURED** → **PLUS FABRICATION AND INSPECTION**

Special kraft papers are first selected for chemical purity . . . freedom from metal. Diamond Insulation (made with extra strong fibres), chipboard, etc., can also be used.

Adhesives and proper paper tension now combine to give C-D-F Spiral Tubing its unique strength with a minimum of paper gap!

The finest electrical grades of phenolic resins are used. Controlled by C-D-F technicians, tube impregnation gives uniform electrical and machining properties.

Electronic regulators control the heat and time spent by the Spiral Tubing in C-D-F's huge ovens.

C-D-F's modern shops, staffed with top-notch machinists and inspectors, result in few rejects, greater precision, close adherence to tolerances.

GRADES

IMPREGNATED

1. General Electrical and Mechanical. Hard, rigid, round tubing for coil forms. Suitable for riveting if hole is punched or drilled.
1A. General Electrical and Mechanical with special punching qualities. Round.
2. Mild Stapling, Riveting, Forming. Medium hard round tubing that may be notched and formed by customer.
2A. Intermediate Fabricating and Stapling. Medium hard round tubing which has good resistance to moisture and action of solvents. Used in paint rollers.
3. Severe Stapling, Riveting and Forming. A softer tube for difficult fabricating. Readily notched or formed. Round.
5. Constant Torque and Formed and Notched. Formed and notched tubing, custom fabricated by C-D-F for use in coil forms with threaded iron tuning core. Tubing is threaded internally; three point contact with core prevents binding. Write for samples.
6. Special High Humidity. Hard, rigid tube with improved moisture resistance. Has better dimensional stability and rigidity in thin wall sizes.
6A. High-Strength Mechanical and Electrical. Very hard round tube with lowest water absorption under immersion conditions. High axial and radial compressive strength; used for bushings.
7. Soft Tubing. Very soft, varnished kraft round, square, rectangular tubing for coil forms.
7A. Hard, Rigid Rectangular Tubing. Similar to harder round tube grades in moisture resistance and dimensional stability. Rectangular and square.
8. Varnished Diamond Insulation. Used in television coil forms. Round.
9. "Deflection Coil" tubing. Soft, round tube for large size coil forms.
10. Mechanical Purpose. Large diameter, heavy wall round tubing. Phenolic resin impregnated.

UNIMPREGNATED

20. Special Wound. Round, square, or rectangular unimpregnated tubing to customer's B/P with any thickness, arrangement or number of plies. Wide choice of materials.
21. Plain Kraft. Round, rectangular, square.
22. Plain Diamond Insulation round tubing.
23. Plain Chipboard large-size round tubing.

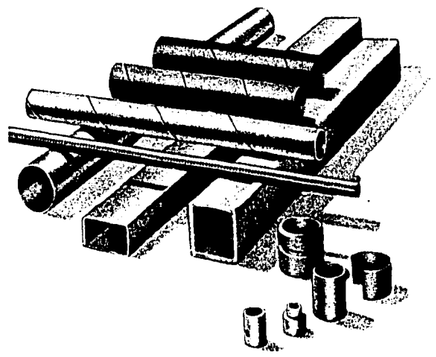
ROUND STANDARD SIZE RANGES

GRADES	INSIDE DIAMETER—"	WALL THICKNESS—"
1, 2, 2A, 3, 6, 21	3/32 to 8	.0075 to 1/8
1A	3/32 to 8	.0075 to 1/16
5	3/32 to 8	.0075 to 1/16
6A	3/32 to 1/8 1/8 to 3/16 3/16 to 1 1 to 3 Over 3" to 8"	.020 to 1/16 1/32 to 3/32 1/32 to 1/8 3/64 to 1/8 1/16 to 1/8
7	3/32 to 8	.0075 to 1/8
8 and 22	3/32 to 1/4 Over 1/4 to 1/2 Over 1/2 to 1 Over 1 to 8	.008 to .015 .008 to .020 .008 to 1/32 Up to 3/61
9	3/32 to 8	.0075 to 1/8
10 and 23	1/4 to 8	1/32 to 1/4
20	Information furnished on request.	

RECTANGULAR AND SQUARE *

7, 7A, 21	5/16 x 5/16 to 2 1/8 x 2 1/8	.010 to 3/32
20	Information furnished on request.	

*Radius at inside corners—1/64 to 1/32



STANDARD LENGTHS: 24 to 48", with the exception of Grade 5 furnished in 15" lengths. The above size ranges are given for routine ordering purposes. Spiral Tubing is furnished in the standard lengths indicated or in cut to size or fabricated pieces. Other sizes or longer lengths can frequently be furnished on request.

PROPERTIES

Impregnated Grades in wall thicknesses from 1/64" to 1/8".

GRADE	Water Absorption (immersion),% ASTM D-348-46 D_1-24/23* E-1/105*	Moisture Absorption % C-48/46/95*	Axial Compressive Strength psi ASTM D-348-46	Dielectric Strength Short Time, Volts Per Mil ASTM D-149 For Wall Thicknesses 1/8	1/16	1/32	1/64	Arc Resistance Sec. ASTM D-495-48T Minimum	Dielectric Loss Properties 10⁶ Cycles ASTM D-150 Average Dissipation Factor	Dielectric Constant
1	15-25	3-6	5000- 8000	80-130	130-175	175-250	250-350	5	.026	3.1
1A	15-25	3-6	5000- 8000	—	130-175	175-250	250-350	5	.026	3.0
2	15-25	3-6	4000- 7000	—	130-170	170-250	250-350	5	.026	2.9
2A	10-20	3-6	4000- 7000	—	135-175	175-250	—	5	.024	3.0
3	15-30	3-6	4000- 7000	—	130-175	175-250	250-350	5	.028	3.0
5	20-35	3-6	3000- 6000	—	—	—	250-350	5	—	—
6	10-20	2-5	5000- 9000	80-130	130-175	150-250	250-350	5	027	3.3
6A	3-13	2-4	9000-14000	100-150	150-200	200-300	—	5	.027	3.1
7	50-80	5-8	2000- 4000	—	—	175-250	250-300	10	.037	3.5
7A	15-25	4-7	2000- 5000	—	—	175-250	250-350	5	.028	3.9
8	50-80	4-8	2500- 4500	—	—	—	250-350	15	.050	5.9
9	—	3-7	2000- 4000	—	130-170	150-225	—	10	.035	3.5
10	—	3-7	2000- 4000	—	—	—	—	—	—	—

*D_1-24/23 (24 hr. immersion at 23° C.) E-1/105 (preconditioned 1 hr. at 105° C.) C-48/46/95 (48 hr., 115° F. 95% Relative Humidity)

SHEETS • TAPES • SPECIALTIES OF TEFLON*

*duPont trademark for tetrafluoroethylene resin

C-D-F molds, machines and processes Teflon into forms you need . . . tapes, sheets, metal-clads, diaphragm stock, gaskets, packing, release material.

A study of Teflon properties shows that this high strength plastic always deserves consideration where heat and moisture resistance plus low dielectric losses must be obtained. Write for 8-page Technical Folder T-52 with samples.

SHEETS Two classes are available: *Unsupported* or pure Teflon Sheet. Fiber glass cloth *supported* sheet with Teflon applied by dispersion, then dried and fused at elevated temperatures. Laminated glass supported sheets have greater mechanical strength while retaining low dielectric loss properties.

Weight — 12.8 cubic inches per pound.

SHEET SIZES (Approx.)*

Thickness Range	Unsupported	Glass Supported
0.008 to 5/8" inc. 0.002 to 1/16" inc.	up to 12" wide in sheets or rolls 24 x 24" 48 x 24" 48 x 48"	16 x 36"
1/16 to 1"		

*Other sizes to order.

TEFLON TYPICAL PROPERTY VALUES COMPARED WITH OTHER C-D-F GLASS-BASED LAMINATES

		TEFLON (Unsupported)	TEFLON (GB-112T)	DILECTO GB-112S (Silicone base)	DILECTO GB-28M (Melamine base)	DILECTO GB-112D (Phenolic base)
Dissipation Factor, 1 megacycle		.0005	.0007	.001	.012	.018
Dielectric Constant, dry, 1 megacycle		1.90	2.60	3.4	7.2	5
Loss Factor, 1 megacycle		.001	.002	.004	.090	.090
Dielectric Strength, Perpendicular to Laminations (1/32" thick) VPM	Short time	900	700	450	500	700
	Step by step	800	500	400	350	600
Arc Resistance, Seconds		250*	160*	225	195	4
Maximum Constant Operating Temp. C°.		250	250	200	175	140
Flexural Strength (Thousands of psi)	Lengthwise		13	30	48	24
	Crosswise		11	27	40	20
Water Absorption, %, 24 hours (1/16" thick)		Negligible	.03	.20	1.7	2.

*Will not form complete conducting path. Arc continues indefinitely but material gradually erodes away on full time continuous arc.

TAPES. For heavy duty, high heat cable and motor insulation. See back cover.

METAL-CLAD STOCK. For printed circuits that must withstand over 300° F. for extended periods. A special C-D-F bonding process results in higher bond strength, 5 to 9 lb. per inch of width.

OUTSTANDING PROPERTIES OF C-D-F TEFLON INSULATION



HEAT RESISTANCE

Due to the non-flammability and high heat resistance of Teflon, it easily meets both Class B and Class H, AIEE standards for maximum hot spot insulation temperature. Teflon coated glass fabric laminates withstand 250°C. continuously and up to 300°C. intermittently. One factor which influences the heat resistance of Teflon is that there is no apparent degradation from oxygen, which has a definite degrading effect on silicone materials.



ELECTRICAL

The dissipation factor and dielectric constant of Teflon laminates are both extremely low over a wide frequency range. From 60 to 100 megacycles, the dissipation factor range is between .005 to .0005 and the dielectric constant ranges from 2.8 to 2.5 when measured in a field perpendicular to laminations. As corona will slightly degrade Teflon, care should be taken in designing parts used at voltages over 2500. Sharp corners, and other contributing factors to corona should be avoided.



MOISTURE RESISTANCE

A Teflon laminate has practically zero water absorption and its electrical properties are little affected after long exposure to high humidity. Teflon is unaffected by fungus and temperature changes. Not only has it lower moisture absorption than any other laminate known, but it tends to repel water . . . retaining high surface insulation properties even under extremely humid conditions.

Celoron

CANVAS or PAPER-BASED MACERATED MOLDED INDUSTRIAL PLASTICS

C-D-F pioneered in molded industrial plastics, developed the famous Celoron timing gears for the automotive industry. Celoron is unaffected by rapid temperature changes, may be used continuously at 225 to 250° F. It has high impact strength, excellent resistance to heat, oil and water, many chemicals.

Typical Property Values

	Laminated Sheet Celoron (C-813)	*Molded Celoron (CFI-20)*
Specific Gravity	1.35	1.35
Rockwell Hardness, M scale	110	105
Tensile Strength, psi	10,000	6,500
Flexural Strength, psi	20,000	10,000
Compression Strength, psi	38,000	25,000
Shearing Strength, psi	12,000	8,500
Impact Strength, flatwise	4.0	2.3
Water Absorption, % 24 hrs.	1.25	1.25
Coefficient of Thermal Expansion, °C	2.5 x 10⁻⁵	2.5 x 10⁻⁵
Dielectric Strength, VPM—Short time (¼")	200	200

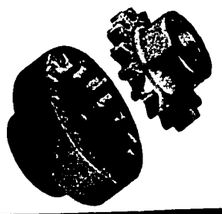
All values given are average values and should not be used for specification purposes.

SHEETS

From laminated stock, fabric-based phenolic impregnated Celoron can be furnished in sheets, cut pieces, blanks and rings machined from sheet stock. For gear applications (idler and spur gears, and cams), it is normally identified by two black lines. See Dilecto C grades for mechanical applications requiring toughness plus impact strength.

MOLDED

Celoron can be molded to close tolerances for both mechanical and electrical applications. Rugged, dimensionally stable, readily machined, Celoron is a dependable material; remember C-D-F has both the men and equipment to handle "big run" molding requirements. Colors: Golden mottled brown or black.



COUPLINGS

Flexible coupling molded from Celoron. Outside surface is smooth, every tooth is capable of carrying heavy loads. Low cost, resists repeated impacts. A good example of Celoron's strength and versatility.



GEARS

All these gears are Celoron which finds wide usage in textile and printing machinery. Build silence into your product with Celoron gears. Write for Celoron catalog with horsepower ratings.



INSULATION

This diesel contact controller drum assembly uses two C-D-F products: Celoron drum body, drilled and broached. Diamond Vulcanized Fibre between the brass contact plate.

BUILD A BETTER MOTOR
MICABOND

TAPES
PLATE
TUBING
SEGMENTS
"V" RINGS

C-D-F, expert in insulation, uses superior grades of mica, places it for complete leak-proof coverage, and applies strong, pliable electrical insulating binders. Micabond Tapes are hand laid; flexible sheets are both hand and machine laid; both retain their electrical insulating properties at elevated temperatures.

ALWAYS SPECIFY MICABOND but talk over your insulation requirements with your C-D-F sales engineer. To build a better motor, to get more insulation value, put C-D-F experience to work for you. America's largest users of mica products rely on C-D-F. Micabond Catalog, samples of Micabond materials, technical aid, all are yours on request.



TAPES

GRADE

20 **Paper both sides**
Made of selected India Mica splittings, all edges overlapped, faced on each side with strong, tough tissue paper. Flexible binder will not dry out under ordinary conditions.
Thickness .005"
.007"
¾" wide x 150' x .005" thick—.25 lb.

21 **Cotton cloth one side, paper one side**
Large India Mica splittings, bonded with flexible binder. Faced on one side with thin cotton insulation cloth, and tissue paper on other side. High tensile strength. Good tear resistance. Use where moderate high voltages are encountered, where space is not limited.
Thickness .006"
.008"
¾" wide x 150' x .006" thick—.31 lb.

22 **Cellophane both sides**
Large India Mica splittings are faced on both sides with .001 thick moisture-proof cellophane. Unusually high tensile and dielectric strengths. Not quite so pliable.
Thickness .005"
.007"
¾" wide x 150' x .005" thick— .6 lb.

24 **Silk one side, paper one side**
Large India Mica splittings, bonded with flexible insulating cement. Faced with .001" silk, with tough tissue paper on other side. Silk gives tape good tensile and tear strength. Good dielectrically, this tape meets all normal requirements.
Thickness .005"
.007"
¾" wide x 100' x .005" thick—.25 lb.

28 **Silk both sides**
Large book-form India Mica splittings, bonded with flexible, non-slipping binder. Thin silk is used for facing on both sides. High tensile strength. Fine tear resistance. Excellent dielectric strength. The ideal tape for ease of application . . . use where space is limited.
Thickness .005"
.007"
¾" wide x 100' x .005" thick—.23 lb.

SILICONE BOND **Fiberglas cloth one or both sides**
Class H insulation. This inorganic tape withstands temperatures 50°C.-75°C. higher than organic bonded material.
Fiberglas one side: .035, .004, .005, .006" and up.
Fiberglas both sides: .007" and up.

TUBING

Micabond can be made round, square, hexagonal, oval, etc. Diameters range from ⅛" ID to 24" ID in practically all wall thicknesses. Lengths are 12", 18", 24" and 36" depending on wall thickness and ID.

GRADES

100% Micabond
95% Micabond— 5% Paper
80% Micabond—20% Paper
50% Micabond—50% Paper
50% Micabond—50% Asbestos

TOLERANCES

ID up to 2" + .015" / —.000"
ID 2" to 4" + .020" / —.000"
OD up to 2½" ± .015"
OD 2½" to 4½" ± .020"

SEGMENTS

Either Amber or India, may be punched or sawed, depending on dimensions and thickness as well as quantity. These four styles cover 95% of segments in use today:

Sawed or sheared except in smallest sizes.

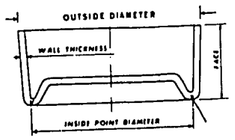
Rectangle with riser at either end. Punched in small sizes.

Very popular design, without riser. Smaller sizes must be punched.

With riser. Smaller sizes must be punched.

"V" RINGS

C-D-F punched "V" rings are reinforced with accurately centered discs which are formed into the taper, giving unusual mechanical and dielectric strength. Larger rings are molded in forms and set under heat and pressure. C-D-F Micabond rings are made in countless sizes and styles. For prices, send us a working drawing with all dimensions.



TOLERANCES

Nominal Thickness	Variation in Average of 10 Measurements	Variation in Individual Measurements
Up to .005"	±.001"	±.002"
0.005" and up	±.002"	±.003"

STANDARD LENGTH ROLLS
.0035 through .005"—150'
.006 through .009"—100'
.010" and over —50'

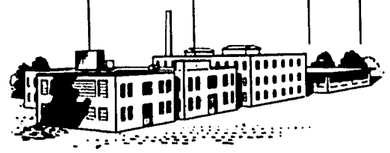
All tapes are shipped twelve ¾" rolls to a package, or their equivalent in piled height.

TOLERANCES FOR MICABOND "V" RINGS

	Up to 1"	1" up to 3"	3" up to 7"	7" up to 20"
OD—large end	±.003	±.005	±.007	±.009
Height (vertical)	+.010 —.000	+.015 —.000	+.025 —.000	+.032 —.000
Wall thickness	±.003	±.005	±.007	±.009

MICABOND PLATE

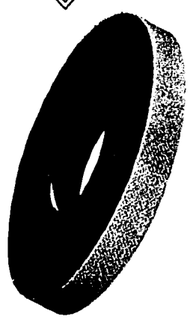
	Thickness (inches)		Max. Bond Content	Nominal Thickness	Average Thickness Tolerance	Max. Thickness Tol. in one plate or roll	Average Dielectric Strength, VPM: Short-time	Average Dielectric Strength, VPM: Step-by-step
101 INDIA MOLDING PLATE (NEMA 1) .082 lbs. per cu. in. Milled Sheets 18 x 36"								
Accurately milled molding plate. Used for "v" rings, commutator insulation and formed parts, troughs, angles, tubes, bushings, slot insulation. Heating makes No. 101 flexible and pliable, so that it is readily molded; becomes rigid and firm upon cooling.	.015 .020 .025 .030	.035 .040 .050 1/16	18%	.020 up to .036" .036 up to .625"	± .002" ± .002"	± .003" ± .003"	500 350	390 250
111 INDIA MOLDING PLATE (NEMA 2) .079 lbs. per cu. in. Rough Milled or Unmilled Sheets 18 x 36"								
The same grade of MICABOND as No. 101 Plate except that it is not milled to accurate thickness, and consequently is lower in price.	.010 .015 .020	.025 .030 1/16	18%	Up to .015" .015 up to .063"	± .003" ± .005"	± .008"	500 350	390 250
102 INDIA SEGMENT PLATE (NEMA 3) .093 lbs. per cu. in. Unmilled Sheets 18 x 36"								
Segment plate must be held to close thickness tolerances, retain its dimensions under most exact operating conditions. No. 102 meets these requirements, has a special binder, a minimum of which insures complete adhesion. Under pressure and heat No. 102 will not ooze, slip or otherwise give trouble.	.015 .020 .025 .030	.035 .040 .050 1/16	7%	.020" and over	± .001"	± .002"	600	390
104 AMBER SEGMENT PLATE (NEMA 4) .093 lbs. per cu. in. Milled Sheets 18 x 36"								
Milled plate with uniform mechanical and electrical properties. Resistance to abrasion about equal to copper, eliminating the need of undercutting when used as commutator segments. Punches and saws readily, will not shatter or flake.	.015 .020 .025 .030	.035 .040 .050 1/16	7%	.020" and over	± .001"	± .002"	600	390
122 INDIA SEGMENT PLATE (NEMA 5) .093 lbs. per cu. in. Unmilled Sheets 18 x 36"								
The same grade of MICABOND as No. 102 Plate except that it is not milled to accurate thickness, and consequently is lower in price.	.010 .015 .020	.025 .030 1/16	7% 16%	Up to .062" .062" and over	± .007" ± .010"		450 325	300 225
55 FLEXIBLE PLATE (NEMA 6) Sheets 36 x 36" .073 lbs. per cu. in.								
Specially selected splittings of India Mica bonded with a special binder developed by C-D-F to achieve extreme flexibility at normal room temperatures. Stays flexible after long storage. Does not readily dry out, is not and will not become sticky.	.005 .010 .015 .020	.025 1/32 1/16	20% 20% 20%	.005 up to .010" .010 up to .020" .020" and over	+.003"/—.001" ± .003" ± .005"	+.007"/—.003" +.008"/—.005" +.010"/—.008"	525 350 300	350 250 200
106 INDIA HEATER PLATE (NEMA 7) Shellac Bond. Sheets 18 x 36", 36 x 36" .089 lbs. per cu. in.								
Withstands constant temperatures of 600° to 700° F. without losing insulating value. Its mechanical strength is lowered due to the binder being consumed on the first heating. Must be mechanically supported on both sides.	.010 .015 .020		4%	.010 up to .020"	± .003"		400	300
107 AMBER HEATER PLATE (NEMA 8) Shellac Bond. Sheets 18 x 36", 36 x 36"								
Greater heat resistance than No. 106 Plate. Withstands constant temperatures of from 700° to 800° F. Should be used whenever higher than ordinary temperatures are encountered. No. 107 must be mechanically supported on both sides.	.010 .015 .020		4%	.010 up to .020"	± .003"		400	300
12 MICABOND PAPER SHEETS (NEMA 11) .071 lbs. per cu. in. Sheets 36 x 36", Rolls 36" wide								
Layers of large India Mica splittings cemented together with a special pliable insulating compound and faced on both sides with insulating tissue paper. Material is suitable for hand wrapping or machine wrapping of coils or compensator bars at room temperatures.	.005 .008 .011 .015		....	.005 up to .009" .009" and over	± .002" ± .003"	+.005"/—.003" +.008"/—.005"	325 300	225 200
12 MICAFOLIUM SHEETS .071 lbs. per cu. in. Sheets 36 x 36", not available in rolls								
Layers of large India Mica splittings faced on one side with thin shellac coated paper. Micafolium is not flexible at room temperature and is usually applied by machine application as a hot coil wrapper.	.005 .008 .011 .015		....	.005 up to .009" .009" and over	± .002" ± .003"	+.005"/—.003" +.008"/—.005"	325 300	225 200
17 MICABOND FISH PAPER (NEMA 13) Sheets 36 x 36" .058 lbs. per cu. in.								
Layers of India Mica bonded with a flexible insulating cement faced on one side with tissue and on the other side with Diamond Insulation (Fish Paper). Provides a tough, high quality insulating wrapper.	.010 .012 .015 .020		....	.007 up to .021"	± .003"	+.008"/—.005"	300	200
10 MICABOND CLOTH (NEMA 16) .061 lbs. per cu. in. Sheets 36 x 36", Rolls 36" wide.								
Layers of large India splittings faced on one side with tissue and on the other side with a specially prepared cotton cloth. A flexible cement is used.	.008 .011 .014		....	Up to .010" .010 up to .016"	± .002" ± .003"	± .003" +.008"/—.005"	250 250	200 200
120 MICABOND & CELLOPHANE .069 lbs. per cu. in. Sheets 36 x 36", Rolls 36" wide		Length of Roll						
Layers of large India Mica splittings cemented together with a special flexible insulating compound and faced on both sides with .001 moisture-proof cellophane.	.005 .008 .010 .015 .020 .025 1/32 & over	100' 100' 50' 50' 50' 50' 50'	....	.005 up to .010" .010 up to .016"	± .002" ± .003"	+.005"/—.003" +.008"/—.005"	325 300	325 200



Making exactly what you want, when you want it, is a routine part of your C-D-F Micabond purchase. For a new source for mica, call on C-D-F's modernized Valparaiso, Indiana plant.

FOR HIGH HEAT APPLICATIONS

SILICONE TAPES



Silicone Varnished Fiberglas
Class H Electrical Insulation. Resistant up to 250°C. Low dielectric losses, little affected by moisture. High tensile strength. Tape consists of single ply of glass fabric treated with Silicone varnish.
Color: Natural, clear white to yellow

	Nominal Thickness "
GB - 108SV	.003, .004, .005
GB - 112SV	.005, .007
GB - 116SV	.007, .010, .012
GB - 125SV	.010, .012
GB - 126SV	.012
GB - 127SV and 128SV	.010, .012, .015
GB - 141SV	.015, .020
GB - 162SV	.025, .030

Silicone Rubber Fiberglas
Class H Electrical Insulation. Recommended for many applications where abrasion and mechanical abuse is encountered. Good thermal conductivity. Extreme flexibility, but is not equal to Silicone Varnished Fiberglas in dielectric strength, dielectric losses, tensile strength. Normally furnished fully cured. Made in three grades:
E=Electrical G=General Purpose for high temperature applications.
ME=For applications requiring good mechanical and electrical properties.
Colors: Red, white

	Nominal Thickness "
GB - 113SR	.005
GB - 112SR	.007
GB - 116SR	.010, .012
GB - 128SR	.012, .015
GB - 164SR	.030

Tape Widths: ¼" minimum to 1½" maximum in ⅛" increments—Tolerances ± 1/64".
Length: Continuous up to 25 or 36 yards, 1 or 2 pieces in each multiple.
Grade designation number refers to glass fabric cloth number — Normally, all fabrics are heat cleaned before coating.

TAPES OF TEFLON*



Uniform, high strength tapes of unsupported Teflon and supported Teflon impregnated fiberglas cloth. Both are unaffected by moisture or fluctuating high temperatures, exposure to oils and greases. Unsupported tapes have a high elongation value and a "plastic memory" that causes insulation to fit tightly when temperature rises. Supported tapes have greater mechanical strength, are available in greater range of widths. Either form may be used with automatic wrapping machines.

UNSUPPORTED TAPES Widths	Width Tolerance ±
¼ to ½"	1/64"
over ½ to 1"	1/32"
over 1 to 3"	3/64"
3 to 12"	1/16"

Standard thicknesses up to 1/16"

SUPPORTED TAPES Widths: ¼ to 38" Standard Thicknesses up to .010"

Thickness Range	Thickness Tolerances ± Unsupported	Supported
.002 to .005 inc.	.0005	.0005
over .005 to .008 inc.	.001	.001
over .008 to .010 inc.	.002	.001
over .010 to .015 inc.	.002	
over .015 to .025 inc.	.0025	
over .025 to 1/32" inc.	.003	
over 1/32" to 1/16" inc.	.004	

*du Pont trade mark.



YOUR CDF SALES ENGINEER PUTS FIVE PLANTS TO WORK FOR YOU

The sales engineer in your locality can give you more than order-taking service. He has been trained in our fabricating shops and laboratories to help you develop wider uses for modern insulating materials. He understands plastics machining and can either help you on the spot or get the best information direct from the factory. Get to know him well . . . for he can give you countless examples of substantial savings in time, materials and money when C-D-F handles the complete fabrication job, from raw material to finished component. C-D-F has the latest high speed equipment for machining laminated and molded plastics, fibre and mica specialties. Use these facilities. Hire these trained, available specialists. Let C-D-F, through your nearby sales engineer, help you get superior insulation quality and quantity production.



NEWARK, DELAWARE
The executive, sales and manufacturing center of C-D-F. Laminated Dilecto and Spiral Tubing are made here. Large fabricating shops handle numerous special orders for the electrical industry.



MARSHALLTON, DELAWARE
Vulcoid, an electrical insulating material of resin impregnated vulcanized fibre, is made here. A C-D-F subsidiary, the Haveg Corporation, also uses this plant to manufacture molded plastic corrosion-resistant equipment.



BRIDGEPORT, PENNSYLVANIA
Diamond Vulcanized Fibre is produced in this completely integrated plant which includes a paper mill, resin plant, molded gear department, and testing laboratories.



VALPARAISO, INDIANA
A large plant making Micabond tapes, sheets and special forms. Mica is a universal insulator against heat, and C-D-F leads in its manufacture. Dilecto and Spiral Tubing are both made and fabricated here.



SPARTANBURG, SOUTH CAROLINA
Sales and service center for the textile industry in the South, this warehouse stocks Celoron gear stock and receptacles made of Diamond Fibre.

Continental-Diamond Fibre Company

NEWARK, DELAWARE

Export Department: Bridgeport, Penna., U.S.A.

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BOSTON SALES OFFICE 1245 Hancock St., Quincy 69, Mass. — Granite 2-2150
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PRINTED IN U.S.A.

WHEN YOU NEED POTENTIOMETERS THAT HAVE

... GUARANTEED EXTREME ACCURACY
... HIGH RESOLUTION
... LOW TORQUE
... LOW NOISE LEVEL
... LONG SERVICE LIFE
... SMALL SIZE

... your best choice is

FAIRCHILD PRECISION POTENTIOMETERS

... and here's why

Products — Precision is literally designed and built into Fairchild Precision Potentiometers. Shaft, mounting plate, and housing are made to extremely close tolerances. Windings are custom-made by an exclusive technique.

Service — Each Fairchild Precision Potentiometer is custom-built with windings tailored to individual applications. Therefore, Fairchild engineers can help in solving many complex problems, and their recommendations are offered without obligation. Similarly, the services of the Fairchild Potentiometer Sample Laboratory are available at nominal cost.

Manufacturing Know-How — Fairchild originally made potentiometers for its own equipment because no units then available were satisfactory from the standpoint of precision. Present manufacturing practice is based on new knowledge gained since then, and constant refinement of this knowledge.

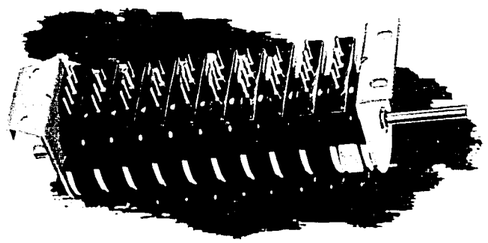
Experience — Over ten years of comprehensive experience in design, manufacture, and application are now behind Fairchild Precision Potentiometers. The first application was the Fairchild Computing Gunsight. Today's applications not only cover a wide range of military equipment, but extend to electrical computing systems for machine-tool controls, process controls, telemetering, and analog computers of all types.

SPECIFICATIONS OF FAIRCHILD PRECISION POTENTIOMETERS (Nominal Values)

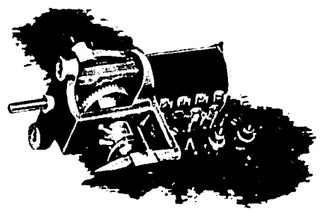
	Type 736	Type 746	Type 756	Type 747	Type 748	Type D-C-P
Resistance Range, ohms						
Linear (standard), min.	680 ±5% a	680 ±5% a	800 ±5% a	1,800 ±5% a	2,250 ±5% a	2,250 ±5% a
max.	115,000 ±5% a	115,000 ±5% a	40,000 ±5% a	90,000 ±5% a	150,000 ±5% a	150,000 ±5% a
Linear (special), min.	85 ±5% a	85 ±5% a	50 ±5% a	50 ±5% a	80 ±5% a	80 ±5% a
max.	—	—	45,000 ±5% a	—	—	—
Non-Linear	b	b	b	—	—	—
Electrical Function Angle, deg. (standard)	320 nominal	320 nominal	320 nominal c	351.3 ±0.5	354.5 ±0.5	354.5 ±0.5
(special)	—	—	350 nominal c d	—	—	—
Electrical Contact Angle, deg.	340 nom.	340 nom.	340 nom. (std.)	351.3 (+4, −0)	354.5 (+4, −0)	354.5 (+4, −0)
Mechanical Rotation	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
Functional Tolerance (guaranteed), per cent						
Linear, Some Non-Linear	±0.50 e	±0.50 e	±0.25	±0.15 f	±0.10 g	±0.10 g
Other Non-Linear	±1.00	±1.00	±0.35 h	—	—	—
Mechanical Accuracy						
Concentricity (shaft to pilot bushing), in., FIR max.	0.0025	0.0010	0.0010	0.0025	0.0025	0.0025
Radial Shaft Play, in., max.	0.0015	0.0009	0.0009	0.0015	0.0015	0.0015
Shaft, dia., in.	i	i	i	i	i	i
Pilot Bushing, dia., in.	j	j	j	k	k	k
Torque, oz.-in. per cup	2.0	1.5	1.5	1.0	1.0	1.0
Wattage (rated at 40 C ambient temperature)	2.5	2.5	2.5	4	5	5
Voltage Breakdown at Sea Level (60 cycle) RMS	900	900	900	900	900	900
Taps, number per cup	9 m	1 mn	1 p	12 q	16 q	r
accuracy of location, deg.	±1	±1	±1	±1	±0.5	±0.5
width, deg., max.	s	s	1.00 t	0.75 t	0.60 t	0.60 t
Ganging on Single Shaft, max.	5	20	20	10	10	—
Operating Ambient Temperature Range, deg. C	−55 to +71	−55 to +71	−55 to +71	−55 to +71	−55 to +71	−55 to +71
Service Life, cycles, max.	5,000,000 u	5,000,000 u	5,000,000 u	10,000,000 u	10,000,000 u	10,000,000 u
Dimensions, in.						
Diameter	1.899	1.750	1.750	2.093	3.093	3.093
Length (one cup), max.	0.795	0.800 ±0.009	0.800 ±0.009	1.156	1.156	1.219
Added Length Per Unit Ganged	0.609	0.580 ±0.002	0.580 ±0.002	0.594	0.594	—

a Tolerance on both linearity and over-all resistance may vary or be improved, depending on resistance value required.
b Maximum resistance range will vary according to function. Tolerance on over-all resistance of non-linear windings is ±5%.
c Electrical function angles can be held to tolerance of ±1° by special order.
d No shorted section.
e Linearity up to ±0.30% on the higher resolution windings by special order.
f Linearity up to ±0.10% on the higher resolution windings by special order.
g Linearity up to ±0.05% on the higher resolution windings by special order.
h With maximum of 3:1 slope ratio in high resistance ranges.
i Centerless-ground stainless steel to 0.2500 in. (+0.0000, −0.0005).
j Machined to 0.5000 in. (+0.0000, −0.0005).
k Machined to 0.7500 in. (+0.0000, −0.0005).
m By adding dummy cup section, 19 taps can be provided.
n Two taps can be provided by slight design modification using terminal board clamp screw modified for wiper terminal.
p Two or more taps can be provided by slight design modification using additional boards. 13 taps can be provided by addition of terminal board sections.
q Depending on spacing requirements and without moving bridge or wiper terminal.
r No slip rings provided for taps, but within the cup 16 taps can be provided depending on spacing requirements and without moving the bridge or wiper terminal.
s One turn of wire.
t Varies with resolution.
u Life will be dependent upon specific potentiometer required.

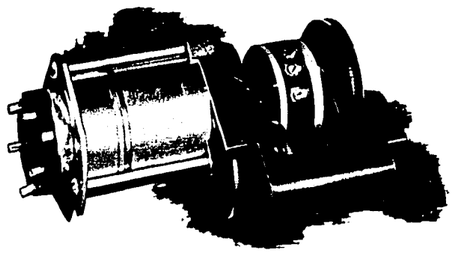
THESE SOLUTIONS TO PRECISION POTENTIOMETER PROBLEMS ARE TYPICAL OF FAIRCHILD'S PRODUCTS, SERVICE, AND KNOW-HOW



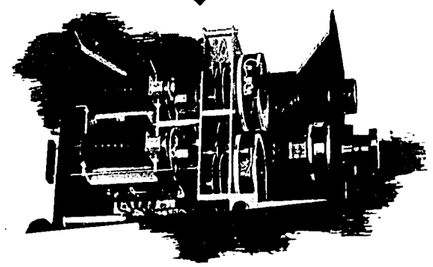
Quick and easy replacement of ganged precision potentiometers to simplify maintenance resulted in a series of packaged Fairchild plug-in units like this. Entire gang can be replaced in a few minutes because only end mounting plates are fastened down. No wires to disconnect or solder. Test points are provided on top of each potentiometer for quick checking.



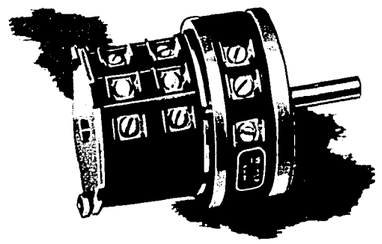
Electrical accuracy of the Fairchild Precision Potentiometers in this radar control assembly must match the mechanical precision of the gears. All of the potentiometers are non-linear (single-cycle log) and, in addition to the 1% linearity tolerance, the units in each pair must track each other within a taper tolerance of 0.1 to 1.0%. This means that the potentiometers in each pair must be identical with each other almost turn-for-turn.



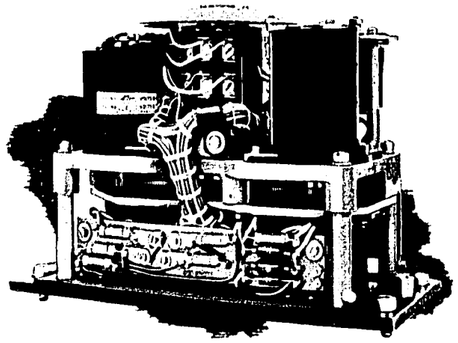
Low noise level, high resolution, extreme linearity, long life were the requirements that made engineers select the Fairchild Type 747 Precision Potentiometer for this computer assembly. These inherent qualities commonly result in the specification of Fairchild Precision Potentiometers for computer assemblies, calibration controls, servo mechanisms, and other instruments.



Accurate resetability in both the single-solution and integrating potentiometers was a prime consideration in this integrating computer application. Fairchild Precision Potentiometers can be accurately reset to any selected resistance or rotation angle, thereby eliminating hunting and carry-over errors.



Space saving and elimination of error accumulation resulted from ganging two Fairchild Type 736 non-linear potentiometers, specially wound to an empirical function, with a highly accurate Fairchild Type 747 linear unit on a common shaft.



Extremely high functional accuracy and mechanical precision that eliminates backlash and binding, which would cause serious errors in the computing system, are the principal reasons that Fairchild Precision Potentiometers were incorporated in this computer for a radar-gunfire control system.

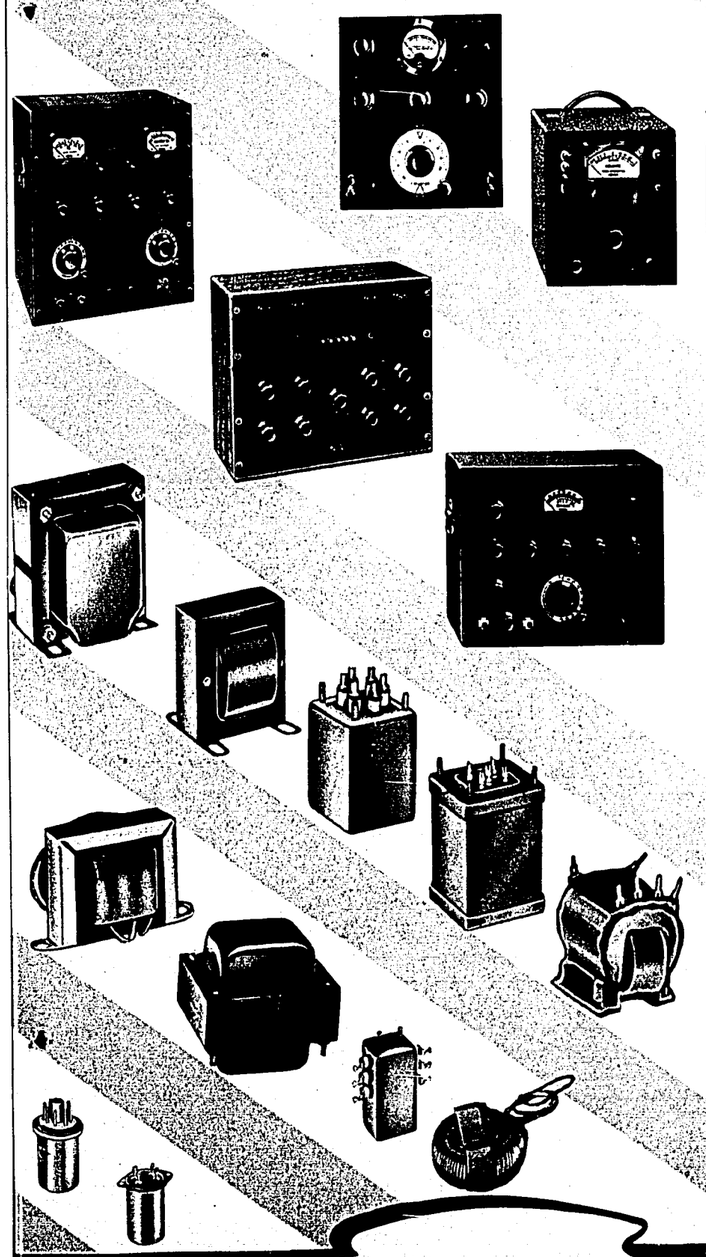
• *FOR YOUR NEXT PRECISION POTENTIOMETER PROBLEM* be sure you have full information about Fairchild Precision Potentiometers and related services, including the Fairchild Potentiometer Sample Laboratory. You can get these details by writing today to *Potentiometer Division, Fairchild Camera and Instrument Corporation, Park Avenue, Hicksville, Long Island, New York, Department 140-38K.*

FAIRCHILD
PRECISION POTENTIOMETERS

FREED *Transformer Co. Inc.*

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CONTENTS

	Pages
HIGH FIDELITY TRANSFORMERS INPUT, HYBRID AND REPEAT COILS	1-2
LOW LEVEL OUTPUT, MIXING AND MATCHING TRANSFORMERS	1-2
DRIVER AND HIGH LEVEL OUTPUT TRANSFORMERS	3
TOROIDAL INDUCTORS	4-5-6-7
HIGH Q REACTORS	8
PULSE TRANSFORMERS	8
MIL AUDIO STANDARD TRANSFORMERS	9
PROFESSIONAL GRADE COMPONENTS MINIATURE AUDIO INPUT TRANSFORMERS	10
LOW LEVEL OUTPUT — MIXING, DRIVER AND HIGH LEVEL OUTPUT TRANSFORMERS	11-12
HIGH Q REACTORS	12
FILTER REACTORS AND SWINGING REACTORS	13
POWER TRANSFORMERS	13-14
FILAMENT TRANSFORMERS	14
STEP-DOWN TRANSFORMERS	15
ISOLATION TRANSFORMERS	15
REPLACEMENT GRADE COMPONENTS AUDIO TRANSFORMERS	16
FILTER CHOKES	16
POWER TRANSFORMERS	17
LABORATORY TEST INSTRUMENTS	18-22

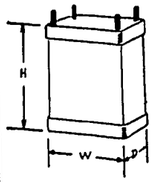
CATALOG NO. 531

for PRECISION

FREED TRANSFORMERS

for QUALITY

HIGH FIDELITY TRANSFORMERS



CASE DIMENSIONS NO. DC-2AT			
Mtg Centers	Dimensions W	D	H
2 × 1¾	2⅝	2¼	3
Knockout	Mtg. Studs	Wgt.	
1½ × 1⅜	8-32	1	

T Following case number indicates Terminals

L Following case number indicates Leads

U-500 IMPEDANCES IN OHMS

50, 125, 200CT, 250, 330, 500CT
125 and 500 ohms can be used for 150 and 600 ohms

Modern high fidelity broadcasting and transcription apparatus require the utmost performance and reliability in the audio transformers used in their circuitry. The Freed "Quality Grade" audio transformers are wide band, high fidelity components featuring astatic construction, longitudinal balance, low harmonic distortion, uniform response, high efficiency, and constant impedance match throughout the audio frequency spectrum. Maximum neutralization of stray fields is accomplished by use of humbalanced coil structures and multiple alloy shielding. High fidelity is achieved on every tap of the universal impedance winding without line reflection or transverse coupling.
All Quality Grade Components are thoroughly impregnated in a special non-hygroscopic varnish, and fully encapsulated in a moisture proof, high melting point compound.

U-60 IMPEDANCES IN OHMS

2.5, 5, 10, 15, 20, 30, 40, 60

FREED - INPUT TRANSFORMERS

CATALOG NO.	APPLICATION	IMPEDANCE LEVEL OHMS PRIMARY	SECONDARY	MAXIMUM POWER LEVEL V.U.*	RATIO	EQUIV. SHIELDING D.B.	MAX PRI D.C. PER SIDE Ma.	D.C. UNBAL. Ma.	FREQ. RESPONSE C.P.S.	CASE NUMBER
QGA 1	Univ. 500 ohm line to push-pull grids	U-500	100,000 SPLIT	+10	1:14.1	70	0	0	±1.0 DB 20-20,000	DC-2AT
QGA 2	Univ. 500 ohm line to push-pull grids	U-500	100,000 SPLIT	+10	1:14.1	90	0	0	±1.0 DB 20-20,000	DC-2AT
QGA 3	Univ. 500 ohm line to single or push-pull grids	U-500	60,000 SPLIT	+10	1:11	70	0	0	±1.0 DB 20-20,000	DC-2AT
QGA 4	Univ. 500 ohm line to single or push-pull grids	U-500	60,000 SPLIT	+10	1:11	90	0	0	±1.0 DB 20-20,000	DC-2AT
QGA 5	Univ. low impedance microphone, pickup or line to single or push-pull grids	U-60	60,000 SPLIT	+10	1:31.6	70	0	0	±1.0 DB 20-20,000	DC-2AT
QGA 6	Univ. low impedance microphone, pickup or line to single or push-pull grids	U-60	60,000 SPLIT	+10	1:31.6	90	0	0	±1.0 DB 20-20,000	DC-2AT

FREED - HYBRID AND REPEAT COILS

CATALOG NO.	APPLICATION	IMPEDANCE LEVEL OHMS PRIMARY	SECONDARY	MAXIMUM POWER LEVEL V.U.*	RATIO	EQUIV. SHIELDING D.B.	MAX PRI D.C. PER SIDE Ma.	D.C. UNBAL. Ma.	FREQ. RESPONSE C.P.S.	CASE NUMBER
QGA 7	Hybrid. Unbalanced 500/600 ohm lines to 600 ohms.	TOTAL PRI 1200/1000 SPLIT 300/250 300/250	600/150 OR 500/125 SPLIT	+10	1.41:1	70	0	0	±1.0 DB 20-20000	DC-2AT
QGA 8	Hybrid. Balanced 500/600 ohm lines to 600 ohms. Longitudinal balance 70 DB.	TOTAL PRI 1200/1000 SPLIT 300/250C.T. 300/250C.T.	600/150 OR 500/125 SPLIT	+10	1.41:1	70	0	0	±1.0 DB 20-20000	DC-2BT
QGA 9	Hybrid. Unbalanced 500/600 ohm lines to triode plate. No D.C. in secondary	TOTAL PRI 1200/1000 SPLIT 300/250 300/250	15,000 OR 12,500	+10	1:3.54	70	0	0	±1.0 DB 20-20000	DC-2AT
QGA 10	Hybrid. Balanced 500/600 ohm lines to triode plate. No D.C. in secondary. Longitudinal balance 70 DB.	TOTAL PRI 1200/1000 SPLIT 300/250C.T. 300/250C.T.	15,000 OR 12,500	+10	1:3.54	70	0	0	±1.0 DB 20-20000	DC-2AT
QGA 11	Repeat coil for low frequency ringing. Longitudinal balance 70 DB.	600/500 SPLIT	600/500 SPLIT BALANCED	+10	1:1	90	0	0	±1.0 DB 20-20000	DC-2AT

CASE DIMENSIONS
Same as Input Transformers above

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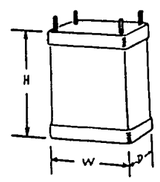
for PRECISION

FREED TRANSFORMERS

for QUALITY

HIGH FIDELITY TRANSFORMERS

FREED - INTERSTAGE TRANSFORMERS



CASE DIMENSIONS							
Case #	Mtg Centers	Dimensions W	D	H	Knockout	Mtg. Studs	Wgt.
DC-2AT	2 × 1¾	2⅝	2¼	3	1½ × 1⅜	8-32	2¾
DC-4AT	2½ × 2½	3⅛	3	3¾	2 × 1¾	8-32	4½

T Following case number indicates Terminals

L Following case number indicates Leads

CATALOG NO.	APPLICATION	IMPEDANCE LEVEL OHMS PRIMARY	SECONDARY	MAXIMUM POWER LEVEL V.U.*	RATIO	EQUIV. SHIELDING D.B.	MAX PRI DC PER SIDE Ma.	D.C. UNBAL. Ma.	FREQ. RESPONSE C.P.S.	CASE NUMBER
QGA 12	Bridging line to single or push-pull grids	10,000	60,000 SPLIT	+10	1:2.45	70	0	0	±1.0 DB 20-20,000	DC-2AT
QGA 13	Single 6C4, 6J5, 1/2 6SN7 triode to push-pull grids. Shunt feed.	15,000	60,000 SPLIT	+18	1:2	45	0	0	±1.0 DB 20-20,000	DC-2AT
QGA 14	Single 6C4, 6J5, 1/2 6SN7 triode to push-pull grids.	15,000	60,000 SPLIT	+18	1:2	45	8	8	±1.0 DB 50-20,000	DC-2AT
QGA 15	Push-pull triode plates to push-pull class A grids	20,000 SPLIT	45,000 SPLIT	+25	1:1.5	30	8	0.5	±1.0 DB 20-20,000	DC-4AT

FREED - LOW LEVEL OUTPUT, MIXING, MATCHING TRANSFORMERS

CASE DIMENSIONS
See DC-2AT Above

U-500 IMPEDANCES IN OHMS

50, 125, 200CT, 250, 330, 500CT
125 and 500 ohms can be used for 150 and 600 ohms

CATALOG NO.	APPLICATION	IMPEDANCE LEVEL OHMS PRIMARY	SECONDARY	MAXIMUM POWER LEVEL V.U.*	RATIO	EQUIV. SHIELDING D.B.	MAX PRI DC PER SIDE Ma.	D.C. UNBAL. Ma.	FREQ. RESPONSE C.P.S.	CASE NUMBER
QGA 16	Single plate or bridging line to Univ. 500 ohm line. Shunt feed.	15,000	U-500	+18	5.5:1	70	0	0	±1.0 DB 20-20000	DC-2AT
QGA 17	Single plate to Universal 500 ohm line	15,000	U-500	+18	5.5:1	70	8	8	±1.0 DB 50-20000	DC-2AT
QGA 18	Push-pull triode plates to Univ. 500 ohm line	20,000 C.T.	U-500	+25	6.3:1	70	8	0.5	±1.0 DB 20-20000	DC-2AT
QGA 19	Mixing, low impedance microphone or line to Universal 500 ohm line	U-500	U-500	+12	1:1	70	0	0	±1.0 DB 20-20000	DC-2AT
QGA 20	Line level mixing and matching	U-500	U-500	+30	1:1	70	0	0	±1.0 DB 20-20000	DC-2AT
QGA 21	High mu triode photocell to Univ. 500 ohm line.	100,000	U-500	+12	14.1:1	70	0	0	±1.0 DB 20-20000	DC-2AT

for PRECISION

FREED TRANSFORMERS

for QUALITY

HIGH FIDELITY TRANSFORMERS

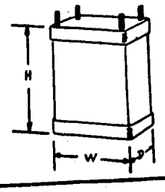
FREED - DRIVER TRANSFORMERS

CATALOG NO.	APPLICATION	PRIMARY IMPEDANCE OHMS	TURN RATIO PRIMARY TO ½ SEC.	MAXIMUM POWER LEVEL V.U.*	MAX PRI DC PER SIDE Ma.	D.C. UNBAL. Ma.	FREQ. RESPONSE C.P.S.	CASE NUMBER
QGA 22	Universal 500 ohm line to Class B grids	U-500	1:1	+40	0	0	±1.0 DB 20-20000	DC-4AT
QGA 23	Push-pull 6J5, etc. to push-pull 2A3's, 6L6's, etc.	20,000 C.T.	3.2:1	+30	8	0.5	±1.0 DB 20-20000	DC-2AT
QGA 24	Push-pull 2A3, 6B4 to push-pull 809, T2-40, 4/125A	5,000 C.T.	3.2:1	+40	50	5	±1.0 DB 20-20000	DC-4AT

FREED - HIGH LEVEL OUTPUT TRANSFORMERS

TUBES TO LINE, TUBES TO VOICE COIL, LINE TO LINE, LINE TO VOICE COIL

CATALOG	APPLICATION	IMPEDANCE LEVEL OHMS PRIMARY	SECONDARY	MAXIMUM POWER LEVEL V.U.*	RATIO	MAX PRI DC PER SIDE Ma.	D.C. UNBAL. Ma.	FREQ. RESPONSE C.P.S.	CASE NUMBER
QGA 25	PP 2A3, 6B4, 6L6, 300A, 275A to Univ. 500 ohm line	5,000 SPLIT	U-500	+42 (15 WATTS)	3.16:1	50	5	+0.5 DB 20-30000	DC-5BT
QGA 26	As above to Universal voice coil.	5,000 SPLIT	U-16	+42	17.7:1	50	5	±0.5 DB 20-30000	DC-5BT
QGA 27	Push-pull 6V6, 6AQ5, 7C5, 6N7 to Univ. 500 ohm line	8,000 SPLIT	U-500	+42	4:1	50	5	±0.5 DB 20-30000	DC-5BT
QGA 28	As above to Univ. Voice Coil	8,000 SPLIT	U-16	+42	22.4:1	50	5	±0.5 DB 20-30000	DC-5BT
QGA 29	P.P. 6F6, 6V6, 6AQ5, 7C5, 7B5, 6AR5, 6K6, 6L6 to Universal 500 ohm line	10,000 SPLIT	U-500	+42	4.47:1	40	4	±0.5 DB 20-30000	DC-5BT
QGA 30	As above to Universal Voice Coil	10,000 SPLIT	U-16	+42	25:1	40	4	±0.5 DB 20-30000	DC-5BT
QGA 31	P.P. 807, 1614, KT-66, (Williamson Amplifier) to Univ. 500 ohm line	10,000 SPLIT	U-500	+45.5 (36 WATTS)	4.47:1	50	5	±0.5 DB 20-30000	DC-6AT
QGA 32	As above to Universal Voice Coil	10,000 SPLIT	U-16	+45.5	25:1	50	5	±0.5 DB 20-30000	DC-6AT
QGA 33	P.P. Parallel 2A3, 6A5G, 300A to Univ. 500 ohm line	2,500 SPLIT	U-500	+45.5	2.24:1	100	10	±0.5 DB 20-30000	DC-6AT
QGA 34	As above to Universal Voice Coil	2,500 SPLIT	U-16	+45.5	12.5:1	100	10	±0.5 DB 20-30000	DC-6AT
QGA 35	P.P. 6L6 or P.P. Parallel 6L6 to Univ. 500 ohm line	3,800 SPLIT	U-500	+47 (50 WATTS)	2.75:1	130	13	±0.5 DB 20-30000	DC-7BT
QGA 36	As above to Universal Voice Coil	3,800 SPLIT	U-16	+47	15.4:1	130	13	±0.5 DB 20-30000	DC-7BT
QGA 37	High level multiple line to Universal Voice Coil	U-500	U-16	+42	5.6:1	0	0	±0.5 DB 20-30000	DC-5BT
QGA 38	High level multiple line to Universal Voice Coil	U-500	U-16	+47	5.6:1	0	0	±0.5 DB 20-30000	DC-7BT



CASE DIMENSIONS							
Case #	Mtg Center	Dimensions W	D	H	Knockout	Mtg. Studs	Wgt.
DC-2AT	2 × 1⅛	2⅛	2½	3	1½ × 1⅛	8-32	2½
DC-4AT	2½ × 2½	3⅛	3	3⅛	2 × 1⅛	8-32	4½
DC-5BT	3⅛ × 2⅛	4⅛	3½	4½	2½ × 2	10-32	10
DC-6AT	3⅛ × 3	5	4⅛	4⅛	3 × 2½	10-32	15
DC-7BT	4⅛ × 3⅛	5½	5	6⅛	3 × 2½	¼-20	22

T Following case number indicates Terminals
L Following case number indicates Leads

U-16 IMPEDANCES IN OHMS

2, 4, 8, 12, 16

U-500 IMPEDANCES IN OHMS

50, 125, 200CT, 250, 330, 500CT

125 and 500 ohms can be used for 150 and 600 ohms

A 70 volt level can be obtained for the following impedances

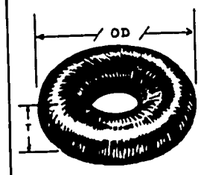
500 ohms – 10 watts +40 VU
330 ohms – 15 watts +42 VU
250 ohms – 20 watts +43 VU
200 ohms – 25 watts +44 VU
125 ohms – 40 watts +46 VU
50 ohms – 100 watts +50 VU

for PRECISION

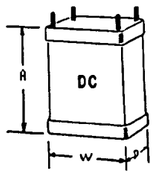
FREED TRANSFORMERS

for QUALITY

FREED TOROIDAL INDUCTORS



UNCASED DIMENSIONS		
Type	T	OD
TI-1	11/16	1 15/16
TI-2	11/16	1 9/16
TI-3	3/4	1 5/8
TI-3A	1	2 1/8



DC Case

8-32 Studs

CASED DIMENSIONS		
Type TI-1*		
H	W	D
2½	2 1/16	1 15/16
Mtg. Centers 1½ × 1¼		
Type TI-2*		
H	W	D
2½	2 1/16	1 15/16
Mtg. Centers 1½ × 1¼		
Type TI-3*		
H	W	D
2½	2 1/16	1 15/16
Mtg. Centers 1½ × 1¼		
Type TI-3A*		
H	W	D
3	2 5/8	2¼
Mtg. Centers 2 × 1¾		

FREED TOROIDAL TYPE TI-1

FREQUENCY RANGE - UP TO 15 KC
NON - STABILIZED

DC CASE

MAXIMUM INDUCTANCE - 20 HY
MAXIMUM "Q" 185 @ 7.5 KC

CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-800	5	MHY	F-811	1.00	HY	F-821	4.00	HY
F-801	10	MHY	F-812	1.25	HY	F-822	4.50	HY
F-802	15	MHY	F-813	1.50	HY	F-823	5.00	HY
F-803	30	MHY	F-814	1.75	HY	F-824	6.00	HY
F-804	50	MHY	F-815	2.00	HY	F-825	7.00	HY
F-805	75	MHY	F-816	2.25	HY	F-826	8.00	HY
F-806	100	MHY	F-817	2.50	HY	F-827	9.00	HY
F-807	150	MHY	F-818	2.75	HY	F-828	10.00	HY
F-808	200	MHY	F-819	3.00	HY	F-829	15.00	HY
F-809	500	MHY	F-820	3.50	HY	F-830	20.00	HY
F-810	750	MHY						

FREED TOROIDAL TYPE TI - 2S

FREQUENCY RANGE - UP TO 75 KC
STABILIZED

DC CASE

MAXIMUM INDUCTANCE - 500 MHY
MAXIMUM "Q" 270 @ 23 KC

CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-1800	1	MHY	F-1806	15	MHY	F-1811	150	MHY
F-1801	2	MHY	F-1807	30	MHY	F-1812	200	MHY
F-1802	3	MHY	F-1808	50	MHY	F-1813	300	MHY
F-1803	4	MHY	F-1809	75	MHY	F-1814	400	MHY
F-1804	5	MHY	F-1810	100	MHY	F-1815	500	MHY
F-1805	10	MHY						

FREED TOROIDAL TYPE TI - 3S

FREQUENCY RANGE - UP TO 200 KC
STABILIZED

DC CASE

MAXIMUM INDUCTANCE - 10 MHY
MAXIMUM "Q" 280 @ 75 KC

CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-1846	.1	MHY	F-1850	.5	MHY	F-1854	4	MHY
F-1847	.2	MHY	F-1851	1	MHY	F-1855	5	MHY
F-1848	.3	MHY	F-1852	2	MHY	F-1845	7.5	MHY
F-1849	.4	MHY	F-1853	3	MHY	F-1844	10	MHY

FREED TOROIDAL TYPE TI - 3AS

FREQUENCY RANGE - UP TO 200 KC
STABILIZED

DC CASE

MAXIMUM INDUCTANCE - 100 MHY
MAXIMUM "Q" 300 @ 37 KC

CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-1856	10	MHY	F-1859	30	MHY	F-1862	75	MHY
F-1857	15	MHY	F-1860	40	MHY	F-1863	100	MHY
F-1858	20	MHY	F-1861	50	MHY			

Standard Tolerance ± 2%

Note: When ordering Freed Toroidal Inductors in Commercial Type Cases, add "C" to Catalog Number - When ordering Hermetically Sealed units, add "H"

*Commercial type cases have Bakelite cover with solder lugs.

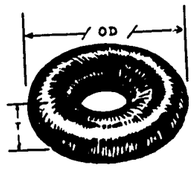
for PRECISION

FREED TRANSFORMERS

for QUALITY

FREED TOROIDAL INDUCTORS

Standard Tolerance ± 2%



UNCASED DIMENSIONS		
Type	T	OD
TI-4	5/8	1 5/16
TI-5	3/8	1
TI-6	5/8	1 5/16
TI-7	3/8	1

FREED TOROIDAL TYPES TI-4 & 4S

DM CASE

TYPE TI-4
FREQUENCY RANGE-UP TO 15 KC
NON-STABILIZED
MAXIMUM INDUCTANCE-5 HY
MAXIMUM "Q" 175 @ 7.5 KC

TYPE TI-4S
FREQUENCY RANGE-UP TO 15 KC
STABILIZED
MAXIMUM INDUCTANCE-5 HY
MAXIMUM "Q" 175 @ 7.5 KC

CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-850	5	MHY	F-860	400	MHY	F-870	2.00	HY
F-851	10	MHY	F-861	500	MHY	F-871	2.25	HY
F-852	15	MHY	F-862	600	MHY	F-872	2.50	HY
F-853	30	MHY	F-863	700	MHY	F-873	2.75	HY
F-854	50	MHY	F-864	800	MHY	F-874	3.00	HY
F-855	75	MHY	F-865	900	MHY	F-875	3.50	HY
F-856	100	MHY	F-866	1.00	HY	F-876	4.00	HY
F-857	150	MHY	F-867	1.25	HY	F-877	4.50	HY
F-858	200	MHY	F-868	1.50	HY	F-878	5.00	HY
F-859	300	MHY	F-869	1.75	HY			

FREED TOROIDAL TYPES TI-5 & 5S

DM CASE

TYPE TI-5
FREQUENCY RANGE-UP TO 15 KC
NON-STABILIZED
MAXIMUM INDUCTANCE-2 HY
MAXIMUM "Q" 115 @ 10 KC

TYPE TI-5S
FREQUENCY RANGE-UP TO 15 KC
STABILIZED
MAXIMUM INDUCTANCE-2 HY
MAXIMUM "Q" 115 @ 10 KC

CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-1700	5	MHY	F-1707	150	MHY	F-1714	800	MHY
F-1701	10	MHY	F-1708	200	MHY	F-1715	900	MHY
F-1702	15	MHY	F-1709	300	MHY	F-1716	1.00	HY
F-1703	30	MHY	F-1710	400	MHY	F-1717	1.25	HY
F-1704	50	MHY	F-1711	500	MHY	F-1718	1.50	HY
F-1705	75	MHY	F-1712	600	MHY	F-1719	1.75	HY
F-1706	100	MHY	F-1713	700	MHY	F-1720	2.00	HY

FREED TOROIDAL TYPES TI-6 & 6S

DM CASE

TYPE TI-6
FREQUENCY RANGE-UP TO 75 KC
NON-STABILIZED
MAXIMUM INDUCTANCE-1 HY
MAXIMUM "Q" 250 @ 17 KC

TYPE TI-6S
FREQUENCY RANGE-UP TO 75 KC
STABILIZED
MAXIMUM INDUCTANCE-1 HY
MAXIMUM "Q" 250 @ 17 KC

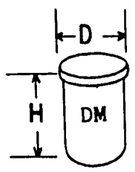
CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-1726	1	MHY	F-1732	10	MHY	F-1738	100	MHY
F-1727	2	MHY	F-1733	15	MHY	F-1739	150	MHY
F-1728	3	MHY	F-1734	20	MHY	F-1740	200	MHY
F-1729	4	MHY	F-1735	30	MHY	F-1741	250	MHY
F-1730	5	MHY	F-1736	50	MHY	F-1742	300	MHY
F-1731	7.5	MHY	F-1737	75	MHY	F-1743	500	MHY

FREED TOROIDAL TYPE TI-7

DM CASE

FREQUENCY RANGE-UP TO 75 KC
NON-STABILIZED
MAXIMUM INDUCTANCE-200 M H Y
MAXIMUM "Q" 170 @ 30 KC

CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-1781	.5	MHY	F-1787	10	MHY	F-1793	50	MHY
F-1782	1	MHY	F-1788	15	MHY	F-1794	75	MHY
F-1783	2	MHY	F-1789	20	MHY	F-1795	100	MHY
F-1784	3	MHY	F-1790	25	MHY	F-1796	150	MHY
F-1785	5	MHY	F-1791	30	MHY	F-1797	200	MHY
F-1786	7.5	MHY	F-1792	40	MHY			



CASED DIMENSIONS

Type TI-4*

H	D
1 1/2	1 3/8
Mtg. Centers	7/8
6-32 Inserts	

Type TI-5*

H	D
1	1 1/8
Mtg. Centers	5/8
4-40 Inserts	

Type TI-6*

H	D
1 1/2	1 3/8
Mtg. Centers	7/8
6-32 Inserts	

Type TI-7*

H	D
1	1 1/8
Mtg. Centers	5/8
4-40 Inserts	

*Commercial type cases have Bakelite cover with solder lugs.

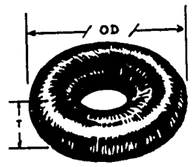
for PRECISION

FREED TRANSFORMERS

for QUALITY

FREED TOROIDAL INDUCTORS

Standard Tolerance ± 2%



UNCASED DIMENSIONS		
Type	T	OD
TI-8	3/8	1
TI-9	1	2 1/8
TI-10	3/4	1 5/8
TI-11	15/16	2 5/8

FREED TOROIDAL TYPES TI-8 & 8S

DM CASE

TYPE TI-8
FREQUENCY RANGE-UP TO 60 KC
NON-STABILIZED
MAXIMUM INDUCTANCE-100 M H Y
MAXIMUM "Q" 150 @ 50 KC

TYPE TI-8S
FREQUENCY RANGE-UP TO 60 KC
STABILIZED
MAXIMUM INDUCTANCE-100 MHY
MAXIMUM "Q" 150 @ 50 KC

CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-1821	.1	MHY	F-1828	3	MHY	F-1835	25	MHY
F-1822	.2	MHY	F-1829	4	MHY	F-1836	30	MHY
F-1823	.3	MHY	F-1830	5	MHY	F-1837	40	MHY
F-1824	.4	MHY	F-1831	7.5	MHY	F-1838	50	MHY
F-1825	.5	MHY	F-1832	10	MHY	F-1839	75	MHY
F-1826	1	MHY	F-1833	15	MHY	F-1840	100	MHY
F-1827	2	MHY	F-1834	20	MHY			

FREED TOROIDAL TYPE TI-9S

DC CASE

FREQUENCY RANGE-UP TO 60 KC
STABILIZED
MAXIMUM INDUCTANCE-500 MHY
MAXIMUM "Q" 270 @ 17.5 KC

CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-1554	1	MHY	F-1560	10	MHY	F-1566	150	MHY
F-1555	2	MHY	F-1561	15	MHY	F-1567	200	MHY
F-1556	3	MHY	F-1562	30	MHY	F-1568	300	MHY
F-1557	4	MHY	F-1563	50	MHY	F-1569	400	MHY
F-1558	5	MHY	F-1564	75	MHY	F-1570	500	MHY
F-1559	7.5	MHY	F-1565	100	MHY			

FREED TOROIDAL TYPE TI-10S

DC CASE

FREQUENCY RANGE-UP TO 60 KC
STABILIZED
MAXIMUM INDUCTANCE-200 MHY
MAXIMUM "Q" 180 @ 40 KC

CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-1579	1	MHY	F-1584	7.5	MHY	F-1589	75	MHY
F-1580	2	MHY	F-1585	10	MHY	F-1590	100	MHY
F-1581	3	MHY	F-1586	15	MHY	F-1591	150	MHY
F-1582	4	MHY	F-1587	30	MHY	F-1592	200	MHY
F-1583	5	MHY	F-1588	50	MHY			

FREED TOROIDAL TYPE TI-11S

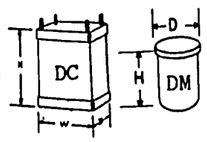
DC CASE

FREQUENCY RANGE-UP TO 15 KC
STABILIZED
MAXIMUM INDUCTANCE-50 HY
MAXIMUM "Q" 255 @ 4 KC

CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-1747	1	MHY	F-1759	200	MHY	F-1770	4.00	HY
F-1748	2	MHY	F-1760	300	MHY	F-1771	4.50	HY
F-1749	3	MHY	F-1761	400	MHY	F-1772	5.00	HY
F-1750	4	MHY	F-1762	500	MHY	F-1773	7.50	HY
F-1751	5	MHY	F-1763	750	MHY	F-1774	10.00	HY
F-1752	10	MHY	F-1764	1.00	HY	F-1775	15.00	HY
F-1753	15	MHY	F-1765	1.50	HY	F-1776	20.00	HY
F-1754	30	MHY	F-1766	2.00	HY	F-1777	25.00	HY
F-1755	50	MHY	F-1767	2.50	HY	F-1778	30.00	HY
F-1756	75	MHY	F-1768	3.00	HY	F-1779	40.00	HY
F-1757	100	MHY	F-1769	3.50	HY	F-1780	50.00	HY
F-1758	150	MHY						

When ordering Freed Toroidal Inductors in Commercial Type Case, add "C" to Catalog No. When ordering Hermetically Sealed Units, add "H".

CASED DIMENSIONS



8-32 Studs

Type TI-8*

H	D
1	1 1/8
Mtg. Centers	5/8
4-40 Inserts	

Type TI-9*

H	W	D
3	2 5/8	2 1/4

Mtg. Centers 2 × 1 3/4

Type TI-10*

H	W	D
2 1/2	2 1/16	1 15/16

Mtg. Centers 1 1/2 × 1 1/4

Type TI-11* (Commercial Case)

H	W	D
3 1/2	2 5/8	2 1/4

Mtg. Centers 2 × 1 3/4

Type TI-11* (Hermetically Sealed Case)

H	W	D
3 9/16	1 9/16	3 1/16

Mtg. Centers 2 1/2 × 1

*Commercial type cases have Bakelite cover with solder lugs.

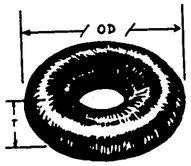
for PRECISION

FREED TRANSFORMERS

for QUALITY

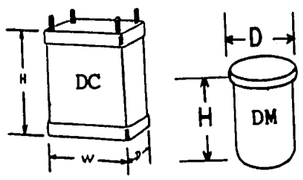
FREED TOROIDAL INDUCTORS

Standard Tolerance ± 2%



UNCASED DIMENSIONS		
Type	T	OD
TI-12	15/16	2 1/8
TI-13	1	2 1/8
TI-14	3/8	1
TI-15	3/8*	1 15/16

*Wedding Ring Size



8-32 Studs

CASED DIMENSIONS		
Type TI-12*		
H	W	D
3	2 5/8	2 1/4
Mtg. Center 2 × 1 3/4		
Type TI-13*		
H	W	D
3	2 5/8	2 1/4
Mtg. Center 2 × 1 3/4		
Type TI-14*		
H		D
1		1 1/8
Mtg. Centers 5/8		
4-40 Inserts		
Type TI-15*		
H		D
1 1/2		1 3/8
Mtg. Centers 7/8		
4-40 Inserts		

*Commercial type cases have Bakelite cover with solder lugs.

FREED TOROIDAL TYPES TI-12 & 12^S

DC CASE

TYPE TI-12 — FREQUENCY RANGE-UP TO 15 KC NON-STABILIZED MAXIMUM INDUCTANCE-30 HY MAXIMUM "Q" 200 @ 5 KC			TYPE TI-12^S — FREQUENCY RANGE-UP TO 15 KC STABILIZED MAXIMUM INDUCTANCE-30 HY MAXIMUM "Q" 200 @ 5 KC		
CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-1655	1	MHY	F-1675	1.50	HY
F-1656	2	MHY	F-1676	2.00	HY
F-1657	3	MHY	F-1677	2.50	HY
F-1658	4	MHY	F-1678	3.00	HY
F-1659	5	MHY	F-1679	3.50	HY
F-1660	7.5	MHY	F-1680	4.00	HY
F-1661	10	MHY	F-1681	4.50	HY
F-1662	15	MHY	F-1682	5.00	HY
F-1663	30	MHY	F-1683	6.00	HY
F-1664	50	MHY	F-1684	7.00	HY
F-1665	75	MHY	F-1685	8.00	HY
F-1666	100	MHY	F-1686	9.00	HY
F-1667	150	MHY	F-1687	10.00	HY
F-1668	200	MHY	F-1688	12.00	HY
F-1669	300	MHY	F-1689	15.00	HY
F-1670	400	MHY	F-1690	17.00	HY
F-1671	500	MHY	F-1691	20.00	HY
F-1672	600	MHY	F-1692	25.00	HY
F-1673	750	MHY	F-1693	30.00	HY
F-1674	1.00	HY			

FREED TOROIDAL TYPE TI-13

DC CASE

FREQUENCY RANGE — UP TO 75 KC MAXIMUM INDUCTANCE — 500 MHY			NON-STABILIZED MAXIMUM "Q" 340 @ 15 KC		
CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-1629	1	MHY	F-1638	50	MHY
F-1630	2	MHY	F-1639	75	MHY
F-1631	3	MHY	F-1640	100	MHY
F-1632	4	MHY	F-1641	150	MHY
F-1633	5	MHY	F-1642	200	MHY
F-1634	7.5	MHY	F-1643	300	MHY
F-1635	10	MHY	F-1644	400	MHY
F-1636	15	MHY	F-1645	500	MHY
F-1637	30	MHY			

FREED TOROIDAL TYPE TI-14^S

DM CASE

TEMPERATURE STABILIZED MAXIMUM INDUCTANCE — 300 MHY			FREQUENCY RANGE — UP TO 50 KC MAXIMUM "Q" 140 @ 25 KC		
CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-1920	1	MHY	F-1929	30	MHY
F-1921	2	MHY	F-1930	50	MHY
F-1922	3	MHY	F-1931	75	MHY
F-1923	4	MHY	F-1932	100	MHY
F-1924	5	MHY	F-1933	150	MHY
F-1925	7 5	MHY	F-1934	200	MHY
F-1926	10	MHY	F-1935	250	MHY
F-1927	15	MHY	F-1936	300	MHY
F-1928	20	MHY			

FREED TOROIDAL TYPE TI-15^S

DM CASE

TEMPERATURE STABILIZED MAXIMUM INDUCTANCE — 100 MHY			FREQUENCY RANGE — UP TO 50 KC MAXIMUM "Q" 140 @ 25 KC		
CATALOG NO. UNCASED	INDUCTANCE VALUE		CATALOG NO. UNCASED	INDUCTANCE VALUE	
F-1870	0.1	MHY	F-1880	7.5	MHY
F.1871	0.2	MHY	F-1881	10	MHY
F-1872	0.3	MHY	F-1882	15	MHY
F-1873	0.4	MHY	F-1883	20	MHY
F-1874	0.5	MHY	F-1884	25	MHY
F-1875	1	MHY	F-1885	30	MHY
F-1876	2	MHY	F-1886	40	MHY
F-1877	3	MHY	F-1887	50	MHY
F-1878	4	MHY	F-1888	75	MHY
F-1879	5	MHY	F-1889	100	MHY

NOTE:
When ordering Freed Inductors in Commercial Type Cases, add "C" to Catalog Number.
When ordering Hermetically Sealed units, add "H".

Freed Toroidal Inductors can also be supplied on special order to tolerances of ± 1%.

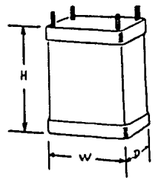
for PRECISION

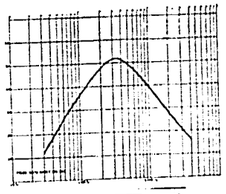
FREED TRANSFORMERS

for QUALITY

HIGH FIDELITY TRANSFORMERS

FREED - QUALITY GRADE HIGH Q REACTORS





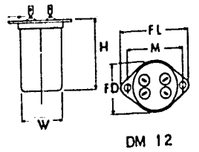
CASE DIMENSIONS				
Case #	Mtg Centers	Dimensions W	D	H
DC-2AT	2 × 1 1/4	2 5/8	2 1/4	3
Knockout	Mtg.	Wgt.		
1 1/2 × 1 5/8	8-32s	2 3/4		

HIGH Q. LOW FREQUENCY REACTORS

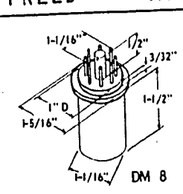
Whenever there is need for a stable reactor with high Q at the lower audio frequencies, these reactors will be ideally suited. Units up to 400 henries can be supplied with inductance tolerance of ± 2%.

CATALOG NUMBER	INDUCTANCE IN HENRIES	CASE SIZE
QGC 1	100	DC 2AT
QGC 2	75	DC 2AT
QGC 3	50	DC 2AT
QGC 4	25	DC 2AT
QGC 5	10	DC 2AT
QGC 6	5	DC 2AT
QGC 7	1	DC 2AT

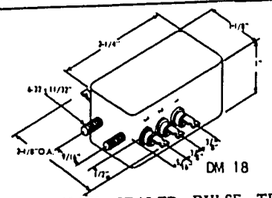
FREED - MIL. PULSE TRANSFORMERS



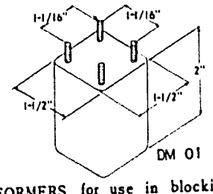
DM 12



DM 8



DM 18



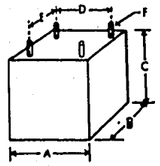
DM 01

CASE DIMENSIONS								
Case #	FL	FD	W	H	M	Screws	Cut Out	Wgt.
DM-12	1 1/2	1 1/2	5/8	1 5/8	1 1/2	4-40	1/2	1.5oz
DM-8	Dimensions shown on drawing							
DM-18	Dimensions shown on drawing							
DM-01	Dim. shown on dr'g (Knockout 1 1/2 dia.)							

HERMETICALLY SEALED PULSE TRANSFORMERS for use in blocking oscillators, low level interstage coupling, and modulator outputs. Made in accordance with MIL-T-27 specifications. These pulse transformers are designed for maximum power, efficiency and optimum pulse performance. Balanced coil structures permit series or parallel connection of windings for turn ratios other than unity. Pulse characteristics, voltages and impedance levels will depend upon interconnections made.

CATALOG NUMBER	APPLICATION	PULSE VOLTAGE KILOVOLTS	PULSE DURATION MICROSECONDS	DUTY RATIO	TEST VOLTAGE KV., RMS	CHARACTERISTIC IMPEDANCE OHMS	CASE SIZE
MPT-1	Blocking oscillator or interstage coupling	0.25/0.25/0.25	0.2-1.0	.004	0.7	250	DM-12
MPT-2	Blocking oscillator or interstage coupling	0.25/0.25	0.2-1.0	.004	0.7	250	DM-12
MPT-3	Blocking oscillator or interstage coupling	0.5/0.5/0.5	0.2-1.5	.002	1.0	250	DM-18
MPT-4	Blocking oscillator or interstage coupling	0.5/0.5	0.2-1.5	.002	1.0	250	DM-18
MPT-5	Blocking oscillator or interstage coupling	0.5/0.5/0.5	0.5-2.0	.002	1.0	500	DM-12
MPT-6	Blocking oscillator or interstage coupling	0.5/0.5	0.5-2.0	.002	1.0	500	DM-12
MPT-7	Blocking oscillator, interstage coupling or low power output	0.7/0.7/0.7	0.5-1.5	.002	1.5	200	DM-18
MPT-8	Blocking oscillator, interstage coupling or low power output	0.7/0.7	0.5-1.5	.002	1.5	200	DM-18
MPT-9	Blocking oscillator, interstage coupling or low power output	1.0/1.0/1.0	0.7-3.5	.002	2.0	200	DM-18
MPT-10	Blocking oscillator, interstage coupling or low power output	1.0/1.0	0.7-3:5	.002	2.0	200	DM-18
MPT-11	Blocking oscillator, interstage coupling or low power output	1.0/1.0/1.0	1.0-5.0	.002	2.0	500	DM-01
MPT-12	Blocking oscillator, interstage coupling or low power output	0.15/0.15/0.3	0.2-1.0	.004	0.7	700	DM-8

FREED - STANDARD MILITARY AUDIO TRANSFORMERS

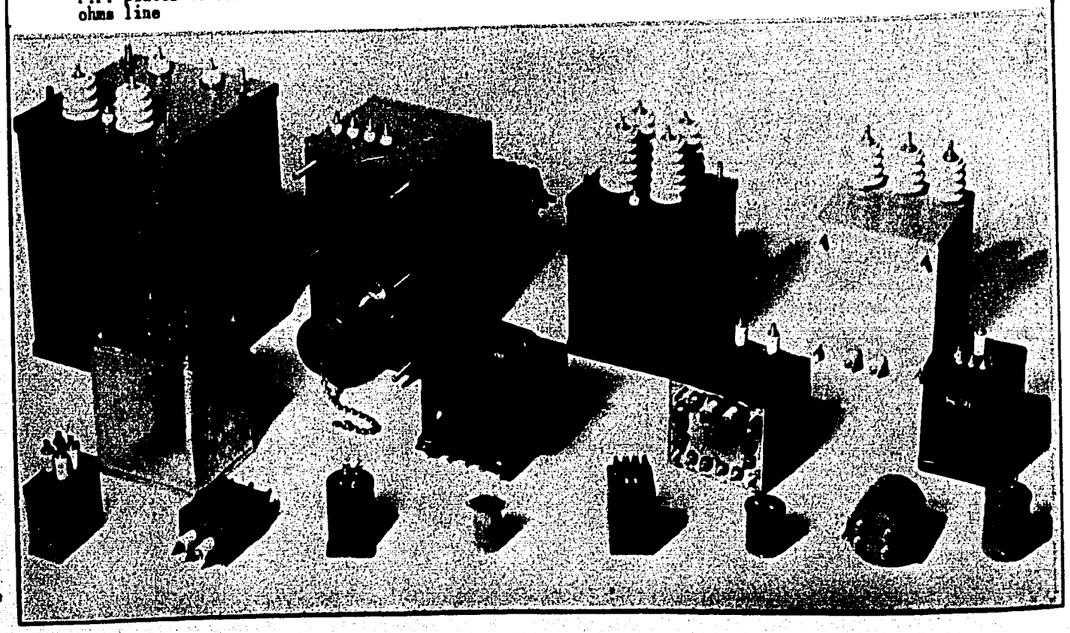


A group of hermetically sealed audio transformers designed in accordance with MIL-T-27 specifications. The functional characteristics of these transformers were established by the Armed Services.

#AJ CASE DIMENSIONS

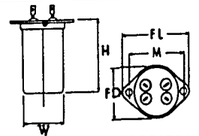
A	B	C	D	E
1 5/8	1 5/8	2 3/8	1 1/16	1 1/16

CATALOG NUMBER	APPLICATION	TYPE DESIGNATION	IMPEDANCE LEVEL IN OHMS PRIMARY	IMPEDANCE LEVEL IN OHMS SECONDARY	RATIO	MAX POWER LEVEL V.U.	MAX PRI D.C. PER SIDE IN MA	MAX. D.C. UNBAL. IN MA	FREQUENCY RESPONSE	CASE
MGA 1	Transformer inter-stage single or P.P. plates to single or P.P. grids	TF1A15AJ	10,000 CT	90,000 SPLIT AND CT	1:3 OVERALL	+15	10	10	±1 DB 300-10,000	AJ
MGA 2	Transformer matching 600 ohms line to voice coil	TF1A16AJ	600 SPLIT	4,8,16	6.12:1 OVERALL	+33	0	0	±1 DB 300-10,000	AJ
MGA 3	Transformer input 600 ohms line to single or P.P. grids	TF1A10AJ	600 SPLIT	135,000 CT	1:15	+15	0	0	±2 DB 300-10,000	AJ
MGA 4	Transformer matching 600 ohms line to 600 ohms line	TF1A16AJ	600 SPLIT	600 SPLIT	1:1	+15	0	0	±1 DB 300-10,000	AJ
MGA 5	Transformer output single plate 7600 ohms, 4800 ohms to 600 ohms line	TF1A13AJ	7600 TAP @ 4800	600 SPLIT	3.56:1	+33	40	40	±2 DB 300-10,000	AJ
MGA 6	Transformer output single plate 7600 ohms, 4800 ohms to voice coil	TF1A13AJ	7600 TAP @ 4800	4,8,16	21.8:1	+33	40	40	±2 DB 300-10,000	AJ
MGA 7	Transformer output single or P.P. plates to 600 ohms line	TF1A13AJ	15,000 CT	600 SPLIT	5:1	+33	10	10	±1 DB 300-10,000	AJ
MGA 8	Transformer output P.P. plates to 600 ohms line	TF1A13AJ	24,000 CT	600 SPLIT	6.32:1	+30	10	1	±1 DB 300-10,000	AJ
MGA 9	Transformer output P.P. plates to 600 ohms line	TF1A13AJ	60,000 CT	600 SPLIT	10:1	+27	10	1	±2 DB 300-10,000	AJ



PROFESSIONAL GRADE COMPONENTS

FREED - MINIATURE AUDIO TRANSFORMERS



DM-12 CASE DIMENSIONS

FL - 1 1/2
FD - 1 1/32
W - 15/16
H - 1 15/32
M - 1 7/32

Screws - 4-40
Cut out - 7/8
Wgt. - 1.5oz.

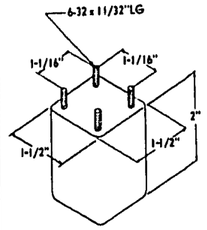
PROFESSIONAL MINIATURE AUDIO TRANSFORMERS

These high quality, miniature transformers feature hermetic sealing for maximum protection from moisture penetration with subsequent electrolysis and corrosion of fine wires. While primarily intended for non-military equipment, these units are constructed in a ccordance with MIL-T-27 Specifications.

CATALOG NO.	APPLICATION	IMPEDANCE LEVEL OHMS PRIMARY	IMPEDANCE LEVEL OHMS SECONDARY	MAXIMUM POWER LEVEL V.U.*	RATIO	MAX PRI DC PER SIDE Ma.	D.C. UNBAL. Ma.	FREQ. RESPONSE C.P.S.	CASE NUMBER
PMA 1	Line or microphone to single or push-pull grids	50/ 200/ 500	60,000 C.T.	+8	1:11	0	0	±2.0 DB 30-20000	DM-12
PMA 2	Dynamic microphone or speaker voice coil to single or P.P. grid	4/8	60,000 C.T.	+8	1:86.6	0	0	±2.0 DB 30-20000	DM-12
PMA 3	Line or microphone to single or push-pull grids. Magnetically shielded.	50/ 200/ 500	60,000 C.T.	+8	1:11	0	0	±2.0 DB 30-20000	DM-12
PMA 4	Single triode plate to single op push-pull grids	15,000	60,000 C.T.	+8	1:2	0	0	±2 DB 30-10000	DM-12
PMA 5	Single triode plate to push-pull grids	15,000	60,000 C.T.	+8	1:2	2	2	±2 DB 200-10000	DM-12
PMA 6	Single triode plate to multiple line	15,000	50/200/500	+8	5.48:1	0	0	±2 DB 20-20000	DM-12
PMA 7	Single triode plate to multiple line	15,000	50/200/500	+8	5.48:1	2	2	±1 DB 200-10000	DM-12
PMA 8	Push-pull triode plates to multiple line	30,000 C.T.	50/200/500	+8	7.75:1	2	0.25	±2 DB 20-20000	DM-12
PMA 9	Crystal mike or pickup to multiple line	60,000	50/200/500	+8	11:1	0	0	±2 DB 30-20000	DM-12
PMA 10	Mixing or matching	50/200	50/200/500	+8	1:1.50	0	0	±2 DB 30-20000	DM-12
PMA 11	Parallel Feed Reactor	40 hy.	3 ma dc,	3500 ohms D.C. resistance					DM-12

• 1 mw. reference level.

FREED - PROFESSIONAL GRADE COMPONENTS



For popular priced high fidelity amplifiers, professional equipment and receivers, for home and public address service. Freed has developed this series of audio transformers using the latest design techniques and the best commercially available materials. Except for units carrying unbalanced direct current, the frequency response is better than ± 1DB from 30 to 15,000 cycles. All units feature excellent performance characteristics with minimum size and weight.

INPUT TRANSFORMERS

DM-01 CASE DIMENSIONS

Mtg Centers	Dimensions W	D	H	Knockout	Mtg. Studs	Wgt.
1 1/8 × 1 1/8	1 1/2	1 1/2	2	1 1/8 dia.	6-32	1/2

U-500 IMPEDANCES IN OHMS

50, 125, 200CT, 250, 330, 500CT
125 and 500 ohms can be used for 150 and 600 ohms

CATALOG NO.	APPLICATION	IMPEDANCE LEVEL OHMS PRIMARY	IMPEDANCE LEVEL OHMS SECONDARY	MAXIMUM POWER LEVEL V.U.*	RATIO	EQUIV. SHIELDING D.B.	MAX PRI DC PER SIDE Ma.	D.C. UNBAL. Ma.	FREQ. RESPONSE C.P.S.	CASE NUMBER
PGA 1	Universal 500 ohm line to single grid	U-500	50,000	+12	1:10	50	0	0	±1.0 DB 30-15000	DM-01T
PGA 2	Univ. 500 ohm line to push-pull grids	U-500	60,000 SPLIT	+12	1:11	50	0	0	±1.0 DB 30-15000	DM-01T
PGA 3	Univ. 500 ohm line to push-pull grids	U-500	100,000 SPLIT	+12	1:14.1	50	0	0	±1.0 DB 30-15000	DM-01T
PGA 4	Bridging line to single grid	10,000	60,000	+12	1:2.45	50	0	0	±1.0 DB 30-15000	DM-01T
PGA 5	Bridging line to push-pull grids	10,000	60,000 SPLIT	+12	1:2.45	50	0	0	±1.0 DB 30-15000	DM-01T
PGA 6	Low level line matching	U-500	U-500	+18	1:1	50	0	0	±1 DB 30-15000	DM-01T

• 1 mw. reference level

for PRECISION

FREED TRANSFORMERS

for QUALITY

PROFESSIONAL GRADE COMPONENTS

FREED - LOW LEVEL OUTPUT AND MIXING TRANSFORMERS

CATALOG NO.	APPLICATION	IMPEDANCE LEVEL OHMS PRIMARY	SECONDARY	MAXIMUM POWER LEVEL V.U.*	RATIO	MAX PRI DC PER SIDE Ma.	D.C. UNBALANCE Ma.	FREQUENCY RESPONSES C.P.S.	CASE NUMBER
PGA 7	Single triode plate to Univ. 500 ohm line. Shunt feed.	15,000	U-500	+18	5.48:1	0	0	±1.0 DB 30-15,000	DM-01T
PGA 8	Single triode plate to Univ. 500 ohm line.	15,000	U-500	+18	5.48:1	8	8	±1.0 DB 100-15,000	DM-01T
PGA 9	Push-pull triode plates to Univ. 500 ohm line.	20,000 C.T.	U-500	+30	6.32:1	8	0.5	±1.0 DB 30-15,000	DM-01T
PGA 10	Low level line matching.	U-500	U-500	+18	1:1	0	0	+1.0 DB 30-15,000	DM-01T

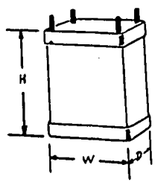
* 1 mw. reference level

U-500 IMPEDANCES IN OHMS: 50, 125, 200CT, 250, 330, 500CT-125 and 500 ohms can be used for 150 and 600 ohms

FREED - DRIVER TRANSFORMERS

CATALOG NO.	APPLICATION	PRIMARY IMPEDANCE OHMS	TURN RATIO PRI: 1/2 SEC.	MAX. LEVEL V.U.*	MAX PRI DC PER SIDE Ma.	MAX. D.C. UNBALANCE Ma.	FREQUENCY RESPONSE C.P.S.	CASE NUMBER
PGA 11	Universal 500 ohm line to push-pull grids	U-500	1:1	+40	0	0	±1.0 DB 30-15,000	DC-2AL
PGA 12	Push-pull 6C4, 6SN7 triodes to push-pull 2A3, 6L6 grids	20,000 C.T.	3.0:1	+30	10	1	±1.0 DB 30-15,000	DC-1AL
PGA 13	Push-pull 2A3, 6B4, 6A5G to push-pull 809, T-40, 4/125A	5,000 C.T.	3.2:1	+40	50	5	±1.0 DB 30-15,000	DC-2AL

FREED - HIGH LEVEL OUTPUT TRANSFORMERS



CASE DIMENSIONS							
Case #	Mtg Center	Dimensions W	D	H	Knockout	Mtg. Studs	Wgt.
DC-2AL	2 × 1¾	2⅜	2¼	3	1½ × 1⅜	8-32	2¼
DC-2BL	2 × 1¾	2⅜	2½	3½	1½ × 1⅜	8-32	3
DC-4AL	2½ × 2½	3⅛	3	3¾	2 × 1½	8-32	4½
DC-5AL	3⅛ × 2⅝	4⅛	3½	3⅛	2½ × 2	10-32	9
DC-6AL	3¾ × 3	5	4⅛	4⅛	3 × 2½	10-32	15

U-16 IMPEDANCES IN OHMS
2, 4, 8, 12, 16

T Following case number indicates Terminals

L Following case number indicates Leads

U-500 IMPEDANCES IN OHMS: 50, 125, 200CT, 250, 330, 500CT-125 and 500 ohms can be used for 150 and 600 ohms
A 70 volt level can be obtained for the following impedances:

500 ohms – 10 watts + 40 VU
330 ohms – 15 watts + 42 VU
250 ohms – 20 watts + 43 VU
200 ohms – 25 watts + 44 VU
125 ohms – 40 watts + 46 VU
50 ohms – 100 watts + 50 VU

CATALOG NO.	APPLICATION	IMPEDANCE LEVEL OHMS PRIMARY	SECONDARY	MAXIMUM POWER LEVEL V.U.* OR POWER IN WATTS	RATIO	MAX PRI DC PER SIDE Ma.	D.C. UNBALANCE Ma.	FREQUENCY RESPONSE C.P.S.	CASE NUMBER
PGA 14	P.P. 6K6, 6AR5, 7B5 Class A to Universal voice coil	12000 C.T.	U-16	+40 (10 WATTS)	27.4:1	40	4	±1.0 DB 30-15000	DC-2BL
PGA 15	P.P. 6F6 Cl. AB_2, P.P. 6V6, 6AQ5, 7C5, 6L6 Cl. AB_1 to Univ. voice coil	10000 C.T.	U-16	+43 (20 WATTS)	25:1	50	5	±1.0 DB 30-15000	DC-4AL
PGA 16	P.P. 6L6 Cl. AB_1, self bias to Univ. 500 ohm line	9000 C.T.	U-500	+44.8 (30 WATTS)	4.23:1	50	5	±1 DB 30-15000	DC-4AL
PGA 17	As above to Universal voice coil	9000 C.T.	U-16	+44.8	23.7:1	50	5	±1.0 DB 30-15000	DC-4AL
PGA 18	P.P. 6N7 Cl B, P.P. 6V6, 6AQ5, 7C5 Cl. AB_1 to Universal voice coil	8000 C.T.	U-16	+41.8 (15 WATTS)	22.3:1	45	5	±1.0 DB 30-15000	DC-4AL
PGA 19	P.P. 6L6, fixed bias, Cl. AB_1 to Univ. 500 ohm line	6600 C.T.	U-500	+44.8	3.63:1	70	7	±1.0 DB 30-15000	DC-4AL

for PRECISION FREED TRANSFORMERS for QUALITY

PROFESSIONAL GRADE COMPONENTS

FREED - HIGH LEVEL OUTPUT TRANSFORMERS (CONT'D)

CATALOG NO.	APPLICATION	IMPEDANCE LEVEL OHMS PRIMARY	SECONDARY	MAXIMUM POWER LEVEL V.U.* OR POWER IN WATTS	RATIO	MAX PRI DC PER SIDE Ma.	D.C. UNBALANCE Ma.	FREQUENCY RESPONSE C.P.S.	CASE NUMBER
PGA 20	As above to Universal voice coil	6600 C.T.	U-16	+44.8	20.3:1	70	7	±1.0 DB 30-15000	DC-4AL
PGA 21	P.P. 6L6 Cl. A, P.P. 2A3, 6A5G, 6B4 self bias P.P. Par. 6V6 Cl. AB_1 to Univ. voice coil	5000 C.T.	U-16	+43	17.7:1	80	8	±1.0 DB 30-15000	DC-4AL
PGA 22	P.P. Par 6L6 Cl. AB_1 self bias P.P. 6L6 Cl. AB_2 fixed bias PP807 Cl. AB_2 to Univ. 500 ohm line	4000 C.T.	U-500	+47 (50 WATTS)	2.83:1	100	10	±1.0 DB 30-15000	DC-5AL
PGA 23	As above to Universal voice coil	4000 C.T.	U-16	+47	15.8:1	100	10	±1.0 DB 30-15000	DC-5AL
PGA 24	P.P. 6A5G, 6B4, 2A3, fixed bias Universal voice coil	3000 C.T.	U-16	+41.8	13.7:1	75	7.5	±1.0 DB 30-15000	DC-4AL
PGA 25	P.P. Par. 807 Cl. AB_2 to Univ. 500 ohm line	2100 C.T.	U-500	+51.8 (150 WATTS)	2.05:1	120	12	±1.0 DB 30-15000	DC-6AL
PGA 26	P.P. Par 2A3, 6A5G, fixed bias 6B4, 300A Cl. AB_1, P.P. Par 6L6 Cl. A to Universal 500 ohm line	1500 C.T.	U-500	+44.8	1.73:1	150	15	±1.0 DB 30-15000	DC-4AL
PGA 27	As above to Universal voice coil	1500 C.T.	U-16	+44.8	9.7:1	150	15	±1.0 DB 30-15000	DC-4AL
PGA 28	Matching line to Univ. voice coil	U-500	U-16	+44.8	5.6:1	0	0	±1.0 DB 30-15000	DC-4AT
PGA 29	Matching line to Univ. voice coil	U-500	U-16	+47	5.6:1	0	0	±1.0 DB 30-15000	DC-5AT
PGA 30	Matching line to Univ. voice coil	U-500	U-16	+50 (100 WATTS)	5.6:1	0	0	±1.0 DB 30-15000	DC-6AT

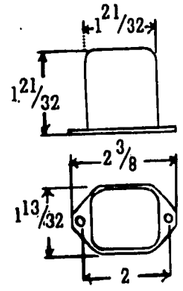
U-16 IMPEDANCES IN OHMS
2, 4, 8, 12, 16

U-500 IMPEDANCES IN OHMS: 50, 125, 200CT, 250, 330, 500CT-125 and 500 ohms can be used for 150 and 600 ohms

A 70 volt level can be obtained for the following impedances:

500 ohms – 10 watts + 40 VU
330 ohms – 15 watts + 42 VU
250 ohms – 20 watts + 43 VU
200 ohms – 25 watts + 44 VU
125 ohms – 40 watts + 46 VU
50 ohms – 100 watts + 50 VU

FREED - HIGH Q REACTORS



DM 02

T Following Case number indicates Terminals

L Following Case number indicates Leads

HIGH Q REACTORS

High Q reactors for use in resonant wave traps and dynamic noise suppression circuits.

CATALOG NUMBER	APPLICATION	RATED IND. IN HENRIES	Q	TUNING CAPACITOR (MF)	CASE SIZE
PQC 1	60 cps resonant trap	14.00	10	.5	DM 02L
PQC 2	400 cps resonant trap	1.58	15	.1	DM 02L
PQC 3	1000 cps resonant trap	1.00	20	.025	DM 02L
PQC 4	Dynamic noise suppression inductor	2.40	20 @ 4 KC		DM 02L
PQC 5	Dynamic noise suppression inductor	2.00	20 @ 4 KC		DM 02L
PQC 6	Dynamic noise suppression inductor	1.30	20 @ 4 KC		DM 02L
PQC 7	Dynamic noise suppression inductor	.80	20 @ 4 KC		DM 02L
PQC 8	Dynamic noise suppression inductor	.60	20 @ 4 KC		DM 02L
PQC 9	Dynamic noise suppression inductor	.40	20 @ 4 KC		DM 02L

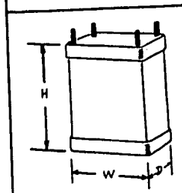
for PRECISION

FREED TRANSFORMERS

for QUALITY

PROFESSIONAL GRADE COMPONENTS

FREED - FILTER REACTORS



CASE DIMENSIONS						
Case #	Mtg Center	Dimensions W	D	H	Mtg. Studs	Wgt.
DM-01	1⅛ × 1⅛	1½	1½	2	6-32	½
DC-1A	1½ × 1½	2⅛	1⅞	2½	8-32	1
DC-2A	2 × 1½	2⅜	2½	3	8-32	2¾
DC-2B	2 × 1½	2⅜	2½	3½	8-32	3
DC-4A	2½ × 2½	3⅛	3	3¾	8-32	4½
DC-5B	3⅛ × 2⅜	4⅛	3½	4½	10-32	10

FILTER REACTORS

Inductance measured at 50V, 60 cycles with rated direct current in the winding.

CATALOG NO.	INDUCTANCE IN HY.	RATED CURRENT D.C. Ma.	D.C. RESISTANCE	DIELECTRIC TEST VOLTAGE	CASE NUMBER
PGC 1	40	15	2000	1000	DM-01L
PGC 2	12	40	400	1000	DC-1AL
PGC 3	8	50	300	1000	DC-1AL
PGC 4	20	50	425	1500	DC-2AL
PGC 5	10	70	250	1500	DC-2AL
PGC 6	6	100	160	1500	DC-2AL
PGC 7	6	150	115	1500	DC-2BL
PGC 8	10	150	160	1500	DC-4AL
PGC 9	5.5	200	95	1500	DC-4AL
PGC 10	10	200	150	1500	DC-4AL
PGC 11	10	250	135	1500	DC-5BL
PGC 12	8	300	95	1500	DC-5BL
PGC 13	7	400	60	1500	DC-5BL

FREED - PARALLEL FEED AUDIO CHOKES

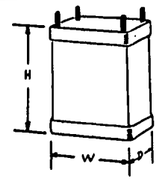
PGC 14	100	10	3500	1000	DM-01L
PGC 15	30	50	650	1500	DC-2AL
PGC 16	400	1	6000	1000	DM-01L

FREED - SWINGING INPUT REACTORS

PGC 17	5 - 20*	150	160	1500	DC-4AL
PGC 18	5 - 20*	250	135	1500	DC-5BL
PGC 19	3 - 15*	300	95	1500	DC-5BL
PGC 20	3 - 15*	400	60	1500	DC-5BL

* Inductance values for 100% and 10% of rated Direct Current.

FREED - PROFESSIONAL GRADE POWER TRANSFORMERS



CASE DIMENSIONS						
Case #	Mtg Center	Dimensions W	D	H	Mtg. Studs	Wgt.
DC-2B	2 × 1½	2⅜	2½	3½	8-32	3
DC-4A	2½ × 2½	3⅛	3	3¾	8-32	4½
DC-5A	3⅛ × 2⅜	4⅛	3½	3¾	10-32	9
DC-5B	3⅛ × 2⅜	4⅛	3½	4½	10-32	10
DC-6A	3¾ × 3	5	4½	4⅝	10-32	15
DC-7B	4⅛ × 3¾	5½	5	6⅝	¼-20	22

PROFESSIONAL GRADE POWER TRANSFORMERS

Fully impregnated and sealed in heavy gauge cases. Temperature rises range from 45° to 50°C.

T Following case number indicates Terminals

L Following case number indicates Leads

CATALOG NO.	PRI. VA	HI VOLT SEC.	CHOKE INPUT D.C.V.	CHOKE INPUT D.C. Ma.	COND. INPUT D.C.V.	COND. INPUT D.C. Ma.	RECTIFIER	FIL. #1	FIL. #2	CASE NUMBER
PGP 1	15	440V. C.T.	Low flux density, humbucking. For Preamp. svce.		270	15	6X4	6.3ct @ 0.6A.	6.3 @ 0.3A.	DC-2BL
PGP 2	30	550V. C.T.	Low flux density, humbucking. For Preamp. svce.		310	35	6X4	6.3ct @ 0.6A.	6.3ct @ 0.9A.	DC-4AL
PGP 3	45	500V. C.T.			270	40	6x4, 5Y3	5/6.3V. @ 2A.	6.3 @ 2A.	DC-4AL
PGP 4	57	600V. C.T.			330	50	6x4, 5Y3	5/6.3V. @ 2A.	6.3 @ 2.5A	DC-4AL
PGP 5	64	650V. C.T.			370	50	6x4, 5Y3	5/6.3 @ 2A.	6.3 @ 3A.	DC-4AL
PGP 6	73	600V. C.T.			320	70	6x4, 5Y3	5/6.3 @ 2A.	6.3 @ 3A.	DC-4AL

for PRECISION

FREED TRANSFORMERS

for QUALITY

FREED PROFESSIONAL GRADE POWER TRANSFORMERS

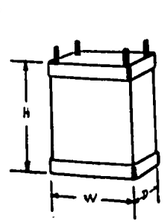
(Continued From Previous Page - See Same For Case Sizes)

CATALOG NO.	PY VA	HI VOLT	CHOKE INPUT D.C.V.	CHOKE INPUT D.C. Ma.	COND. INPUT D.C.V.	COND. INPUT D.C. Ma.	BIAS TAP.	RECTIFIER	FIL. #1	FIL. #2	FIL. #3	CASE NUMBER
PGP 7	110	650 C.T.	225	140	330	100		5Y3 5U4	5 @ 3A.	6.3 @ 5A.		DC-5BL
PGP 8	76	700 C.T.	260	100	385	70		5Y3	5 @ 2A.	6.3 @ 2.5		DC-5AL
PGP 9	108	700 C.T.	250	125	370	90		5Y3 5U4	5 @ 3A.	6.3 @ 5A.		DC-5BL
PGP 10	127	700V. C.T.	260	170	350	120		5U4	5 @ 3A.	6.3 @ 5A.		DC-5BL
PGP 11	146	700V. C.T.	260	210	350	150		5U4	5 @ 3A.	6.3 @ 5.A	6.3 @ 1.A	DC-6AL
PGP 12	207	800V. C.T.	295	280	400	200		5U4 2-5Y3	5 @ 4A.	6.3 @ 6A.		DC-6AL
PGP 13	225	800V. C.T.	295	280	400	200	80	5U4 2-5Y3	5 @ 4A.	6.3 @ 6A.	5/6.3 @ 2A.	DC-6AL
PGP 14	268	840V. C.T.	330	350	450	250	80	2-5U4	5 @ 6A.	6.3 @ 6A.	5/6.3 @ 2A.	DC-6AL
PGP 15	320	900V. C.T.	340	420	490	300	80	2-5U4	5 @ 6A.	6.3 @ 6A.	5/6.3 @ 2A.	DC-7BL
PGP 16	127	900V. C.T.	360	150				5U4	5 @ 3A.	6.3 @ 5A.		DC-6AL
PGP 17	150	900V. C.T.	350	200				5U4	5 @ 3A.	6.3 @ 5A.		DC-6AL
PGP 18	203	1100V. C.T.	400	250				5R4GY	5 @ 3A.	6.3 @ 5A.		DC-6AL
PGP 19	248	1100V. C.T.	420	300				2-5R4GY	5 @ 4A.	6.3 @ 7A.		DC-6AL
PGP 20	310	1280V. C.T.	480	350				2-5R4GY	5 @ 4A.	6.3 @ 7.0A.		DC-7BL

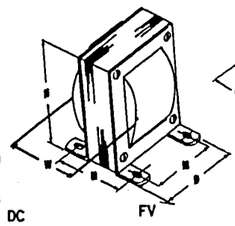
FREED - FILAMENT TRANSFORMERS

ALL PRIMARIES ARE FOR 115 V., 50/60 c.p.s.

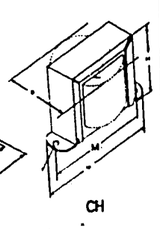
CATALOG NUMBER	SECONDARY VOLTAGE	SECONDARY CURRENT AMPS.	SECONDARY TEST VOLTAGE RMS	CASE SIZE
TF 1	2.5 C.T.	7.5	1500	CH60
TF 2	2.5 C.T.	10	1500	CH70
TF 3	2.5 C.T.	5	7500	DC2BT
TF 4	2.5 C.T.	10	7500	DC4AT
TF 5	5.0 C.T.	4	1500	CH60
TF 6	5.0 C.T.	6	1500	CH70
TF 7	5.0 C.T.	10	1500	CH80
TF 8	5.0 C.T.	10	1500	FV10
TF 9	5.0 C.T.	20	2500	FV30
TF 10	5.0 C.T.	20	10,000	DC6AT
TF 11	6.3 C.T.	1.35	1500	CH50
TF 12	6.3 C.T.	3	1500	CH60
TF 13	6.3 C.T.	5	1500	CH70
TF 14	6.3 C.T.	7	1500	FV12
TF 15	6.3 C.T.	10	1500	FV22
TF 16	10 C.T.	5	2500	CH80
TF 17	10 C.T.	5	2500	FV10
TF 18	10 C.T. OR 11. C.T. (TAPPED PRIMARY)	12 OR 11	7500	DC-5CT
TF 19	12.6 C.T.	2	1500	CH62



DC



FV



CH

T Following case number indicates Terminals

L Following case number indicates Leads

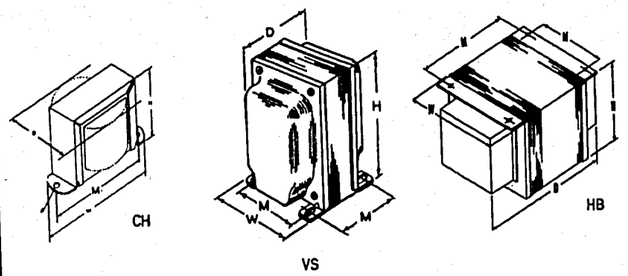
CASE DIMENSIONS								
Case #	Mtg Center	Dimensions W	D	H	Knockout	Mtg. Studs	Wgt.
DC-2BT	2 × 1½	2⅜	2½	3½	1⅛ × 1⅜	8-32	3
DC-4AT	2½ × 2½	3⅛	3	3¾	2 × 1½	8-32	4½
DC-5CT	3⅛ × 2⅜	4⅛	3½	4⅜	2½ × 2	10-32	12
DC-6AT	3¾ × 3	5	4½	4⅝	3 × 2½	10-32	15
FV-10	2 × 2	2⅜	2½	3⅛			2½
FV-12	2 × 2⅜	2⅜	2⅜	3⅛			2¾
FV-22	2½ × 2½	2⅜	2⅜	3⅛			4
FV-30	2½ × 2½	3⅛	3⅛	3⅜			5½
CH-50	2⅛ ×	2⅜	1⅜	1⅜			¾
CH-60	2⅜	3⅛	2	2			1½
CH-62	2⅜	3⅛	2⅛	2			1¾
CH-70	3⅛	3⅛	2⅛	2⅛			2
CH-80	3⅛	4	2⅛	2⅛			2¾

for PRECISION

FREED TRANSFORMERS

for QUALITY

FREED - AUTO TRANSFORMERS



To be used as a step-down auto transformer. Equipped with standard receptacle and line cord.

CATALOG NUMBER	TRANSFORMATION	VA RATING	CASE SIZE
SDT 1*	230/115 V. 50/60 C.P.S.	25	CH-60
SDT 2*	230/115 V. 50/60 C.P.S.	50	CH-62
SDT 3	230/115 V. 50/60 C.P.S.	50	VS-300
SDT 4	230/115 V. 50/60 C.P.S.	100	VS-401
SDT 5	230/115 V. 50/60 C.P.S.	200	VS-501
SDT 6	230/115 V. 50/60 C.P.S.	300	VS-601
SDT 7	230/115 V. 50/60 C.P.S.	400	VS-604
SDT 8	230/115 V. 50/60 C.P.S.	500	VS-611
SDT 9	230/115 V. 50/60 C.P.S.	750	VS-706
SDT 10	230/115 V. 50/60 C.P.S.	1000	VS-718
SDT 11	230/115 V. 50/60 C.P.S.	1500	VS-728
SDT 12*	230/115 V. 50/60 C.P.S.	2000	HB-718
SDT 13*	230/115 V. 50/60 C.P.S.	2500	HB-728
SDT 14*	230/115 V. 50/60 C.P.S.	3000	HB-828
SDT 15*	230/115 V. 50/60 C.P.S.	5000	HB-920

CASE DIMENSIONS

Case #	Mtg Center	Dimensions W	D	H	Wgt. (lbs)
CH-60	$2\frac{13}{16}$	$3\frac{1}{4}$	2	2	$1\frac{1}{2}$
CH-62	$2\frac{13}{16}$	$3\frac{1}{4}$	$2\frac{1}{8}$	2	$1\frac{3}{4}$
HB-718	$4\frac{3}{4} \times 4\frac{3}{4}$	$6\frac{3}{8}$	$8\frac{1}{2}$	$6\frac{1}{4}$	36
HB-728	$4\frac{3}{4} \times 6$	$6\frac{3}{8}$	$9\frac{3}{4}$	$6\frac{1}{4}$	45
HB-828	$5\frac{5}{8} \times 5\frac{7}{8}$	$7\frac{1}{4}$	$9\frac{7}{8}$	$6\frac{5}{8}$	54
HB-920	$5\frac{3}{8} \times 4\frac{3}{4}$	$7\frac{1}{4}$	$8\frac{5}{8}$	10	75
VS-300	$2 \times 1\frac{11}{16}$	$2\frac{29}{32}$	$2\frac{3}{4}$	$3\frac{1}{32}$	$2\frac{3}{4}$
VS-401	$2\frac{1}{4} \times 1\frac{3}{4}$	$2\frac{29}{32}$	3	$3\frac{15}{32}$	$4\frac{1}{2}$
VS-501	$2\frac{1}{2} \times 2\frac{1}{16}$	$3\frac{7}{32}$	$3\frac{5}{16}$	$3\frac{17}{32}$	$6\frac{1}{4}$
VS-503	$2\frac{1}{2} \times 2\frac{5}{16}$	$3\frac{7}{32}$	$3\frac{5}{8}$	$3\frac{17}{32}$	$5\frac{1}{4}$
VS-601	$3 \times 2\frac{7}{16}$	$3\frac{27}{32}$	$3\frac{5}{8}$	$4\frac{19}{32}$	$7\frac{1}{4}$
VS-604	$3 \times 2\frac{11}{16}$	$3\frac{27}{32}$	$3\frac{7}{8}$	$4\frac{19}{32}$	$7\frac{3}{8}$
VS-611	$3 \times 3\frac{11}{16}$	$3\frac{27}{32}$	$4\frac{7}{8}$	$4\frac{19}{32}$	12
VS-700	$3\frac{1}{2} \times 3\frac{3}{16}$	$4\frac{1}{2}$	$4\frac{3}{4}$	$5\frac{11}{32}$	14
VS-706	$3\frac{1}{2} \times 3\frac{13}{16}$	$4\frac{1}{2}$	$5\frac{1}{4}$	$5\frac{11}{32}$	16
VS-714	$3\frac{1}{2} \times 4\frac{13}{16}$	$4\frac{1}{2}$	$6\frac{1}{4}$	$5\frac{11}{32}$	25
VS-718	$3\frac{1}{2} \times 5\frac{3}{16}$	$4\frac{1}{2}$	$6\frac{3}{4}$	$5\frac{11}{32}$	29
VS-728	$3\frac{1}{2} \times 6\frac{9}{16}$	$4\frac{1}{2}$	8	$5\frac{11}{32}$	36

*Supplied with leads without line cord and receptacle

FREED - ISOLATION TRANSFORMERS

Electrostatic shield between primary and secondary. Equipped with standard receptacle and line cord.

CATALOG NUMBER	PRIMARY VOLTAGE 50/60 C.P.S.	SECONDARY VOLTAGE	VA RATING	CASE SIZE
IT 1	115	115	50	VS-401
IT 2	115	115	100	VS-503
IT 3	115	115	300	VS-700
IT 4	115	115	500	VS-714

for PRECISION

FREED TRANSFORMERS

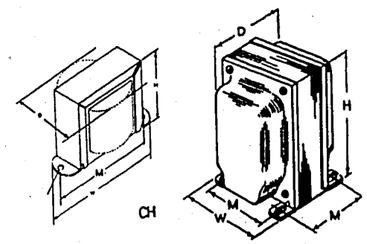
for QUALITY

REPLACEMENT GRADE COMPONENTS

FREED - REPLACEMENT GRADE CHOKES

CATALOG NO.	INDUCT. IN HENRIES	RATED CURRENT D.C.Ma.	D.C. RESIST.	DIELECTRIC TEST VOLTAGE	CASE NUMBER
RGC 1	4	40	200	1000	CH-40
RGC 2	9	40	400	1000	CH-40
RGC 3	6	50	400	1000	CH-40
RGC 4	10	55	400	1500	CH-50
RGC 5	10	75	250	1500	CH-60
RGC 6	10	75	250	1500	VS-100
RGC 7	6	100	150	1500	CH-60
RGC 8	6	100	150	1500	VS-100
RGC 9	3.5	150	100	1500	CH-60
RGC 10	3.5	150	100	1500	VS-100
RGC 11	2	200	60	1500	CH-60
RGC 12	2	200	60	1500	VS-100
RGC 13	3.7	200	65	1500	CH-80
RGC 14	3.7	200	65	1500	VS-300
RGC 15	2.8	300	65	1500	CH-80
RGC 16	2.8	300	65	1500	VS-300

FREED REPLACEMENT GRADE AUDIO TRANSFORMERS



CASE DIMENSIONS

Case #	Mtg Center	Dimensions W	D	H	Wgt. (lbs.)
CH-40	2	$2\frac{3}{8}$	$1\frac{5}{8}$	$1\frac{1}{4}$	$\frac{1}{2}$
CH-50	$2\frac{3}{8}$	$2\frac{5}{8}$	$1\frac{7}{8}$	$1\frac{1}{8}$	$\frac{3}{4}$
CH-60	$2\frac{13}{16}$	$3\frac{1}{4}$	2	2	$1\frac{1}{2}$
CH-80	$3\frac{5}{8}$	4	$2\frac{5}{8}$	$2\frac{5}{8}$	$2\frac{1}{4}$
VS-100	$1\frac{1}{2} \times 1\frac{1}{8}$	$1\frac{5}{8}$	$2\frac{1}{4}$	$2\frac{1}{2}$	$1\frac{1}{2}$
VS-300	$2 \times 1\frac{11}{16}$	$2\frac{29}{32}$	$2\frac{3}{4}$	$3\frac{1}{32}$	$2\frac{1}{4}$

CATALOG NO.	APPLICATION	IMPEDANCE LEVEL OHMS PRIMARY	SECONDARY	MAX. POWER LEVEL V.U.* or POWER IN WATTS	RATIO	MAX PRI DC PER SIDE Ma.	D.C. UNBAL. Ma.	FREQ. RESPONSE C.P.S.	CASE NUMBER
RGA 1	Input; multiple line or double button mike to single or push pull grids	500CT 200CT	100000CT	+ 20	1:14.1	50	5	± 1DB 200-5000	CH40
RGA 2	Input; single button mike to single or push pull grids	100	100000CT	+ 20	1:31.6	50		± 1DB 200-5000	CH40
RGA 3	Input; voice coil to single grid	3.2	100000	+ 20	1:179			± 1DB 200-5000	CH40
RGA 4	Mixing and matching line to line	600CT 500CT 200CT 150/125/50.	600CT 500CT 200CT 150/125/50	+ 20	1:1			± 1DB 100-5000	CH40
RGA 5	Interstage; single triode plate to single or P.P. grids	10000	90000CT	+ 30	1:3	10		± 1DB 200-5000	CH40
RGA 6	Output; single plate to line or mixer	10000	600CT 500CT 200CT 150/125/50	+ 30	4.8:1	10		± 1DB 200-5000	CH40
RGA 7	Output; Push pull plates to line or mixer triode	20000CT	600CT 500CT 200CT 150/125/50	+ 30	6.32:1	10	1	± 1DB 200-5000	CH40
RGA 8	Output; plate to V.C. 6AL6, 6L6, 6Y6, 25B6, 25C6, 35A5, 35B5, 35C5, 50B5, 50C5, 50C6, 50L6 117N7	2500	3.2	5W		60		± 1DB 200-10000	CH40
RGA 9	Output; plate to V.C. 6V6, 6AQ5, 6AS5, 7C5	5000	3.2	5W		50		± 3DB 200-10000	CH40
RGA 10	Output; plate to V.C. 6AR5, 6K6, 6V6, 7B5, 14A5, 3S4, 3U4, 3Q4, 3Q5, 3C5, 3A4	10000 OR 7500	3.2	5W		30		± 3DB 200-10000	CH40
RGA 11	Output; P.P. plates to V.C. P.P. 6V6, PP6K6	12000CT OR 8000	3.2	15W		50		± 2DB 50-8000	CH60

* 1 sw. reference level

for PRECISION

FREED TRANSFORMERS

for QUALITY

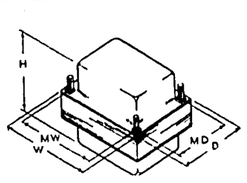
FREED - REPLACEMENT GRADE POWER TRANSFORMERS

The "Replacement Grade Components" are low price excellent efficiency transformers and reactors designed for radio, television, public address and low power amateur equipment.

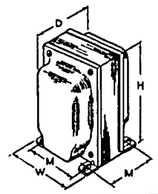
Tapped audio transformers assure maximum impedance range together with optimum frequency response.

The performance characteristics of all filter reactors are given under full load conditions. Power transformers are conservatively designed for good regulation resulting in a temperature rise not exceeding 55°C.

All "Replacement Grade Components" feature low loss magnetic materials and vacuum impregnation for a moisture proof seal.



HS



VS

CASE DIMENSIONS					
Case #	Mtg Centers	Dimensions W	D	H	Wgt. (lbs.)
VS-300	2 × 1⅛	2⅜	2¾	3½	2¾
VS-303	2 × 1⅝	2⅜	3	3½	3½
VS-306	2 × 2⅛	2⅜	3⅜	3½	4½
VS-307	2 × 2⅛	2⅜	3¾	3½	4¾
VS-503	2½ × 2⅜	3½	3⅝	3⅞	5¼
VS-505	2½ × 2⅜	3½	3⅝	3⅞	6
VS-604	3 × 2⅛	3½	3¾	4⅜	7⅜
VS-605	3 × 2⅜	3½	4⅛	4⅜	8¾
VS-606	3 × 3⅛	3½	4¼	4⅜	9¼
VS-609	3 × 3⅛	3½	4⅜	4⅜	11
VS-611	3 × 3½	3½	4⅜	4½	12
VS-612	3 × 3½	3½	5	4½	13
VS-709	3½ × 4⅛	4½	5⅜	5⅛	19

CASE DIMENSIONS					
Case #	Mtg Centers	Dimensions W	D	H	Wgt. (lbs.)
HS-300	2½ × 2	3	2½	2⅛	2¾
HS-303	2½ × 2	3	2½	2⅛	3½
HS-306	2½ × 2	3	2½	3¼	4½
HS-307	2½ × 2	3	2½	3½	4¾
HS-503	3⅛ × 2½	3¾	3⅛	3⅜	5¼
HS-505	3⅛ × 2½	3¾	3⅛	3⅜	6
HS-604	3¾ × 3	4½	3¾	3⅞	7⅜
HS-605	3¾ × 3	4½	3¾	3⅞	8¼
HS-606	3¾ × 3	4½	3¾	4	9¼
HS-609	3¾ × 3	4½	3¾	4⅛	11
HS-611	3¾ × 3	4½	3¾	4⅜	12
HS-612	3¾ × 3	4½	3¾	4¾	13
HS-709	4⅜ × 3½	5¼	4⅜	5⅜	19

CATALOG NO.	PY VA	HI VOLT D.C.V.	CHOKE D.C.Ma.	INPUT	COND. D.C.V.	INPUT D.C.Ma.	BIAS TAP	RECTIFIER	FIL. #1	FIL. #2	FIL. #3	CASE NUMBER
RGP 1	45	500 CT			270	40		6x4, 5Y3	5/6.3 @ 2A	6.3 @ 2A		VS300
RGP 2												HS300
RGP 3	57	600 CT			330	50		6x4, 5Y3	5/6.3 @ 2	6.3 @ 2.5		VS303
RGP 4												HS303
RGP 5	64	650 CT			370	50		6X4, 5Y3	5/6.3 @ 2	6.3 @ 3		VS303
RGP 6												HS303
RGP 7	73	600 CT			320	70		6x4, 5Y3	5/6.3 @ 2	6.3 @ 3		VS306
RGP 8												HS306
RGP 9	110	650 CT	225V.	140	330	100		5Y3, 5U4	5 @ 3	6.3 @ 5		VS503
RGP 10												HS503
RGP 11	76	700 CT	260V.	100	385	70		5Y3	5 @ 2	6.3 @ 2.5		VS307
RGP 12												HS307
RGP 13	108	700 CT	250	125	370	90		5Y3, 5U4	5 @ 3	6.3 @ 5		VS503
RGP 14												HS503
RGP 15	127	700 CT	260	170	350	120		5U4	5 @ 3	6.3 @ 5		VS505
RGP 16												HS505
RGP 17	146	700 CT	260	210	350	150		5U4	5 @ 3	6.3 @ 5	6.3 @ 1	VS604
RGP 18												HS604
RGP 19	207	800 CT	295	280	400	200		5U4 2-5Y3	5 @ 4	6.3 @ 6		VS606
RGP 20												HS606
RGP 21	225	800 CT	295	280	400	200	80	5U4 2-5Y3	5 @ 4	6.3 @ 6	5/6.3 @ 2	VS606
RGP 22												HS606
RGP 23	268	840 CT	330	350	450	250	80	2-5U4	5 @ 6	6.3 @ 6	5/6.3 @ 2	VS612
RGP 24												HS612
RGP 25	320	900 CT	340	420	490	300	80	2-5U4	5 @ 6	6.3 @ 6	5/6.3 @ 2	VS709
RGP 26												HS709
RGP 27	127	900 CT	360	150				5U4	5 @ 3	6.3 @ 5		VS604
RGP 28												HS604
RGP 29	150	900 CT	350	200				5U4	5 @ 3	6.3 @ 5		VS605
RGP 30												HS605
RGP 31	203	1100 CT	400	250				5R4GY	5 @ 3	6.3 @ 5		VS611
RGP 32												HS611
RGP 33	248	1100 CT	420	300				2-5R4GY	5 @ 4	6.3 @ 7		VS612
RGP 34												HS612
RGP 35	310	1280 CT	480	350				2-5R4GY	5 @ 4	6.3 @ 7		VS709
RGP 36												HS709

for PRECISION

FREED TEST INSTRUMENTS

for QUALITY

LOW FREQUENCY "Q" INDICATOR

TYPE NO. 1030



USES

The Type 1030 Low Frequency "Q" Indicator measures directly the "Q" factor of coils. The instrument can also be used to measure the inductance of coils, distributed capacity, impedances, and dielectric losses. The "Q" Indicator can be used to study the magnetic properties of iron, such as stability of iron cores in function of applied voltages, and iron losses as a function of the frequency.

FEATURES

The main and essential feature of the instrument is that the "Q" factor is read directly without any complicated computations. The possibility of measuring "Q" through the whole audio and supersonic frequency range is provided. The setting up and the measuring of the "Q" of coils is practically instantaneous. The instrument is unaffected by line voltage variations, is entirely self-contained and A.C. operated. Both meters ("multiply-by" and "Q") are protected against overloads and cannot be burned out. The effective frequency range for "Q" measurements is 50 to 50,000 cycles. Due to the fact that the R.C. Oscillator frequency range is from 20 to 200,000 cycles, comparative "Q" Measurements can be made below 50 cycles and above 50,000 cycles. Since the "Q" factor appears as a relative quantity, i.e., a ratio of two voltages, the tracking of the two meters is such that a reasonably good accuracy of "Q" factors is obtained for frequencies above 50,000 cycles. The terminals of the variable decade condensers are available directly on the front panel of the instrument and can therefore be used as a high quality precision variable condenser. The R.C. Oscillator and variable impedance amplifier can be used as a separate low frequency generator with a maximum output power of five watts into a 50 ohm load. The "Q" scale is calibrated from 0 to 50. A high accuracy of measurement is obtained, since for any position of the multipliers, a total of "Q" variation from 0 to 50 is read on a 4 inch meter. "Q" factors of coils can be measured with up to 50 volts across the coil, and therefore makes it possible to determine the stability and the variations of the "Q" factor of coils in function of the applied voltage. The voltage fed into the series circuit is variable from 10 volts to 0.01 volt.

SPECIFICATIONS

Range of "Q" Measurements: The range of "Q" factors is from 0.5 to 500 over the frequency range from 50 to 50,000 cycles. The accuracy of "Q" measurement is approximately 5% for frequencies up to 50,000 cycles.

Oscillator Frequency Range: Continuously variable from 20 to 200,000 cycles in four ranges.

Frequency Accuracy: 1% under normal temperature conditions. The frequency stability is better than 2% over a long period of time.

Output Impedance and Voltage: Four output impedances are available.

(a) 10 ohms impedance – 10 V Output Voltage
(b) 1 ohm impedance – 1 V Output Voltage
(c) 0.2 ohm impedance – 0.1 V Output Voltage
(d) 0.1 ohm impedance –0.01 V Output Voltage

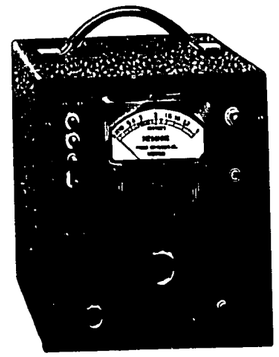
Those Impedances are measured at 50,000 cy.

Variable Condenser: The variable condenser is composed of a 10 x 1 mf., 10 x 0.1 mf., 10 x 0.01 mf., 10 x 0.001 mf. decade condenser and a 0.001 mf. variable air condenser.

Power Supply: The instrument is entirely self-contained and A.C. operated. Total consumption 200 watts.

Dimension ..... 19¼" 14½" 23"
Weight .....120 lbs.

TYPE 1020-B MEGOHMMETER



USES: The Freed Type 1020-B Megohmmeter is a self contained and a-c operated instrument equally useful in the laboratory or for production testing of the leakage resistance of insulation materials, condensers, cables, motors and transformer windings.

FEATURES: Resistance values indicated directly on a four inch meter protected against over-load.

Rapid and safe to use, test voltage removed from terminals and capacitive component discharged to ground in all positions of multiplier switch. Low resistance in series with component under test provides very short charging time for even the very largest capacitors. Calibration position provided to check accuracy of 500 volts d-c potential. 500 volt test supply electronically regulated.

SPECIFICATIONS

Range: 1 megohm to 2,000,000 megohms in six overlapping ranges selected by a multiplier switch.

Accuracy: Plus or minus 3% on resistance values up to 100,000 megohms; plus or minus 5% from 100,000 to 2,000,000 megohms.

Voltages on Unknown: The voltage applied to the unknown terminals is 500 volts d-c and is independent (less than 1%) of the value of the unknown.

Stability: Line voltage variations from 105-125 volts will cause less than 2% variation in the meter reading.

Power Supply: 105-125 volts A.C. 50-60 cycles 30 watts.

Dimensions: 9½ x 10½ x 8 inches.

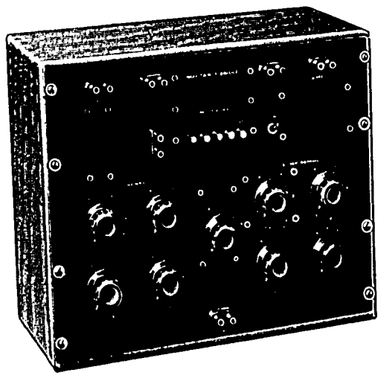
Net Weight: 18 pounds.

for PRECISION

FREED TEST INSTRUMENTS

for QUALITY

TYPE 1110-A INCREMENTAL INDUCTANCE BRIDGE



USES

The Incremental Inductance Bridge is designed for measuring the inductance of Iron Core components at any frequency up to 10,000 cycles. Inductors can be measured with a superimposed direct current, therefore, the bridge will measure the incremental inductance of coils. The bridge can be used for determination of storage factor, "Q", either at a given frequency in function of the applied voltage or at a given voltage in function of the applied frequency. The bridge can be used by the manufacturers of iron core components, such as filter chokes, high Q coils, and iron core audio and supersonic frequency components. Due to its very wide inductance range the instrument can be used as a general purpose laboratory inductance bridge.

SPECIFICATIONS

Inductance Ranges: One millihenry to one thousand henries in five ranges. Inductance values are read directly from a four dial decade and a multiplier switch. The last range may be extended to 10,000 henries through the use of an external resistance.

Conductance Ranges: One micromho to one mho in five ranges, read directly from a four dial decade and a multiplier switch. This conductance represents the reciprocal of the A.C. resistance of the coil.

"Q" Range: "Q" is measured as the product of Inductance (L) and Conductance (G). The range of "Q" measured on the bridge is 0.5 to 100. Measurement of inductance is independent of the values of "Q".

Accuracy: 1% through the frequency range from 60-1000 cycles 2% for frequencies from 1000 to 10,000 cycles. This accuracy is decreased for extreme positions of the multiplier. Conductance measurements 5% from 60-1000 cycles.

Frequency Range: The bridge is calibrated and adjusted at both 60 and 1000 cycles, but can be used at any frequency up to 10,000 cycles. Errors resulting from stray capacity increase with frequency. Coils having a high inductance should be measured at a low frequency to avoid resonance effect.

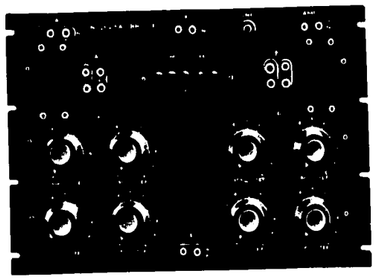
Range of Superimposed D.C.: On multiplier switch position L X 100, the D.C. is limited to 10ma.
On the position L X 10, the D.C. is limited to 250 ma.
On all other positions the D.C. can be one ampere maximum.

Mounting: The bridge is supplied in a walnut cabinet or on special order for standard rack mounting.

		W	H	D
Dimensions:	Rack:	19"	x 8"	x 14"
Dimensions:	Cabinet:	21"	x 8"	x 14 5/8"

Net Weight: Rack–37 lbs.; Cabinet–48 lbs.

TYPE 1150 UNIVERSAL BRIDGE



FEATURES

The Universal Bridge offers a variety of five possible bridge circuits. A wide range of capacitance, inductance, impedance, and phase angle measurement can be made throughout the frequency spectrum from 20 cycles to 20,000 cycles. By using decade resistors in the variable arms the unknown can be measured to four significant figures.

Operation is simple and both terminals and controls are arranged for convenience and ease of measurements.

SPECIFICATIONS

Frequency Range: The bridge can be used at frequencies from 20 cycles to 20,000 cycles.

Accuracy: All resistors of the bridge arms are adjusted to 0.1%. The absolute accuracy of measurement will depend upon the accuracy of standards used.

Inductance Range: The bridge will measure inductance of coils from 0.1 mh to 1000 henries with an accuracy of 0.5% at 1000 cycles.

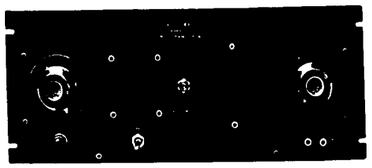
Capacitance Range: Condensers from 0.001 mf to 1 mf can be measured to within 0.5% at 1000 cycles. Condensers below 0.001 mf should be measured by the substitution method.

Mounting: The bridge is supplied in a walnut cabinet or on special order for standard rack mounting.

	W	D	H
Dimensions:	19"	x 8½"	x 14"

Weight: 32 lbs.

NO. 1180 A.C. SUPPLY



A valuable laboratory instrument with continuously variable output from 1/10 volt to 100 volts at 60 cycles.

Dimensions: Width–19"; Depth 5"; Height 7"

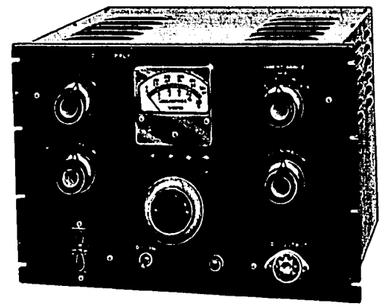
Weight: 13½ pounds.

for PRECISION

FREED TEST INSTRUMENTS

for QUALITY

TYPE NO. 1170 D.C. SUPPLY



USES

The Type 1170 Power Supply is intended to be used as a dependable source of direct current for the Incremental Inductance Bridge Type No. 1110A. The supply can also be used as a general laboratory substitute for a high voltage storage battery.

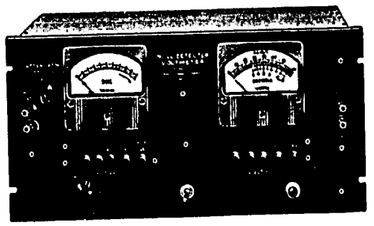
DESCRIPTION

The Type 1170 D.C. supply consists of an electronically regulated high voltage supply. Four independent control circuits provide four current ranges, namely 5 milliamperes, 25 milliamperes, 100 milliamperes and 500 milliamperes. The output current is indicated by a multirange 4" meter.

SPECIFICATIONS

Current Ranges: Four current ranges - 5-25-100 and 500 milliamperes.
Voltage Ranges: The maximum no load voltages corresponding to the four current ranges are the following: 500 MA – 270 volts, 100 MA – 270 volts, 25 MA – 55 volts, 5 MA – 25 volts. On both 500 MA and 100 MA range with the control set to zero, the output voltage is independent of the load.
Voltage Regulation: The unit operates from a 115 volts, 50-60 cycle line. For a line variation of plus or minus 10%, the output voltage shall not vary more than ± 1½%.
Power Consumption: Under 500 MA full load the power consumption is 360 watts. Under no load conditions the consumption is 150 watts.
Hum Level: On the 270 volt, 500 milliampere range the hum level under full load condition is 6 millivolts which corresponds to – 93 Db.
Mounting: The instrument is supplied for mounting on a 19 inch relay rack or for cabinet mounting.
Dimensions: Rack: 19"W. x 12 3/16" D. x 12¼"; Cabinet: 21½"W. x 15"D. x 14"H.
Net Weight: In Cabinet - 89 lbs Rack Mounted - 68 lbs.

NO. 1210 NULL DETECTOR AND VACUUM TUBE VOLTMETER



USES

The Type 1210 Null Detector and Vacuum Tube Voltmeter is primarily designed for bridge measurements. The Null Detector indicates the balance of the bridge, and the Vacuum Tube Voltmeter indicates the voltage across the unknown two terminal or four terminal network. The three selective circuits provide means for sharply tuning the instrument to audio frequencies commonly used for measurements. The Vacuum Tube Voltmeter can be used as a general purpose audio Vacuum Tube Voltmeter.

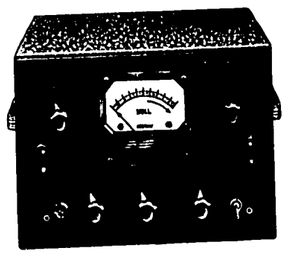
DESCRIPTION

The Type 1210 Null Detector and Vacuum Tube Voltmeter is a combination of the Model 1140A Null Detector Amplifier, and a modified model 1060 high input impedance Vacuum Tube Voltmeter. Both instruments are independent and feed two separate 4" meters.

SPECIFICATIONS

NULL DETECTOR
Input Impedance: 1 megohm in parallel with 25 mmf.
Frequency Response: 2 Db from 20 to 20,000 cycles – 5 Db at 50,000 cycles.
Null Detector Sensitivity: At 1000 cycles, 100 microvolts will give a 15% meter deflection.
Selective Amplifier: 23 Db second harmonic attenuation at 60 cycles, 400 cycles and 1000 cycles.
VACUUM TUBE VOLTMETER
Voltage Ranges: 0.01 volts to 100 volts in four ranges–(0.1–1–10–100 volts at ⅓ of scale.)
Accuracy: 2% of full scale on all four ranges.
Waveform Error: The instrument is a full wave average meter and is free of turnover effects. For small amounts of distortion the accuracy of the instrument is independent of the waveform.
Frequency Range: 20 cycles to 20,000 cycles (1 Db).
Input Impedance: Equivalent to 50 megohms resistance in parallel with a 15 mmf condenser.
Meter Scale: Voltage scale calibrated from 0 to 150. Decibel scale calibrated from–6Db to + 3Db.
Dimensions: Rack Mounting 19"x 9"x 11½".
Net Weight: 25 Lbs.

MODEL 1140A NULL DETECTOR-AMPLIFIER



USES

The Freed Model 1140A Null Detector Amplifier is a sensitive null indicator for bridge measurements, providing visual null indications or aural when used in conjunction with headphones. The unit may also be used as a high gain amplifier for general laboratory work.

DESCRIPTION

Functionally the instrument consists of a high gain linear amplifier with a 30 db. input attenuator in addition to the variable gain control. A four inch panel meter provides visual null indications, the response of the meter circuit is approximately logarithmic over a 40 db. voltage range. Resonant circuits tuned to 60, 400 and 1000 cycles limit the amplifier transmission characteristics to the three audio frequencies commonly used for bridge measurements.

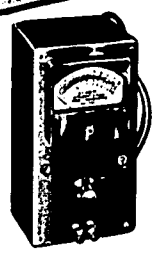
SPECIFICATIONS

Input Impedance: 1 megohm in parallel with 25 mmf. GAIN: 98 db. with 1 megohm load (6 mmf. shunt capacity), down 1.5 db. at 25,000 cycles, down 5 db. at 50,000 cycles, down 2 db. at 20 cycles.
Null Detector Sensitivity: At 1 Kc. 100 microvolts will give a 15% meter deflection
Selective Amplifier: 23 db. second harmonic attenuation at 60, 400 and 1000 cycles.
Output Impedance: Approximately 50,000 ohms.
Output Voltage: 40 volts undistorted into 1 megohm load, 10 volts into 20,000 ohms.
Power Supply: 105-125 volts, 50-60 cycles, 35 watts consumption.
Mounting: This instrument can be supplied in cabinet model(Type No. 1140A) or in a standard relay rack mount with dust cover (Type No.1140AR)
Dimensions: (Type No. 1140A) 13½" x 8½" x 10" overall; (Type No.1140AR) 19"L. x7" W. x 9"D.
Weight: 24 lbs.

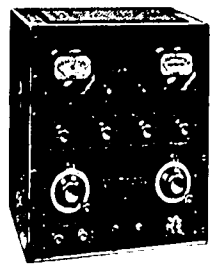
FREED

TRANSFORMERS & INSTRUMENTS

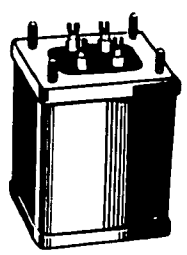
"PRODUCTS OF EXTENSIVE RESEARCH



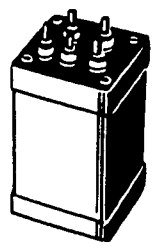
NO. 1040 VACUUM TUBE VOLTMETER



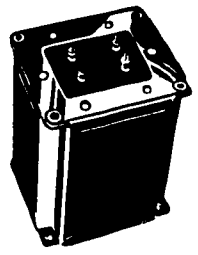
NO. 1030 LOW FREQUENCY "Q" INDICATOR



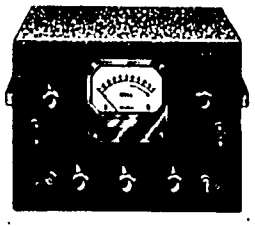
HIGH FIDELITY TRANSFORMERS ½ DB 20 CPS TO 30 KC.



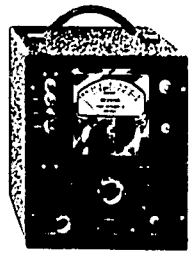
DISCRIMINATORS 10 CPS TO 1 MC



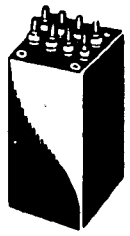
COMMERCIAL COMPONENTS QUALITY— DEPENDABILITY — PRICE



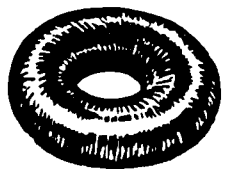
NO. 1140A NULL DETECTOR COMPLETE WITH SELECTIVE CIRCUITS



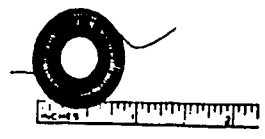
NO. 1020B MEGOHMMETER 2,000,000 MEGOHMS DIRECT READING



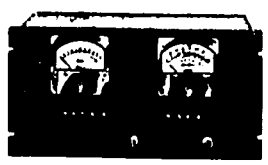
HERMETICALLY SEALED COMPONENTS TO MEET MIL-T-27 SPECS.



TOROIDAL INDUCTORS 60 CPS TO 1 MC



MINIATURE INDUCTORS 1000 CPS TO 100 KC



NO. 1210 NULL DETECTOR & VACUUM TUBE VOLTMETER



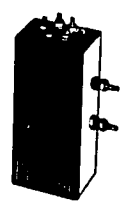
DECADE INDUCTORS 30 CPS TO 300 KC



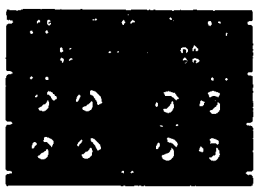
SUB MINIATURE HERMETICALLY SEALED TOROIDAL INDUCTORS



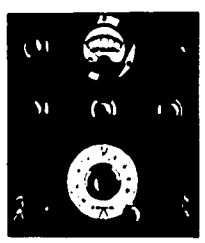
SUB MINIATURE HERMETICALLY SEALED COMMUNICATION COMPONENTS



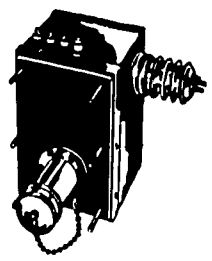
SLUG TUNED COMPONENTS



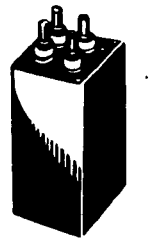
NO. 1150 UNIVERSAL BRIDGE 5 A.C. BRIDGES IN ONE UNIT



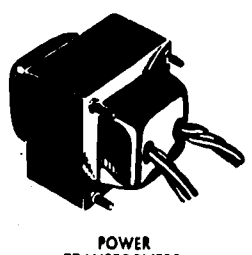
NO. 1010A COMPARISON BRIDGE FAST, ACCURATE, RELIABLE



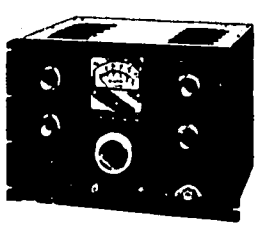
PULSE MODULATORS



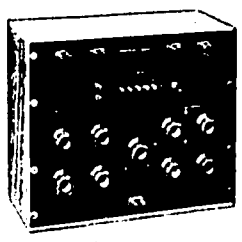
PULSE TRANSFORMERS FROM WATTS TO MEGAWATTS



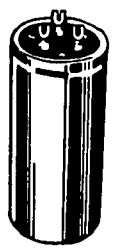
POWER TRANSFORMERS RUGGED, DEPENDABLE, INEXPENSIVE,



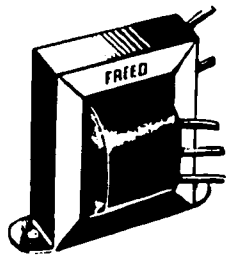
1170 D.C. SUPPLY DIRECT CURRENT UP TO 500 MA.



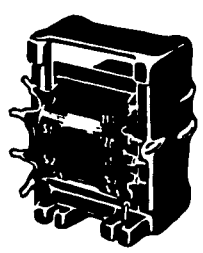
NO. 1110A INCREMENTAL INDUCTANCE BRIDGE A NECESSITY FOR EVERY LAB.



PRECISION FILTERS 10 CPS. TO 1 MC.



CHANNEL MOUNTING INEXPENSIVE—RELIABLE



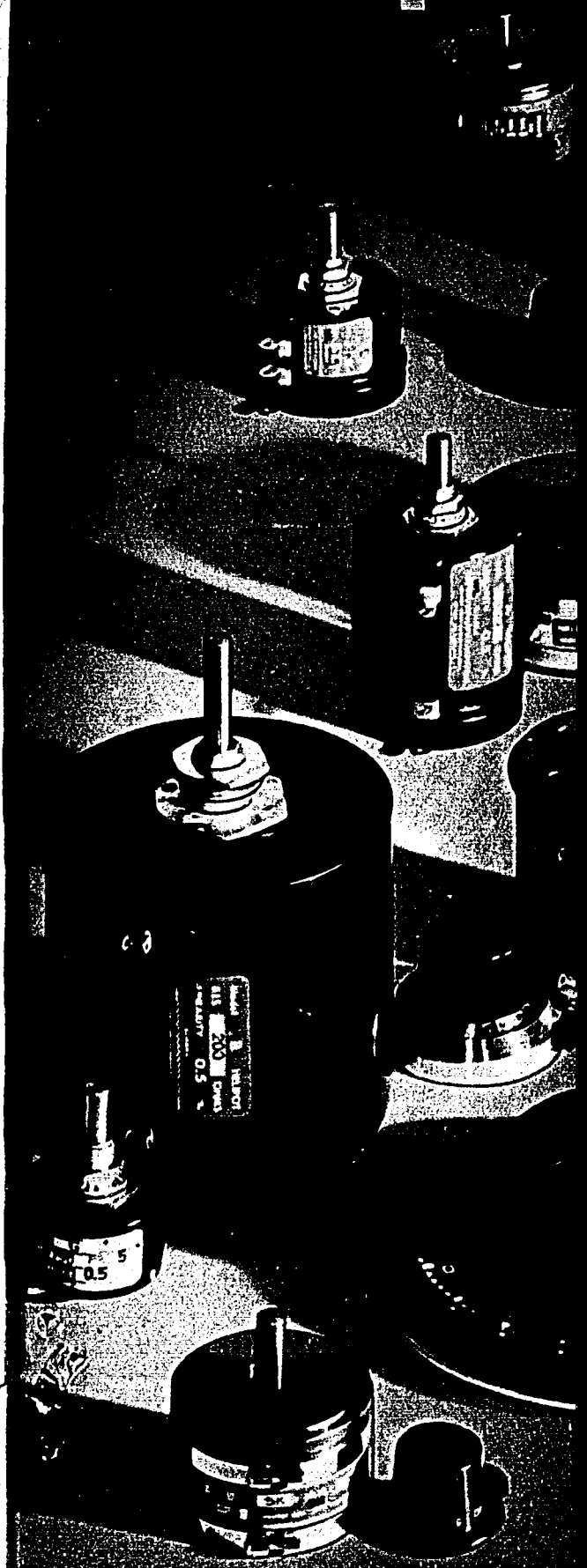
FREEDSEAL TREATMENT ANE-19 SPECS.

FREED TRANSFORMER CO., INC.

1718-36 WEIRFIELD ST., (RIDGEWOOD) BROOKLYN 27, NEW YORK

EXPORT DIVISION: 458 BROADWAY, NEW YORK CITY 13, N. Y.

Helipo



Helipot — First in precision potentiometers



WHATEVER YOUR NEEDS in precision potentiometers, you know they will be met at Helipot. For the widest selection of types ... for the greatest choice of models ... for the largest number of in-stock items ... for the assurance of a precision potentiometer to meet your exact specifications ... come to Helipot ... first in precision potentiometers!

MULTI-TURN HELIPOTS Where highest accuracy and greatest resolution is required ... especially where space is limited ... a multi-turn potentiometer may be the answer. Helipot, originator of the helical potentiometer, makes multi-turn models in a variety of sizes and designs ... one for every purpose. Standard models are described in the following pages ... and as with *every* Helipot product, they may be modified to meet *your* specifications.

SINGLE-TURN HELIPOTS Where continuous rotation is needed, there is a single-turn Helipot to meet your requirements. In this type, too, Helipot offers a variety of sizes and designs ... one styled specifically for each use. See the following pages for characteristics of the several standard models ... and bear in mind that our large and expert engineering staff is always happy to work with you, whether your particular use requires an adaptation of a standard Helipot ... or an entirely new model.

NON-LINEAR HELIPOTS There is an increasing number of important applications for potentiometers which have non-linear (functional) characteristics. As with *every* Helipot product, we offer a variety of mounting arrangements ... and an almost unlimited number of non-linear functions may be reproduced. If your use requires a special empirical function ... or if it will be met by one of the more common trigonometric functions ... Helipot engineers can design the potentiometer best suited to your needs.

DUODIALS Helipot engineers have designed several models of multiple-turns-indicating Duodials ... for use not only with Helipots, but with *any* multi-turn device. Duodials add distinction to the finest instrument panels ... even more important, they provide the high degree of setting accuracy needed to complement the adjustment accuracy of the Helipot.

Naturally, the Helipot engineering staff is at your service [illegible] Helipot division is happy to [illegible] standard models to meet [illegible] or in adapting [illegible] to your particular requirements [illegible] in handling [illegible] new types to [illegible] your own special needs.

The various basic types of Helipots and Duodials are described in detail in the following pages ... note particularly the wide range of standard models which are carried in stock.

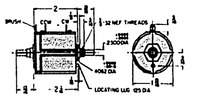
Helipot division

BECKMAN INSTRUMENTS INC.
SOUTH PASADENA, CALIFORNIA
Plants at South Pasadena, Calif., and Mountainside, N.J.
Representatives in Principal Cities
(See map and listing on following pages)

MULTI-TURN HELIPOTS

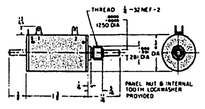
MODEL A SERIES

Successor to the first commercially manufactured helical potentiometer ... and still the one most widely used. A ten-turn unit of convenient size and compact design, offering resolution of twelve to fourteen times that of a single-turn unit of the same diameter. Threaded bushing mount.



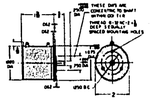
MODEL AJ SERIES

A miniature ten-turn unit ... no larger than a copper penny ... yet with a coil length of eighteen inches! Model AJ: threaded bushing mount. Model AJS: sleeve bearing servo mount. Model AJSP: ball bearing servo mount.



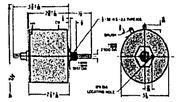
MODEL AN SERIES

Dimensionally similar to the Model A Series, but manufactured to such close tolerances that they have about a two-to-one advantage in linearity tolerance. Especially well suited to servo mechanism use ... regularly furnished with ball bearing servo mount.



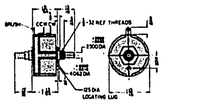
MODEL B SERIES

A larger diameter, 15-turn unit, offering the highest resolution and greatest adjustment accuracy available in a standard, mass-produced potentiometer. Model B: threaded bushing mount. Model BS: sleeve bearing servo mount. Model BSP: ball bearing servo mount.



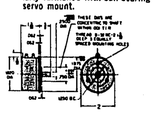
MODEL C SERIES

Generally similar to the Model A Series, but with only three helical turns of resistance wire. Especially suited to those applications requiring great accuracy, but where space behind the panel is limited.



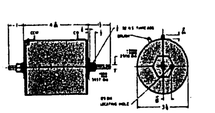
MODEL CN SERIES

Dimensionally similar to the Model C Series, but manufactured to such close tolerances that they have about a two-to-one advantage in linearity tolerance. Especially well suited to servo mechanism use ... regularly furnished with ball bearing servo mount.



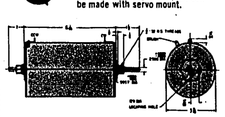
MODEL D SERIES

A larger diameter, 25-turn unit, affording extremely high resolution and accuracy. Usually furnished with threaded bushing mount, but can be made with servo mount.



MODEL E SERIES

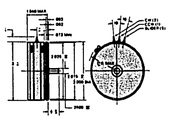
Generally similar to the Model D Series, but with 40 turns of resistance wire, affording even higher resolution and adjustment accuracy. Usually furnished with threaded bushing mount, but can be made with servo mount.



SINGLE-TURN HELIPOTS

MODEL L SERIES

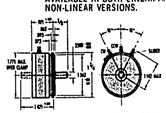
A continuous-rotation Helipot, three inches in diameter, offering high resolution, great versatility, and rugged construction. Model L: threaded bushing mount. Model LS: sleeve bearing servo mount. Model LSP: ball bearing servo mount.



MODEL Y SERIES

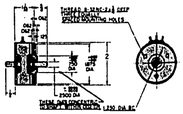
A continuous-rotation Helipot, only an inch and three-quarters in diameter, yet offering high resolution and great versatility. Model Y: threaded bushing mount. Model YS: sleeve bearing servo mount. Model YSP: ball bearing servo mount.

MODEL Y SERIES HELIPOTS ARE AVAILABLE IN BOTH LINEAR AND NON-LINEAR VERSIONS.



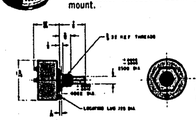
MODEL J SERIES

A continuous-rotation Helipot ... two inches in diameter ... the first mass-produced precision potentiometer with ball bearing servo mounting as a standard feature.



MODEL G SERIES

A continuous-rotation Helipot originally developed for aircraft servo mechanisms. A small, extra-rugged unit designed to "take it" even under adverse conditions. Threaded bushing mount.



Design details subject to change without notice. Certified drawings available upon request.

HELIPOT SERIES	A	AJ	AN	B	C	CN	D	E	G	J	L	Y
Number of turns	10	10	10	15	3	3	25	40	1	1	1	1
Diameter, inches (approx.)	2	.75	2	3.312	2	2	3.312	3-5/16	1.312	2	3	1.75
Length of coil, inches (approx.)	46.5	18	46.5	140	14	14	234	374	3.1	5	8.3	4.6
Weight, oz. (not ganged)	4	1	4	14	2	2.5	18	27	1.5	4	8	3.25
Max. resistance range, ohms (Std. tolerance ±5%; see note A)	10 to 300,000	100 to 50,000	100 to 250,000	50 to 500,000	5 to 50,000	30 to 75,000	100 to 750,000	200 to 1,000,000	5 to 25,000	50 to 50,000	10 to 100,000	5 to 75,000
Power rating, watts	5	2	5	10	3	3	13	17	2	4	5	3
Max. voltage (C)	1000	900	1000	1000	1000	1000	1000	1000	400	400	400	400
Electrical rotation	$^{+4°}_{3600°-0°}$	$^{+12°}_{3600°-0°}$	$^{+1°}_{3600°-0°}$	$^{+4°}_{5400°-0°}$	$^{+4°}_{1080°-1°}$	$^{+1°}_{1080°-0°}$	$^{+4°}_{9000°-0°}$	$^{+4°}_{14,400°-0°}$	352°±2°	356°±1°	358°±1°	354°±1°
Linearity tolerance, std. (A)	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
Linearity tol., best practical	±0.5% 1K Λ & above	±0.1% 5K Λ & above	±0.025% 5K Λ & above	±0.025% 25K Λ & above	±0.1% 5K Λ & above	±0.05% 30K Λ & above	±0.025% 1K Λ & above	±0.02% 1K Λ & above	±0.25% 5K Λ & above	±0.15% 10K Λ & above	±0.1% 5K Λ & above	±0.25% 5K Λ & above
Starting torque, max., oz., in. (per section)	2.0	1.00	1.5	2.75	1.75	1.5	3.5	3.5	0.75	1.25	1.65	1.5
Running torque, max., oz., in., (per section)	1.5	.90	1.0	2.00	1.25	1.0	2.5	2.5	0.5	0.5	1.20	0.8
Moment of inertia, rotating parts, gm. cm.² (per section)	18	0.3	22	200	7.0	7.5	270	400	2.8	14.0	54	2.5
Max. no. ganged sections (B)	3	no ganging	2	3	3	2	no ganging	no ganging	no ganging		8	8	14
Min. distance between tops (B)	20°	45°	20°	15°	20°	20°	15°	15°	36°	15°	10°	18°

(A) Closer tolerances may be obtained on special order.
(B) Sections can be ganged and tap connections added, only during manufacture.
(C) Maximum voltage to be applied regardless of resistance value.

MODELS CARRIED IN STOCK

CATALOG NO	TOTAL RESISTANCE (OHMS)	WIRE TURNS	WIRE TEMPERATURE COEFFICIENT
MODEL A			
25-AZ	25	2,630	.0008
50-AZ	50	2,871	.0008
100-AZ	100	3,476	.0008
200-AZ	200	4,479	.0008
500-AZ	500	3,550	.00002
1,000-AZ	1,000	5,020	.00002
2,000-AZ	2,000	6,059	.00002
5,000-AZ	5,000	6,855	.00011
10,000-AZ	10,000	8,478	.00011
20,000-AZ	20,000	9,630	.00011
30,000-AZ	30,000	10,834	.00011
50,000-AZ	50,000	12,894	.00011
100,000-AZ	100,000	14,670	.00011
200,000-AZ	200,000	15,920	.00011
300,000-AZ	300,000	16,125	.00002
MODEL AJ			
100-AJZ	100	2,600	.0008
500-AJZ	500	2,130	.00002
1,000-AJZ	1,000	2,900	.00002
5,000-AJZ	5,000	3,600	.00011
10,000-AJZ	10,000	3,650	.00011
20,000-AJZ	20,000	4,730	.00011
30,000-AJZ	30,000	5,000	.00002
50,000-AJZ	50,000	6,000	.00002
MODEL B			
1,000-BZ	1,000	9,680	.00002
5,000-BZ	5,000	20,400	.00002
10,000-BZ	10,000	16,740	.00011
25,000-BZ	25,000	21,150	.00011
50,000-BZ	50,000	24,050	.00011
100,000-BZ	100,000	32,670	.00011

CATALOG NO	TOTAL RESISTANCE (OHMS)	WIRE TURNS	WIRE TEMPERATURE COEFFICIENT
MODEL C			
10-CZ	10	1,070	.0008
50-CZ	50	1,390	.0008
100-CZ	100	1,000	.00002
500-CZ	500	1,850	.00002
1,000-CZ	1,000	1,360	.00011
5,000-CZ	5,000	2,480	.00011
10,000-CZ	10,000	3,260	.00011
20,000-CZ	20,000	3,980	.00011
30,000-CZ	30,000	4,410	.00011
50,000-CZ	50,000	4,230	.00011
MODEL G			
10-GZ	10	304	.0008
100-GZ	100	370	.00002
500-GZ	500	430	.00011
1,000-GZ	1,000	670	.00011
5,000-GZ	5,000	730	.00011
10,000-GZ	10,000	1,110	.00011
20,000-GZ	20,000	1,333	.00011
MODEL J			
100-JZ	100	570	.00002
1,000-JZ	1,000	855	.00011
5,000-JZ	5,000	1,300	.00011
10,000-JZ	10,000	1,610	.00011
20,000-JZ	20,000	1,580	.00011
30,000-JZ	30,000	1,990	.00011
50,000-JZ	50,000	1,750	.00002

CATALOG NO	TOTAL RESISTANCE (OHMS)	WIRE TURNS	WIRE TEMPERATURE COEFFICIENT
MODEL LS			
100-LSZ	100	725	.0008
500-LSZ	500	1,210	.00002
1,000-LSZ	1,000	1,370	.00011
5,000-LSZ	5,000	2,000	.00011
10,000-LSZ	10,000	2,583	.00011
20,000-LSZ	20,000	2,563	.00011
50,000-LSZ	50,000	2,680	.00002
100,000-LSZ	100,000	4,386	.00002
MODEL YS			
100-YSZ	100	570	.00002
1,000-YSZ	1,000	855	.00011
5,000-YSZ	5,000	1,300	.00011
10,000-YSZ	10,000	1,275	.00011
20,000-YSZ	20,000	1,540	.00002
30,000-YSZ	30,000	1,620	.00002
50,000-YSZ	50,000	2,175	.00002

These units are regularly carried in stock, for immediate delivery, with resistance tolerance ±5% ... linearity tolerance ±0.5%. Closer tolerances ... other resistance values ... a number of special features ... all are available on special order.

Design details subject to change without notice
Certified drawings available upon request

Helipot *First in precision potentiometers*

. . . originator of the helical potentiometer, Helipot is the largest organization devoted *exclusively* to the manufacture of precision potentiometers. Helipot leadership stems from advanced engineering . . . from insistence upon quality *first* . . . from careful testing and rigorous control . . . from engineering and production know-how developed over the years . . . from the application of mass-production techniques to the precision-manufacturing processes essential to the making of *accurate, rugged, versatile* precision potentiometers. Here are but a few of the reasons for Helipot pre-eminence:

Spot-Welded Connections. No pressure-type connections are used in *any* Helipot. Skilled workers accurately and *permanently* weld every electrical connection . . . using high-power microscopes and specially developed techniques.

High-Speed Coil Winding. Special machines quickly, accurately wind the carefully selected resistance wires which are the heart of every Helipot . . . at high speeds for maximum efficiency. This technique assures evenly spaced, permanently positioned winding for *every* Helipot.

Highest Quality Materials. Only the highest quality materials are used . . . the best *for the particular use.* Coil wires, resistance wires, housings, contacts, rotors . . . all are selected to insure long life and trouble-free performance.

Special Features. Helipot engineering makes it not only possible, but very practical, to take advantage of a number of special features. These include ganging several sections on a common shaft . . . spot-welding extra tap connections to *only a single turn* of the resistance wire, at almost any spot on the coil, with a high degree of accuracy . . . moisture and fungus-resisting treatment . . . rear-shaft extensions . . . and, of course, a wide choice of mounting styles.

Helipot division

BECKMAN INSTRUMENTS INC.
SOUTH PASADENA, CALIFORNIA
Plants at South Pasadena, Calif., and Mountainside, N.J.
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DUODIALS— for every application



MODEL RA

This beautiful Duodial DeLuxe has an appearance and a "feel" that adds distinction to the finest instrument panels. Features novel "jump" outer dial; easy reading; positive shaft lock. Diameter 1-13/16". For use with ¼" diameter shafts. Available in 10:1 turns ratio only.



MODEL R

The standard Duodial, available in 10:1, 15:1, 25:1, 40:1 turns ratios, for use with the corresponding multi-turn Helipots. Diameter 2". For use with ¼" diameter shafts.



MODEL SR101

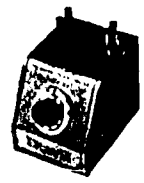
A miniature Duodial, for use with AJ Series Helipots. Polished aluminum dial with black numerals. Diameter 1-5/32". For use with ⅛" diameter shafts. Available in 10:1 turns ratio only.



MODEL W

A large Duodial, ideally suited for use as a primary control. Available in 10:1, 15:1, 25:1, 40:1 turns ratios, for use with the corresponding multi-turn Helipots. Diameter 4¾". For use with ¼" diameter shafts.

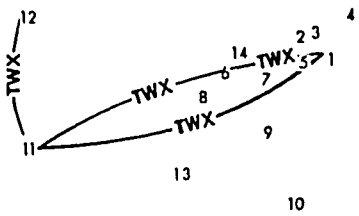
LABORATORY HELIPOT— **MODEL T-10A**



Combines a ten-turn Model A Helipot and a Model RA Duodial in a handsome walnut case. Three-way binding posts make it ideal for experiment or instruction . . . easy to set up or change . . . much faster to use than decade boxes . . . compact . . . rugged. Power rating 5 watts . . . Linearity tolerance ±0.1%. Carried in stock in 100, 500, 1K, 5K, 10K, 20K, 50K, and 100K ohms resistances.

For more detailed information on any model, call the Helipot representative nearest you . . . or write to Helipot, South Pasadena, Calif. . . . ask for Data File 53

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Oscillators, voltmeters, generators, analyzers, amplifiers—frequency counting, measuring and monitoring instruments, microwave coaxial or waveguide equipment—whatever your measuring needs, there's a precision-built *-hp-* instrument for the job. The *-hp-* line, world's most complete, includes over 200 tested and proved equipments for all types of measurement. Each gives you engineering economies of fast, accurate measurement, broad applicability, dependability, trouble-free service. Each has the traditional *-hp-* "family characteristics" of simple operation, minimum adjustment, independence of line voltage or tube changes, generous overload protection and highest quality design and construction. On these pages you'll find brief details of major *-hp-* instruments. For complete information, see your *-hp-* representative, or write factory direct.

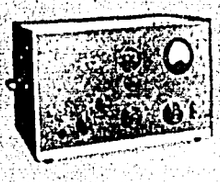
Complete Coverage in Electronic Test Instrumentation

-hp- 200 SERIES AUDIO OSCILLATORS



Now four basic *-hp-* oscillators have been redesigned into two compact, lightweight instruments offering wider frequency range, more operating simplicity, highest accuracy and stability. New Models 200AB and 200CD replace Models 200A through 200D, retain the time-tested RC circuits that insure constant output, low distortion; require no zero set. In addition to these general test instruments, *-hp-* continues to offer Model 202D for sub-audio, audio, supersonic and carrier tests; and Model 200I, a spread-scale oscillator for interpolation or where frequency must be known precisely.

-hp- 650A TEST OSCILLATOR



Highly stable, wide band (10 cps to 10 mc) multi-purpose test oscillator for audio, supersonic, video, and rf measurements. Output variable 30 μv to 3 v. Frequency response flat ± 1 db. Output impedance 600 ohms, or 6 ohms with voltage divider. $475.00.

Instrument	Primary Uses	Frequency Range	Output	Price
-hp- 200AB	Audio tests	20 cps to 40 kc	1 watt/24.5 v	$120.00
-hp- 200CD	Audio, ultrasonic tests	5 cps to 600 kc	160 mw/20 v *	150.00
-hp- 200H	Carrier current, telephone tests	50 cps to 600 kc	10 mw/1 v	350.00
-hp- 200I	Interpolation and frequency measurements	6 cps to 6 kc	100 mw/10 v	225.00
-hp- 201B	High quality audio tests	20 cps to 20 kc	3 w 42.5 v	250.00
-hp- 202A	Low frequency measurements	01 cps to 1 kc	20 mw 10 v	460.00
-hp- 202B	Low frequency measurements	1 cps to 50 kc	100 mw 10 v	360.00
-hp- 202D	Low frequency measurements	2 cps to 70 kc	100 mw 10 v	275.00
-hp- 204A	Portable, battery operated	2 cps to 20 kc	2.5 mw/5 v	175.00
-hp- 205A	High power audio tests	20 cps to 20 kc	5 watts	390.00
-hp- 205AG	High power tests, gain measurements	20 cps to 20 kc	5 watts	425.00
-hp- 205AH	High power supersonic tests	1 kc to 100 kc	5 watts	550.00
-hp- 206A	High quality, high accuracy audio tests	20 cps to 20 kc	-15 dbm	550.00
-hp- 230A	Carrier test oscillator	35 cps to 35 kc	-14 dbm 600 ohms	275.00
-hp- 233A	Carrier test oscillator	50 cps to 500 kc	3 w 600 ohms	475.00
-hp- 234A	Carrier test oscillator	160 cps to 160 kc	-14 dbm 600 ohms	300.00
-hp- 650A	Wide range video tests	10 cps to 10 mc	15 mw/3 v	475.00

*Open circuit. Internal impedance 600 ohms.

Data subject to change without notice. Prices f.o.b. factory.

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Precision-built -*hp*- instruments for every electronic measuring need

-*hp*- Vacuum Tube Voltmeters — 2 to 700,000,000 cps

-*hp*- 410B VACUUM TUBE VOLTMETER



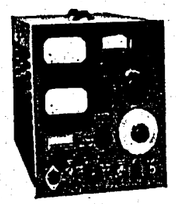
Wide range, flat response ± 1 db, 20 cps to 700 mc. Convenient, simple to use, occupies minimum bench space. Handy compartment for probe and leads. Diode probe places approximately 1.5 μμfd capacity across circuit under test. This, plus high shunt impedance (10 megohms at low frequencies) means circuits under test are not disturbed, and true voltage readings are assured. Also measures dc voltage to 1,000 volts and resistances to 500 megohms. $245.00.

Instrument	Primary Uses	Frequency Range	Voltage Range	Input Impedance	Price
-*hp*- 400A	General purpose ac measurements	10 cps to 1 mc	.005 to 300 v 9 ranges	1 megohm 24 μμfd shunt	$185.00
-*hp*- 400B	Low frequency ac measurements	2 cps to 100 kc	.005 to 300 v 9 ranges	10 megohms 24 μμfd shunt	195.00
-*hp*- 400C	Wide range ac measurements. High sensitivity	20 cps to 2 mc	.0001 to 300 v 12 ranges	10 megohms 15 μμfd shunt	200.00
-*hp*- 404A	Portable, battery operated	2 cps to 50 kc	.0005 to 300 v 11 ranges	10 megohms 20 μμfd shunt	185.00
-*hp*- 410B	Audio, rf, VHF measurements; dc voltages; resistances	20 cps to 700 mc	.1 to 300 v 7 ranges	10 megohms 1.5 μμfd shunt	245.00

-*hp*- Voltmeter Accessories (not listed) include voltage dividers, connectors, shunts and multipliers to extend the useful range of your equipment.

-*hp*- Signal Generators — 10 to 10,800 mc

-*hp*- 612A SIGNAL GENERATOR



450 to 1,200 mc. Master oscillator-power amplifier generator for UHF-TV measurements including gain, selectivity, sensitivity, image rejection. Directly set and read; no charts, no interpolation. Low incidental fm, high-quality broad band video modulation to 5 mc. May be modulated internally or externally, amplitude modulated or pulse modulated. (Good rf pulses 0.2 μsec or longer.) $1,200.00.

Instrument	Frequency Range	Characteristics	Price
-*hp*- 608A	10 to 500 mc	Output 0.1 μv to 1 v into 50 ohm load. Pulse or CW modulation. Direct calibration.	$ 850.00
-*hp*- 610B	450 to 1,200 mc	Output 0.1 μv to 0.1 v into 50 ohm load. Pulse, CW or Square wave modulation. Direct calibration.	925.00
-*hp*- 612A	450 to 1,200 mc	Output 0.1 μv to 0.5 v into 50 ohm load. Pulse, CW or amplitude modulation to 5 mc. Direct calibration.	1,200.00
-*hp*- 614A	800 to 2,100 mc	Output 0.1 μv to 0.223 v into 50 ohm load. Pulse, CW or FM modulation. Direct calibration.	1,950.00
-*hp*- 616A	1,800 to 4,000 mc	Output 0.1 μv to 0.223 v into 50 ohm load. Pulse, CW or FM modulation. Direct calibration.	1,950.00
-*hp*- 618B	3,800 to 7,600 mc	Output 0.1 μv to 0.223 v into 50 ohm load. Pulse, CW, FM or Square wave modulation. Direct calibration	2,250.00
-*hp*- 620A	7,000 to 10,800 mc	Output 0.1 μv to 0.071 v into 50 ohm load. Pulse, CW, FM or Square wave modulation. Direct calibration.	2,250.00
-*hp*- 623B	5,925 to 7,725 mc	Output 70 μv to 0.223 v into 50 ohm load. FM or Square wave modulation. Separate power meter and wave meter section.	1,750.00
-*hp*- 624B	8,500 to 10,000 mc	Output 3.0 μv to 0.223 v into 50 ohm load. Pulse, FM or Square wave modulation. Separate power meter and wave meter section.	2,250.00

-*hp*- Distortion, Wave Form Analyzers — 20 cps to 20 kc

-*hp*- 330B DISTORTION ANALYZER



Measures distortion as low as 0.1% at any frequency, 20 cps to 20 kc. Measures noise voltages as low as 100 μv. High sensitivity, high stability, broad applicability for broadcast, laboratory or production problems. Wide band 20 db gain input amplifier. Built-in vacuum tube voltmeter usable separately. $395.00.

FM, AM-FM MODELS

-*hp*- *330C*, for FM broadcasters, includes VU meter meeting F.C.C. requirements. -*hp*- *330D*, for AM-FM broadcasters, includes AM detector to rectify AM carrier, plus VU meter employed in model 330C. Model 330C, $425.00. Model 330D, $440.00.

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-*hp*- 300A	Wave form analyzer	30 cps to 16 kc	Variable selectivity; measuring range 1 mv to 500 v	$625.00
-*hp*- 320A	Measures total distortion	400 cps and 5 kc	Requires external detector	75.00
-*hp*- 320B	Measures total distortion	50, 100, 400 cps, 1, 5 and 7.5 kc	Same as above	150.00
-*hp*- 330B	Measures total audio distortion	20 cps to 20 kc	Includes input amplifier, VTVM	395.00
-*hp*- 330C	For FM broadcast measurements	20 cps to 20 kc	Special VU meter to meet F.C.C. requirements	425.00
-*hp*- 330D	For AM-FM broadcast measurements	20 cps to 20 kc	AM detector and VU meter to meet F.C.C. requirements	440.00
SQUARE WAVE GENERATOR				
-*hp*- 210A	Transient and frequency response	20 cps to 10 kc	Output 50 v peak-to-peak 1,000 ohm impedance	150.00

Data subject to change without notice. Prices f.o.b. factory.

Microwave test instruments for coaxial & waveguide systems

-*hp*- 430B MICROWAVE POWER METER



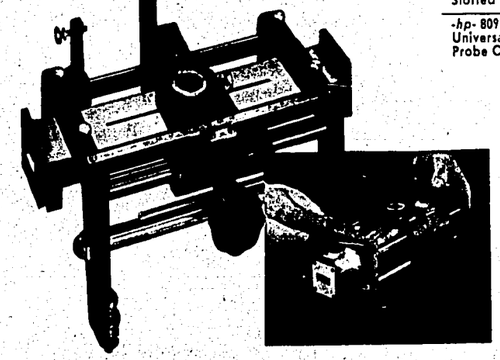
No computations! Provides instantaneous, automatic power readings *direct* in db or mw at all frequencies for which there are suitable bolometer mounts. For CW measurements, uses either 1/100 amp. fuse or Sperry 821 barretter. Also measures CW or pulsed power with negative coefficient thermistor. Operates with -*hp*- 475B or 476A Bolometer Mounts; also 485B Detector Mounts. $250.00.



-*hp*- 803A VHF BRIDGE

Gives fast, direct readings of any impedance between 50 and 500 mc. Measures by sampling electric and magnetic fields in transmission line. Usable for comparative measurements 5 to 700 mc. Impedance range 2 to 2,000 ohms. Phase angle —90° to +90°, at 52 mc and above. Also measures SWR, % reflected power, VHF system flatness. $495.00.

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-*hp*- 360A-D Low Pass Filters	Eliminates harmonic voltages from UHF systems	Cutoff frequencies A-700 mc. B-1,200 mc. C-2,200 mc. D-4,100 mc.	50 db rejection at 1.2 cutoff freq.	$ 50.00
-*hp*- 415A Standing Wave Indicator	VSWR indicator or null indicator	300 to 2,000 cps. Normal freq. 1,000 cps	0 to 60 db attn. Max. sensitivity 0.3 μv	200.00
-*hp*- 417A VHF Detector	VHF bridge detector (for -*hp*- 803A)	10 to 500 mc	Approx. 5 μv sensitivity	200.00
-*hp*- 430B Microwave Power Meter	Measurement of rf power	Depends on Bolometer mount	.01 to 10 mw ± 5% accuracy	250.00
-*hp*- 475B Tunable Bolometer Mount	Measurement of rf power (with 430B)	1,000 to 4,000 mc	Matches 50-ohm line to 100 or 200 ohms	200.00
-*hp*- 476A Universal Bolometer Mount	Measurement of rf power (with 430B)	10 to 1,000 mc	No tuning required VSWR less than 1.25	125.00
-*hp*- 803A VHF Bridge	Measurement of VHF impedance, VSWR	50 to 500 mc	2 to 2,000 ohms impedance — 90° to + 90° phase angle	495.00
-*hp*- 805A Coaxial Slotted Section	Measurement of VSWR	500 to 4,000 mc	For Type N Connectors, flexible cables	475.00
-*hp*- 805B Coaxial Slotted Section	Same as above	Same as above	For rigid ⅞" RG44/U line	475.00
-*hp*- 806B Coaxial Slotted Section	Same as above (Mounts in 809B)	3,000 to 12,000 mc	For Type N Connectors, flexible cables	200.00
-*hp*- 809B Universal Probe Carriage	Supports 806B section, also G, J, H, X and P 810 Waveguide sections		Accepts 442B and 444A probes	160.00



-*hp*- 809B UNIVERSAL PROBE CARRIAGE
-*hp*- 810 WAVEGUIDE SLOTTED SECTIONS

Convenient, all-purpose -*hp*- 809B carriage operates with six different -*hp*- slotted sections, waveguide and coaxial. Mounts sections covering frequencies 3,000 to 18,000 mc—*sections interchange in 30 seconds!* Precision-built carriage calibrated in mm to 0.1 mm; dial gauge may be mounted. Operates with -*hp*- 442B Broad Band Probe and -*hp*- 440A Coaxial Detector in combination; or with -*hp*- 444A Untuned Probe. (See preceding page for probe details.) -*hp*- 809B, $160.00.

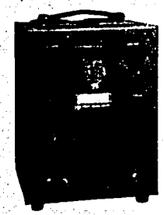
-*hp*- *810A/B Slotted Sections.* -*hp*- *810B*, for mounting in 809B carriage, is a flanged waveguide section with accurately machined slot tapered at ends to minimize reflection. Available in 5 waveguide bands, 3.95 thru 18.0 kmc. -*hp*- *S810A*, complete slotted section assembly including probe carriage. Available for 2.6 to 3.95 kmc band only. (See table on preceding page for data, prices.)



-*hp*- 805A/B COAXIAL SLOTTED SECTION

Range 500 to 4,000 mc. High accuracy, high stability, negligible slope, minimum leakage. Exclusive parallel plane design, VSWR of basic section and connectors, 1.04. -*hp*- *805A*, 50 ohms, Type N coax-connector. -*hp*- *805B*, 46.3 ohms, for ⅞" rigid transmission lines. $475.00.

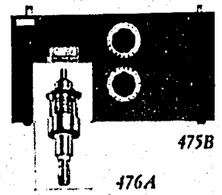
-*hp*- *806B Coaxial Slotted Section*, 3,000 to 12,000 mc. For use with -*hp*- 809B carriage. Section and connector VSWR 1.04 to 8,000 mc. 50 ohm impedance, negligible slope. Type N connectors, $200.00.



-*hp*- *417A VHF Detector* for use with 803A Bridge; or general laboratory use. Super-regenerative receiver, 10 to 500 mc. 5 bands. Approx. 5 μv sensitivity over entire band. Direct reading frequency control, thoroughly shielded. $200.00.



-*hp*- *415A Standing Wave Indicator* for all waveguide or coaxial slotted sections. Gives direct readings in VSWR or db. Single frequency operation; 300 to 2,000 cps. Low noise level, 0.3 μv sensitivity, 60 db calib. attenuator. $200.00.



-*hp*- *476A Universal Bolometer Mount* measures rf power 10 to 1,000 mc. No tuning or adjustment. VSWR less than 1.15, 20 to 500 mc; 1.25, 10 to 1,000 mc. $125.00. -*hp*- *475B Tunable Mount*, continuous 1,000 to 4,000 mc. $200.00.

Data subject to change without notice. Prices f.o.b. factory.

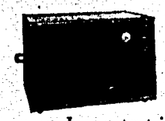
Instruments for Complete Coverage

HEWLETT-PACKARD COMPANY

electronic measuring need. See your -hp- representative or write direct for details

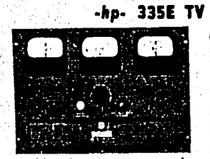
-hp- Frequency Measuring and Monitoring Equipment

-hp- 100D SECONDARY FREQUENCY STANDARD



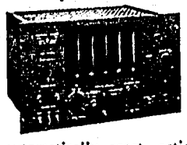
Swift, sure frequency comparison, new convenience in standardizing with minimum external equipment. 100 μsec time markers, built-in oscilloscope, sine or rectangular waves. Low output impedance; short-time stability 1/1,000,000. Performs most functions of expensive primary standards in audio, rf or supersonic ranges. $600.00.

-hp- 335E TV MONITOR

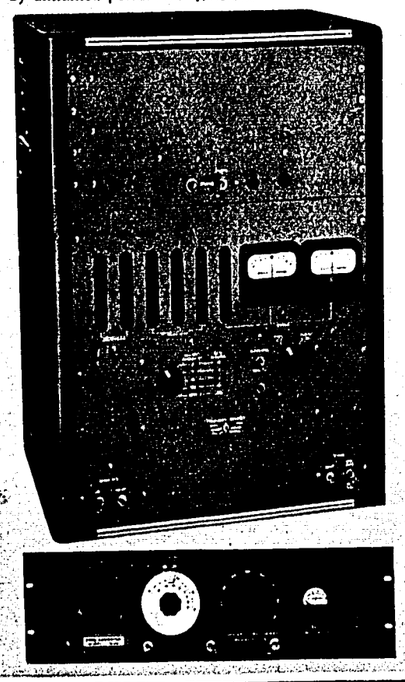


Channels 2 through 83. Exceeds F.C.C. requirements. Compact, only 12¼" high, rack mounted. Low cost, all purpose, for visual and aural frequency monitoring, percentage aural modulation. Long-term dependability, precise accuracy, highest stability, no adjustment during operation. Forced ventilation, remote indication features. $1,950.00.

-hp- 522B ELECTRONIC COUNTER



Compact, low cost, versatile instrument for frequency, period *or* time measurements. Range 10 cps to 100 kc. Reads direct in cps, kc, seconds or milliseconds. Count automatically reset, action repetitive. Stability of time base 5/1,000,000. Display length variable. Automatic illuminated decimal. Performs all functions without extra-cost modification. Easily used by untrained personnel. $900.00.



Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 100C Secondary Standard	Audio, supersonic calibration	100 kc, 10 kc, 1 kc, 100 cps	Accurate within ± .001% Sine waves only	$ 450.00
-hp- 100D Secondary Standard	Frequency, time measurements	100 kc, 10 kc, 1 kc, 100 cps, 10 cps	Stability 1/1,000,000 (short-time) Sine or rectangular output. Marker pips	600.00
-hp- 335B Frequency Monitor	FM broadcast station monitor	88 to 108 mc	Frequency deviation ± 3 kc; accuracy ± .001%; modulation 0 to 100 kc	935.00
-hp- 335E TV Monitor	TV visual, aural and % mod. monitor	Channels 2 through 83	Indicates visual, aural carrier frequency deviation, % modulation aural carrier	1,950.00
-hp- 500A Frequency Meter	Rapid frequency measurements	10 cps to 50 kc	10 ranges ± 2% accuracy. Input 0.5 to 200 volts	210.00
-hp- 505A Electronic Tachometer	Measurements of high speed machinery	600 to 3,000,000 rpm	10 ranges ± 2% accuracy	300.00
-hp- 505B Electronic Tachometer	Same as 505A	10 to 50,000 rps	Same as 505A except calibrated in rps	300.00
-hp- 510A Mixer	Measure frequency continuously with -hp- 500A and 100 D/C	20 cps to 200,000 cps	Mixes two frequencies, delivers difference to -hp- 500A	200.00
-hp- 512A Frequency Converter	Extends -hp- 524A range to 100 mc	100 kc to 100 mc	Fast, direct readings of signals to 100 mc with 524A. No charts, interpolation. Min. input 0.01 v	350.00
-hp- 520A Decade Scaler	For counting high-rate pulses	Capacity 100 counts in 2 decades. 10,000,000 pps counting rate	100:1 divider for operation of low speed scalers	600.00
-hp- 522A Electronic Counter	Wide-range frequency, period measurements	10 cps to 100 kc	Frequency measuring gate time is 1 sec. or multiples; standard frequency counted for period measurement 100 kc	775.00
-hp- 522B Electronic Counter	Wide-range frequency, period, time interval measurements	10 cps to 100 kc	Measures rate of occurrences 0.00001 to 100,000/sec.; time interval 10 μsec to 27.8 hrs.; periods of frequency count 1/1,000, 1/100, 1/10, 1, 10 sec. and multiples. Direct readings in cps, kc, sec. and millisec.	900.00
-hp- 524A Frequency Counter	Frequency, interval, time measurements	.01 cps to 10 mc	Direct reading, no interpolation, accuracy about 2/1,000,000/week	2,000.00

Frequency measurement 0.01 cps to 100 mc . . . no computations or complex setups; usable by anyone!

-hp- 524A Frequency Counter. Measures instantly, automatically; presents results directly—determines any frequency 0.01 cps to 10 mc. Time of count 1/1,000, 1/100, 1/10, 1 or 10 seconds. Accuracy of measurement 2/1,000,000/week. For low frequency work, measures duration one cycle in μsec, based on 10 cycle sample. Accuracy 0.03%. External standards usable if desired. Min. voltage of unknown, 1 v peak. Simple operation, easily used by untrained personnel. $2,000.00.

-hp- 512A Frequency Converter. Operates with 524A Frequency Counter to extend counter's range from 10 mc to 100 mc. Makes possible fast, direct readings to 100 mc without interpolation, charts. Eliminates time-consuming setups, costly extra equipment. Operates *only* on 0.01 v input. Fundamental accuracy of -hp- 524A is maintained. $350.00.

Data subject to change without notice. Prices f.o.b. factory.

-hp- Waveguide Test Equipment — 2.6 to 18 kmc

Basic, low-cost elements offer utmost flexibility for assembly of exact instrumentation required. Each unit covers entire range of its waveguide size. Simple, sturdy mechanical design; accurate, multi-purpose operation.

Instrument	Coaxial Type N. Conn.	"S" 3" x 1½" 2.6–3.95 kmc.	"G" 2" x 1" 3.95–5.85 kmc.	"J" 1½" x ¾" 5.85–8.2 kmc.	"H" 1¼" x ⅝" 7.05–10.0 kmc.	"X" 1" x ½" 8.2–12.4 kmc.	"P" .702" x .391" 12.4–18.0 kmc.
Adapters, Waveguide to Coax		S281A $75.00	G281A $55.00	J281A $50.00	H281A $45.00	X281A $35.00	
Cover to choke flange		S290A $40.00	G290A $30.00	J290A $25.00	H290A $20.00	X290A $15.00	P290A $20.00
Attenuators, Fixed 6, 10, 20 db		S370 $75.00	G370 $65.00	J370 $65.00	H370 $60.00	X370 $55.00	P370 $60.00
Flap, 25 db max.		S375A $75.00	G375A $65.00	J375A $60.00	H375A $55.00	X375A $50.00	P375A $55.00
Calibrated, precision		S380A $225.00				X382A $250.00	
Detector Mounts	440A† $85.00	S485A‡ $125.00	G485B† $95.00	J485B† $90.00	H485B† $85.00	X485B† $75.00	
Frequency Meters, Reaction				J530A $120.00	H530A $120.00	X530A $120.00	
Directional Couplers, Cross Guide: 20, 30 db		S750 $100.00	G750 $85.00	J750 $70.00	H750 $60.00	X750 $50.00	
Directional Couplers, Multi Hole: 10, 20 db		S752 $210.00	G752 $170.00	J752 $140.00	H752 $120.00	X752 $100.00	
Slotted Sections, Waveguide		S810A* $450.00	G810B§ $90.00	J810B§ $90.00	H810B§ $90.00	X810B§ $90.00	P810B§ $90.00
Waveguide Tees, Series		S840A $60.00	G840A $50.00	J840A $40.00	H840A $35.00	X840A $30.00	P840A $35.00
Shunt		S841A $60.00	G841A $50.00	J841A $40.00	H841A $35.00	X841A $30.00	P841A $35.00
Hybrid		S845A $90.00	G845A $75.00	J845A $60.00	H845A $55.00	X845A $45.00	P845A $55.00
Transformers, Slide Screw		S870A $150.00	G870A $140.00	J870A $135.00	H870A $130.00	X870A $125.00	P870A $130.00
E-H		S880A $175.00	G880A $155.00	J880A $145.00	H880A $135.00	X880A $130.00	P880A $135.00
Terminations, Low Power		S910A $45.00	G910A $40.00	J910A $35.00	H910A $30.00	X910A $25.00	P910A $30.00
Terminations, High Power		S912A $125.00				X912A $75.00	
Moving Load		S914A $80.00	G914A $70.00	J914A $60.00	H914A $50.00	X914A $40.00	P914A $50.00
Adjustable Shorts		S920A $80.00	G920A $70.00	J920A $65.00	H920A $60.00	X920A $50.00	P920A $55.00
Broad Band Probe	442B $50.00			All Frequencies			
Broad Band Probe, Untuned	444A $50.00			All Frequencies			

†For use with bolometer or crystal. ‡For use with bolometer only. *Complete assembly including carriage. §Mounts in 809B Carriage—See next page.

Equipment below available for most waveguide bands. Table above shows data, prices.

-hp- 281A WAVEGUIDE-COAX ADAPTERS



For convenient transition between waveguide and coax systems. Each unit covers a full waveguide range with VSWR less than 1.25. Equipped with Type N connectors.

-hp- 750 CROSS-GUIDE COUPLERS



Directional couplers offered in 2 models with coupling factors of 20 or 30 db ± 1.5 db over full range of a waveguide. VSWR less than 1.15; directivity approx. 20 db. Available as a 4-terminal network.

-hp- 485B DETECTOR MOUNTS



To measure power over complete waveguide range in conjunction with -hp- 430B Power Meter and barretter. Also measures relative level, or detects rf energy using 1N21 or 1N23 crystal. Semi-tuned by movable short to VSWR 1.25.

-hp- X382A PRECISION ATTENUATOR



Precision broad band attenuation to 50 db. Completely independent of frequency; phase shift constant all attenuations. Calibrated range 0 to 50 db, maximum error ± 2% of db reading. Range 8,200 to 12,400 mc. VSWR less than 1.15 full range. Radical new design with rotating attenuator films.

-hp- 870A SLIDE SCREW TUNERS



For flattening waveguide systems. The position and penetration of a probe is adjusted to set up a VSWR which is used to cancel existing VSWR in system. VSWR values up to 20 can be corrected with accuracy of 1.02 VSWR.

-hp- 444A UNTUNED PROBE



A 1N26 crystal plus small antenna in a convenient, easy-to-use housing. Variable penetration depth, no tuning required. Sensitivity equal to single- or double-tuned probes. Frequency range: 2.6 to 18.0 kmc. Mounts in 809B Carriage. (See next page for carriage details.)

-hp- 375A FLAP ATTENUATORS



Simplifies adjusting power level in waveguide. Attenuation is quickly adjustable 0 thru 20 db. Approximate calibration. VSWR less than 1.15 over attenuation range. No leakage.



-hp- 752 MULTI-HOLE COUPLER

Directional couplers available in 2 models with coupling factors of 10 and 20 db ± 0.7 db over full range of a waveguide. VSWR better than 1.05. Directivity 40 db or better over entire range. Available as a 3-terminal network.



-hp- 914A MOVING LOAD

Low-reflection load covering full frequency range of guide. Load position variable at least ½ wavelength to reverse phase of reflection so that small residual reflections can be evaluated. Coefficient of reflection less than ½%.

Data subject to change without notice. Prices f.o.b. factory.

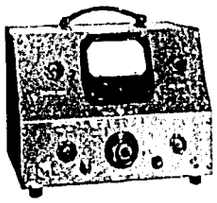
HEWLETT-PACKARD COMPANY

Instruments for Complete Coverage

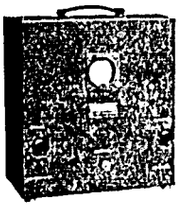
electronic measuring need

Microwave test instruments for coaxial & waveguide systems

-hp- 430B MICROWAVE POWER METER



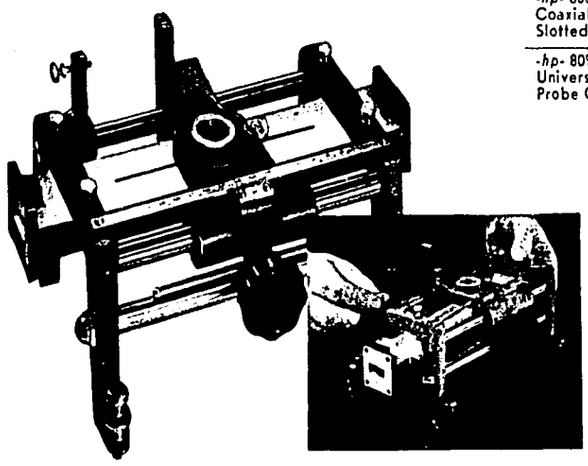
No computations! Provides instantaneous, automatic power readings *direct* in db or mw at all frequencies for which there are suitable bolometer mounts. For CW measurements, uses either 1/100 amp. fuse or Sperry 821 barretter. Also measures CW or pulsed power with negative coefficient thermistor. Operates with *-hp-* 475B or 476A Bolometer Mounts; also 485B Detector Mounts. $250.00.



-hp- 803A VHF BRIDGE

Gives fast, direct readings of any impedance between 50 and 500 mc. Measures by sampling electric and magnetic fields in transmission line. Usable for comparative measurements 5 to 700 mc. Impedance range 2 to 2,000 ohms. Phase angle —90° to +90°, at 52 mc and above. Also measures SWR, % reflected power, VHF system flatness. $495.00.

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 360A-D Low Pass Filters	Eliminates harmonic voltages from UHF systems	Cutoff frequencies A-700 mc. B-1,200 mc. C-2,200 mc. D-4,100 mc.	50 db rejection at 1.2 cutoff freq.	$ 50.00
-hp- 415A Standing Wave Indicator	VSWR indicator or null indicator	300 to 2,000 cps. Normal freq. 1,000 cps	0 to 60 db attn. Max. sensitivity 0.3 μv	200.00
-hp- 417A VHF Detector	VHF bridge detector (for -hp- 803A)	10 to 500 mc	Approx. 5 μv sensitivity	200.00
-hp- 430B Microwave Power Meter	Measurement of rf power	Depends on Bolometer mount	.01 to 10 mw ± 5% accuracy	250.00
-hp- 475B Tunable Bolometer Mount	Measurement of rf power (with 430B)	1,000 to 4,000 mc	Matches 50-ohm line to 100 or 200 ohms	200.00
-hp- 476A Universal Bolometer Mount	Measurement of rf power (with 430B)	10 to 1,000 mc	No tuning required VSWR less than 1.25	125.00
-hp- 803A VHF Bridge	Measurement of VHF impedance, VSWR	50 to 500 mc	2 to 2,000 ohms impedance — 90° to + 90° phase angle	495.00
-hp- 805A Coaxial Slotted Section	Measurement of VSWR	500 to 4,000 mc	For Type N Connectors, flexible cables	475.00
-hp- 805B Coaxial Slotted Section	Same as above	Same as above	For rigid ⅞" RG44/U line	475.00
-hp- 806B Coaxial Slotted Section	Same as above (Mounts in 809B)	3,000 to 12,000 mc	For Type N Connectors, flexible cables	200.00
-hp- 809B Universal Probe Carriage	Supports 806B section, also G, J, H, X and P 810 Waveguide sections		Accepts 442B and 444A probes	160.00



-hp- 809B UNIVERSAL PROBE CARRIAGE
-hp- 810 WAVEGUIDE SLOTTED SECTIONS

Convenient, all-purpose *-hp-* 809B carriage operates with six different *-hp-* slotted sections, waveguide and coaxial. Mounts sections covering frequencies 3,000 to 18,000 mc—*sections interchange in 30 seconds!* Precision-built carriage calibrated in mm to 0.1 mm; dial gauge may be mounted. Operates with *-hp-* 442B Broad Band Probe and *-hp-* 440A Coaxial Detector in combination; or with *-hp-* 444A Untuned Probe. (See preceding page for probe details.) *-hp-* 809B, $160.00.

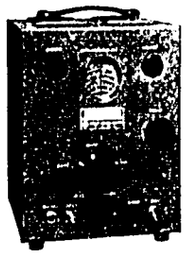
-hp- 810A/B Slotted Sections. -hp- 810B, for mounting in 809B carriage, is a flanged waveguide section with accurately machined slot tapered at ends to minimize reflection. Available in 5 waveguide bands, 3.95 thru 18.0 kmc. *-hp- S810A,* complete slotted section assembly including probe carriage. Available for 2.6 to 3.95 kmc band only. (See table on preceding page for data, prices.)



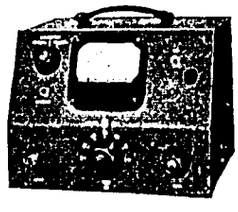
-hp- 805A/B COAXIAL SLOTTED SECTION

Range 500 to 4,000 mc. High accuracy, high stability, negligible slope, minimum leakage. Exclusive parallel plane design, VSWR of basic section and connectors, 1.04. *-hp- 805A,* 50 ohms, Type N coax-connector. *-hp- 805B,* 46.3 ohms, for ⅞" rigid transmission lines. $475.00.

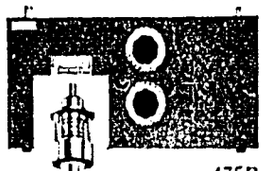
-hp- 806B Coaxial Slotted Section, 3,000 to 12,000 mc. For use with *-hp-* 809B carriage. Section and connector VSWR 1.04 to 8,000 mc. 50 ohm impedance, negligible slope. Type N connectors, $200.00.



-hp- 417A VHF Detector for use with 803A Bridge; or general laboratory use. Super-regenerative receiver, 10 to 500 mc. 5 bands. Approx. 5 μv sensitivity over entire band. Direct reading frequency control, thoroughly shielded. $200.00.



-hp- 415A Standing Wave Indicator for all waveguide or coaxial slotted sections. Gives direct readings in VSWR or db. Single frequency operation; 300 to 2,000 cps. Low noise level, 0.3 μv sensitivity, 60 db calib. attenuator. $200.00.



475B

476A

-hp- 476A Universal Bolometer Mount measures rf power 10 to 1,000 mc. No tuning or adjustment. VSWR less than 1.15, 20 to 500 mc; 1.25, 10 to 1,000 mc. $125.00. *-hp- 475B Tunable Mount,* continuous 1,000 to 4,000 mc. $200.00.

Data subject to change without notice. Prices f.o.b. factory.

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ELECTRONIC TEST INSTRUMENTS

Other -*hp*- precision instruments

-*hp*- POWER SUPPLIES

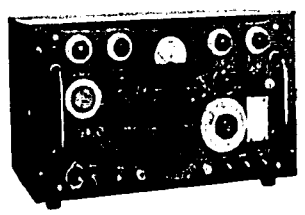


-hp- 715A (illustrated) is a versatile source of regulated beam and reflector voltage for operating most test bench klystron tubes. Beam voltage 250 to 400 v; reflector voltage 0 to 900 v; 6.3 v filament. Internal, 1,000 cps square wave modulation, also 60 cps fm modulation, both on reflector voltage. $300.00.

-hp- 710A—Highly stable regulated dc supply, output variable 180 to 360 v at 75 ma, 6.3 v filament. Either terminal may be grounded. Total hum and noise less than 5 mv. $85.00.

-hp- 712A. Stabilized, variable power supply providing 0 to 500 v at 200 ma and ½% regulation. Also variable bias voltages, 0 to 150 v at 5 ma, and 6.3 v filament at 10 amps. Main supply completely metered. Either terminal may be grounded. Hum less than 8 mv. For laboratory, production or general use. $250.00.

-*hp*- 624A X-BAND TEST SET



High level, direct reading, *portable* test set simplifies lab or field work at frequencies 8,500 to 10,000 mc. Rf output .223 v max. High stability attenuator reduces level by 100 db. May be pulsed or fm modulated. Separate section measures external rf power or external frequency. Ideal one-piece unit for measuring sensitivity and selectivity, tuning and power level of radar, gunfire and beacon systems. $2,250.00.

-hp- 623B SHF Test Set, like 624A but operates over frequencies determined by klystron installed. Three klystrons available (each with 600 mc band width) for frequencies between 5,925 and 7,725 mc. Fm modulated. Includes 1,000 cps square wave modulator. $1,650.00 *(with one Klystron).*

-*hp*- AMPLIFIERS

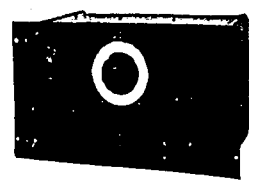


Complete instrumentation for distortion-free fast pulse measurement. *-hp- 460A Wide Band Amplifiers,* in cascade with *-hp- 460B Fast-Pulse Amplifiers* offer up to 90 db gain, 125 v open circuit output. This permits full deflection of 5XP CRT, or 2-inch deflection of 5CP tubes. Rise time 0.0026 μsec; can amplify milli-microsecond pulses; gives over 100 mc bandwidth to your standard oscilloscope. 460A, $185.00; 460B, $225.00. Connecting cables, plugs, accessories—prices on request.

-hp- 450A Amplifier—general purpose instrument, 20 db or 40 db gain, for use wherever wide frequency range and high stability are needed. 10 cps to 1 mc. Negligible phase shift, no spurious responses. $140.00.

-hp- 451A Bridging Amplifier. For connecting to high impedance circuits without disturbing circuits or affecting operating conditions. 83 megohms impedance probe readily connects to any point in circuit. Amplifier repeats this voltage accurately, without distortion, for operation of VTVM, distortion analyzer, oscilloscope, etc. Frequency 20 cps to 1 mc. $100.00.

-*hp*- 212A PULSE GENERATOR



Provides continuously variable, high power "fast pulses" of superior wave form. Combines broad general usefulness with 0.02 μsec rise and decay time to meet requirements of radar, TV and nuclear work. Pulse length variable 0.07 to 10 μsec; minimum overshoot; 50 watt peak power (50 v to 50 ohms load). Low impedance means accurate pulses can be delivered at a distance from the instrument. Repetition rate variable 50 to 5,000 pps; controlled internally or externally. Synchronizing pulses available in advance of, or following, output pulse. $550.00.

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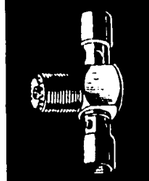
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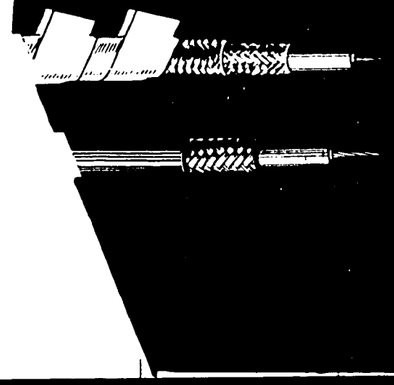
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UG-9/U	Type N Plug
UB-10/U	Type N Panel Jack
UG-11/U	Type N Jack
UG-12/U	Type N Plug
UG-13/U	Type N Panel Jack
UG-14/U	Type N Jack
UG-15/U	Type N Plug
UG-16/U	Type N Panel Jack
UG-18/U	Type N Plug
UG-18A/U	Type N Plug
UG-18B/U	Type N Plug
UG-19/U	Type N Panel Jack
UG-19A/U	Type N Panel Jack
UG-19B/U	Type N Panel Jack
UG-20/U	Type N Jack
UG-20A/U	Type N Jack
UG-20B/U	Type N Jack
UG-21/U	Type N Plug
UG-21A/U	Type N Plug
UG-21B/U	Type N Plug
UG-21C/U	Type N Plug
UG-21D/U	Improved Type N Plug
UG-22/U	Type N Panel Jack
UG-22A/U	Type N Panel Jack
UG-22B/U	Type N Panel Jack
UG-22C/U	Type N Panel Jack
UG-22D/U	Improved Type N Panel Jack
UG-23/U	Type N Jack
UG-23A/U	Type N Jack
UG-23B/U	Type N Jack
UG-23C/U	Type N Jack
UG-23D/U	Improved Type N Jack
UG-27A/U	Type N Rt. Angle Adapter
UG-27B/U	Type N Rt. Angle Adapter
UG-28/U	Type N Adapter Tee
UG-28A/U	Type N Adapter Tee
UG-29B/U	Type N Adapter Straight (Female to Female)
UG-30/U	Type N Adapter Bulkhead Pressurized
UG-32/U	Adapter N to Rigid Line 7/8 to 50 ohm line
UG-33/U	Adapter N to Rigid Line 7/8 to 70 ohm line
UG-34/U	Plug Ceramic – Insert Type – Pulse
UG-36/U	Plug Ceramic – Insert Type – Pulse
UG-37A/U	Receptacle Ceramic – Insert Type Pulse
UG-38A/U	Receptacle Ceramic Insert Pulse
UG-45/U	7/8" Male Coupling
UG-46/U	7/8" Female Coupling
UG-57B/U	Type N Adapter Straight (Male to Male)
UG-58/U	Type N Receptacle
UG-58A/U	Type N Receptacle
UG-59A/U	Type HN Plug
UG-60A/U	Type HN Jack
UG-61A/U	Type HN Panel Jack
UG-83/U	Adapter N to UHF
UG-85/U	Type BN Plug
UG-86/U	Type BN Receptacle Pressurized
UG-87/U	Type BN Receptacle
UG-88/U	Type BNC Plug
UG-88B/U	Type BNC Plug
UG-89/U	Type BNC Jack
UG-89A/U	Type BNC Jack
UG-90/U	Type BNC Panel Jack
UG-91/U	Type N Plug
UG-91A/U	Type N Plug
UG-92/U	Type N Jack
UG-92A/U	Type N Jack
UG-93/U	Type N Panel Jack
UG-93A/U	Type N Panel Jack
UG-94A/U	Type N Plug
UG-95/U	Type N Jack
UG-95A/U	Type N Jack
UG-96/U	Type N Panel Jack
UG-96A/U	Type N Panel Jack
UG-97/U	Type LN Rt. Angle Adapter
UG-97A/U	Type LN Rt. Angle Adapter
UG-98/U	Type LN Receptacle
UG-98A/U	Type LN Receptacle
UG-100/U	Type LN Plug
UG-100A/U	Type LN Plug
UG-101/U	Type LN Panel Jack
UG-101A/U	Type LN Panel Jack
UG-107/U	Type N Adapter Tee
UG-107B/U	Type N Adapter Tee
UG-108/U	Adapter N to LN (Female to Female)
UG-108A/U	Adapter N to LN (Female to Female)
UG-109/U	Type LN Adapter (Female to Female)
UG-109A/U	Type LN Adapter (Female to Female)
UG-110/U	Adapter SKL to N
UG-114/U	Type BN Panel Jack
UG-115/U	Type BN Jack
UG-119/UP	Crystal Holder (Type N to UHF)
CW-123/U	Type BNC Cap and Chain
UG-131/U	Adapter SKL to N
UG-146/U	Adapter N to UHF
UG-154/U	Type LC Plug
UG-155/U	Type C Adapter Straight
CW-155/W	Type BNC Cap
UG-156/U	Type LC Plug
UG-157/U	Type LC Adapter Straight
UG-158/U	Panel Jack Ceramic Insert Type Pulse
CW-159/U	BNC Shorting Plug
UG-159A/U	Type N Panel Jack Bulkhead
UG-160A/U	Type N Panel Jack Bulkhead
UG-160B/U	Type N Panel Jack Bulkhead
UG-166/U	Panel Jack Ceramic Insert Type Pulse
UG-167/U	Type N Plug
UG-167A/U	Type N Plug
UG-174/U	Plug Ceramic Insert Type Pulse
UG-175/U	Reducing Adapter
UG-176/U	Reducing Adapter
UG-185/U	Type BNC Receptacle
UG-188/U	Type N Plug
UG-192/U	Adapter Cable to Rigid Line
MX-195/U	Hood
UG-201/U	Adapter BNC to N
UG-202/U	Type N Adapter Rt. Angle Mtg. Plate
UG-204/U	Type N Plug
UG-204A/U	Type N Plug
UG-206/U	Type BN Receptacle
UG-207/U	Adapter Cable to Rigid Line
UG-288/U	Type LC Adapter, Rt. Angle

Modified and Special Types on Request

UG-212A/U	Type HN Rt. Angle Adapter
UG-213A/U	Adapter N to LN
UG-215/U	Type LC Adapter Straight
UG-216/U	Type LC Adapter Rt. Angle
UG-217/U	Adapter HN to LC
UG-218/U	Adapter HN to LC Rt. Angle
UG-219/U	Type LC Adapter Rt. Angle
UG-220/U	Type LC Adapter Straight
UG-222/U	Adapter, Ceramic, Insert Type – Pulse
UG-231/U	Type N Receptacle
UG-233/U	Adapter LC to 7/8" Rigid Line 70 ohm
UG-234/U	Adapter LC to 7/8" Rigid Line 50 ohm
UG-237/U	Adapter LC to 7/8" Rigid Line
UG-241/U	Adapter BN to UHF
UG-242/U	Type BN Adapter Tee
UG-243/U	Type BN Adapter Rt. Angle
UG-244/U	Type BN Adapter – Bulkhead – Pressurized
UG-245/U	Type BN Plug
UG-246/U	Type BN Panel Jack
UG-249/U	Adapter HN to 7/8" Line, Stub Line Rg-44/
UG-250/U	Adapter HN to 7/8" Rigid Line 50 ohm
UG-251/U	Adapter HN to 7/8" Rigid Line 70 ohm
UG-252/U	Adapter HN to LC
UG-253/U	Type BNC Jack Bulkhead Pressurized
UG-254/U	Type BNC Receptacle Pressurized
UG-254A/U	Type BNC Receptacle Pressurized
UG-255/U	Adapter BNC to UHF
UG-256/U	Adapter Cable to Rigid Line
UG-257/U	Adapter Cable to Rigid Line
UG-259/U	Adapter HN to LC
UG-260/U	Type BNC Plug
UG-260A/U	Type BNC Plug
UG-261/U	Type BNC Jack
UG-261A/U	Type BNC Jack
UG-262/U	Type BNC Panel Jack
UG-262A/U	Type BNC Panel Jack
UG-266/U	UHF Receptacle
UG-270/U	Adapter N to LC
UG-271/U	Adapter N to LC Mtg. Plate
UG-272/U	Adapter N to 7/8" Rigid Line Stub Line R
UG-273/U	Adapter BNC to UHF
UG-274/U	Type BNC Adapter Tee
UG-275/U	Type SKL Plug
UG-276/U	Type SKL Adapter Tee
UG-279/U	Type LN Jack
UG-279A/U	Type LN Jack
UG-281/U	Type N Panel Jack
UG-287/U	Type LC Adapter Straight Panel Mtg.
UG-290/U	Type BNC Receptacle
UG-291/U	Type BNC Panel Jack
UG-291A/U	Type BNC Panel Jack
UG-306/U	Type BNC Adapter Rt. Angle
UG-309/U	Adapter HN to BNC

Connector Engineering

UG-318/U	Adapter UHF to N
UG-333/U	Type HN Jack
UG-334/U	Type HN Panel Jack
UG-335/U	Adapter N to BNC Mtg. Plate
UG-347/U	Plug, quick-disconnect
UG-348/U	Jack, quick-disconnect
UG-349/U	Adapter N to BNC
UG-350/U	Receptacle Ceramic, Insert Type
UG-352/U	Type LC Receptacle (Superseded by UG-352A)
UG-352A/U	Type LC Receptacle
UG-414/U	Adapter
UG-427/U	Type HN Jack
UG-447/U	Type BNC Receptacle with clearance holes
UG-475/U	Type HN Adapter Tee
UG-479/U	Adapter (RG-81/U to RG-8/ & RG-10/U)
UG-480/U	Adapter (RG-81/U to RG-82/U)
UG-483/U	Type N Jack
UG-484/U	Type N Jack
UG-486/U	Type N Plug
UG-487/U	Type N Plug
UG-491/U	Type BNC Adapter Bulkhead – Pressurized
UG-494/U	Type HN Plug
UG-495/U	Type HN Plug
UG-496/U	Type HN Receptacle
UG-497/U	Adapter
UG-516/U	Adapter N to LN
UG-516A/U	Adapter N to LN
UG-535/U	Rt. Angle Mounting Connector
UG-536/U	Type N Plug
UG-555/U	Type LN Tee Adapter
MX-564/U	Armor Clamp
UG-564/U	Adapter C to N
UG-565/U	Adapter C to N
UG-566/U	Adapter Tee Type C
UG-567/U	Adapter Right Angle Type C
UG-568/U	Receptacle Type C
UG-569/U	Receptacle Bulkhead Type C
UG-570/U	Jack Bulkhead Type C
UG-571/U	Panel Jack Type C Mtg. Plate
UG-572/U	Jack Type C
UG-573/U	Plug Type C
UG-594/U	Rt. Angle Plug Adapter
UG-602/U	Type N Jack
UG-603/U	Type N Plug
UG-604/U	BNC Receptacle Similar to UG-290 Panel Mtg.
UG-606/U	Adapter Pressurized N to BNC
UG-625/U	BNC Receptacle Panel Mtg.
MX-913/U	Cap and Chain
NT-49550	Plug
NT-49551	Panel Receptacle
NT-49579	Jack
NT-49580	Panel Jack
NT-49891	Rt. Angle Adapter

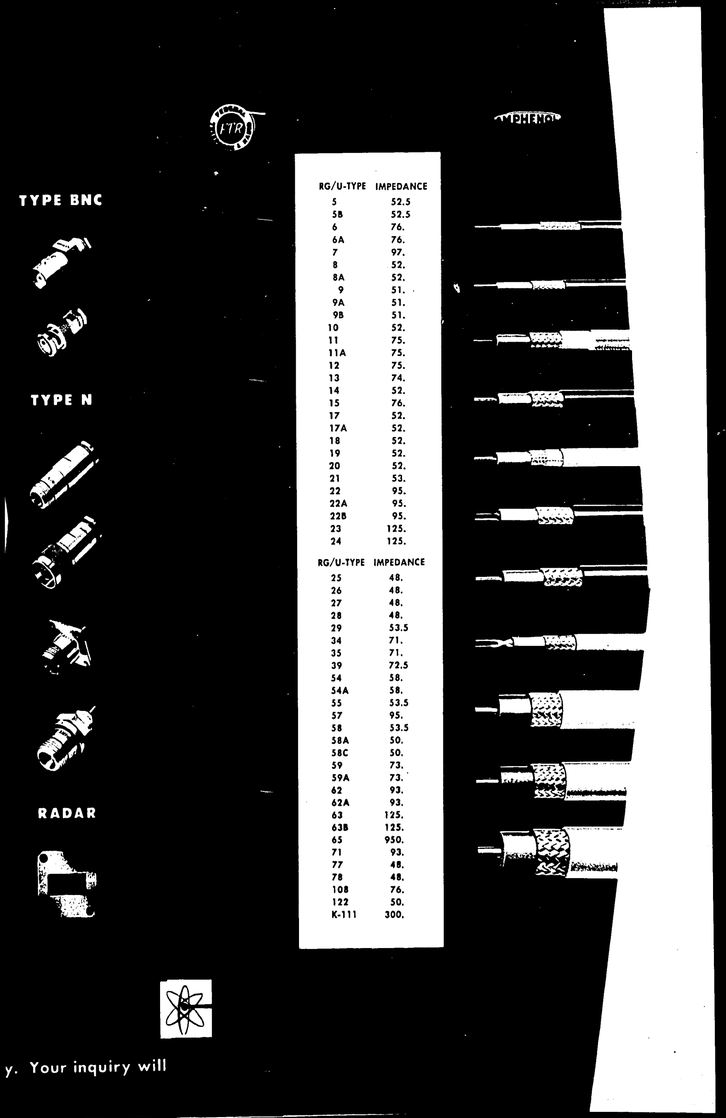
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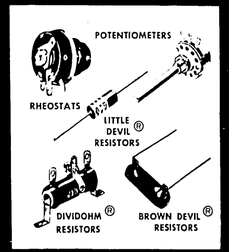


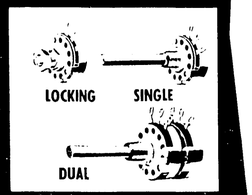
RG/U-TYPE	IMPEDANCE
5	52.5
5B	52.5
6	76.
6A	76.
7	97.
8	52.
8A	52.
9	51.
9A	51.
9B	51.
10	52.
11	75.
11A	75.
12	75.
13	74.
14	52.
15	76.
17	52.
17A	52.
18	52.
19	52.
20	52.
21	53.
22	95.
22A	95.
22B	95.
23	125.
24	125.

RG/U-TYPE	IMPEDANCE
25	48.
26	48.
27	48.
28	48.
29	53.5
34	71.
35	71.
39	72.5
54	58.
54A	58.
55	53.5
57	95.
58	53.5
58A	50.
58C	50.
59	73.
59A	73.
62	93.
62A	93.
63	125.
63B	125.
65	950.
71	93.
77	48.
78	48.
108	76.
122	50.
K-111	300.

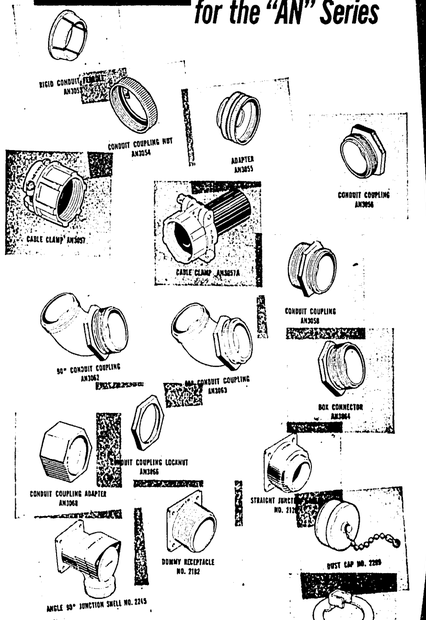
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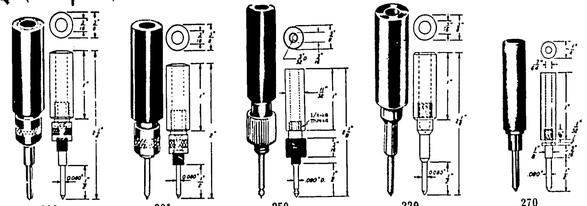
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No. 200 Senior Type $23.00 Per C
No. 201 Junior Type $21.00 Per C

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Signal Corps Approved. Steel, case hardened phone tip made to Signal Corps drawing and spec. Supplied with Bicld Thermoplastic handle to JAN spec. Available in Red or Black Specify color.

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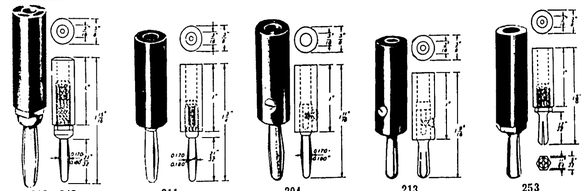
Plug portion brass, nickel plated, or sturdy one piece construction. Fits all standard phone tip jacks. Molded plastic handle available in Red, Black, Yellow or Green. Specify color.

No. 229 $28.00 Per C

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Fits all standard phone tip jacks. For checking all types of subminiature equipment. Brass, nickel plated tip, $\frac{1}{16}$" O.D. handle of Red or Black bare fibre. Specify color.

No. 270 $20.00 Per C



INSULATED BANANA PLUGS

Plug portion brass, nickel plated. Fits all standard banana jacks. No. 212 beryllium spring retains resiliency after thousands of insertions. Wire can be soldered to brass stud or directly to plug itself. Molded plastic handle available in Red, Black, Yellow or Green. Specify color.

No. 242 Phosphor Bronze Spring $30.00 Per C
No. 242 Beryllium Copper Spring $50.00 Per C

INSULATED BANANA PLUG

Spring Type. Plug portion brass, nickel plated. Fits all standard banana jacks. Four heated phosphor bronze spring. Set screw provided for solderless connection. Molded plastic handle available in Red, Black, Yellow or Green. Specify color.

No. 211 $25.00 Per C

INSULATED BANANA PLUG

Spring Type. Plug portion brass, nickel plated. Fits all standard banana jacks. Four heated phosphor bronze spring. Wire can be soldered to stud or plug. Molded plastic handle available in Red, Black, Yellow or Green. Specify color.

No. 204 $25.00 Per C

INSULATED BANANA PLUG

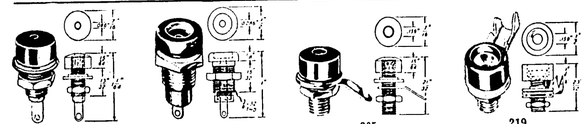
Split Type. Plug portion brass, nickel plated, cross slotted set screw for solderless connection. Molded plastic handle available in Red, Black, Yellow or Green. Specify color.

No. 213 $20.00 Per C

INSULATED BANANA PLUG

Molded plastic handle. Plug portion brass, nickel plated. Wire can be soldered to stud or plug. Molded plastic handle available in Red, Black, Yellow or Green. Specify color.

No. 253 $25.00 Per C



INSULATED PHONE TIP JACKS

Accommodates all standard phone tip plugs. Body is brass, nickel plated. Sturdy phosphor bronze spring. Mounts in $\frac{3}{8}$" hole in panels up to $\frac{1}{8}$" thick. Molded plastic head available in Red, Black, Yellow or Green. No. 202 available in Blue also. Specify color.

No. 222 $\frac{1}{2}$" Head Diameter $20.00 Per C
No. 223 $\frac{3}{4}$" Head Diameter $35.00 Per C

ALL INSULATED TIP JACK

Accommodates all standard phone tips. Sturdy phosphor bronze contact. Mounts in $\frac{3}{8}$" hole in panels up to $\frac{1}{8}$" thick. Red, Black, Yellow, Green or Blue. Specify color.

No. 240 $50.00 Per C

INSULATED BANANA JACK

Accommodates all standard banana plugs. Body is brass, nickel plated. Mounts in $\frac{3}{8}$" hole in panels up to $\frac{1}{8}$" thick. Molded plastic head, Red, Black, Yellow, Green or Blue. Specify color.

No. 205 $20.00 Per C

INSULATED BANANA JACK

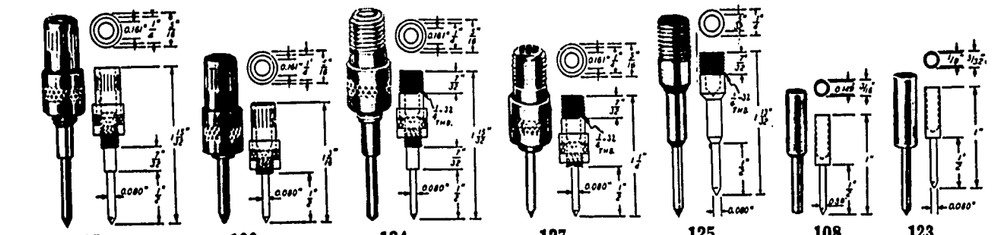
Accommodates all standard banana plugs. Body is brass, nickel plated. Mounts in $\frac{3}{8}$" hole in panels up to $\frac{1}{8}$" thick. Plastic head Red, Black, Yellow or Green. Specify color.

No. 219 $22.00 Per C

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105 106 124 127 125 108 123

SOLDERLESS PHONE TIP PLUGS

Brass, nickel plated. Wire is wrapped around screw portion, and tightened with knurled nut. Fits standard phone tip jacks.

No. 105	Senior Type	$16.00 Per C
No. 106	Junior Type	$16.00 Per C

THREADED SOLDERLESS PHONE TIPS

Brass, nickel plated. Wire is wrapped around screw portion and tightened with knurled nut. Threaded for easy insertion in plastic handles. Fits standard phone tip jacks.

No. 124	Senior Type	$18.00 Per C
No. 127	Junior Type	$18.00 Per C

HEAVY DUTY PHONE TIP PLUG

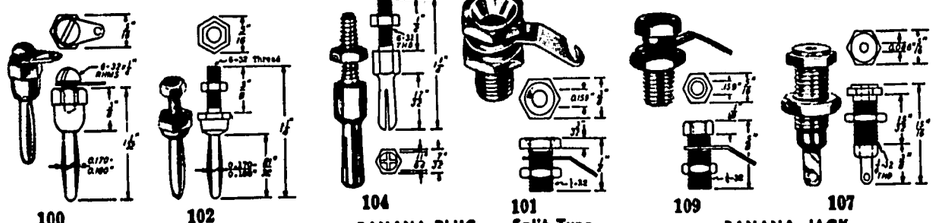
This brass nickel plated phone tip is of extra sturdy construction, and fits all standard phone tip jacks.

No. 125 $16.00 Per C

SOLDER TYPE PHONE TIPS

Brass nickel plated.

No. 108	Standard Type	$ 30.00 Per M
No. 123	Large I.D. Type	$ 40.00 Per M



100 102 104 101 109 107

BANANA PLUG

Hexed brass, nickel plated. Spring is four-leave phosphor bronze, nickel plated. Plug supplied with screw and phosphor bronze tinned lug. Internal female permits use of this plug on all size panels.

No. 100 $20.00 Per C

BANANA PLUG

Hexed brass, nickel plated. Four-leaved phosphor bronze spring, nickel plated. 6-32 hex nut.

No. 102 $20.00 Per C

BANANA PLUG — Split Type

Hexed brass, nickel plated. Cross slotted for positive and lasting contact. Fits all standard banana jacks. One-piece construction. 6-32 hex nut.

No. 104 $20.00 Per C

BANANA JACK

Hexed brass, nickel plated jack with recessed head. Recommended for use with No. 100 banana plug but accommodates all standard banana plugs.

No. 101 $15.00 Per C

BANANA JACK

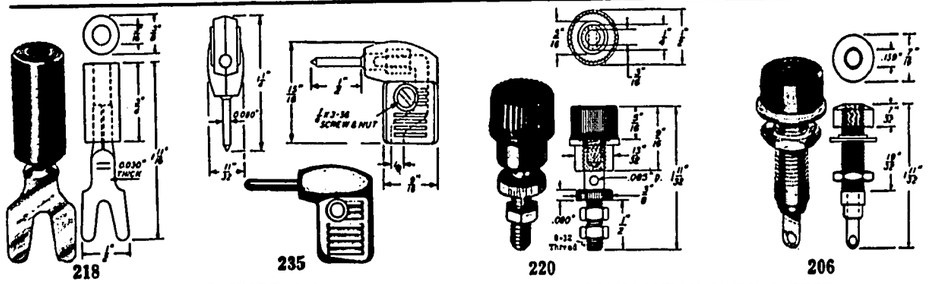
Hexed brass, nickel plated. Mounts in ¼" hole and fits panels up to ⅜" thick. Accommodates all standard banana plugs.

No. 109 $15.00 Per C

PHONE TIP JACK

Body is brass, nickel plated, with internal phosphor bronze spring for positive contact. Mounts in ¼" hole in panels up to ⅜" thick. ¼-32 hex nut.

No. 107 $15.00 Per C



218 235 220 206

INSULATED SPADE LUG

Adapts banana plug to a spade lug. Steel hot tinned lug .080" thick for extra durability. Molded plastic handle in Red or Black. Specify color.

No. 218 Complete $18.00 Per C No. 129 Lug Only $20.00 Per M

MOLDED METER TIP PLUG

Molded in two halves for easy assembling. Brass nickel plated tip fits standard tip jacks. Available in Red and Black. Specify color.

No. 235	Tip Plug	$0.45 Each
No. 235-D	Display of 24 Pairs	$21.60 Each

COMBINATION BINDING POST

Molded plastic free turning non-removable head. Accepts a phone tip plug, a spade lug, or a banana plug. Normally grounded; can be insulated by use of No. 2155 shoulder and 2163 flat fibre washers. Red or Black. Specify color.

No. 220 $40.00 Per C

INSULATED COMBINATION JACK

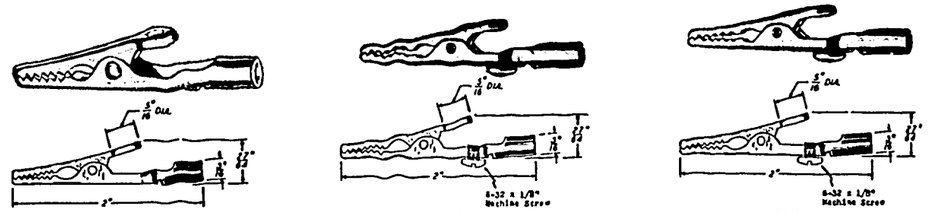
Accommodates all standard phone tip or banana plugs. Body is brass, nickel plated; contact is a sturdy phosphor bronze spring. Molded plastic head. Red, Black, Yellow, Green or Blue. Specify color.

No. 206 $25.00 Per C

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300 350 360

ALLIGATOR CLIP

Steel, cadmium plated. Jaws match accurately for firm grip. Banana plug fits in rear of alligator clip.

No. 300 $10.00 Per C

STEEL ALLIGATOR CLIP Screw Type

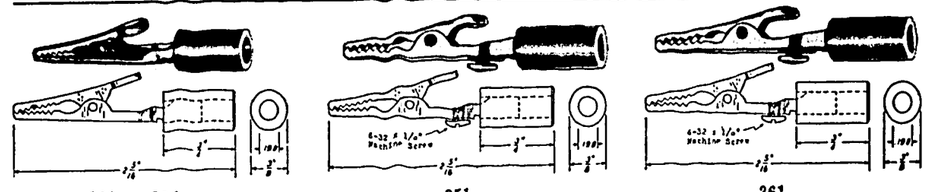
Steel, cadmium plated. Jaws match accurately for firm grip. Supplied with screw for solderless connection.

No. 350 $11.00 Per C

COPPER ALLIGATOR CLIP Screw Type

Solid copper. Jaws match accurately for firm grip. Supplied with brass screw for solderless connection.

No. 360 $15.00 Per C



301 306 351 361

INSULATED ALLIGATOR CLIP

Embodies our No. 300 steel cadmium plated alligator clip with molded plastic Red or Black handle. Specify color.

No. 301	¾" Handle	$18.00 Per C
No. 306	1½" Handle	$35.00 Per C

INSULATED STEEL ALLIGATOR CLIP

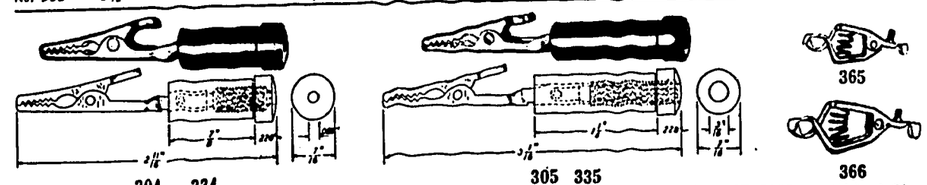
Screw type. Embodies our No. 350 steel, cadmium plated screw type alligator clip with molded plastic Red or Black handle. Specify color.

No. 351 $19.00 Per C

INSULATED COPPER ALLIGATOR CLIP

Screw type. Embodies our No. 360 copper screw type alligator clip with molded plastic Red or Black handle. Specify color.

No. 361 $23.00 Per C



304 334 305 335 365 366

PHONE TIP TO ALLIGATOR CLIP ADAPTER

No. 300 Alligator clip with No. 202 tip jack in rear of handle, adapts phone tip plugs to alligator clips. Red or Black. Specify color.

No. 304 $50.00 Per C

Same, except with No. 360 screw type copper alligator Clip.

No. 334 $55.00 Per C

PHONE TIP OR BANANA PLUG TO ALLIGATOR CLIP ADAPTER

No. 300 alligator clip with No. 206 comb. phone tip and banana plug jack in rear of handle. Adapts phone tips and banana plugs to alligator clips. Red or Black. Specify color.

No. 305 $60.00 Per C

Same, except with No. 360 screw type copper alligator clip.

No. 335 $65.00 Per C

BATTERY TEST CLIP — Midget Size

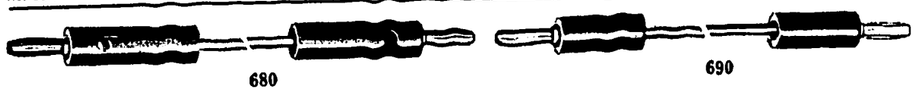
Steel, cadmium plated, for radio and ignition work, etc. Jaws have meshing teeth. Jaw spread ½", 7 lb. spring, 1½" long, 5 amp. capacity.

No. 365 $9.50 Per C

BATTERY TEST CLIP — Small Size

For general testing and radio use. Steel, Electroplated. Jaws have meshing teeth. Jaw spread ¼", 10 lb. spring, 2" long, 10 amp. capacity.

No. 366 $10.00 Per C



680 690

"CROSS-PATCH" PATCH CORD

Provides a never-ending banana plug receptacle to interconnect an unlimited amount of multiple circuits. The cross hole is designed for positive contact of all standard banana plugs. Fits all standard banana jacks. Four-leaved phosphor bronze nickel plated spring. Red or Black assemblies. Specify color.



No. 680	8"	Wire Length	$1.45 Each
No. 681	12"	Wire Length	$1.55 Each
No. 682	24"	Wire Length	$1.65 Each
No. 683	36"	Wire Length	$1.75 Each

PATCH CORD

Embodies No. 211 banana plug and is used to interconnect circuits. Molded plastic handle. Plug portion brass, nickel plated. Fits all standard banana jacks. Four-leaved phosphor bronze nickel plated spring. Red or Black assemblies. Specify color.

No. 690	8"	Wire Length	$ .80 Each
No. 691	12"	Wire Length	$ .90 Each
No. 692	24"	Wire Length	$1.00 Each
No. 693	36"	Wire Length	$1.10 Each

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BRASS SPACERS CADMIUM PLATED

Ideal for use in raising sub panels, chassis, condensers, transformers, etc. Hole in bushing to accommodate a No. 6 or No. 8 screw.

For No. 6 Screw No.	Per C	¼" O.D. Length	For No. 8 Screw No.	Per C
2100	$5.00	¼"	2105	$5.00
2101	6.50	⅜"	2106	6.50
2102	8.00	½"	2107	8.00
2103	9.50	¾"	2108	9.50
2104	11.00	1"	2109	11.00
		⅜" O.D.		
2110	$8.00	¼"	2115	$8.00
2111	9.50	⅜"	2116	9.50
2112	11.00	½"	2117	11.00
2113	12.50	¾"	2118	12.50
2114	14.00	1"	2119	14.00

THREADED BRASS SPACERS CADMIUM PLATED

Brass bushings ¼" O.D. Threaded 6-32 and 8-32.

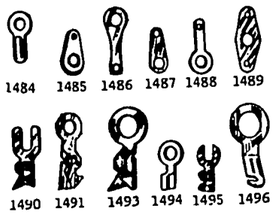
Threaded 6-32 No.	Per C	Length	Threaded 8-32 No.	Per C
2120	$6.00	¼"	2125	$6.00
2121	7.50	⅜"	2126	7.50
2122	9.00	½"	2127	9.00
2123	11.00	¾"	2128	11.00
2124	12.50	1"	2129	12.50

INSULATED SPACERS

For No. 6 Screw No.	Per C	¼" O.D. Length	For No. 8 Screw No.	Per C
2130	$6.00	¼"	2140	$6.00
2131	6.75	⅜"	2141	6.75
2132	7.00	½"	2142	7.00
2133	9.00	¾"	2143	9.00
2134	10.75	1"	2144	10.75

SOLDER TYPE LUGS

Hot Tinned



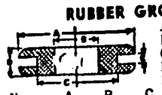
1484 1485 1486 1487 1488 1489

1490 1491 1493 1494 1495 1496

No.	Material	L.	Thick-ness	Hole	Per M
1484	Brass	⅝"	.020"	No. 6	$7.70
1485-6	Ph. Br.	⅝"	.012"	No. 6	8.00
1485-8	Ph. Br.	⅝"	.012"	No. 8	8.00
1486-6	Ph. Br.	⅞"	.012"	No. 6	8.00
1486-8	Ph. Br.	⅞"	0.12"	No. 8	8.00
1487-6	Ph. Br.	⅝"	0.12"	No. 6	8.00
1487-8	Ph. Br.	⅝"	0.12"	No. 8	8.00
1488	Brass	⅜"	.016"	No. 6	6.60
1489	Brass	⅞"	.015"	No. 8	9.00
1490	Brass	⅜"	.020"	No. 10	10.00
1491	Copper	⅛"	.020"	No. 10	11.00
1493	Brass	1 ⅛"	.027"	¼"	20.00
1494-6	Brass	⅝"	.020"	No. 6	8.30
1494-8	Brass	⅝"	.020"	No. 8	8.30
1495	Brass	⅝"	.020"	No. 8	7.70
1496	Brass	¾"	.020"	¼"	10.00

An attractive display card of each lug containing 24 15c list envelopes, can be obtained by specifying the letter "D" after the above catalog numbers.

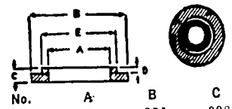
RUBBER GROMMETS



A: O.D.
B: I.D.
C: PANEL
D: THICK
E: P. THICK

No.	A	B	C	D	E	Per C
2185	⅛"	⅛"	⅛"	⅛"	⅛"	$2.20
2172	⅛"	⅛"	⅛"	⅛"	⅛"	3.85
2170	⅛"	⅛"	⅛"	⅛"	⅛"	3.60
2174	⅛"	⅛"	⅛"	⅛"	⅛"	3.85
2175	⅛"	⅛"	½"	⅛"	⅛"	3.60
2177	⅜"	⅛"	⅜"	⅛"	⅛"	4.95
2186	1 ⅛"	½"	⅞"	⅛"	⅛"	5.20
2187	1 ⅛"	⅝"	⅞"	⅛"	⅛"	5.50
2188	1 ⅛"	⅛"	1⅛"	⅛"	⅛"	
2189	1"	¾"	⅞"	⅛"	⅛"	8.00

FIBRE SHOULDER WASHERS



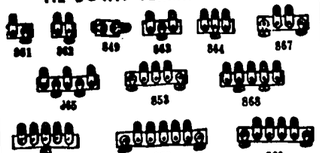
A. Inside Diameter
B. Outside Diameter
C. Thickness Over-all
D. Height of Shoulder
E. Diameter of Shoulder

No.	A	B	C	D	E	Per M
2150	#6-.140	.375	.098	.031	.237	$11.50
2151	#4-.110	.250	.062	.031	.187	9.50
2152	#6-.136	.250	.093	.031	.187	10.00
2153	#6-.136	.312	.093	.031	.187	11.00
2154	¼"-.250	.500	.068	.028	.312	12.00
2155	#8-.172	.375	.093	.031	.246	11.00
2156	#10-.196	.375	.093	.031	.308	11.00
2157	⅜"-.375	.750	.093	.031	.500	14.50
2158	⅜"-.385	.625	.093	.031	.500	14.00

FLAT FIBRE WASHERS

No.	For Screw-(I.D.)	O.D.	Thickness	Per M
2160	#6-.136	.250	1/32	$9.50
2161	#4-.110	.250	1/16	9.50
2162	#6-.140	.375	1/32	8.50
2163	#8-.172	.375	1/16	8.50
2164	#10-.196	.375	1/8	9.00
2165	¼"-.250	.500	1/16	9.50
2166	¼"-.250	.500	1/8	9.00
2167	5/16"-.312	.500	1/16	11.00
2168	⅜"-.385	.625	1/16	14.00
2169	⅜"-.375	.750	1/16	

TIE DOWN TERMINAL STRIPS



861 863 849 863 864 867

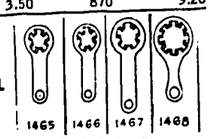
865 853 868

866 869

848 870

No.	Per C	No.	Per C
848	$9.75	864	$3.75
849	2.75	865	6.10
853	5.75	866	5.95
860	8.25	867	5.00
861	2.75	868	6.50
862	2.90	869	7.50
863	3.50	870	9.20

LOCKING TYPE TERMINAL LUGS

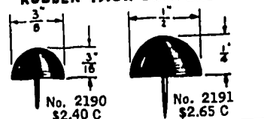


1465 1466 1467 1468

BRASS ELECTRO PLATED

No.	Hole Size	Thick	Per M
1465	No. 4	.020	$14.00
1466	No. 6	.020	14.00
1467	No. 8	.020	14.00
1468	¼"	.020	14.00

RUBBER TACK BUMPERS



No. 2190 $2.40 C

No. 2191 $2.65 C

TERMINAL BOARDS

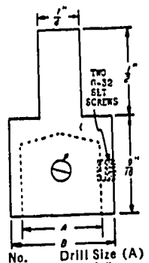
Screw Type



Brass hot tinned lugs mounted on ⅛" bakelite. Lugs are spaced ⅞" center to center.

No.	Terminals	Mounting Center	Per C
872	2	1 ⅛"	$12.00
873	3	1⅞"	18.00
874	4	2 ⅝"	22.00
875	5	2⅝"	28.00
876	6	3 ⅛"	33.00
877	7	3 ⅝"	40.00

DRILL ADAPTER



Convert your ¼" drill chuck to drill holes up to ½". Steel drill adapter enables the use of drills from ⅛" to ½" in portable electric drill with a ¼" chuck. Drills can be quickly inserted and tightened with two set screws located at 90° angle for firm hold.

No.	Drill Size (A)	O.D. (B)	Each
175	⅛"	⅞"	$0.75
176	3/16"	⅞"	.80
177	¼"	⅞"	.85
178	5/16"	⅞"	.90
179	½"	⅞"	3.30
	Kit of 1 each		

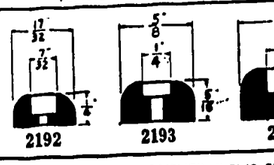
BEARING FOR PANEL ASSEMBLY



Made of brass, and fits in ⅜" diameter hole in panels up to ⅛" thick. Bearing is made to accommodate ¼" shafts. Overall length ¼".

No. 119.....$0.25 each

RECESS RUBBER BUMPERS



2192 2193 2194 2184

No.	Per C
2192	$2.20
2193	2.75
2194	4.40
2184	4.50

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SPERRY GYROSCOPE COMPANY

SPERRY KLYSTRON TUBES and *Microline*† INSTRUMENTS

Stemming from its sponsorship of the development of the klystron in 1938, Sperry has had vast experience in the manufacture of these tubes for low, medium and high power applications. As a result of Sperry's pioneering in microwave measuring techniques, this company has a complete line of *Microline* instruments which include every type of device essential to precision measurement, in the entire microwave field.

For further information on the equipment listed below or on new development of klystrons and microwave test units, write or telephone our Special Electronics Department or our nearest District Office.

KLYSTRONS

Type	Description	Frequency Range in MC	Output Power	Beam Voltage	Reflector Voltage
SRL17	Reflex Oscillator	750 to 990	5w	1000	0 to —1500
3N23	Reflex Oscillator	950 to 1150	5w	1000	0 to —1500
SRL7C	Reflex Oscillator	1850 to 2160	10w	1000	0 to —1000
2K41	Reflex Oscillator	2660 to 3310	250mw*	1250	0 to —750
2K42	Reflex Oscillator	3300 to 4200	250mw*	1250	0 to —750
2K43	Reflex Oscillator	4200 to 5700	250mw*	1250	0 to —750
2K44	Reflex Oscillator	5700 to 7500	250mw*	1250	0 to —750
2K39	Reflex Oscillator	7500 to 10,300	250mw*	1250	0 to —750
2K25	Reflex Oscillator	8500 to 9660	20mw*	300	—55 to —220
SRC-43 Series	Reflex Oscillator	5925 to 8100	1w	750	0 to —300
SRU-55	Reflex Oscillator	14,000 to 17,500	25mw	300	0 to —150
SAC-19	Amplifier/ Oscillator	6000 to 6300	6w	625	none
SAS28	Cascade Amplifier	** 2600 to 2800	225w	4000	none
2K35	Cascade Amplifier	2730 to 3330	25w	3000	none
SAC41	Cascade Amplifier	3700 to 4200	10w	750	none
SAC30	Cascade Amplifier	4970 to 5034	9w	1000	none
SAC53	Cascade Amplifier	** 4800 to 5300	500w	5200	none
SAL30	Pulsed Cascade Amp. (1% duty cycle)	960 to 1215	30kw	20,000	none
SAX30	Pulsed Amplifier (3.6% duty cycle)	** 8100 to 9500	125w	5000	none
SAX22	Pulsed Amplifier (2.4% duty cycle)	** 9100 to 9500	7.5kw	17,000	none
SMS27	Frequency Multiplier	** 250 to 270 in ** 2900 to 2700 out	350mw	1000	none
SMC11	Frequency Multiplier	** 675 to 715 in ** 3750 to 4000 out	400mw	1000	none
SMX12	Amp.-Freq. Multiplier	** 4500 to 5250 in ** 9000 to 10,500 out	1.5w	1000	none
SMX40	Amp.-Freq. Multiplier	** 4700 to 5200 in ** 23,500 to 26,000 out	600mw	1500	none

*Maximum Output Power.

†Produced by manufacturer to control frequency specified by customer. An individual tube has only trimmer tuning.

(See Adapter Section for Klystron Tube Mounts.)

†T.M. Reg. U. S. Pat. Off.

BARRETTER AND THERMISTOR MOUNTS

Model	Description	Barretter Type	Frequency Range-kmc	Max. VSWR	Fittings Input	Fittings Output
554	⅛" Coaxial Barretter and Thermistor	811	.82-2.0	1.8	UG-46/U	BNC
		550		1.5		
163	Type N Coaxial	821	2.5-2.7	1.8	Type N Plug	UHF
85	Type N Coaxial	821	2.7-2.9	1.8	Type N Plug	UHF
164	Type N Coaxial	821	2.9-3.1	1.8	Type N Plug	UHF
245	2"x1" Waveguide	821	3.7-4.5	1.5	UG-149A/U	UHF
83A	2"x1" Waveguide	821	4.6-5.65	1.5	UG-149A/U	UHF
253	1½"x¾" Waveguide	821	5.3-6.6	1.7	UG-344/U	UHF
212	1¼"x¼" Waveguide	821	6.0-7.6	1.5	UG-344/U	UHF
184	1"x½" Waveguide	821	8.5-9.6	1.5	UG-39/U	UHF
219C	1"x½" Thermistor Waveguide	—	8.5-9.6	1.5	UG-39/U	BNC

BARRETTER ELEMENTS

811 125 OHMS (see Barretter and Thermistor Mounts)
821 200 OHMS (see Barretter and Thermistor Mounts)

IMPEDANCE METERS

Model	Frequency Range-kmc	Reading Accuracy	Transmission Line Size	Detector Element	Fittings Input	Fittings Output
361A	.65-4.0	0.1mm	⅛" Coaxial	IN21B*	UG-86/U	UG-45/U
299	2.6-4.0	0.1mm	3"x1¼"	IN21B*	UG-214/U	UG-214/U
103B	3.95-6.0	0.1mm	2"x1"	IN23B*	UG-149A/U	UG-149A/U
201	5.3-8.2	0.1mm	1¼"x⅝"	IN23B*	UG-344/U	UG-344/U
145	8.1-12.4	0.1mm	1"x½"	IN23B*	UG-39/U	UG-39/U
320	18.0-26.5	0.01mm	¼"x¼"	IN26	UG-425/U	UG-425/U
346	26.5-40.0	0.01mm	.360"x.220"	IN53	UG-381/U	UG-381/U

*The Model 821 barretter element can also be used.

IMPEDANCE TRANSFORMERS

Model	Type	Description	Frequency Range-kmc	Max. VSWR	Fittings
363	Double-Slug	⅛" Coaxial	.665-3.7	1.4	UG-86/U and UG-45/U
34A	Triple-Stub	⅛" Coaxial	1.7-3.75	1.4	UG-86/U and UG-45/U
137	Double-Stub	¼" Coaxial	2.65-10.3	—	Type N Jack
301	Double-Slug	3"x1¼"	2.6-4.0	1.10	UG-214/U
109B	Double-Slug Waveguide	2"x1"	3.95-6.0	1.1	UG-149A/U
117B	Double-Slug Waveguide	2"x1"	3.95-6.0	1.1	UG-149A/U
202	Double-Slug Susceptance Waveguide	1¼"x¼"	5.3-8.1	1.1	UG-344/U
173	Double-Slug Susceptance Waveguide	1"x½"	8.1-12.4	1.1	UG-39/U
146	Double-Slug Waveguide	1"x½"	8.1-12.4	1.1	UG-39/U

FREQUENCY METERS

Model	Description	Type*	Frequency Range-kmc	Absolute Accuracy	Fittings R-F	Video
124C	Broadband Coaxial	T	.66-3.0	1/1000	Type N	UHF
S22	Detector Wavemeter Kit	T&A	2.4-3.4	1/2000	Type N	UHF
291A	Cavity	T&A	2.575-3.78	1/10,000	Type N	UHF
27B	Coaxial	T	3.5-6.5	1/1000	Type N	BNC
28B	Cavity	T&A	4.01-6.0	1/10,000	UG-149A/U	UHF
207A	Coaxial	T	5.3-8.1	1/2000	Type N	BNC
208A	Cavity	T&A	5.49-8.1	1/10,000	UG-344/U	UHF
273	Cavity	T&A	8.1-11.9	1/10,000	UG-39/U	UHF
348	Cavity	T&A	13.8-18.0	1/1000	UG-419/U	
349	Cavity	T&A	19.0-26.0	1/1000	UG-425/U	
350	Cavity	T&A	26.5-39.0	1/1000	UG-381/U	
126	Coaxial	A	8.1-10.2	1/2000	UG-39/U	
138A	Cavity Direct Reading	A	8.43-9.66	1/4000	UG-39/U	

*T—Transmission A—Absorption

DIRECTIONAL COUPLERS

Model	Description	Frequency Range-kmc	Attenuation-db	Fittings
517	⅛" Coaxial	.24-.48	20-30-40	UG-46/U*
519	¼" Coaxial	.48-.96	20-30-40	UG-46/U*
480	½" Coaxial	.96-1.99	20-30-40	UG-46/U*
467	½" Coaxial	1.99-4.0	20-30-40	UG-46/U*
306	3"x1½" Waveguide	2.6-4.0	30	UG-214/U
233	2"x1" Waveguide	4.0-6.0	24	UG-149A/U
321	2"x1" Waveguide	4.0-6.0	30	UG-149A/U
322	2"x1" Waveguide	4.0-6.0	40	UG-149A/U
209	1½"x¾" Waveguide	5.3-8.1	24	UG-344/U
237	1½"x¾" Waveguide	5.3-8.1	30	UG-344/U
235	1"x½" Waveguide	8.1-12.4	20	UG-39/U
419	1"x½" Waveguide	8.1-12.4	30	UG-39/U
234	1"x½" Waveguide	8.1-12.4	40	UG-39/U
388	0.702"x0.390" Waveguide	12.4-17.0	20	UG-419/U
413	¼"x½" Waveguide	18.0-26.5	20	UG-425/U
415	¼"x½" Waveguide	18.0-26.5	40	UG-425/U
405	0.360"x0.220" Waveguide	26.5-36.0	20	UG-381/U

*Input fitting. Main line output UG-45/U. Secondary line output, UG-46/U. Adapters (Models 352A and 217) convert these units to Type N.

ATTENUATORS

Model	Description	Frequency Range-kmc	Attenuation Range-db	Waveguide Size	Fittings
127A	Precision ± .2db	29-32mc	15-95	—	UHF
110	Variable	4.0-6.0	0-20	2"x1"	UG-149A/U
292	Variable	7.0-10.0	2-20	1¼"x⅝"	UG-51/U
134A	Calibrated ± .5db	8.5-9.6	2-45	1"x½"	UG-39/U
173	Fixed ± .5db	8.5-9.6	3	1"x½"	UG-39/U
174	Fixed ± .5db	8.5-9.6	6	1"x½"	UG-39/U
183	Fixed ± .5db	8.5-9.6	10	1"x½"	UG-39/U
152A	Variable	8.1-12.4	0.5-20	1"x½"	UG-39/U
375A	Variable	12.4-18.0	0.5-20	0.702"x0.391"	UG-419/U
290	Variable	3.95-6.0	2-20	2"x1"	UG-149A/U

TERMINATIONS

Model	Description	Frequency Range-kmc	Power Capacity Watts	Max. VSWR	Fittings
637	⅛" Coaxial	.65-3.5	12	1.4	UG-46/U
308	3"x1½" Waveguide	2.6-4.0	1	1.04	UG-214/U
105	2"x1" Waveguide	3.95-6.0	1	1.04	UG-149A/U
113	2"x1" Waveguide	4.0-6.0	210	1.10	UG-149A/U
214	1½"x¾" Waveguide	5.3-8.2	1	1.04	UG-344/U
213	1½"x¾" Waveguide	5.3-8.2	150	1.10	UG-344/U
150	1"x½" Waveguide	8.1-12.4	1	1.04	UG-39/U
246	1"x½" Waveguide	8.1-12.4	100	1.10	UG-39/U
401	0.702"x0.391" Waveguide	12.4-18.0	100	1.15	UG-419/U
402	0.360"x0.220" Waveguide	26.5-40.0	18	1.15	UG-381/U
495	1"x½" Waveguide	8.1-12.4	5	Tunable	UG-39/U

WATTMETER BRIDGES—SIGNAL SOURCES

Model 84C Wattmeter Bridge*
Model 123B Wattmeter Bridge*
Model 555 Klystron Power Supply—see Klystrons
Model 296B Microwave Receiver
Model 38A F. M. Test Set (Commercial equivalent of the TS-147/B)

*See Barretter & Thermistor Section for units applicable to these bridges.

DETECTORS AND MIXERS

Model	Description	Frequency Range-kmc	Crystal	Fittings Input	Local Osc.	Output
111B	Detector Sect.	3.95-6.0	1N23B	UG-149A/U	none	UHF
206	Detector Sect.	5.3-8.2	1N21B*	UG-344/U	none	UHF
360A	Detector 1"x½" Waveguide	8.1-9.6	1N23B*	UG-39/U	none	UHF
357	Detector 0.702" x0.391" Waveguide	12.4-18.0	1N26	UG-419/U	none	UHF
358	Detector ½"x¼" Waveguide	18.0-26.5	1N26	UG-425/U	none	UHF
359	Detector 0.360" x0.220" Waveguide	26.5-40.0	1N53	UG-381/U	none	UHF
337	Mixer ½" Coaxial	2.6-4.0	1N23	Type N Female	Type N	UHF
379	Mixer	8.1-12.4	1N23B	UG-39/U	UG-39/U	UHF

*The model 821 barretter element can also be used.

ADAPTERS

Model	Description	Frequency Range-kmc	Fittings	
352A	⅛" Coaxial to Type N	0-4.0	UG-45/U	Type N Jack
217	⅛" Coaxial to Type N	0-4.0	UG-46/U	Type N Jack
354A	⅛" Coaxial to ½" Coaxial	0-4.0	UG-45/U	UG-45/U
355A	⅛" Coaxial to ½" Coaxial	0-4.0	UG-46/U	UG-46/U
250	3"x1¼" Waveguide to Type N	2.6-4.0	UG-214/U	Type N Jack
144A	3"x1½" Waveguide to ⅛" Coaxial	2.6-4.0	UG-214/U	UG-45/U
248	2"x1" Waveguide to Type N	3.95-6.0	UG-149A/U	Type N Jack
100A	2"x1" Waveguide to ½" Coaxial	3.95-6.0	UG-140/U	UG-149A/U
204	1½"x¾" Waveguide to Type N	5.3-8.2	UG-344/U	Type N Jack
251	1½"x¾" Waveguide to ⅝" Coaxial	5.3-7.0	UG-344/U	UG-140/U
249	1¼"x⅝" Waveguide to Type N	7.0-10.0	UG-51/U	Type N Jack
167A	1"x½" Waveguide to Type N	8.1-12.4	UG-39/U	Type N Jack
486A	SKL to 1"x½" Waveguide Transformer Adapter	8.1-12.4	UG-39/U	SKL

UG-275/U SKL Cable End Plug.
UG-276/U SKL Right Angle Plug.
UG-131/U SKL Type N Jack Adapter.

TEES AND BENDS

Model	Description	Frequency Range-kmc	Fittings
274	3"x1½" Waveguide—Series Tee	2.6-4.0	UG-214/U
275	3"x1½" Waveguide—Shunt Tee	2.6-4.0	UG-214/U
106A	2"x1" Waveguide—Series Tee	3.95-6.0	UG-149A/U
107A	2"x1" Waveguide—Shunt Tee	3.95-6.0	UG-149A/U
276	1½"x¾" Waveguide—Series Tee	5.3-8.2	UG-344/U
277	1½"x¾" Waveguide—Shunt Tee	5.3-8.2	UG-344/U
278	1¼"x⅝" Waveguide—Series Tee	7.0-10.0	UG-51/U
279	1¼"x⅝" Waveguide—Shunt Tee	7.0-10.0	UG-51/U
165A	1"x½" Waveguide—Series Tee	8.1-12.4	UG-39/U
166A	1"x½" Waveguide—Shunt Tee	8.1-12.4	UG-39/U
170	1"x½" Waveguide—E-Plane Bend	8.1-12.4	UG-39/U
171	1"x½" Waveguide—H-Plane Bend	8.1-12.4	UG-39/U
392	0.702"x0.391" Waveguide—Series Tee	12.4-18.0	UG-419/U
393	0.702"x0.391" Waveguide—Shunt Tee	12.4-18.0	UG-419/U
394	¼"x½" Waveguide—Series Tee	18.0-26.5	UG-425/U
395	¼"x½" Waveguide—Shunt Tee	18.0-26.5	UG-425/U
406	1"x½" Waveguide—Magic Tee	8.1-12.4	UG-39/U

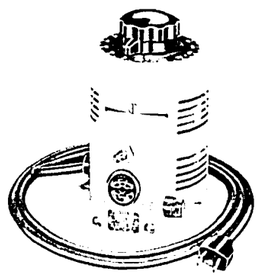
SHORTS

Model	Description	Frequency Range-kmc	Fittings
636	⅛" Coaxial	.7-4.0	UG-46/U
114A	2"x1" Waveguide	3.95-6.0	UG-149A/U
203	1½"x¾" Waveguide	5.3-8.2	UG-344/U
377	1"x½" Waveguide	8.1-12.4	UG-39/U
372	0.702"x0.391" Waveguide	12.4-18.0	UG-419/U
371	0.360"x0.220" Waveguide	26.5-40.0	UG-381/U

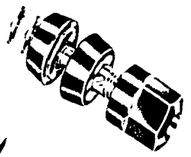
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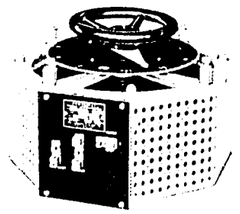


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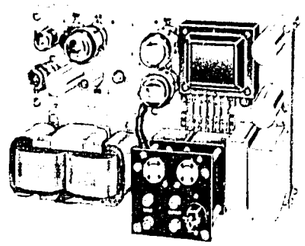


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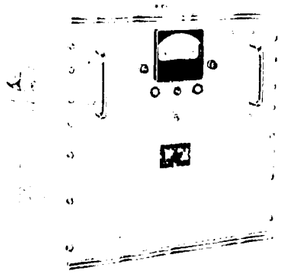
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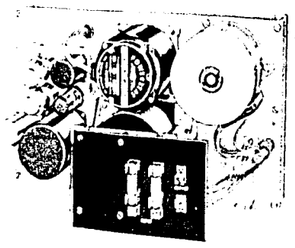


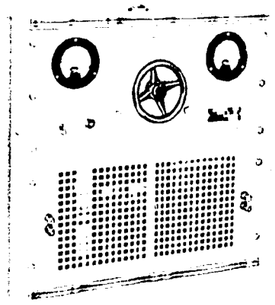
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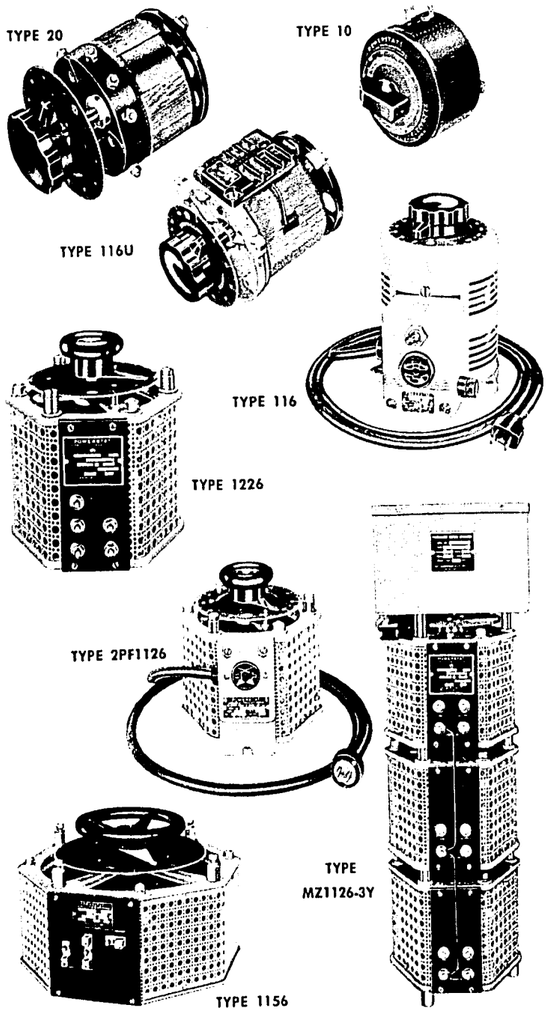






POWERSTAT *Variable Transformers* to provide a continuously adjustable source of a-c voltages.

A COMPLETE LINE FROM 150 VA TO 100 KVA



POWERSTAT variable transformers are autotransformers of toroidal core design with a movable brush tap which is rotated to deliver any desired output voltage from zero to, or above, line voltage. Glass smooth commutator surfaces and advanced winding techniques assure smooth operation and permit adjustment to a fraction of a volt. Other important features include: excellent regulation, high efficiency, conservative ratings, zero waveform distortion and rugged construction.

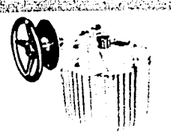
A wide range of standard POWERSTAT variable transformers are available for 115, 230 and 460 volt, single and three phase operation. Both manually-operated and motor-driven types are offered. The rating chart lists some of the most-called-for standard POWERSTATS. Others — specifically designed to customer requirements — are available to fulfill each application. Consult us about your specific needs.

Line Volt.	Output Volt.	Max. Output Amp.	Output KVA	Frequency	Type	Approximate Net Wt. (Lbs.)	Approximate Shipp. Wt. (Lbs.)	**Standard Motor Speeds
120	0-132	1.25	0.165	‡60	*10	1.8	3	.....
115	0-135	3.0	0.4	‡60	*20	4	6	.....
	0-135	7.5	1.0	50/60	*116U	10	11	.....
	0-135	7.5	1.0	50/60	116	11	12	.....
	0-135	7.5	1.0	50/60	3PF116	11	12	.....
	0-135	7.5	1.0	50/60	3TF116	11	12	.....
	0-135	15.0	2.0	50/60	1126	21	25	W,X,Y,Z
	0-135	15.0	2.0	50/60	F1126	21	25	W,X,Y,Z
	0-135	30.0	4.0	50/60	1126-2P	48	55	W,X,Y,Z
	0-135	45.0	6.1	50/60	1156	73	80	W,X,Y,Z
	0-135	45.0	6.1	50/60	F1156	74	81	W,X,Y,Z
	0-135	90.0	12.1	50/60	1156-2P	150	170	W,X,Y,Z
	0-135	135.0	18.2	50/60	1156-3P	225	295	W,X,Y,Z
	0-135	180.0	24.3	50/60	1156-4P	330	420	W,X,Y
	0-135	270.0	36.4	50/60	1156-6P	500	600	W,X,Y
230	0-270	3.0	0.81	50/60	*216U	10	11	.....
	0-270	3.0	0.81	50/60	216	11	12	.....
	0-270	3.0	0.81	50/60	3PF216	11	12	.....
	0-270	3.0	0.81	50/60	3TF216	11	12	.....
	0-270	7.5	2.0	50/60	*116U-2S	17	22	.....
	0-270	7.5	2.0	50/60	*116-2S	18	23	.....
	0-270	9.0	2.4	50/60	1226	25	29	W,X,Y,Z
	0-270	9.0	2.4	50/60	F1226	25	29	W,X,Y,Z
	0-270	15.0	4.0	50/60	1126-2S	45	52	W,X,Y,Z
	0-270	28.0	7.5	50/60	1256	73	80	W,X,Y,Z
	0-270	28.0	7.5	50/60	F1256	74	80	W,X,Y,Z
	0-270	45.0	12.1	50/60	1156-2S	144	164	W,X,Y,Z
	0-270	56.0	15.1	50/60	1256-2P	150	170	W,X,Y,Z
	0-270	84.0	22.7	50/60	1256-3P	225	295	W,X,Y,Z
	0-270	112.0	30.2	50/60	1256-4P	330	420	W,X,Y
	0-270	168.0	45.3	50/60	1256-6P	500	600	W,X,Y
460	0-540	3.0	1.6	50/60	216U-2S	17	22	.....
	0-540	3.0	1.6	50/60	216-2S	18	23	.....
	0-540	9.0	4.9	50/60	1226-2S	53	60	W,X,Y,Z
	0-540	28.0	15.1	50/60	1256-2S	144	164	W,X,Y,Z
	0-540	56.0	30.2	50/60	1256-4PS	330	420	W,X,Y
	0-540	84.0	45.3	50/60	1256-6PS	500	600	W,X,Y
Three Phase 115	0-135	3.0	0.7	‡60	*20-2D	9	15	.....
	0-135	7.5	1.8	50/60	*116U-2D	17	22	.....
	0-135	7.5	1.8	50/60	*116-2D	18	23	.....
	0-135	15.0	3.5	50/60	1126-2D	45	52	W,X,Y,Z
	0-135	45.0	10.5	50/60	1156-2D	144	164	W,X,Y,Z
	0-135	90.0	21.0	50/60	1156-4D	320	410	W,X,Y
	0-135	135.0	31.6	50/60	1156-6D	490	590	W,X,Y
230	0-230	3.0	1.2	60	20L-3Y	15	24	.....
	0-270	3.0	1.4	50/60	*216U-2D	17	22	.....
	0-270	3.0	1.4	50/60	*216-2D	18	23	.....
	0-270	7.5	3.5	‡60	*116U-3Y	26	36	.....
	0-270	7.5	3.5	‡60	*116-3Y	27	37	.....
	0-270	9.0	4.2	50/60	1226-2D	53	60	W,X,Y,Z
	0-270	15.0	7.0	‡60	1126-3Y	65	75	W,X,Y,Z
	0-270	28.0	13.1	50/60	1256-2D	144	164	W,X,Y,Z
	0-230	45.0	17.9	50/60	1156L-3Y	215	280	W,X,Y,Z
	0-270	56.0	26.2	50/60	1256-4D	320	410	W,X,Y
	0-270	84.0	39.3	50/60	1256-6D	490	590	W,X,Y
	0-230	90.0	35.8	50/60	1156L-6Y	500	600	W,X,Y
460	0-540	3.0	2.8	‡60	*216U-3Y	26	36	.....
	0-540	3.0	2.8	‡60	216-3Y	27	37	W,X,Y,Z
	0-540	9.0	8.4	‡60	1226-3Y	76	86	W,X,Y,Z
	0-540	28.0	26.2	‡60	1256-3Y	215	280	W,X,Y
	0-540	56.0	52.5	‡60	1256-6Y	500	600	W,X,Y

* These units are supplied with an "L" terminal which allows connecting in the field to limit the output voltage to the applied voltage. If "L" type connection is required on other models, the "L" must be included in the type number when ordering.
‡ When these POWERSTATS are "L" connected so that the output voltage does not exceed the applied voltage, the frequency range is 50/60 cycles.
** When a motor-drive is required, prefix the letter "M" together with the speed designation letter to the type number. Z — 6 seconds, Y — 14 seconds, X — 19 seconds and W — 45 seconds for full range travel. Since the driving motors are frequency sensitive, be sure to specify whether 50 or 60 cycles is required. Only manually-operated unit weights are listed. For motor-drives add 10, 11 and 14 pounds to the 116-216, 1126-1226 and 1156-1256 types, respectively.

STANDARD POWERSTAT TYPES for VARIED APPLICATIONS

OIL-COOLED OPERATION



TYPE 0-1126

Immersion in transformer oil increases ratings above normal air operation and protects against corrosive atmospheres. Various ratings and sizes are offered.

EXPLOSIVE ATMOSPHERES



TYPE X-1126

Explosion-proof POWERSTATS provide safe operation in explosive atmospheres. Standard models are Underwriters' approved for Class 1, Group D service.

POWERSTAT LINE CORRECTORS



TYPE 2106LC

This combination of a POWERSTAT and a fixed-ratio transformer will control relatively high currents. It is used to correct line voltage variations or to supply a limited output voltage range. Numerous ratings are available.

STABILINE *Automatic Voltage Regulators* maintain constant output voltage regardless of line or load changes.

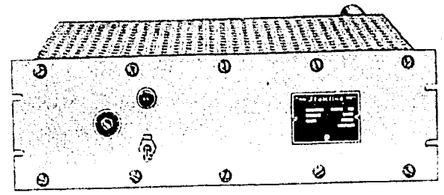
MADE IN 2 DISTINCT TYPES TO MEET EACH NEED

Because it is obviously impossible to produce any single type of electrical instrument that will fulfill all requirements for every application, STABILINE Automatic Voltage Regulators are manufactured in two distinct types to meet individual needs. These two are: TYPE IE (Instantaneous Electronic) . . . for the most exacting control — and TYPE EM (Electro Mechanical) . . . for controlling large industrial loads or for applications requiring zero waveform distortion. Both are designed and manufactured to assure precise correction and dependable operation over long periods of continuous use. They will meet the most rigid mechanical and electrical specifications. A wide range of standard models are available and are listed below. Special types and models will be engineered to meet your own specific requirements.

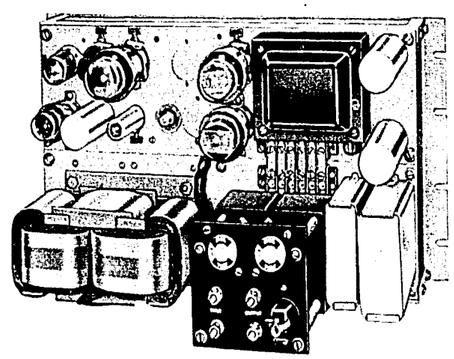
IE

Type IE is completely electronic with no moving parts. Providing instantaneous correction, it is ideal for laboratories, test lines, as a component of other equipment . . . and everywhere that the most exacting automatic voltage regulation is required. At no load, full load or any intermediate stage, constant output voltage is maintained regardless of line fluctuations. The output voltage is held to within ±0.1 volts of nominal for wide line variations and within ±0.15 volts of nominal for any load current or load power factor change from .5 lagging to .9 leading. Waveform distortion never exceeds 3%. Standard types are listed below.

Input Voltage Range	Output Voltage Range	Frequency In Cycles	Load Range in Amperes	Load Power Factor Range	Rated Output KVA	Type
95-135	110-120	60 ± 10%	0 - 2.2	.5 lagging to .9 leading	0.25	IE51002
95-135	110-120	60 ± 10%	0 - 2.2		0.25	IE51002R
95-135	110-120	60 ± 10%	0 - 4.5		0.5	IE51005
95-135	110-120	60 ± 10%	0 - 4.5		0.5	IE51005R
95-135	110-120	50 ± 10%	0 - 4.5		0.5	IEL51005
95-135	110-120	50 ± 10%	0 - 4.5		0.5	IEL51005R
195-255	220-240	50 ± 10%	0 - 2.2		0.5	IEL52005
195-255	220-240	50 ± 10%	0 - 2.2		0.5	IEL52005R
95-135	110-120	60 ± 10%	0 - 8.5		1.0	IE5101
95-135	110-120	60 ± 10%	0 - 8.5		1.0	IE5101R
95-135	110-120	50 ± 10%	0 - 8.5		1.0	IEL5101
95-135	110-120	50 ± 10%	0 - 8.5		1.0	IEL5101R
195-255	220-240	50 ± 10%	0 - 4.5		1.0	IEL5201
195-255	220-240	50 ± 10%	0 - 4.5		1.0	IEL5201R
95-135	110-120	60 ± 10%	0 - 22.0		2.5	IE5102
95-135	110-120	60 ± 10%	0 - 22.0		2.5	IE5102R
195-255	220-240	60 ± 10%	0 - 11.0		2.5	IE5202
195-255	220-240	60 ± 10%	0 - 11.0		2.5	IE5202R
195-255	220-240	50 ± 10%	0 - 11.0		2.5	IEL5202
195-255	220-240	50 ± 10%	0 - 11.0		2.5	IEL5202R
95-135	110-120	60 ± 10%	0 - 43.5		5.0	IE5105
195-255	220-240	60 ± 10%	0 - 22.0		5.0	IE5205



TYPE IE51002R

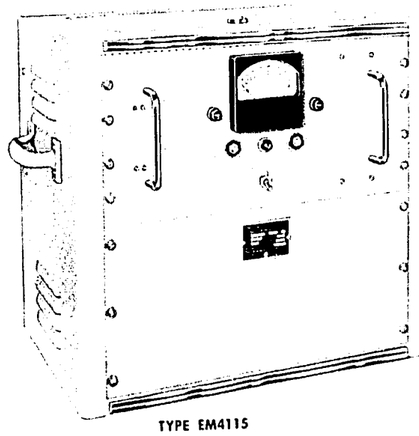


TYPE IE5101R

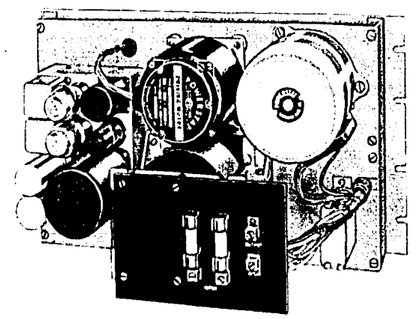
EM

Type EM is an electro-mechanical device with a very sensitive detector controlling a motor-driven POWERSTAT variable transformer and auxiliary transformer. While not instantaneous, Type EM corrects faster than most other automatic voltage regulators. Highly efficient in operation, it finds widest application in controlling large industrial loads and also in electronic equipment where zero waveform distortion is essential. Features include: complete insensitivity to the magnitude and power factor of the load, no effect on system power factor, no critical adjustments and adjustable output voltage. Standard types listed below.

Nominal Output Voltage	Input Voltage Range	Output Voltage Range	Output Current (Amperes)	Output KVA	Type
Single Phase 115	95-135	110-120	17.5	2.0	EM4102
			52.0	6.0	EM4106
			130.0	15.0	EM4115
230	195-255	220-240	32.5	7.5	EM4207
			120.0	27.5	EM4228
460	400-520	420-460	15.0	6.6	EM4407
			40.0	17.6	EM4418
Three Phase 230	195-255	220-240	25.0	10.0	EM6210Y
			38.0	15.0	EM6215Y
			50.0	20.0	EM6220Y
			113.0	45.0	EM6245Y
			175.0	70.0	EM6270D
460	400-520	420-460	16.0	12.5	EM6412Y
			22.0	17.5	EM6417Y
			33.0	25.0	EM6425Y
			66.0	50.0	EM6450Y
			100.0	75.0	EM6475Y
	420-500	420-460	131.0	100.0	EM64100Y



TYPE EM4115



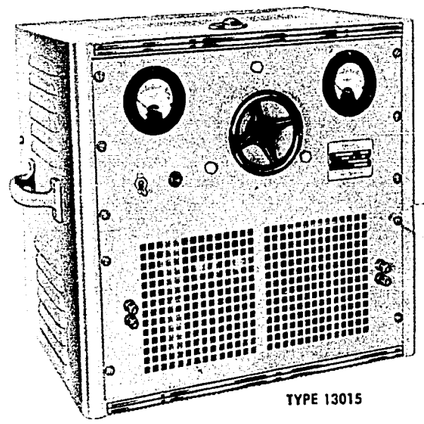
TYPE EM4102R

and Also...

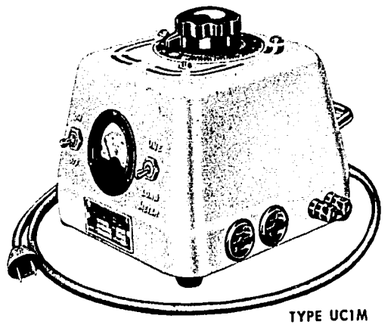
VARICELL

— A VARIABLE RANGE OF STABILIZED and REGULATED D-C VOLTAGES from an A-C SOURCE

The ideal source of low d-c voltages, the VARICELL is simply plugged into any convenient, single phase a-c outlet supplying a nominal 115 volts at 60 cycles and it is ready to operate. Turning the handwheel provides any desired output voltage from 0-30 volts. Its load rating is 15 amperes. Any setting from 6 to 30 volts is unaffected by changes in line or load current. For any setting from 6 to 30 volts, R.M.S. ripple voltage never exceeds 0.1 volts, and stabilization and regulation is ±0.25 volts.



TYPE 13015



TYPE UC1M

VOLTBOX

A-C POWER SUPPLIES

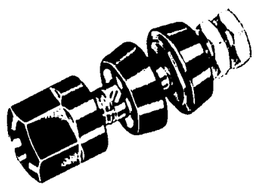
— A COMPACT, PORTABLE SOURCE OF VARIABLE A-C VOLTAGE

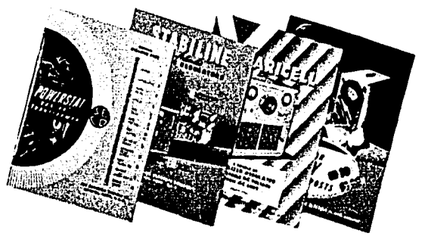
This is a handy instrument widely used in chemical, physical, electrical and other laboratories and in inspection, testing and plant maintenance departments. It eliminates the need for collecting a variable transformer, voltmeter and connection leads when tests involve variable a-c voltages. All necessary components are housed in a compact, aluminum case. By turning the "On-Off" switch to "On"; snapping the line-load switch to "Load" and rotating the knob; the desired voltage is available at the output receptacles and binding posts. Ratings are available to meet every requirement.

SUPERIOR *5-WAY* BINDING POSTS

— ADDED VERSATILITY . . . SAFE, POSITIVE CONNECTIONS

This versatile binding post offers 5 different methods of connection . . . permanent clamping, spade lug, clip-lead, banana plug, or looping and clamping. Ruggedly built of the finest materials it provides complete insulation, a current capacity of 30 amperes and a working voltage of 1,000 volts. Two available colors, red and black, provide circuit identification where required.





FOR COMPLETE INFORMATION ON ANY EQUIPMENT...FOR ANY APPLICATION

Fully descriptive literature covering all of the voltage control apparatus shown here is available and will be sent at your request . . . without cost or obligation. The Superior Electric Company is well qualified to help with your specific requirements. We will be glad to recommend standard equipment exactly suited to your needs — or to engineer special types or new designs for unusual applications.

THE SUPERIOR ELECTRIC CO.
BRISTOL, CONNECTICUT

MANUFACTURERS OF

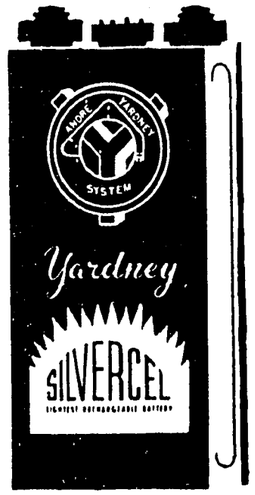
STABILINE AUTOMATIC VOLTAGE REGULATORS • VOLTBOX A-C POWER SUPPLIES • SUPERIOR 5-WAY BINDING POSTS
POWERSTAT LIGHT DIMMING EQUIPMENT • VARICELL D-C POWER SUPPLIES • POWERSTAT VARIABLE TRANSFORMERS

SECO Form 4535

Printed in U.S.A.

YARDNEY SILVERCEL*

WORLD WIDE PATENTS PENDING OR GRANTED



the world's
smallest
mightiest
lightest
storage battery

1/5 the size · 1/6 the weight

YARDNEY ELECTRIC CORPORATION
ENGINEERING DEPARTMENT: 10

TEL: WOrth 2-5500

*

The YARDNEY SILVERCEL* is up to 6 times lighter and up to 5 times smaller than other, more familiar lead-acid, nickel-cadmium or nickel-iron storage batteries of the same ampere-hour capacity. It is the lightest and smallest storage battery in the world.

brief history of the YARDNEY SILVERCEL

The culmination of more than 150 years of scientific research, the YARDNEY SILVERCEL* bears out Volta's oft-repeated statement that silver and zinc were the best materials for batteries. This opinion, held by many leading scientists since the beginning of the nineteenth century, advocated the use of these metals because of the great saving in weight and reduction in size which could be achieved thereby. For more than a century, numerous unsuccessful experiments were made to evolve a satisfactory silver-zinc battery.

After World War I, a French scientist, Mr. Henri André (now associated with Yardney International Corporation), devoted years to the same problem and finally succeeded in creating the first practical rechargeable cell of this type.

Michel N. Yardney, President of Yardney International Corporation, recognized the value inherent in Mr. André's work. Accordingly, he directed his own energies, as well as those of Yardney Laboratories in this country and associated laboratories in England, France, Germany, Sweden and elsewhere throughout the world, toward overcoming the difficulties Mr. André had encountered.

Long and intensive research by the engineers and scientists of these organizations resulted in the YARDNEY SILVERCEL* (manufactured in the United States by Yardney Electric Corporation, a licensee of Yardney International Corporation).

This revolutionary alkaline battery, known throughout the world as the ANDRE-YARDNEY SYSTEM, and manufactured in different countries under various trade names, marks an extraordinary advance in the field of storage of electrical energy.

Not only is the YARDNEY SILVERCEL* the smallest and lightest battery in the world, but—as can be seen from the following pages—it also possesses a number of other highly desirable features which cannot be found in any other type of storage battery.

The ANDRE-YARDNEY SYSTEM is represented by the most powerful scientific team in the field of silver-zinc storage batteries. This group of outstanding scientists and engineers is responsible for the continuous progress of the YARDNEY-SILVERCEL*.

*Registered U. S. Patent Office. Covered by one or more of the following U. S. Patents: 2,594,709; 2,594,710; 2,594,711; 2,594,712; 2,594,713; 2,594,714; 2,601,133; 2,610,219; 2,611,792; 2,635,127—Others pending.

YARDNEY SILVERCEL

comparison with other storage batteries

FIG. 1 TYPICAL DISCHARGE CHARACTERISTIC OF HIGH RATE SILVERCELS

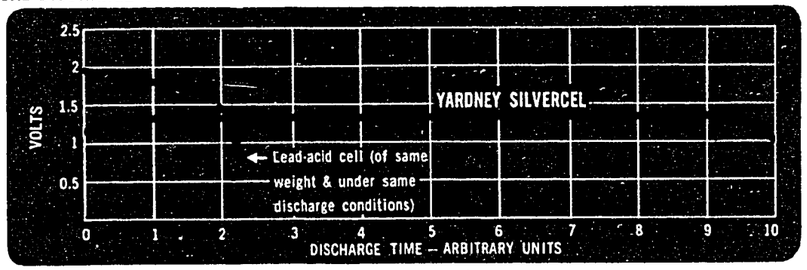


FIG. 2 WATT-HOURS/LB. VS. DISCHARGE RATE

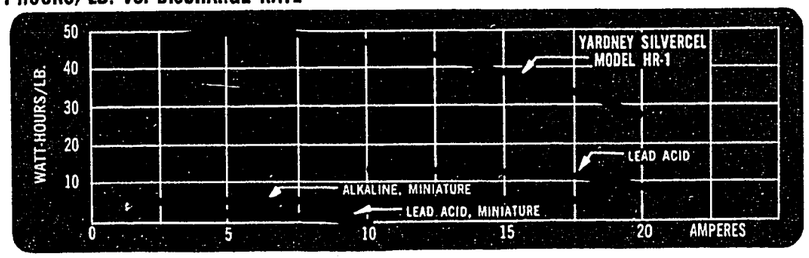
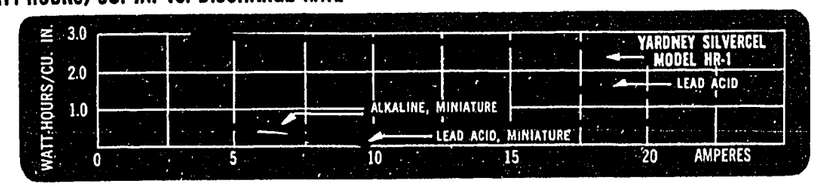
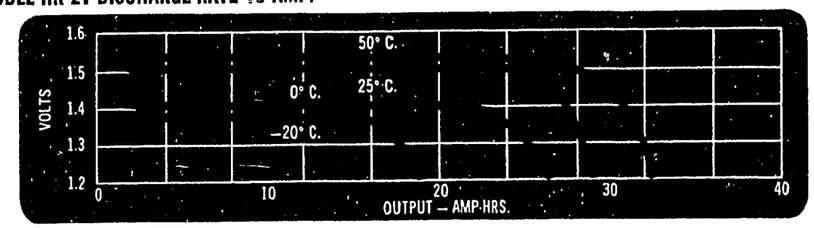


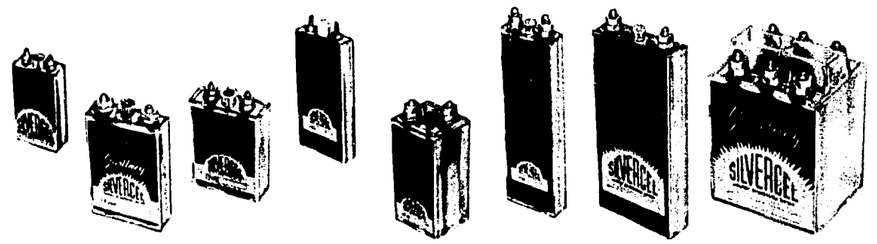
FIG. 3 WATT-HOURS/CU. IN. VS. DISCHARGE RATE



typical discharge characteristics at various temperatures

FIG. 4 MODEL HR 21 DISCHARGE RATE 15 AMP.





outstanding features of the YARDNEY SILVERCEL

light weight & small size

The most outstanding feature of the YARDNEY SILVERCEL is the extremely high capacity per unit weight and unit volume. This cell is up to 6 TIMES LIGHTER and up to 5 TIMES SMALLER than other storage batteries of the same characteristics.

As a consequence, WHENEVER SAVINGS IN SPACE AND WEIGHT ARE IMPORTANT, THE YARDNEY SILVERCEL OFFERS A UNIQUE OPPORTUNITY TO ACHIEVE NEW STANDARDS OF ECONOMY IN THE OVERALL SIZE AND WEIGHT OF BATTERY-POWERED ELECTRICAL EQUIPMENT.

The advantages of the YARDNEY SILVERCEL can best be understood by reviewing the Table shown below, in which ampere-hour per pound and per cubic inch values, as well as corresponding watt hour figures, are tabulated both for a typical YARDNEY SILVERCEL and a conventional lead-acid battery.

	YARDNEY SILVERCEL MODEL HR 100	CONVENTIONAL LEAD-ACID BATTERY	RATIO (YARDNEY SILVERCEL TO LEAD-ACID)
AH/lb.	37	approx. 5	7.4
WH/lb.	56	approx. 10	5.6
AH/cu. in.	2.25	approx. 0.43	5.2
WH/cu. in.	3.4	approx. 1.3	2.6

The above ratio values clearly demonstrate the striking superiority of the YARDNEY SILVERCEL.

cell reaction

As previously stated, the YARDNEY SILVERCEL is an alkaline storage battery based on the use of silver and zinc as the active materials.

The chemical reactions occurring in operation are entirely reversible, and can be expressed as follows:

$$\underset{\text{discharged}}{Ag + Zn(OH)_2} \quad \rightleftharpoons \quad \underset{\text{charged}}{AgO + Zn + H_2O}$$

high rate discharges

Owing to its exceptionally low internal resistance, due to its unique design, the YARDNEY SILVERCEL is ideal for extremely high discharge rates.

Since the maximum permissible current is limited solely by the heat generated within the cell, the YARDNEY SILVERCEL can be designed to meet practically any high current requirements.

It is notable that the ampere-hour efficiency of the YARDNEY SILVERCEL is only slightly affected at high discharge rates.

flat voltage characteristic

Another outstanding characteristic of the YARDNEY SILVERCEL is the EXTREME FLATNESS OF ITS VOLTAGE CURVE at all discharge rates.

THIS VALUABLE FEATURE MAKES THE YARDNEY SILVERCEL PREFERABLE FOR ALL APPLICATIONS WHERE A FLAT VOLTAGE CHARACTERISTIC IS REQUIRED.

safety, absence of corrosive and poisonous fumes

The unique construction of the YARDNEY SILVERCEL, in addition to the fact that the electrolyte is substantially absorbed into the active material, eliminates completely the hazard of spillage, and, in most models, the hazard of leakage.

The corrosive and poisonous fumes typical of other types of storage batteries are noticeably absent during charge and discharge cycles.

SILVERCEL

mechanical strength

The YARDNEY SILVERCEL exhibits a remarkable resistance to mechanical stresses such as shock, vibration and acceleration, since there are no rigid plates or separators to be damaged.

Tests during discharge under 10 g vibration and 100 g shock in various planes showed less than one-half percent variation in voltage and no loss in capacity.

Acceleration up to 1000 g was found to have no effect on cell performance.

life and shelf

The number of useful charge-discharge cycles and shelf life of the YARDNEY SILVERCEL compare more than favorably to those usually obtained with other batteries.

The reliability of the YARDNEY SILVERCEL is evidenced by the fact that THOUSANDS OF THEM ARE CURRENTLY IN SUCCESSFUL USE.

The application of the ion-exchange principle to cell separators, pioneered by Yardney International Corporation, is, after long and extensive experimentation, in the process of becoming a standard feature of the YARDNEY SILVERCEL, and will contribute still further to its long life and reliability.

performance at high altitudes

The YARDNEY SILVERCEL performs efficiently at high altitudes.

With proper packing, it has been used at altitudes as high as 85 miles.

performance at various temperatures

The capacity of the YARDNEY SILVERCEL is practically unaffected by temperature within the range from 0° C to 80° C.

For special applications, performance can be obtained outside the above temperature range.

Considerable research work is in progress on the subject.

flexibility and ease of servicing

The YARDNEY SILVERCEL can be charged at various rates. For best results, however, we recommend that the instructions supplied with each model be followed carefully.

All of the usual charging methods are applicable to our cells (which can be used either individually, or assembled into packs for series or parallel operation), and any of our models can be supplied assembled into battery packs to meet specific applications.

Unlike other types of storage batteries, the SILVERCEL requires very little maintenance or special care. It is only necessary to keep the cells clean and dry. For most models, it should not be necessary to add any electrolyte during the normal life span.

Unless otherwise specified, all models of YARDNEY SILVERCELS are shipped in a wet-discharged condition.

For further information on operation, maintenance and storage of SILVERCEL, see "General Operating and Maintenance Instructions for YARDNEY SILVERCEL."

physical and electrical characteristics of the YARDNEY SILVERCEL

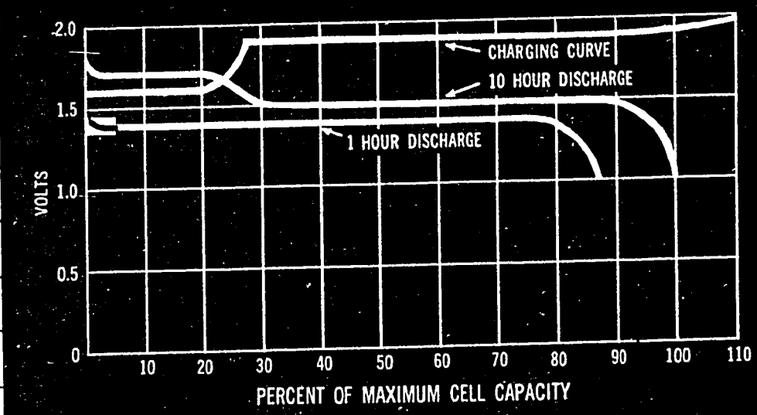
As improvements are made continually specifications are subject to alteration without notice

Former Model	CELL MODEL	PHYSICAL CHARACTERISTICS						ELECTRICAL CHARACTERISTICS										FOR ADDITIONAL INFORMATION SEE SHEET NO.
		OVERALL HEIGHT IN.	HEIGHT LESS TERMINALS IN.	WIDTH IN.	DEPTH IN.	WEIGHT OZ.	VOLUME CU. IN.	NOMINAL CAPACITY AH	RECOMMENDED CHARGING RATE AMPS	LOW RATE DISCHARGE RATE AMPS	LOW RATE DISCHARGE RATE TIME HRS.	LOW RATE DISCHARGE VOLTS	HIGH RATE DISCHARGE AMPS	TIME MIN.	VOLTS	MAXIMUM DISCHARGE RATE	
A 05	LR 05	1.52	1.22	1.10	.55	.72	.92	.5	.06	.05	10	1.5	.....	.....	.....	ALL MODELS ARE SUITABLE FOR OPERATION AT CONSIDERABLY HIGHER DISCHARGE RATES THAN INDICATED IN THIS TABLE. FOR ADDITIONAL INFORMATION SEE INDIVIDUAL SHEETS LISTED RIGHT OF THIS COLUMN	1
HR 05	HR 05	1.52	1.22	1.10	.55	.72	.92	.5	.07	.05	10	1.5	2.5	12	1.35		1
A 1	LR 1	1.98	1.69	1.08	.55	1.00	1.16	1.0	.10	.10	10	1.5	.....	.....	.....		1
HR 1	HR 1	1.98	1.69	1.08	.55	1.00	1.16	1.0	.12	.10	10	1.5	5	12	1.40		1
	LR 3	2.86	2.49	1.72	.59	3.00	2.88	3.0	.20	.30	10	1.5	.....	.....	.....		2
HR 3	HR 3	2.86	2.49	1.72	.59	3.00	2.88	3.0	.30	.30	10	1.5	15	12	1.35		2
	LR 5	3.00	2.50	2.08	.80	4.13	5.05	5.0	.30	.50	10	1.5	.....	.....	.....		2
5 HR	HR 5	3.00	2.50	2.08	.80	4.13	5.05	5.0	.35	.50	10	1.5	25	12	1.35		2
	LR 10*	4.78	4.30	2.30	.76	7.5	8.36	10.0	.50	1.0	10	1.5	.....	.....	.....		2
	HR 10*	4.78	4.30	2.30	.76	7.5	8.36	10.0	1.0	1.0	10	1.5	50	12	1.30		2
20 HR 15	LR 20	4.29	3.63	2.05	1.75	12.6	15.4	20.0	1.0	2.0	10	1.5	15	60	1.40		3
20 HR GS	HR 20	4.29	3.63	2.05	1.75	12.7	15.4	20.0	2.0	.....	.....	.....	100	8	1.35		3
20 HR NS	HR 21	7.62	6.85	2.30	.82	15.0	14.4	20.0	3.0	2.0	10	1.5	120	6	1.35		3
	LR 40	7.00	6.35	3.25	1.00	22.0	22.7	40.0	2.0	4.0	10	1.5	30	60	1.40		3
40 HR NS	HR 40	7.00	6.35	3.25	1.00	23.0	22.7	40.0	3.0	4.0	10	1.5	125	15	1.35		3
60 HR 50	LR 60	4.50	3.85	2.75	2.38	29.9	29.5	60.0	3.0	6.0	10	1.5	50	60	1.40		4
60 HR NS	HR 60	4.50	3.85	2.75	2.38	32.1	29.5	60.0	4.0	6.0	10	1.5	400	4	1.35		4
	LR 100	4.78	3.73	3.49	2.79	43.0	46.5	100.0	5.0	10.0	10	1.5	50	120	1.45		4
100 HR SN	HR 100	4.78	3.73	3.49	2.79	43.5	46.5	100.0	6.0	10.0	10	1.5	500	6	1.30		4

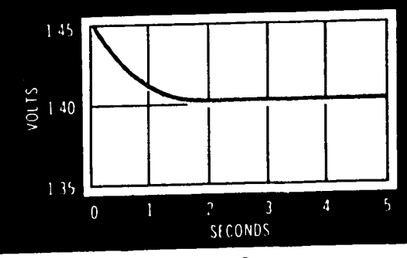
Note: Since the preparation of this brochure, additional data sheets have been prepared, and are now available.

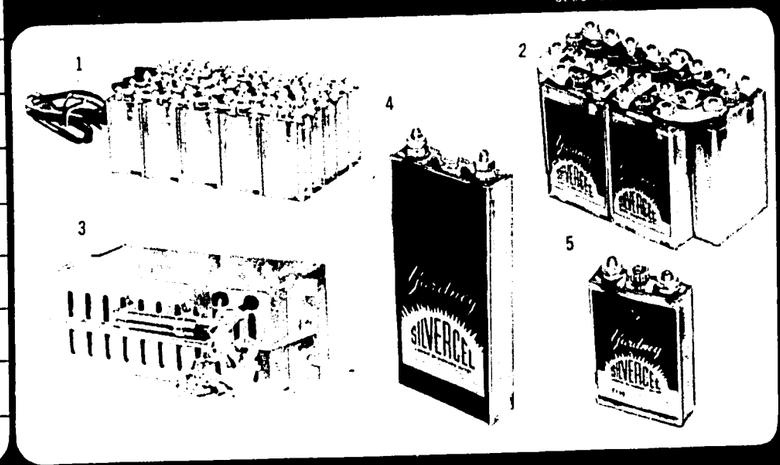
IN MANY CASES THE YARDNEY SILVERCEL MAY BE THE ONLY SOLUTION TO YOUR PROBLEM

typical characteristic curves of YARDNEY SILVERCEL



Enlargement of Initial Voltage Variation





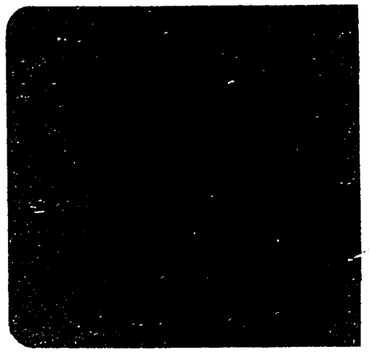
1 Miniaturized 37.5 volt, 1 AH Battery Unit
2 Special 15.0 Volt, 3 AH Pack
3 Fully encased 33.0 volt, 5 AH Battery — including automatic temperature control
4 Cell Model LR40 (and HR40)
5 Cell Model LR3 (and HR3)

applications

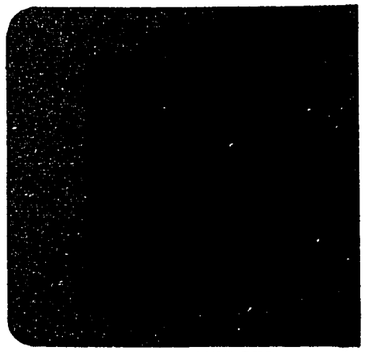
The YARDNEY SILVERCEL has, since its inception, been utilized in numerous and varied electrical and electronic devices. In aircraft and guided missiles activities, the SILVERCEL has proven itself a boon since its high ratio of energy to volume and weight more than met the miniaturization program.

MANY THOUSANDS OF CELLS ARE CURRENTLY IN SUCCESSFUL OPERATION AND, IN A GREAT MANY CASES, HAVE OPENED THE WAY TO COMPLETELY NEW FIELDS OF APPLICATION HERETOFORE CONSIDERED IMPOSSIBLE. Some of them are:

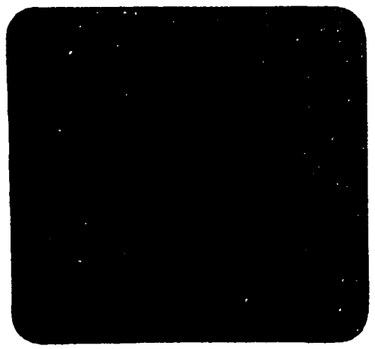
Motion picture and television cameras and allied equipment; portable illumination, radio and sound apparatus; hearing aids; miners lamps; mobile and portable power installations; model planes and boats; battery-powered test instruments, and miscellany including electrical cigarette lighters, toys, etc.



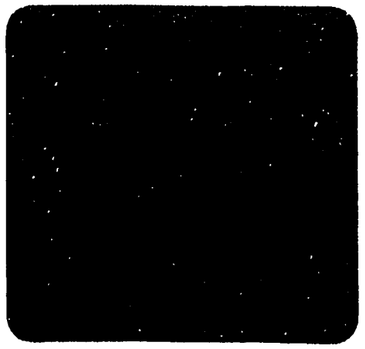
"Walkie-Lookie" portable TV transmitter – built by R.C.A. for the National Broadcasting Company – using Yardney SILVERCEL batteries exclusively.



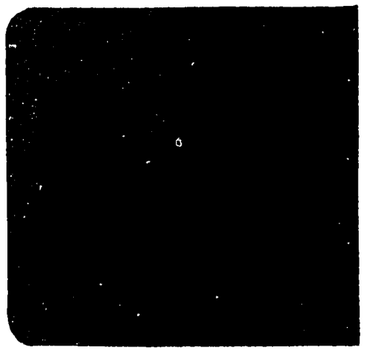
Experimental SILVERCEL powered pocket cigarette lighter.



Maurer professional 16mm. motion picture camera – another special application for SILVERCELS.



Radio-controlled model airplane utilizing SILVERCEL power for radio and servo operation.



Comparison of three miners' lamps showing the reduction in size made possible by the Yardney SILVERCEL.

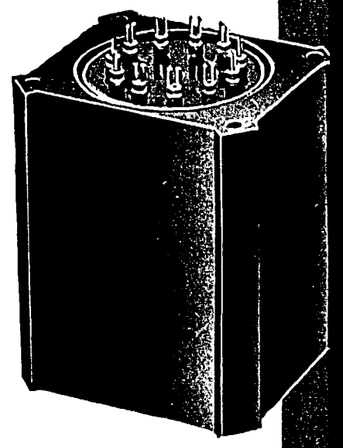
YARDNEY ELECTRIC CORPORATION

105-107 CHAMBERS STREET • NEW YORK 7 • N. Y.
Licensee for U.S.A. of Yardney International Corp.

a few names from our sales ledger

U. S. Army, U. S. Navy, U. S. Air Forces, Air Associates, Airborne Instruments, American Speedlight, Bell Aircraft, Bendix Aviation, Boeing Aircraft, Brush Development, Columbia University, Eastman Kodak, Emerson Electric, General Electric, Hoffman Laboratories, Hughes Aircraft, I.B.M., John Hopkins, Magnecord, Maurer Camera, M.I.T., Motorola, Movietonews, National Bureau of Standards, Raytheon, R.C.A., Sandia Corp., Sperry Gyroscope, Twentieth Century-Fox, Vitro Corp., Westinghouse

Linear Standard Units..



THE ULTIMATE IN QUALITY...

UTC Linear Standard Audio Transformers represent the closest approach to the ideal component from the standpoint of uniform frequency response, low wave form distortion, high efficiency, thorough shielding and utmost dependability.

UTC Linear Standard Transformers feature ...

- **True Hum Balancing Coil Structure** . . . maximum neutralization of stray fields.
- **Balanced Variable Impedance Line** . . permits highest fidelity on every tap of a universal unit . . . no line reflections or transverse coupling.
- **Reversible Mounting** . . . permits above chassis or sub-chassis wiring.
- **Alloy Shields** . . . maximum shielding from inductive pickup.
- **Hiperm-Alloy** . . . a stable, high permeability nickel-iron core material.
- **Semi-Toroidal Multiple Coil Structure** . . . minimum distributed capacity and leakage reactance.
- **Precision Winding** . . . accuracy of winding .1%, perfect balance of inductance and capacity; exact impedance reflection.
- **High Fidelity** . . UTC Linear Standard Transformers are the only audio units with a guaranteed uniform response of ± 1 DB from 20-20,000 cycles.

TYPICAL LS LOW LEVEL TRANSFORMERS

Type No.	Application	Primary Impedance	Secondary Impedance	±1 db From	Max. Level	Relative hum-pickup reduction	Max. Unbalanced DC in prim'y	List Price
LS-10	Low impedance mike, pickup, or multiple line to grid	50, 125, 200, 250, 333, 500/600 ohms	60,000 ohms in two sections	20-20,000	+15 DB	—74 DB	5 MA	$25.00
LS-10X	As Above	As above	50,000 ohms	20-20,000	+14 DB	—92 DB	5 MA	35.00
LS-12	Low impedance mike, pickup, or multiple line to push pull grids	50, 125, 200, 250, 333, 500/600 ohms	120,000 ohms overall, in two sections	20-20,000	+15 DB	—74 DB	5 MA	28.00
LS-12X	As above	As above	80,000 ohms overall, in two sections	20-20,000	+14 DB	—92 DB	5 MA	35.00
LS-26	Bridging line to single or push pull grids	5,000 ohms	60,000 ohms in two sections	15-20,000	+20 DB	—74 DB	0 MA	30.00
LS-19	Single plate to push pull grids like 2A3, 6L6, 300A. Split secondary	15,000 ohms	95,000 ohms; 1.25:1 each side	20-20,000	+17 DB	—50 DB	0 MA	26.00
LS-21	Single plate to push pull grids. Split primary and secondary	15,000 ohms	135,000 ohms; turn ratio 3:1 overall	20-20,000	+14 DB	—74 DB	0 MA	26.00
LS-22	Push pull plates to push pull grids. Split primary and secondary	30,000 ohms plate to plate	80,000 ohms; turn ratio 1.6:1 overall	20-20,000	+26 DB	—50 DB	.25 MA	32.00
LS-30	Mixing, low impedance mike, pickup, or multiple line to multiple line	50, 125, 200, 250, 333, 500/600 ohms	50, 125, 200, 250, 333, 500, 600 ohms	20-20,000	+17 DB	—74 DB	5 MA	26.00
LS-30X	As above	As above	As above	20-20,000	+15 DB	—92 DB	3 MA	32.00
LS-27	Single plate to multiple line	15,000 ohms	50, 125, 200, 250, 333, 500/600 ohms	30-12,000 cycles	+20 DB	—74 DB	8 MA	26.00
LS-50	Single plate to multiple line	15,000 ohms	50, 125, 200, 250, 333, 500/600 ohms	20-20,000	+17 DB	—74 DB	0 MA	26.00
LS-51	Push pull low level plates to multiple line	30,000 ohms plate to plate	50, 125, 200, 250, 333, 500/600 ohms	20-20,000	+20 DB	—74 DB	1 MA	28.00
LS-141	Three sets of balanced windings for hybrid service, centertapped	500/600 ohms	500/600 ohms	30-12,000	+10 DB	—74 DB	0 MA	30.00

TYPICAL LS OUTPUT TRANSFORMERS

Type No.	Primary will match following typical tubes	Primary Impedance	Secondary Impedance	±1 db from	Max. Level	List Price
LS-52	Push pull 245, 250, 6V6, 42 or 2A5 A prime	8,000 ohms	500, 333, 250, 200, 125, 50, 30, 20, 15, 10, 7.5, 5, 2.5, 1.2	25-20,000	15 watts	$35.00
LS-55	Push pull 2A3's, 6A5G's, 300A's, 275A's, 6A3's, 6L6's	5,000 ohms plate to plate and 3,000 ohms plate to plate	500, 333, 250, 200, 125, 50, 30, 20, 15, 10, 7.5, 5, 2.5, 1.2	25-20,000	20 watts	35.00
LS-57	Same as above	5,000 ohms plate to plate and 3,000 ohms plate to plate	30, 20, 15, 10, 7.5, 5, 2.5, 1.2	25-20,000	20 watts	25.00
LS-58	Push, pull parallel 2A3's, 6A5G's, 300A's, 6A3's	2,500 ohms plate to plate and 1,500 ohms plate to plate	500, 333, 250, 200, 125, 50, 30, 20, 15, 10, 7.5, 5, 2.5, 1.2	25-20,000	40 watts	50.00
LS-6L1	Push pull 6L6's self bias	9,000 ohms plate to plate	500, 333, 250, 200, 125, 50, 30, 20, 15, 10, 7.5, 5, 2.5, 1.2	25-20,000	30 watts	50.00

Write for our Catalog PS-520

150 VARICK STREET NEW YORK 13, N. Y.
EXPORT DIVISION 13 EAST 40th STREET, NEW YORK 16, N. Y. CABLES "ARLAB"

NEW "M" TYPE TOROIDS Maximum Q Minimum Size

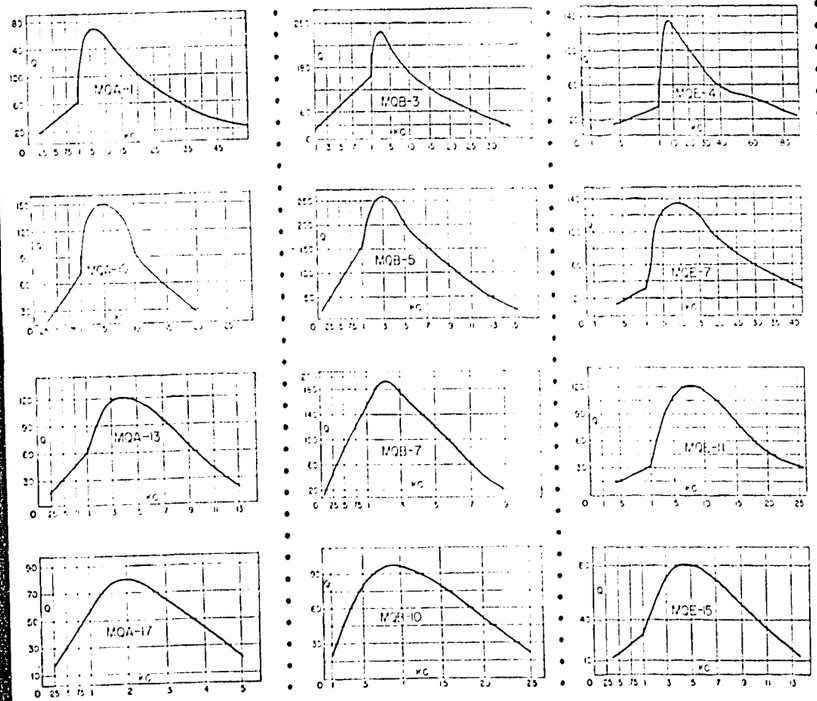
UTC (formerly Ward) Toroids have been the standard of the industry for over 15 years. The new "M" coils provide the highest Q factor in their class (see curves, below), with miniaturized dimensions of cases conservatively designed to MIL-T-27 specifications.

The inductance is constant for the MQE-7 the inductance change is less than 1% for variation from 1 to 5 volts. The MQB-11 change is less than 1% for applied voltages from 1 to 20 volts. The MQB-5 change is less than 1% for applied voltages from 1 to 50 volts. DC is permissible through the coil (values listed below) without appreciable change of inductance, Q, resonance and vibration.

Shield packaging is extremely low due to the toroidal winding structure, with windings centered around the core. The field is of high permeability, affording additional shielding such that close spacing of units can be allowed. The coupling between units will be approximately 80 DB.

Other values of inductance than those listed are available on special order at the price of the next lower listed value.

TYPICAL Q CURVES



MQA TYPES

Type No.	Inductance	*DC Max.
MQA-1	7 mhy.	250
MQA-2	12 mhy.	200
MQA-3	20 mhy.	150
MQA-4	30 mhy.	125
MQA-5	50 mhy.	100
MQA-6	70 mhy.	80
MQA-7	120 mhy.	60
MQA-8	.2 hy.	50
MQA-9	.3 hy.	40
MQA-10	.5 hy.	30
MQA-11	.7 hy.	25
MQA-12	1 hy.	20
MQA-13	1.5 hy.	17
MQA-14	2.5 hy.	13
MQA-15	4 hy.	10
MQA-16	6 hy.	9
MQA-17	10 hy.	7
MQA-18	15 hy.	5
MQA-19	22 hy.	4

*This value of D.C. (MA) will drop the coil inductance 5%. Values of D.C. below this will show proportionately (linear) less inductance drop. For example, MQE-1 will drop ½% in L with 13.5 MA.

MQB TYPES

Type No.	Inductance	*DC Max.
MQB-1	10 mhy.	400
MQB-2	30 mhy.	250
MQB-3	70 mhy.	170
MQB-4	120 mhy.	120
MQB-5	.5 hy.	60
MQB-6	1 hy.	40
MQB-7	2 hy.	30
MQB-8	3.5 hy.	22
MQB-9	7.5 hy.	16
MQB-10	12 hy.	11
MQB-11	18 hy.	9
MQB-12	25 hy.	8

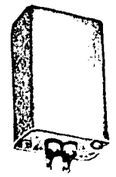
MQE TYPES

Type No.	Inductance	*DC Max.
MQE-1	7 mhy.	135
MQE-2	12 mhy.	100
MQE-3	20 mhy.	80
MQE-4	30 mhy.	65
MQE-5	50 mhy.	50
MQE-6	70 mhy.	40
MQE-7	100 mhy.	35
MQE-8	150 mhy.	30
MQE-9	.25 hy.	22
MQE-10	.4 hy.	17
MQE-11	.6 hy.	14
MQE-12	.9 hy.	12
MQE-13	1.5 hy.	9
MQE-14	2 hy.	8
MQE-15	2.8 hy.	7.2



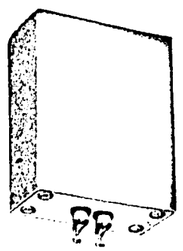
MQE CASE

Length ..... 1 1/16"
Width ..... 1/2"
Height ..... 17/32"
Unit Weight ..... 1.5 oz.



MQA CASE

Length ..... 1 9/32"
Width ..... 1 1/16"
Height ..... 1 23/32"
Unit Weight ..... 4 oz.

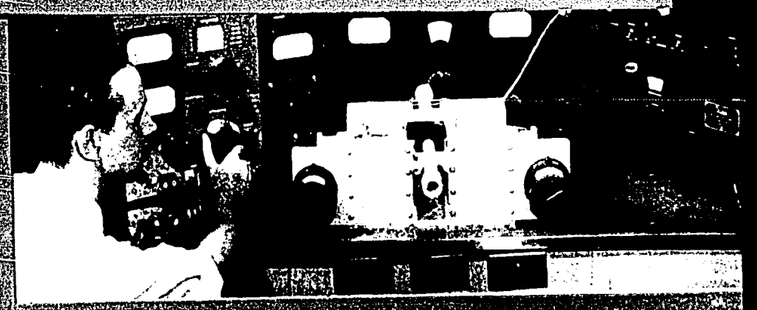


MQB CASE

Length ..... 2 9/16"
Width ..... 1 13/16"
Height ..... 2 13/16"
Unit Weight ..... 14 oz.

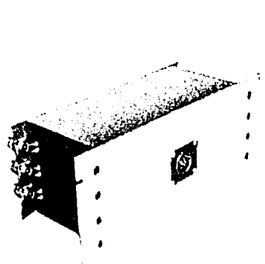
150 VARICK STREET NEW YORK 13, N. Y.

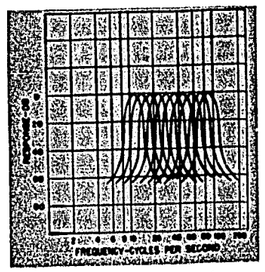
EXPORT DIVISION: 13 EAST 40th STREET, NEW YORK 16, N. Y.. CABLES: "ARLAB"



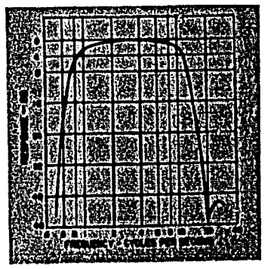
for SPECIALIZED FILTERS

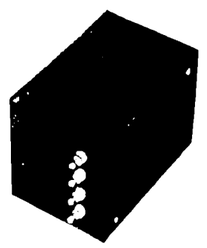
Decades of experience in the design and manufacture of [illegible] filters have resulted in UTC being one of the [illegible]. Fifteen years ago UTC was already the [illegible] dust toroids in the world (exclusive of the [illegible]). Present designs include a wide variety of [illegible] winding methods to provide maximum [illegible] requirements and stability. Illustrated [illegible] sands of special filter designs in process [illegible]



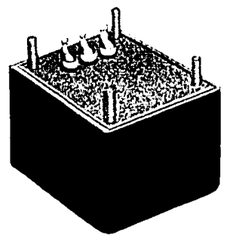


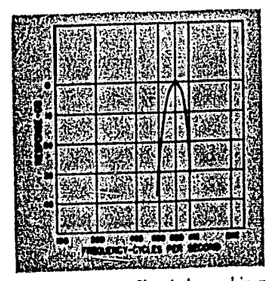
These low frequency band pass filters are held to 1 DB tolerance at the 3 DB crossover . . . 600 ohm . . . 4 filters per 7 1/2" rack panel.



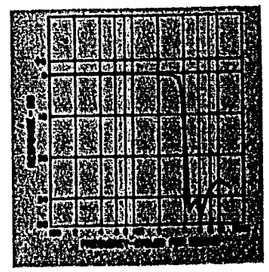


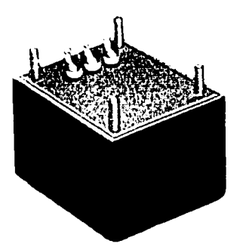
This ultra low frequency filter has a band pass range of one cycle to 10 cycles . . . 50,000 ohms . . . 700 cubic inches.



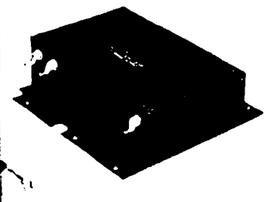


This 600 ohm miniaturized 1 KC band pass filter is housed in a case only 1" x 1 3/4" x 2 1/2".

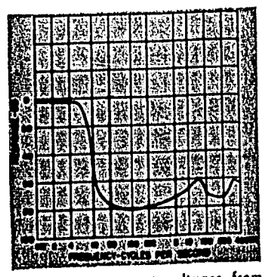


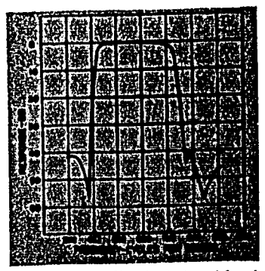


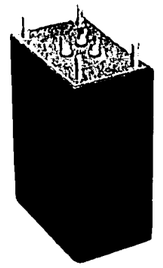
This 600 ohm miniaturized low pass filter is housed in a case only 1" x 1 3/4" x 2 1/2".



This power line filter provides correct output voltages from sources of 50 to 400 cycles . . . noise attenuation is from 14 KC to 400 MC . . . 29 cubic inches.







This band pass filter is designed for sharp cut-off at both ends of the range . . . 10,000 ohms . . . case dimensions 1 5/8" x 2 1/2" x 3 1/4".

150 VARICK STREET NEW YORK 13, N. Y.

EXPORT DIVISION 13 EAST 40th STREET NEW YORK 16 N. Y. CABLES ARLAB

for MINIATURIZED COMPONENTS

from STOCK

MINIATURE AUDIO UNITS...RCOF CASE

Type No.	Application	MIL Type	Pri. Imp. Ohms	Sec. Imp. Ohms	DC in Pri., MA	Response ± 2db. (Cyc.)	Max. level dbm	List Price
H-1	Mike, pickup, line to grid	TF1A10YY	50,200 CT, 500 CT*	50,000	0	50-10,000	+5	$16.50
H-2	Mike to grid	TF1A11YY	82	135,000	50	250-8,000	+21	16.00
H-3	Single plate to single grid	TF1A15YY	15,000	60,000	0	50-10,000	+6	13.50
H-4	Single plate to single grid, DC in Pri.	TF1A15YY	15,000	60,000	4	200-10,000	+14	13.50
H-5	Single plate to P.P. grids	TF1A15YY	15,000	95,000 CT	0	50-10,000	+5	15.50
H-6	Single plate to P.P. grids, DC in Pri.	TF1A15YY	15,000	95,000 split	4	200-10,000	+11	16.00
H-7	Single or P.P. plates to line	TF1A13YY	20,000 CT	150/600	4	200-10,000	+21	16.50
H-8	Mixing and matching	TF1A16YY	150/600	600 CT	0	50-10,000	+8	15.50
H-9	82/41:1 input to grid	TF1A10YY	150/600	1 meg.	0	200-3,000 (4db.)	+10	16.50
H-10	10:1 single plate to single grid	TF1A15YY	10,000	1 meg.	0	200-3,000 (4db.)	+10	15.00
H-11	Reactor	TF1A20YY	300 Henries-0 DC, 50 Henries-3 Ma. DC, 6,000 Ohms.					12.00



RCOF CASE

Length 1 25/64
Width 61/64
Height 1 13/32
Mounting 1 1/8
Screws ..... 4-40 FIL.
Cutout ..... 7/8 Dia.
Unit Weight ..... 1.5 oz.

SUBMINIATURE AUDIO UNITS...SM CASE

Type No.	Application	MIL Type	Pri. Imp. Ohms	Sec. Imp. Ohms	DC in Pri., MA	Response ± 2db. (Cyc.)	Max. level dbm	List Price
H-30	Input to grid	TF1A10YY	50**	62,500	0	150-10,000	+13	$13.00
H-31	Single plate to single grid, 3:1	TF1A15YY	10,000	90,000	0	300-10,000	+13	13.00
H-32	Single plate to line	TF1A13YY	10,000***	200	3	300-10,000	+13	13.00
H-33	Single plate to low impedance	TF1A13YY	30,000	50	1	300-10,000	+15	13.00
H-34	Single plate to low impedance	TF1A13YY	100,000	60	.5	300-10,000	+ 6	13.00
H-35	Reactor	TF1A20YY	100 Henries-0 DC, 50 Henries-1 Ma. DC, 4,400 ohms.					11.00



SM CASE

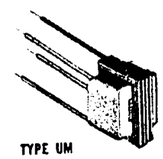
Length 11/16
Width 1/2
Height 29/32
Screw ..... 4-40 FIL.
Unit Weight ..... 8 oz.

SPECIAL

ULTRA-MINIATURE UNITS TO SPECIFICATIONS ONLY

UTC ultra-miniature units are uncased types of extremely small size. They are made to customers' specifications only, and represent the smallest production transformers in the world. The overall dimensions are ½ x ½ x 7/16" ...Weight approximately .2 ounces. Typical special units of this size are noted below:

Type K-16949 100,000 ohms to 100 ohms...6 MW...100 to 5,000 cycles.
Type M-14878 20,000 ohms (1 Ma. DC) to 35 ohms...6 MW...300 to 5,000 cycles.
Type M-14879 6 ohms to 10,000 ohms...6 MW...300 to 5,000 cycles.
Type M-14880 30,000 ohms (.1 Ma. DC) to 3,000 ohms...6 MW...300 to 5,000 cycles.
Type M-14881 25,000 ohms (.5 Ma. DC) to 1,000 ohms...6 MW...300 to 5,000 cycles.



TYPE UM

* 200 ohm termination can be used for 150 ohms or 250 ohms. 500 ohm termination can be used for 600 ohms.
** can be used with higher source impedances, with corresponding reduction in frequency range. With 200 ohm source, secondary impedance becomes 250,000 ohms . . . loaded response is –4 db. at 300 cycles.
*** can be used for 500 ohm load . . . 25,000 ohm primary impedance . . . 1.5 Ma. DC.

150 VARICK STREET • NEW YORK 13, N. Y.
EXPORT DIVISION 13 EAST 40th STREET, NEW YORK 16 N. Y. CABLES: ARLAB

1953 IRE DIRECTORY INDEX TO ADVERTISERS

Firm	Page
A'G'A Div., Elastic Stop Nut Corp.	3
Aaron & Assoc., Inc., Irvin I.	343
Abalon Precision Mfg. Corp.	140
Ace Coil & Electronics Co.	143
Ace Engineering & Machine Co., Inc.,	309
Acme Electric Corp.	215
Acromark Co.	293
Adams & Westlake Co.	Catalog
Advance Electric & Relay Co.	191
Advance Electronics Co.	325
Advance Insulated Wire & Cable Co., Inc.	248
Aerocoil, Inc.	143
Aerolite Electronics Corp.	103
Aeronautical Electric Co.	180
Aerovox Corp.	362-363
Air Marine Motors, Inc.	177
Aircraft Radio Corp.	123
Aircraft Transformer Corp.	1
Airflyte Electronics Co.	5
Airtron, Inc.	244
Alden Electr. & Imp. Rec. Co.	125
Alden Products Co.	150-151
Alfax Paper & Eng. Co.	125
Allied Radio Corp.	342
American Brass Co.	266
American Lava Corp.	4
American Phenolic Corp.	2
American Time Products, Inc.	322
Amperite Co., Inc.	193
Ampex Electric Corp.	364-365
Anton Electronic Labs., Inc.	226
Applied Science Corp. of Princeton	238
Arco Electronics, Inc.	Catalog
Art Wire & Stamping Co.	299
Artos Engineering Co.	289
Associated Specialties Co.	185
Astron Corp.	136
Atlantic India Rubber Works, Inc.	9
Atomic Instrument Co.	229
Ballantine Laboratories, Inc.	304
Barber Labs., Alfred W.	282
Barco, Inc.	11
Barker & Williamson, Inc.	408
Bart Laboratories Co., Inc.	259
Bauman & Bluzat	344
Bead Chain Mfg. Co.	268
Bel Fuse, Inc.	165
Belden Mfg. Co.	Cover II
Bendix Aviation Corp., Eclipse-Pioneer Div.	366-367
Bendix Aviation Corp., Red Bank Div.	176
Berkeley, Div. Beckman Instruments, Inc.	8
Berkshire Laboratories	315
Birnbach Radio Co., Inc.	103, 248
Biwax Corp.	287
Bliley Electric Co.	12
Bodnar Industries, Inc.	269
Bogue Electric Mfg. Co.	13
Bomac Labs., Inc.	382-383
Boonton Radio Corp.	332
Boyle Metalcraft Corp.	132
Brainin Co., C. S.	208
Brand & Co., William	15
Braun Tool & Instr. Co., Inc., H.	261
Browning Laboratories, Inc.	326
Bud Radio, Inc.	267, 346
Buggie, Inc., H. H.	153
Burgess Battery Co.	131
Burlington Instrument Co.	173
Burnell & Co.	16
Burroughs Corp., New Products Div.	Catalog
Burstein-Applebee Co.	346
Bussmann Mfg. Co.	166
Cadillac Employment Agency	17
Cambridge Thermionic Corp.	254
Camera Equipment Co.	119
Campbell Industries, Inc.	199
Cannon Electric Co.	148
Cargo Packers, Inc.	260
Carter Motor Co.	19
Centralab, Div. Globe-Union, Inc.	Catalog
Centronics Co.	186
Century Electronics, Div. Century Metalcraft	329
Chatham Electronics Corp.	404-405
Cherry-Channer Corp.	248
Chester Cable Corp.	20
Chicago Condenser Corp.	134
Chicago Rivet & Machine Co.	21
Chicago Telephone Supply Corp.	376-377
Chicago Transformer Div., Essex Wire Corp.	212
Ciba Co., Inc.	24
Cinch Mfg. Corp.	384-385
Citation Products Co.	269
Clarostat Mfg. Co., Inc.	394-395
Coaxial Connector Co.	155
Cohan-Epner Co., Inc.	263
Coil Winding Equipment Co.	291
Collectron Corp.	23
Collins Radio Co.	428-429
Columbia Technical Corp.	245
Comar Electric Co.	195
Commercial Plastics Co.	298
Communication Accessories Co.	144
Communication Measurements Lab., Inc.	312
Communication Products Co., Inc.	286
Constantin & Co., L. L.	393
Content, Edward J.	256
Continental Carbon, Inc.	199
Continental-Diamond Fibre Co.	Catalog
Cornell-Dubilier Electric Corp.	6
Cosa Corp.	288
Crosby Laboratories, Inc.	114, 282
Cross Co., H.	294
Crucible Steel Co. of America	10
Cubic Corp.	327
Custom Gear Co.	25
Dale Products, Inc.	452-453
Dalis, Inc., H. L.	348
Dalmo Victor, Inc.	26
Davidoff, Charles	257
Decade Instrument Corp.	321
DeJur-Amsco Corp.	152, 168
Dialight Corp.	182
Dietz Design & Mfg. Co.	27
Dorne & Margolin	130
Douglas Laboratories	401
Douglas Microwave Co., Inc.	324
Drake Co., R. L.	165
Drake Mfg. Co.	28
Driver Co., Wilbur B.	32
DuMont Labs., Inc., Allen B.	29
Duro Specialty Co., Inc.	29
Eby, Inc., Hugh H.	207
Edison, Inc., Thomas A.	194
Eitel-McCullough, Inc.	402-403
Elastic Stop Nut Corp. of America	36
Eldico of New York, Inc.	257
Electra Mfg. Co.	201
Electralab, Inc.	186
Electran Mfg. Co.	215
Electrical Industries, Inc.	14
Electro Engineering Products Co.	31
Electro Impulse Laboratory	240
Electro-Mec Laboratory	31
Electro Motive Mfg. Co., Inc.	40
Electro Products Laboratories	231
Electro-Seal Corp.	262
Electro-Search	283
Electro Tec Corp.	44
Electronic Associates, Inc.	318
Electronic Mfg. Co.	303
Electronic Mechanics, Inc.	278
Electronic Parts Mfg. Co., Inc.	33
Electronic Research Assoc., Inc.	180, 335
Electronic Transformer Co., Inc.	214
Electrons, Inc.	223
Elk Electronic Laboratories	257
Epco Products, Inc.	217
Erie Resistor Corp.	18
F-R Machine Works, Inc.	283
Fairchild Camera & Instr. Corp.	Catalog
Falls Metal Works, Ltd.	132
Federal Screw Products, Inc.	270
Federal Telephone & Radio Corp.	368-373
Federated Semi-Conductor Co.	204
Film Capacitors, Inc.	135
Finn & Co., Inc., T. R.	37
Flexilab Products Co.	102
Ford Instrument Co.	235
Formica Co.	48
Frederick Research Corp.	283
Freed Transformer Co., Inc.	Catalog
Frequency Standards	335
Fugle-Miller Laboratories	145
Fusite Corp.	50
Galbraith & Son Elec. Corp., C. C.	104
Gallay, Harris	257
Garde Mfg. Co.	270
General Ceramics & Steatite Corp	52, 54, 349
General Communication Co.	210
General Dyestuff Corp., Antara Chem. Div.	56
General Electric Co., Wiring Device Dept.	41
General Fuse Co.	167
General Hermetic Sealing Corp.	275
General Instrument Corp.	60
General Precision Lab., Inc.	116
General R-F Fittings Co.	151
General Radio Co.	380-381, Cover IV
Glass Products Co.	189
Glenco Corp.	137
Godley Co., Paul	257
Gombos Co., Inc., John	154
Gordon Associates, Inc.	257
Grant Pulley & Hardware Co.	142
Gray Research & Dev. Co., Inc.	118
Griffin Co., John	45
Guardian Electric Mfg. Co.	62
Guderman Co.	22
Hammarlund Mfg. Co., Inc.	424-427
Harnett Electric Corp.	264
Hartford City Paper Co.	282
Hawley Products Co.	132
Haydon Co., A. W.	178
Heath Co.	331
Heiland Research Corp.	232
Heinze Electric Co.	132
Heldor Mfg. Co.	276
Helipot Corp.	Catalog
Heminway & Bartlett Mfg. Co.	47
Heppner Mfg. Co.	64
Hermaseal Co., Inc.	277
Hermetic Seal Products Co.	66
Hewlett-Packard Co.	Catalog
Heyman Mfg. Co.	271
Hickok Electrical Instr. Co.	170
Highland Engineering Co.	217, 283
Hill Electr. Eng. & Mfg. Co., Inc.	160
Hoffman Co., P. R.	163
Hogan Laboratories, Inc.	293
Howard Industries, Inc.	179
Hudson Radio & Television Corp.	350
Hudson Tool & Die Co., Inc.	30
Hughes Aircraft Co.	68
Hunt Corp., The	163
I-T-E Circuit Breaker Co.	146
Illinois Condenser Co.	70
Indiana Steel Products Co.	171
Induction Motors Corp.	180
Industrial Hardware Mfg. Co.	205
Industrial Test Equipment Co.	307
Institute of Radio Engineers.	360, 396, 416, 448-449
Instrument Corp. of America	72
Instrument Specialties Co., Inc.	271
Insuline Corp. of America	134
Interelectronics Corp.	51
International Instruments, Inc.	171
International Pump & Machine Works	293
International Rectifier Corp.	188
Ippolito & Co., Inc., James	300

(Continued on next page)

1953 IRE DIRECTORY INDEX TO ADVERTISERS

(Continued from preceding page)

Firm	Page
JFD Mfg. Co., Inc.	140, 242
Jennings Radio Mfg. Co.	390-392
Johnson Co., E. F.	183
Johnson & Hoffman Mfg. Co.	397-400
Jones Electronics Co., Inc., M. C.	51
Kahle Engineering Co.	290
Kahn, Leonard R.	257
Kalbfell Laboratories, Inc.	257
Kaupp Co., C. B.	74
Kay Electric Co.	314
Kearfott Co., Inc.	53
Kellogg Co., M. W.	76
Kellogg Switchboard & Supply Co.	106
Kent Co., F. C.	246
Kenyon Transformer Co.	406-407
Kepco Laboratories, Inc.	224
Kester Solder Co.	78
Keystone Electronics Co.	162
Keystone Products Co.	216
King Laboratories, Inc.	301
Kings Electronics Co.	414-415
Kinn, Theodore P.	257
Kinney Mfg. Co.	292
Kirchberger & Co., Inc., M.	255
Knights Co., James	55
Kollsman Instrument Corp.	43
Laboratory for Electronics	432-433
Lambda Electronics Corp.	57
Langevin Manufacturing Corp.	218
Lavoie Laboratories, Inc.	328
Lee Laboratories	284
Lenz Electric Mfg. Co.	250
Lindgren & Assoc., Erik A.	311
Linear Equipment Labs.	333
Linemaster Switch Corp.	211
Littelfuse, Inc.	58
Little Falls Alloys, Inc.	251
Lowenthal Co., T. R.	352
Lubcke, Harry R.	258
Lynn Electronic Research Co.	59
Machlett Laboratories, Inc.	222
Macmillan Co.	340
Magnavox Co.	138
Magnetic Amplifiers, Inc.	167
Magnetics, Inc.	160
Makepeace Co., D. E.	80
Malco Tool & Mfg. Co.	272
Mansol Ceramics	296
Marion Electrical Instr. Co.	234
Maxson Corp., W. L.	122
Mayer Co., A. W.	353
McCoy Electronics Co.	61
McGraw-Hill Book Co.	340
Measurements Corp.	284, 422-423
Mendelsohn Speedgun Co., Inc.	155
Mepco, Inc.	388-389
Metal Fabricators Corp.	141
Metal Textile Corp.	279
Methode Mfg. Corp.	208
Metropolitan Overseas Supply Corp.	353
Mica Fabricators Association	279
Mico Instrument Co.	63
Micro-Circuits Co.	287
Microwave Consultants	258
Microwave Development Labs., Inc.	284
Microwave Services, Inc.	258
Midland Mfg. Co., Inc.	82
Millen Mfg. Co., Inc., James	336
Model Rectifier Corp.	191
Motson Co., J. Frank	265
Multicore Sales Corp.	84
Murphy & Miller, Inc.	317
Mycalex Corp. of America	430-431
N.R.K. Mfg. & Eng. Co.	65
Nassau Research & Dev. Assoc., Inc.	243
National Co., Inc.	434-435
National Union Radio Corp.	46
Nesor Alloy Products Co.	253
Neutronic Associates	184
Ney Co., J. M.	209
Norrman Labs., Ernst	67
Northern Radio Co., Inc.	410-412
Northshore Nameplate Co.	272
Optical Film Engineering Co.	69
Ortho Filter Corp.	101
Orthon Corp.	117
Oster Mfg. Co., John	181
Ostlund, Evert M.	258
Panoramic Radio Products, Inc.	115
Paramount Paper Tube Corp.	157
Par-Metal Products Corp.	141
Permag Corp.	354
Phaostron Co.	175
Phelps-Dodge Copper Products Corp.	251
Philamon Labs., Inc.	323
Photo Chemical Products, Inc.	187
Pickard & Burns, Inc.	113, 284
Pickering & Co., Inc.	109, 210
Pioneer Machine Works	294
Planet Mfg. Corp.	139
Plastics & Electronics Corp.	99
Plastoid Corp.	34
Pollak Corp., Joseph	194
Polymer Corp. of Pa.	278
Polytechnic Research & Dev. Co., Inc.	374-375
Potter & Brumfield	192
Precise Measurements Co.	294
Precision Apparatus Co., Inc.	330
Precision Paper Tube Co.	273
Preis Engraving Mach. Co., H. P.	73
Premier Metal Products Co.	133
Presto Recording Corp.	110
Production Research Corp.	285
Production Tool & Fixture Co.	295
Pyroferric Co., Inc.	158
R-B-M Div., Essex Wire Corp.	86
Radell Corp.	38
Radio Cores, Inc.	161
Radio Corp. of America	88, 413, 440-441
Radio Materials Corp.	436-437
Radio Receptor Co., Inc.	190, 202
Raypar, Inc.	220
Raytheon Mfg. Co.	228
Reeves-Hoffman Corp.	164
Reon Resistor Corp.	200
Resinite Corp., Div. Precision Paper Tube	298
Resistance Products Co.	196
Resistoflex Corp.	281
Rex Corp.	280
Ripley Co., Inc.	131
Robinson Aviation, Inc.	90
Rockbar Corp.	77
Rosenberg Associates, Paul	258
Sanborn Co.	320
Sanders Associates, Inc.	42
Scala Radio Co.	337
Schweber Electronics	Catalog
Secon Metals Corp.	296
Segel Co., Henry P.	79, 356
Sel-Rex Precious Metals, Inc.	296
Sensitive Research Instr. Corp.	307
Servo Corp. of America	438-439
Servomechanisms, Inc.	237
Shallcross Mfg. Co.	98
Shielding, Inc.	313
Shure Brothers, Inc.	108
Sickles Co., F. W.	421
Signal Eng. & Mfg. Co.	197
Simpson Electric Co.	174
Smith, Inc., Herman H.	Catalog
Snyder Co., V. A.	357
Sola Electric Co.	225
Sound Apparatus Co.	319
Spellman Television Co., Inc.	185
Spencer-Kennedy Laboratories, Inc.	306
Sperry Gyroscope Co.	Catalog
Sphere Co., Inc.	274
Stackpole Carbon Co.	442-443
Standard Electric Time Co.	325
Standard Piezo Co.	92
Staver Co., Inc.	302
Stern Co., Roger M.	39
Stevens-Arnold, Inc.	159
Stevens Mfg. Co.	213
Stevens Mfg. Co., Inc., George	83
Stewart Mfg. Corp., F. W.	273
Sticht & Co., Inc., Herman H.	173
Stoddart Aircraft Radio Co., Inc.	246
Stupakoff Ceramic & Mfg. Co.	139, 189, 203, 255, 265, 277, 295, 297, 303, 378-379
Superior Electric Co.	Catalog
Superior Tube Co.	444-445
Surprenant Mfg. Co.	252
Swift Industries, Inc.	311
Switchcraft, Inc.	104
Sylvania Electric Products Inc.	417-420
Technitrol Engineering Co., Inc.	221
Technology Instrument Corp.	198, 334
Telechrome, Inc.	120, 285
Tel Instrument Co.	120
Tel-Rad Mfg. Co.	87
Telrex, Inc.	258
Tenney Engineering, Inc.	310
Tensolite Insulated Wire Co.	253
Thomas & Skinner Steel Products Co.	169
Thor Ceramics, Inc.	256
Times Facsimile Corp.	303
Torocoil Co.	147
Torwico Electronics, Inc.	149
Trad Television Corp.	338
Transformer & Electr. Specialties Co.	221
Transformer Specialty Co.	219
Transicoil Corp.	236
Transistor Products, Inc.	206
Triad Transformer Corp.	89
Trimm, Inc.	107
Truscon Steel Div., Republic Steel Corp.	126
Tung-Sol Electric, Inc.	94
Tydings Co., Div. Keps Electric Co.	358
Ucinite Co.	447
Ulanet Co., George	211
United-Carr Fastener Corp.	446
U. S. Components, Inc.	96
U. S. Engineering Co.	91
U. S. Gasket Co.	450-451
United Transformer Co.	Catalog
Universal Electronics Co.	186
Universal Mfg. Co., Inc.	149, 247
University Loudspeakers, Inc.	105
Vacuum-Electronic Engineering Co.	294, 311
Varian Associates	454-455
Vector Electronic Co.	205
Vectron, Inc.	308
Vibration Research Labs., Inc.	157, 285
Victory Engineering Corp.	203
Walker Co., George	274
Wang Laboratories	230
Wasserlein Mfg. Co., Inc.	93
Waterman Products Co.	386-387
Waveline, Inc.,	242
Wayne-Kerr Laboratories, Ltd.	316
Weckesser Co.	275
Weston Electrical Instrument Corp.	172
Wheeler Laboratories, Inc.	259
Wiley & Sons, Inc., John	341
Wilgreen Industries	4
Wilmad Glass Co., Inc.	9
Winchester Electronics, Inc.	156
Wind Turbine Co.	128
Workshop Associates Div., Gabriel Co.	112
Yardney Electric Corp.	Catalog
Zophar Mills, Inc.	287

hp hp hp

HEWLETT-PACKARD COMPANY
2758 PAGE MILL ROAD • PALO ALTO, CALIFORNIA, U.S.A.

Oscillators—Signal Generators
.01 to 10,000,000 cps

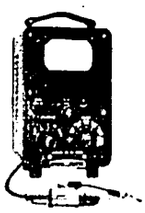


Instrument	Primary Uses	Frequency Range	Output	Price
-hp- 200AB	Audio tests	20 cps to 40 kc	1 watt/24.5 v	$120.00
-hp- 200CD	Audio, ultrasonic tests	5 cps to 600 kc	160 mw/20 v *	150.00
-hp- 200H	Carrier current, telephone tests	60 cps to 600 kc	10 mw/1 v	350.00
-hp- 200I	Interpolation and frequency measurements	6 cps to 6 kc	100 mw/10 v	225.00
-hp- 201B	High quality audio tests	20 cps to 20 kc	3 w/42.5 v	250.00
-hp- 202A	Low frequency measurements	.01 cps to 1 kc	20 mw/ 10 v	450.00
-hp- 202B	Low frequency measurements	½ cps to 50 kc	100 mw/10 v	350.00
-hp- 202D	Low frequency measurements	2 cps to 70 kc	100 mw/10 v	275.00
-hp- 204A	Portable, battery operated	2 cps to 20 kc	2.5 mw/5 v	175.00
-hp- 205A	High power audio tests	20 cps to 20 kc	5 watts	390.00
-hp- 205AG	High power tests, gain measurements	20 cps to 20 kc	5 watts	425.00
-hp- 205AH	High power supersonic tests	1 kc to 100 kc	5 watts	550.00
-hp- 206A	High quality, high accuracy audio tests	20 cps to 20 kc	+15 dbm	550.00
-hp- 230A	Carrier test oscillator	35 cps to 35 kc	+14 dbm/600 ohms	275.00
-hp- 233A	Carrier test oscillator	50 cps to 500 kc	3w/600 ohms	475.00
-hp- 234A	Carrier test oscillator	160 cps to 160 kc	+14 dbm/600 ohms	300.00
-hp- 650A	Wide range video tests	10 cps to 10 mc	15 mw/3 v	475.00

Precision-built -hp- instruments for every

-hp- Vacuum Tube Voltmeters — 2 to 700,000,000 cps

-hp- 410B VACUUM TUBE VOLTMETER



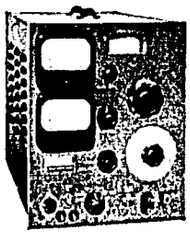
Wide range, flat response ± 1 db, 20 cps to 700 mc. Convenient, simple to use, occupies minimum bench space. Handy compartment for probe and leads. Diode probe places approximately 1.5 μμfd capacity across circuit under test. This, plus high shunt impedance (10 megohms at low frequencies) means circuits under test are not disturbed, and true voltage readings are assured. Also measures dc voltage to 1,000 volts and resistances to 500 megohms. $245.00.

Instrument	Primary Uses	Frequency Range	Voltage Range	Input Impedance	Price
-hp- 400A	General purpose ac measurements	10 cps to 1 mc	.005 to 300 v 9 ranges	1 megohm 24 μμfd shunt	$185.00
-hp- 400B	Low frequency ac measurements	2 cps to 100 kc	.005 to 300 v 9 ranges	10 megohms 24 μμfd shunt	195.00
-hp- 400C	Wide range ac measurements. High sensitivity	20 cps to 2 mc	.0001 to 300 v 12 ranges	10 megohms 15 μμfd shunt	200.00
-hp- 404A	Portable, battery operated	2 cps to 50 kc	.0005 to 300 v 11 ranges	10 megohms 20 μμfd shunt	185.00
-hp- 410B	Audio, rf, VHF measurements; dc voltages; resistances	20 cps to 700 mc	.1 to 300 v 7 ranges	10 megohms 1.5 μμfd shunt	245.00

-hp- Voltmeter Accessories (not listed) include voltage dividers, connectors, shunts and multipliers to extend the useful range of your equipment.

-hp- Signal Generators — 10 to 10,800 mc

-hp- 612A SIGNAL GENERATOR



450 to 1,200 mc. Master oscillator-power amplifier generator for UHF-TV measurements including gain, selectivity, sensitivity, image rejection. Directly set and read; no charts, no interpolation. Low incidental fm, high-quality broad band video modulation to 5 mc. May be modulated internally or externally, amplitude modulated or pulse modulated. (Good rf pulses 0.2 μsec or longer.) $1,200.00.

Instrument	Frequency Range	Characteristics	Price
-hp- 608A	10 to 500 mc	Output 0.1 μv to 1 v into 50 ohm load. Pulse or CW modulation. Direct calibration.	$ 850.00
-hp- 610B	450 to 1,200 mc	Output 0.1 μv to 0.1 v into 50 ohm load. Pulse, CW or Square wave modulation. Direct calibration.	925.00
-hp- 612A	450 to 1,200 mc	Output 0.1 μv to 0.5 v into 50 ohm load. Pulse, CW or amplitude modulation to 5 mc. Direct calibration.	1,200.00
-hp- 614A	800 to 2,100 mc	Output 0.1 μv to 0.223 v into 50 ohm load. Pulse, CW or FM modulation. Direct calibration.	1,950.00
-hp- 616A	1,800 to 4,000 mc	Output 0.1 μv to 0.223 v into 50 ohm load. Pulse, CW or FM modulation. Direct calibration.	1,950.00
-hp- 618B	3,800 to 7,600 mc	Output 0.1 μv to 0.223 v into 50 ohm load. Pulse, CW, FM or Square wave modulation. Direct calibration	2,250.00
-hp- 620A	7,000 to 10,800 mc	Output 0.1 μv to 0.071 v into 50 ohm load. Pulse, CW, FM or Square wave modulation. Direct calibration.	2,250.00
-hp- 623B	5,925 to 7,725 mc	Output 70 μv to 0.223 v into 50 ohm load. FM or Square wave modulation. Separate power meter and wave meter section.	1,750.00
-hp- 624B	8,500 to 10,000 mc	Output 3.0 μv to 0.223 v into 50 ohm load. Pulse, FM or Square wave modulation. Separate power meter and wave meter section.	2,250.00

-hp- Distortion, Wave Form Analyzers — 20 cps to 20 kc

-hp- 330B DISTORTION ANALYZER



Measures distortion as low as 0.1% at any frequency, 20 cps to 20 kc. Measures noise voltages as low as 100 μv. High sensitivity, high stability, broad applicability for broadcast, laboratory or production problems. Wide band 20 db gain input amplifier. Built-in vacuum tube voltmeter usable separately. $395.00.

FM, AM-FM MODELS

-hp- 330C, for FM broadcasters, includes VU meter meeting F.C.C. requirements. *-hp- 330D,* for AM - FM broadcasters, includes AM detector to rectify AM carrier, plus VU meter employed in model 330C. Model 330C, $425.00. Model 330D, $440.00.

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 300A	Wave form analyzer	30 cps to 16 kc	Variable selectivity; measuring range 1 mv to 500 v	$625.00
-hp- 320A	Measures total distortion	400 cps and 5 kc	Requires external detector	75.00
-hp- 320B	Measures total distortion	50, 100, 400 cps, 1, 5 and 7.5 kc	Same as above	150.00
-hp- 330B	Measures total audio distortion	20 cps to 20 kc	Includes input amplifier, VTVM	395.00
-hp- 330C	For FM broadcast measurements	20 cps to 20 kc	Special VU meter to meet F.C.C. requirements	425.00
-hp- 330D	For AM-FM broadcast measurements	20 cps to 20 kc	AM detector and VU meter to meet F.C.C. requirements	440.00
SQUARE WAVE GENERATOR				
-hp- 210A	Transient and frequency response	20 cps to 10 kc	Output 50 v peak-to-peak 1,000 ohm impedance	150.00

Data subject to change without notice. Prices f.o.b. factory.

Instruments for Complete Coverage



A "Balanced" Promotion Package

. . . for selling Radio and Electronic Engineers is the marketing by-product of this great engineering society!

3 WAYS TO MARKET

The cube illustrated above is symbolic of the IRE Balanced Promotion Package, which is composed of a monthly magazine, a directory and a show, to do these three marketing jobs:

Product Promotion is the function of advertising in "Proceedings of the I.R.E." which reaches 34,894 net paid, ABC readers of which 31,286 are member engineers (including 4,059 student engineers). The publication is a month-by-month textbook of engineering and radio science, and its advertising keeps the engineer up-to-the-minute with product development. Thus its ads promote products to the "thinking and reading" engineers who design and set the specs for tomorrow's production.

Product Reference is the job of the IRE DIRECTORY. Engineers are highly literate, and what they do not know or remember themselves, they do know where and how to look up. The IRE DIRECTORY is their own reference book for men, firms and products—supplying an accurate source of information—in which advertising is an "insurance" that your facts will be found.

Product Presentation is accomplished economically through the Radio Engineering Show, which attracted 35,642 registered visitors, and served 405 exhibitors in 1953.

TYPICAL "PACKAGE" COSTS

Several types of balanced advertising programs which will provide your firm product promotion, reference, and product presentation are shown below, for different budget amounts.

An economy plan costing $1830 a year.

12 one-third page ads in "Proceedings"	$1440
1 one-third page in IRE Directory	120
1 10′ x 10′ booth Radio Eng. Show	270

More space & display, less frequency for $2460 (figures about ¼ of a $10,000 budget).

1 page in color, Convention issue	$ 470
5 ⅔rd pages every other month	1300
3 one column ads in IRE Directory	390
1 standard booth (at 6 time rate)	300

A strong program costing ½ of a $10,000 budget.

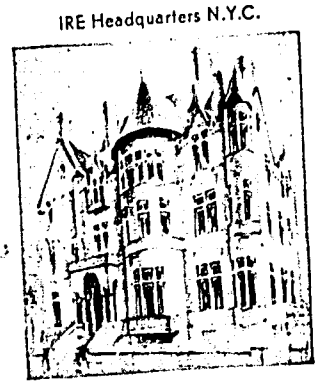
12 pages, 1 a month in "Proceedings"	$4320
1 page in IRE Directory	360
1 standard booth in Radio Eng. Show	270
	$4950

A dominating campaign which costs but 1½¢ per impression, or less than 28¢ per qualified engineer a year to cover, total $8280.

12 full pages in color, Proceedings of IRE	$5280
8 page multiple unit in IRE Directory	1920
2 Preferred Position large booths in Show	1080

(Many flexible budget combinations possible.)

IRE Headquarters N.Y.C.



THE INSTITUTE OF RADIO ENGINEERS

Organized in 1913, the Institute of Radio Engineers is a non-profit organization of 31,286 members drawn together for self help through the exchange of information by meetings and publications. There are no company members.

Advertising Dept., 1475 Broadway
New York 36, N.Y., BRyant 9-7550

Proceedings of the IRE • IRE Directory • Radio Engineering Show

GR TYPE 1183-T
TV Station Monitor

★ Now In Use By Nearly Every TV Station

★ Standard Equipment with Transmitters of Such Leading Manufacturers as RCA, GE, DuMont

★ In Regular Production

★ Highest Stability

★ Less Than 0.1% Distortion For 25 kc Swing

★ Accurate, Visual and Aural Carrier-Frequency Indication

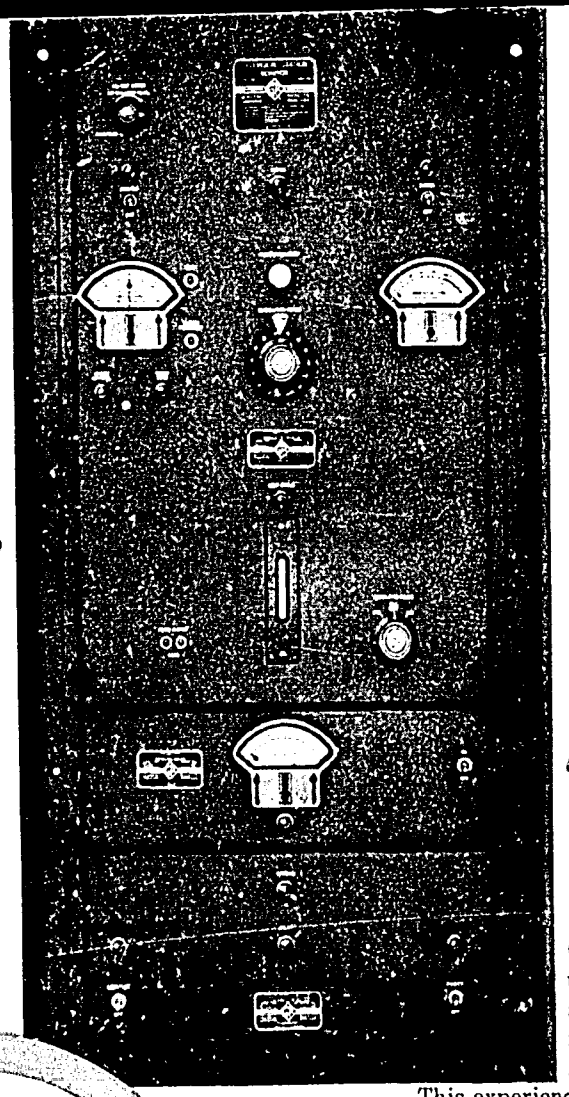
★ Reliable Modulation-Level Monitoring

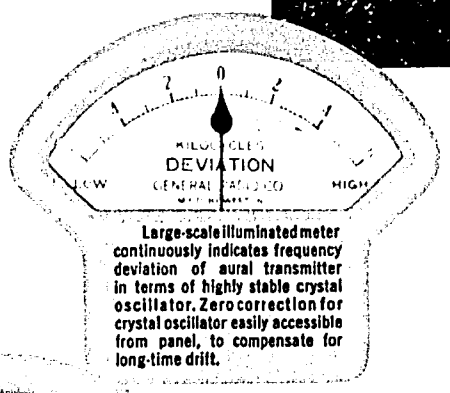
★ Only Routine Maintenance

★ Convenient to Use

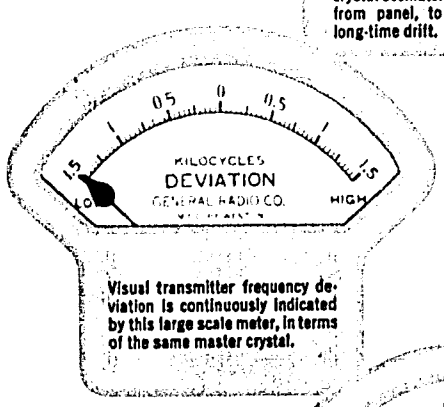
in T-V Monitoring Equipment

The Type 1183-T T-V Station Monitor is in regular production—deliveries current to meet "on the air" schedules. Price: from $2830 to $2905 *depending on frequency bands.*

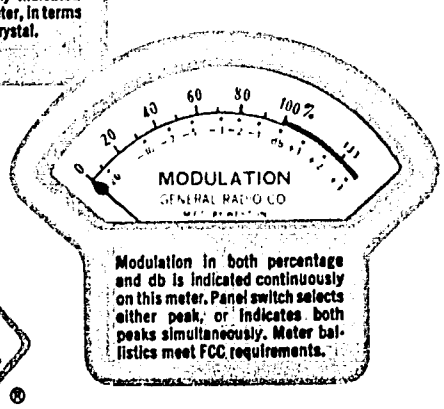




Large-scale illuminated meter continuously indicates frequency deviation of aural transmitter in terms of highly stable crystal oscillator. Zero correction for crystal oscillator easily accessible from panel, to compensate for long-time drift.



Visual transmitter frequency deviation is continuously indicated by this large scale meter, in terms of the same master crystal.



Modulation in both percentage and db is indicated continuously on this meter. Panel switch selects either peak, or indicates both peaks simultaneously. Meter ballistics meet FCC requirements.

it's Dependability that Counts!

Since the beginning of broadcasting, G-R has pioneered in the design and manufacture of monitors of all types. Almost all of the 242+ Radio Broadcast Stations now on the air are equipped with G-R Monitors.

This experience has provided the necessary engineering and manufacturing background to anticipate all of the station needs for high quality, dependable, accurate and trouble-free T-V Monitors. Months of "post-freeze" operation in all of the leading v-h-f and u-h-f stations has proven the reliability, accuracy and convenience of the new G-R Monitor.

★ *Two large-scale, illuminated meters continuously indicate frequency deviation of aural and video transmitters in terms of a highly stable crystal oscillator. Modulation in both percentage and db is shown on another meter; panel switch selects either peak, or indicates both peaks simultaneously*

★ *High Stability; Visual Monitor ±500 cycles*
Aural Monitor ±1000 cycles

On all VHF channels, the above accuracy is guaranteed for at least thirty days — at the lower UHF frequencies (channel 14), the period is over sixteen days — on channel 83, the period is ten days or more

★ *High-fidelity audio output for distortion and noise-level measurements, and for audio monitoring — residual noise level is down 70 db or better for 25 kc deviation*

★ *Overmodulation alarm for aural transmitter — lamp flashes when modulation exceeds predetermined level set by dial*

★ *Sensitivity for both Aural and Visual inputs. High Impedance Input (VHF) — 1 volt or better. Low Impedance (UHF) — 500 mw or less*

★ *Excellent signal-to-noise ratio through channel 83*

★ *Separate heater inputs allow direct connection of crystal oven to station standby power*

★ *Pilot lamp indicates adequate r-f input level*

★ *Terminals are provided for connecting remote center-frequency and modulation meters and over-modulation indicators*

★ *Counter-type discriminator has excellent linearity over ±100 kc range — overall distortion is less than 0.1%, insuring accurate distortion measurements and center-frequency indications even under heavy modulation*

★ *New cabinet arranged for maximum heat dissipation and easy installation or removal for servicing*

GENERAL RADIO Company
275 Massachusetts Avenue, Cambridge 39, Massachusetts, U. S. A.
90 West St. NEW YORK 6 920 S. Michigan Ave. CHICAGO 5 1000 N. Seward St. LOS ANGELES 38

Admittance Meters ☆ Coaxial Elements ☆ Decade Capacitors
Decade Inductors ☆ Decade Resistors ☆ Distortion Meters
Frequency Meters ☆ Frequency Standards ☆ Geiger Counters
Impedance Bridges ☆ Modulation Meters ☆ Oscillators
Variacs ☆ Light Meters ☆ Megohmmeters ☆ Motor Controls
Noise Meters ☆ Null Detectors ☆ Precision Capacitors
Pulse Generators ☆ Signal Generators ☆ Vibration Meters ☆ Stroboscopes ☆ Wave Filters
U-H-F Measuring Equipment ☆ V-T Voltmeters ☆ Wave Analyzers ☆ Polariscopes