

EDITOR'S PROFILE of this issue

from a historical perspective ...

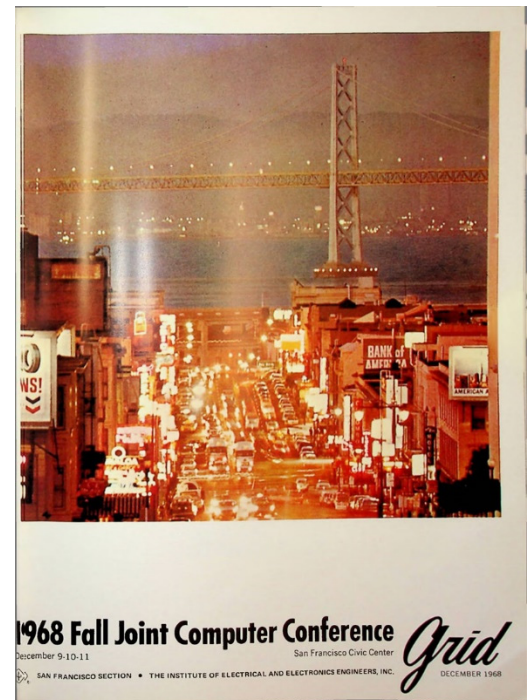
with Paul Wesling, SF Bay Area Council GRID editor (2004-2014)

December, 1968:

Cover: Photo shows the North Beach area of S.F., looking toward Oakland; the Fall Joint Computer Conference is to be held at the Civic Center. This is destined to be one of the most important IEEE gatherings in our lifetime, as Doug Engelbart will be giving his "Mother of All Demos" on December. 9th. More on page 4.

Page 4: The outline of the FJCC program shows Session 14 on "A Research Center for Augmenting Human Intellect" will have only a sole speaker: Doug Engelbart of the Augmentation Research Center at the Stanford Research Institute (SRI). During his oNLine System (NLS) demonstration, we learn about networking (back to Menlo Park) and the fundamental elements of modern personal computing, including windows, hypertext, graphics, video conferencing, the computer mouse, word processing, and a collaborative real-time editor. When Steve Jobs saw a demonstration of the Xerox PARC Alto computer, developed by ex-SRI people, he adopted the paradigm for his Lisa (and Macintosh). The full presentation was captured in video, and you can watch it: <https://www.youtube.com/watch?v=yJDv-zdHzMY> (1:40:52) I met Doug at a talk at the Computer History Museum.

Pages 4-5: Bill Davidow of HP (later at Intel, with PhD from Stanford) is the chair of the FJCC. He becomes a venture capitalist in 1985; my partner and I met with him to request an investment for a small venture we were starting up (but we didn't get the funding).



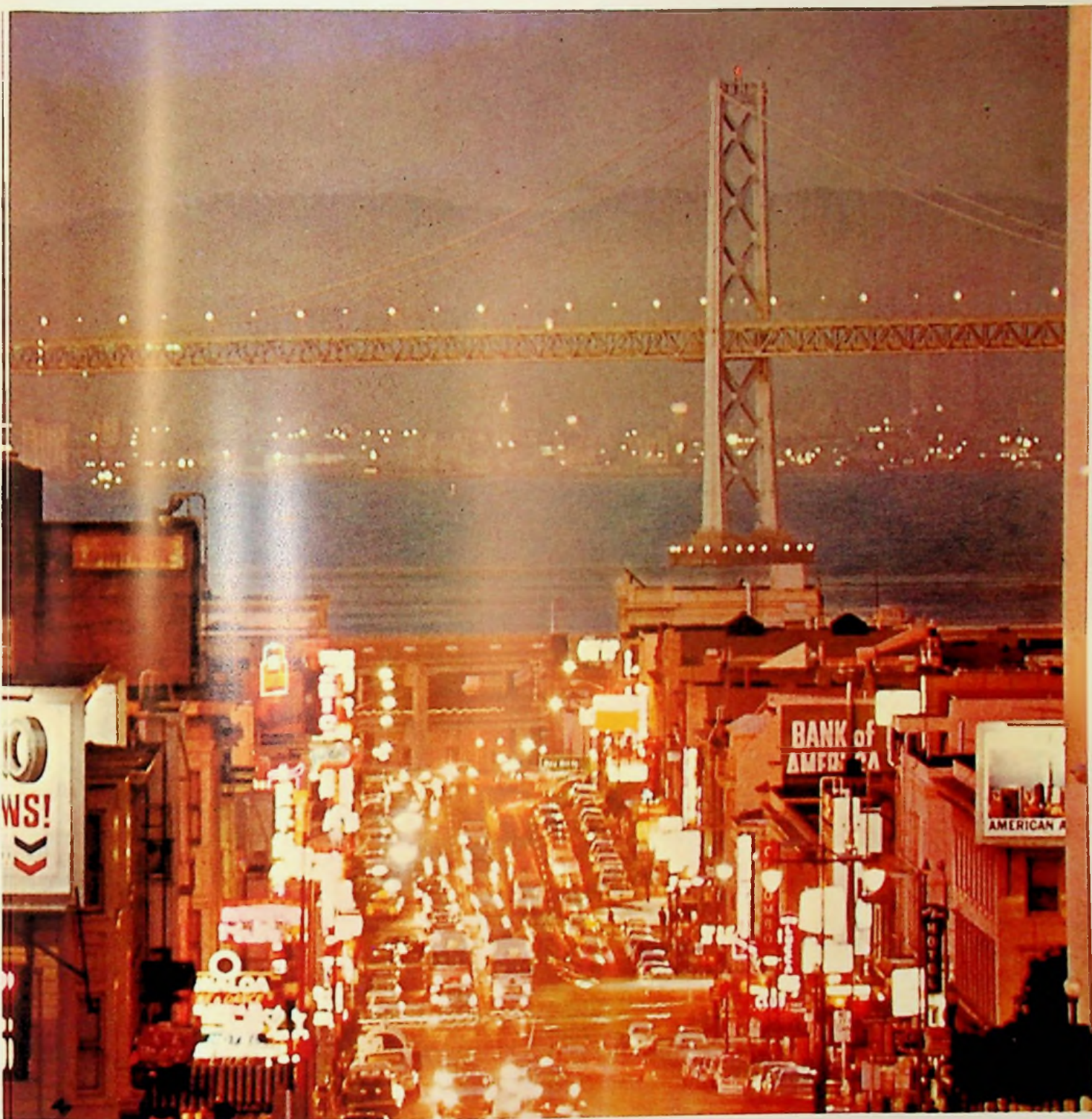
Archive of available SF Bay Area GRID Magazines is at this location:

https://ethw.org/IEEE_San_Francisco_Bay_Area_Council_History

At time of scanning, the bound volumes are held by Paul Wesling.

April, 2025

Contact p.wesling@ieee.org



1968 Fall Joint Computer Conference

December 9-10-11

San Francisco Civic Center



SAN FRANCISCO SECTION • THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

Grid

DECEMBER 1968

CYBERCOM
CORPORATION

432 toyama drive, sunnyvale, california, 94086, phone: 734-3230

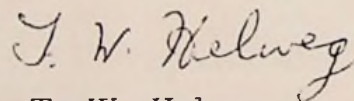
November 13, 1968

Attendees
Fall Joint Computer Conference
Brooks Hall
Civic Center
San Francisco, California

It has been estimated that by 1973 the expenditures for computers and their equipment will exceed \$30 billions. Cybercom, a manufacturer of human engineered computer peripheral products, will be a major contributor to that growth.

Stop by our hospitality suite, and let's discuss our mutual growth. We'll be at the St. Francis during conference week.

Sincerely,



T. W. Helweg
President

TWH:gw

Meeting Calendar

MAGNETICS

SONIC FILM BLOCK ORIENTED RANDOM ACCESS MEMORY. Dr. R. Shahbender, RCA Research Laboratories, Princeton, N.J.

DEC. 12, Thursday, 8:00 p.m., Lockheed Auditorium, Bldg. 202, 3250 Hanover St., Palo Alto. No dinner. **Story in Nov. Grid.**

NUCLEAR SCIENCE

Story on page 8

DEVELOPMENT AND OPERATION OF THE BEAM SWITCHBOARD AREA AT SLAC. Dr. Ed Seppi, in charge of the Research Area Dept. at SLAC.

DEC. 17, Tuesday, 8:00 p.m., SLAC Auditorium, Sand Hill Road, Menlo Park. Dinner: 6:30 p.m., Stone Cellar, 1906 El Camino, Menlo Park. Chicken \$4, Ham \$4.25, including tax & tip. Reservations: Arlene Lenzi, 837-5311, ext. 700 by Dec. 13th.

SF SECTION/ EAST BAY SUBSECTION

Story on page 18

THE APOLLO EFFORT. Bradford A. Evans, Public Affairs Officer, Nasa.

JAN. 27, Monday, 7:30 p.m., Engineers Club of San Francisco, 160 Sansome St., San Francisco. Cocktails: 5:30 p.m., dinner: 6:30 p.m. Ladies invited and guests welcome. Further details in January Grid.

Grid

volume 15
number 4

DECEMBER, 1968

Published monthly except July and August
by San Francisco Section
Institute of Electrical and Electronics Engineers

EDITORIAL BOARD

John E. Barkle, Bechtel Corp.
John B. Damonte, LMSC
Larry G. FitzSimmons, Jr., PTT Co.
Donald O. Pederson, U.C. Berkeley

PUBLICATIONS ADVISOR

Merle Mass, Hewlett Packard Co.

EDITOR

Ernesto Montano

Address all mail except
address changes to
San Francisco Section Office, IEEE
Suite 2210, 701 Welch Road
Palo Alto, Calif. 94304
Telephone: (415) 327-6622

Jean Helmke, Office Manager
Marilynn Dwight, Adv. & Editorial Assistant

1968-69 San Francisco Section Officers

Chairman: JOHN E. BARKLE
Vice Chairman: JOHN B. DAMONTE
Secretary: DONALD O. PEDERSON
Treasurer: LARRY G. FITZSIMMONS, Jr.
Membership Chairman: JAMES J. McCANN
PG&E, 781-4211

Members send address change promptly to
IEEE, 345 East 47th St., New York, N. Y. 10017
(Telephone: (212) PL 2-6800)

Advertising
E. A. Montano, IEEE
701 Welch Rd., Palo Alto, Calif. (415) 327-6622

Second Class postage paid at Palo Alto, Ca.
and at additional mailing offices

Subscriptions:
\$4.00 (members); \$6.00 (others);
overseas, \$7.00 per annum

Printed by
Metropolitan Printing Co., Portland, Oregon



ON THE COVER

A view of San Francisco's North Beach Broadway Area, the Bay Bridge with the lights of Oakland and a dim outline of the Berkeley, Oakland Hills in the background. San Francisco hosts the FJCC December 9-10-11 at Civic Center.

Cover art through the courtesy of Hal Lawrence, Inc., Advertising Agency, Palo Alto.

ENGINEERS and MANAGERS

B.S., M.S., Ph.D.

Urgent Requirements
by Our Clients in
Commercial Product
Areas for Experienced
Engineers to Staff
Key Positions in fields of

VIDEO CIRCUITRY
MICROWAVE DEVICES
SMALL COMPUTERS
PERIPHERAL EQUIPMT.
DISPLAY SYSTEMS
DATA ACQUISITION
INSTRUMENTATION
MECHANISMS
FLUIDICS

for personal and
confidential referrals
to client management,
at no cost to you
please submit resume

ENGLERT and COMPANY

*Management
Consultants*

2555 Park Boulevard
Palo Alto, Calif.
(415) 326-7390

Program Highlights - 1969 Annual Symposium on Reliability

The program for the 15th Annual Symposium on Reliability, to be held in Chicago's Palmer House on January 21-23, 1969, will feature addresses by key industrial managers, a panel discussion of reliability-cost considerations, and several technical sessions addressing the symposium theme of "Reliability and the Profit Profile."

The three-day meeting will be opened with a keynote address by Thomas Morrow, Vice President, Chrysler Corporation. The Pacesetter address will be given by Stanley Burriss, Vice President & General Manager of Lockheed Missiles & Space Company. Principal speaker at the annual symposium banquet will be Thomas Wands, Vice President, Operations, Sears Roebuck and Company. The Reliability and Cost Panel will be chaired by J. H. Sidebottom, Vice President, Marketing, Defense Electronic Products, RCA, and will include panelists from major system development organizations.

A total of 18 regular technical sessions are planned, covering the broad

area of reliability and the assurance sciences. Session subjects have been chosen to appeal to both managers and engineers involved in assuring reliability of military, commercial, or consumer products. Discussions will include such timely topics as Medical Instrumentation Reliability, System/Cost Effectiveness, and Manufacturing Reliability. A special feature of the 1969 meeting will be a full day's discussion of Nondestructive Testing for Structural Reliability, including invited papers by experts in the structural reliability field. Three evening sessions on specialized subjects will round out the program.

Several papers will be presented by members of Bay Area companies:

Reliability, The Management of Imperfection, H. E. Fewtrell & R. W. Parcel, Lockheed Missiles & Space Company, Sunnyvale, California

Causal Approach To Reliability, R. G. Stewart, Lockheed Missiles & Space Company, Palo Alto, California

Standard Agena Production Reliability Evaluation Program, Robert E. Ross,

Lockheed Missiles & Space Company, Sunnyvale, California

Introduction to Lazer Reliability, R. S. Cazanjan, H. R. Caldwell, Sylvania Electronic Systems Western Division, Mountain View, California

Software Reliability, R. B. Mulock, Lockheed Missiles & Space Company, Sunnyvale, California

The symposium, which is now in its 15th year, is attended annually by more than 1000 engineers and scientists from the United States, Canada, several European countries, and Japan. Symposium sponsors are The American Society for Quality Control, Electronics Division; The Institute of Electrical and Electronics Engineers, Reliability Group; The Institute of Environmental Sciences; and The American Society for Nondestructive Testing.

For further information contact W. L. Finch, LMSC - 743-1577, or D. E. Richardson, Philco-Ford - 326-4350, ext. 5342.

Lunar Pogo Stick

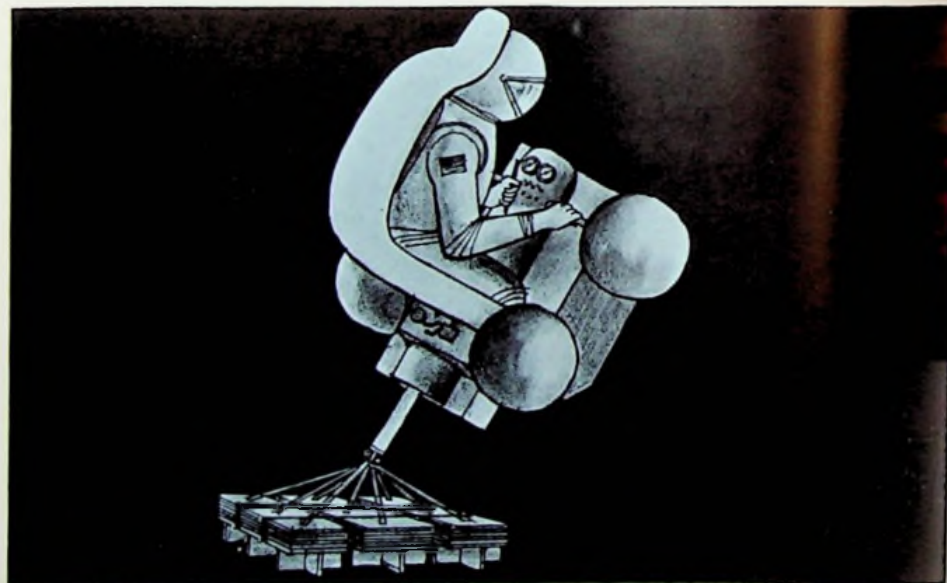
A pogo stick that will enable astronauts to hop across the rugged lunar landscape in 50-foot jumps is on the drafting boards of an engineering research group at Stanford University.

It's to be no ordinary pogo stick, however. It will have a seat for the astronaut, gyroscopes to keep him upright, and rocket jets to help him steer to safe landings. Guidance may even be computerized.

The current design is a refinement of a heavier, longer-range pogo transporter. Being lighter and simpler, the new pogo would be within the Apollo LEM (lunar excursion module) weight limits.

The plans call for a 1200-pound vehicle that will bounce on a piston operated by compressed gas. Because most of the gas will be re-compressed by landing, very little will be used in each leap.

While the upper part of the piston will be attached to the astronaut's seat, gyroscopes, and associated gear, the bottom will attach to a large, flexible "foot" with cleats for digging into the



lunar soil.

The research group's figures indicate that the pogo-stick vehicle could jump 30 feet straight up for reconnaissance or scaling a sharp rise. Taking off at a 45-degree angle would carry it to a landing 50 feet away. It would also have to land with the foot at a forward angle of about the same degree.

At this rate the lunar pogo stick

should be able to go about 10 miles in 1,000 leaps. Average speed would be about seven miles per hour, but this would vary greatly depending on pauses and the terrain.

Fuel consumption would be very low compared to rocket propulsion. Rockets would require about 10 gallons per mile; the piston pogo should go 10 miles to the gallon.

THERE'S A KIND OF HUSH



San Francisco need not always be the effervescence of North Beach . . . or a precarious perch on one of our 1890-vintage cable cars. There's always the opportunity for the quiet kind of excitement of a stroll through our world-renowned De Young or Legion of Honor museums, or the contemplative charm of a panoramic sunrise over the incomparable Golden Gate Bridge.

Many of us need an occasional time-out to reflect on past enjoyments and accomplishments or perhaps to sort out those mind pictures of what could have been. More often than not these periods are brought about not by past accomplishments, but the lack of opportunity to become as involved in your work as your professional talents demand.

We would like to discuss your career goals with you. Our current programs demand the creative talents of those with the inerrant abilities to expand inwardly as well as outwardly. Perhaps your present position is incompatible with your own level of efficiency. Talk to us.

Fall Joint Computer Conference

Should your background and interests lie in the following areas Sylvania would like to talk to you. Contact us during the FJCC at (415) 966-3141.

Programmers/Analysts

Minimum two to three years COBOL experience. BA or Engineering Degree preferred.

Systems & Research Planning Specialist

Six years of data processing with one year minimum experience in all of the following: Systems analysis and design, computer programming and supervision.

Project Leader & Development Group Supervisor

Three to five years heavy commercial data processing experience.

Should you be unable to arrange a personal interview at this time please forward your resume to Mr. David Walsh, P.O. Box 188, Mountain View, California. Sylvania is an equal opportunity employer.

SYLVANIA
A SUBSIDIARY OF
GENERAL TELEPHONE & ELECTRONICS

Forty-seven sessions, 157 individual presentations and seven panel discussions combine to make the technical program for the 1968 Fall Joint Computer Conference here December 9-11 the most ambitious undertaking in the history of the twice-yearly professional conferences and trade exhibitions sponsored by the American Federation of Information Processing Societies.

The impressive range of subjects covered by the program, completed by a committee headed by Robert H. Glaser, promises three full days of heavy involvement for the more than 6000 registrants anticipated.

Mr. Glaser, who is vice president of Campata, Inc. in charge of Northern California operations, has observed that proceedings of the technical program are expected to fill 1500 pages of two volumes — a likewise heavy record to be made available to all registrants.

The technical sessions will run from 10:30 AM December 9 through most of December 11 and will occupy meeting rooms in the Civic Center and at several hotel locations in downtown San Francisco.

A listing of the sessions, and their chairmen follows: Monday Morning, December 9: Session 1 on "Time-Sharing," Kathleen Beisty of Bradford Computer and Systems, New York, chairman; Session 2, a panel on "MIS Value Analysis Justification," Dennis E. Mulvihill of Touche, Ross Bailey & Smart, New York, chairman; Session 3 on "Reliability, Maintenance and Error Recovery in Third Generation Systems," Sanford Elkin of Control Data Corp., Palo Alto, chairman; Session 4 on "Numerical Control," Robert Little of IIT Research Institute, Chicago, chairman; Session 5 on "The Computer Field: What Was Promised, What We Have, What We Need" (software session), Louis Fein of Palo Alto, Calif., chairman; Session 6 on "Applied Mathematics," Glen Lewis of University of Southern California, chairman. Monday Afternoon, December 9: Session 7, a panel on "The Impact of the FCC Interdependence Inquiry on the Computer Industry," Louis Feldner, consultant to Data Communications, Palo Alto, chairman; Session 8 on "MIS Design," Gordon L. Murray of Haskins and Sells, New York, chairman; Session 9 on "Terminal Languages," Arnold Greenman of Programming Sciences Corp., New York, chairman; Session 10 on "Frontier Directions in Interactive Graphics," Richard Conn of Lawrence Radiation Laboratory, chairman; Ses-

sion 11 on "Computer Models of Vision and Speech," D. Raj Reddy of Stanford University, chairman; Session 12 on "Digital Simulation of Continuous Dynamic System — Where is It? Where is It Going?," Jon Strauss of Carnegie-Mellon University, chairman; Session 13 on "Medical Information Systems," Ted Kehl of University of Washington, chairman; Session 14 on "A Research Center for Augmenting Human Intellect," D. C. Engelbart of Stanford Research Institute, chairman and sole speaker; Session 15 on "Planning Models for Management," Alan Seelenfreund of Stanford University Graduate School of Business, chairman; Session 16 on "Plain Talk: Machines That Speak Your Language," Gary Martins of RAND Corp., chairman; Session 17 on "Pricing Computer Services — What? Why? How?," Norman R. Nielsen of Stanford University, chair-

man; Session 18 on "Data Structures for Computer Graphics," Andries Van Dam of Brown University, chairman; Session 19 on "Hybrid Systems for Partial Differential Equations," J. D. Kennedy of J. D. Kennedy Co., Palo Alto, chairman. Tuesday Morning, December 10: Session 20 on "Programming Systems I," Martin E. Hopkins of Computer Usage Co., New York, chairman; Session 21 on "The Mini-Computer," Paul R. Low of IBM Corp., Hopewell Junction, chairman; Session 22 on "Executive Systems for Hybrid Simulation," John E. Sherman of Lockheed Missiles and Space Co., Sunnyvale, Chairman; Session 23 on "Systems Techniques for Interactive Graphics," Irving R. Schwartz of Adage, Inc., Boston, chairman; Session 24, a panel on "Problems in the Implementation of Intelligent Robots," Bertram Raphael of Stanford Research Institute, chairman; Session 25



**1968
fall joint
computer
conference**
NOVEMBER 9-10-11
san francisco
civic center

on "Computers in Biomedical Research," R. L. Linebarger of NASA Ames Research Center, chairman; Session 26, a panel on "Process Control Programming Languages," Eric A. Weiss of Sun Oil Co., Philadelphia, chairman; Session 27 on "Operating Systems (Part I)," Jacques Bouvard of Honeywell, Inc., Wellesley Hills, Mass., chairman; Session 28 on "Large-Scale Integration," James B. Angell of Stanford University, chairman. Tuesday Afternoon, December 10: Session 29 on "Programming Systems II," Harold R. Gillette of Control Data Corp., Palo Alto, chairman; Session 30 on "Memory Techniques — Here Today," Otto Gutwin of IBM Corp., Essex Junction, Vt., chairman; Session 31 on "Automated Maintenance and Checkout of Hybrid Simulation Facilities," Maughan S. Mason of IBM Corp., Palo Alto, chairman; Session 32 on "Dynamic Resource Allocation," Wayne Lichtenberger of

computer conference (CONT)

University of California, Berkeley, chairman; Session 33, a panel on "Human Augmentation Through Computers and Teleoperators," Arthur J. Critchlow of Mobility Systems, Santa Clara, chairman; Session 34 on "Laboratory Automation," I. N. Hooton of Atomic Energy Research Establishment, Harwell, England, chairman; Session 35 on "Hand-Printed Character Recognition," John H. Munson of Stanford Research Institute, chairman; Session 36 on "Operating Systems (Part II)," Jacques Boulevard, of Honeywell, Inc., Wellesley Hills, Mass., chairman; Session 37 on "New Memory Techniques," Arthur V. Pohn of Iowa State University, chairman; Session 38 on "Hybrid Simulation Techniques," G. W. McClary of Martin-Marietta Corp., Orlando, Fla., chairman; Session 39 on "Applications of Computers to problems in the Atmosphere and Geophysics," M. Rotenberg of University of California, La Jolla, chairman;

Session 40 on "Progress in Displays," Jan M. Engel of IBM Systems Development Division, San Jose, chairman. Wednesday Morning, December 11: Session 41 on "Computer-Generated Pictures - Perils, Pleasures and Profits," George Michael of Lawrence Radiation Laboratory, chairman; Session 42 on "New Trends in Programming Languages," Ascher Opler of IBM Corp., Yorktown Heights, N.Y., chairman; Session 43 on "Bulk Memory Devices," William A. Gross of Ampex Corp., Redwood City, chairman; Session 44 on "Simulation in the Design and Evaluation of Digital Computer Systems," Robert J. Creasy of IBM Corp., Palo Alto, chairman; Session 45 on "The Computer Field: What Was Promised, What We Have, What We Need (Hardware Session)," Louis Fein of Palo Alto, chairman; Session 46 on "Real-Time Information Systems and the Public Interest," Harold Sackman of System Development Corp., Santa Monica, chairman; Session 47, a panel on "Computer Design Automation - What Now and What Next," Jerome M. Kurtzberg of IBM Corp., Yorktown Heights, N.Y., chairman.



DR. WILLIAM H. DAVIDOW
General Chairman
1968 Fall Joint
Computer Conference



ROBERT H. GLASER
Technical Program Chairman
1968 FJCC - San Francisco
and
Vice President, Compata, Inc.

AMPEX

*The Videofile Information Systems Division is a new division of Ampex Corporation, world leader in magnetic tape memory equipment and systems. The Videofile System is a sophisticated real-time information storage and retrieval system serving a wide range of applications in government, industry and commerce.

*There are now immediate and pending openings in the Division in the Engineering and Software areas.

SENIOR ENGINEERS

For design and development of in-put out-put devices.
Requires BSEE minimum, plus 3 years' experience, involving circuit design, electro-optical or physics work, or work on electro-static printing, or display devices.

LOGIC ENGINEERS

Junior and Senior levels. To establish digital design procedures and/or design custom logic hardware.
Positions require BSEE plus minimum 2 years' experience in computer digital systems.

ENGINEERS

For work on television cameras and monitors. Positions require BSEE or equivalent and minimum 2 years' TV circuit design and testing experience.

SYSTEMS PROJECT MANAGER

For position involving project management responsibility. Position requires BSEE, MSEE or MBA preferred.

Interviews may be arranged during the Fall Joint Computer Conference by contacting us at the St. Francis Hotel for a personal interview.

Or send your resume in complete confidence to Mr. D. M. Channing, Ampex Corporation, 1020 Kifer Road, Sunnyvale, California 95086. You may phone Mr. Channing COLLECT to (408) 738-4910. We are an equal opportunity employer.

ENGINEERING

Minimum 2 to 3 years' experience as a project engineer in the field of television and/or tape recording, as well as experience involving video, logic circuitry, and servo design. Systems experience and knowledge of computer programming desired.

SOFTWARE

MANAGER - Software Development

To direct the software development and the architecture of future information systems. Will assume total responsibility for all system analysis, software design, programming and related development. Position demands a strong managerial and technical background in sophisticated real-time system programming, time sharing, and multi-processing. Knowledge of digital hardware is essential. BSEE, with MSEE preferred, plus 7-10 years' related experience.

AMPEX



Custom Design Constant Voltage Ferroresonant Transformers

Regulated output voltage $\pm 1\%$ against input variations of $\pm 15\%$.

Quality assurance per MIL T-27B under MIL Q-9858A.

PRODUCTION — Facilities for production orders of any size, large or small. Automatic equipment for multiple production functions assures customers finest quality at competitive prices.

PROTOTYPES — Fast delivery. One week is considered standard. Units are designed and produced either to detailed specifications or to general performance requirements.



Custom and Standard Transformers and Inductors

Geo Space manufactures a wide range of transformers, inductors, filters, chokes, matched audio and sub-audio transformers for aerospace, data processing and other industrial applications.

Inquiries concerning your particular requirements will receive immediate attention.

GEO SPACE



5803 Glenmont • Houston, Texas 77036
Telephone: 713/666-1611
Cable: GEOSPA • Telex: 077-374

FJCC Seminar on 'Computers in Education'

Recognizing the continuing need of educators, school officials and advanced students to be kept abreast of developments in the computer sciences, the 1968 Fall Joint Computer Conference here December 9-11 will have daily seminar sessions geared to the interests of participants from 14 Northern California counties.

Robert J. Andrews of IBM Corp., San Jose, who has led development of the FJCC education programs here in recent years, is again chairman and has announced particulars for the daily events at Del Webb TowneHouse on Market Street, near the main conference activities at the Civic Auditorium and Brooks Hall.

Mr. Andrews has reported plans to accommodate between 400 and 500 students each of the three days and 200-250 school administrators and board members on each of December 10 and 11.

No charge is made for the programs and participants are to be bussed to San Francisco by their respective county school districts.

The presentations will be illustrated by exhibits and demonstrations. There will be luncheon served each day and tours of the industrial and scientific

exhibits will take place each afternoon.

On opening day (December 9) the morning hours will be devoted to junior college students and instructors of the six Bay Area counties.

Introductory remarks on the interface between computers and social change will be made by Dr. Robert Albrecht, senior consultant at Portola Institute.

John M. McGrew, who has supervisory and liaison responsibilities in data processing at the Bank of America, will speak on careers in computers, job satisfactions and the potentials for professional advancement.

Two prominent educators will join Dr. Albrecht for two afternoon sessions, December 10 and 11, for administrators and board members.

Dr. R. Louis Bright, provost of Baylor University and former associate commissioner for research in the U.S. Department of Education, will deal with areas of computer application in education.

Mrs. Judith Edwards, director of Project Network in Oregon public schools systems, will discuss "Why and How of Computer Training in Secondary Schools."

FJCC General Public Meeting

As an adjunct to the regular technical program of the forthcoming 1968 Fall Joint Computer Conference here December 9-11, a general public meeting is being designed to explore ways information and computing machines can improve communications between the electorate and governmental processes.

An open meeting has been set for Tuesday, December 10, at 8 p.m. in San Francisco's Civic Auditorium to hear a panel of men chosen for their professional eminence and identification with the matter of improved public expression.

Subject for the program will be "Information, Computers and the Political Process."

Russell M. H. Berg of Hewlett-Packard Co., chairman of the Public Relations Committee for the 1968 FJCC, is the meeting coordinator.

Present composition of the panel is Dr. Robert Hofstadter, Nobel Laureate Pro-

fessor of Physics at Stanford University; Dr. Emanuel G. Mesthene, director of the Harvard University Program on Technology and Society; Dennis Flannagan, editor of Scientific American; Dr. John R. Pierce, executive director of Communications Systems Research for Bell Telephone Laboratories; and Dr. Garrett Hardin, Professor of Biology at the University of California, Santa Barbara. Mr. Berg has noted that the panel is likely to be expanded to include a major political personality and other public figures as well as a well-known commentator, as panel moderator.

Serving with Mr. Berg in arranging details for this and other events of the FJCC are George F. Caulfield of URS Systems Corp., Pat Murphy of Ampex Corp., Jerry Kelly of Memorex, Dean Thie of Computer Sciences Corp., John Joss of Computer Usage Corp., William D. Orr of SF Associates and Ross Snyder of Hewlett-Packard Co.

Picture your product on this 30,000-force-pound vibration table.



If your product faces tough military or NASA test requirements, give it the best shake (among other things) money can rent. Available for your use at modest cost are the superbly equipped Space Environment Laboratories of Philco-Ford's Space & Re-entry Systems Division in Palo Alto.

This government approved facility provides, in one location, a full gamut of environmental and solar-vacuum space simulation tests for products ranging from miniature relays to entire spacecraft. State-of-the-art test regimes exist for: Vibration, Shock, Acceleration, Temperature, Humidity, Vacuum, Salt Fog, Solar, Structural, EMI, Magnetic, Mass Properties Measurement, and Dynamic Balance. Programs such as these paved the way for Philco-Ford's unparalleled success in space, including the placement of 27 communications satellites in orbit.

To complement the tests, we can contribute a number of useful services. For example, our staff can help you cost and describe environmental tests for your proposals, prepare test plans in accordance with your contract requirements, perform test programs within schedule limitations, and provide test data and reports. We can also arrange for resident government source inspection.

If your product development could benefit from tests and services such as these, let's talk. For quick esti-

mates and schedule information, call Justin Carlino at (415) 326-4350, ext. 6184. Or you can start the ball rolling with the fast-response coupon below.

PHILCO



PHILCO-FORD CORPORATION
Space & Re-entry Systems Division
Palo Alto & Newport Beach, California

CLIP AND MAIL TODAY

Attn. Mr. J. Carlino, Mail Station X-18
3825 Fabian Way, Palo Alto, California 94303
Gentlemen:

As a possible user of your testing services, I would like you to send me a complete description of your approved space-environment test facilities.

Briefly stated, my test requirement is _____

Name _____ Title _____

Company _____ Dept. _____

Address _____

City _____ State _____ Zip _____

Telephone _____ Extension _____

FOR A FASTER-THAN MAIL RESPONSE, CALL JUSTIN CARLINO AT (415) 326-4350, extension 6184.

Development and operation of the beam Switchyard at SLAC



At the December 17 meeting of the Nuclear Science group, Dr. Ed Seppi of the Stanford Linear Accelerator Center and members of his staff will discuss the development and operation of the beam switchyard and research area at SLAC.

Dr. Seppi is in charge of the Research Area Department and it has been his responsibility to develop a system for transporting the high energy electron beam from the output of the accelerator to end stations where experiments are performed. The requirement for providing beam at several end-stations simultaneously complicates the job somewhat.

The problems encountered, and the solutions to these problems, encompass virtually every field of engineering. In addition to a discussion of the overall system, topics receiving special attention at this meeting will be: (1) Beam monitoring instrumentation; (2) Development and operation experience of an



On-line computer facility; (3) High energy beam absorbers, and (4) Magnet power supplies.

All members and other interested persons are invited to attend. The meeting will be held in the SLAC auditorium beginning at 8 p.m. Dinner preceding the meeting will be at the Stone Cellar at 6:30 p.m. See calendar.

The Updating of Maps

Computer-assisted map making is now considered technically feasible because of a graphic communications technique announced recently by IBM. The technique was developed in cooperation with the U.S. Coast and Geodetic Survey.

The new technique utilizes a television-like terminal as a "window" into a computer. Through it, maps that exist only as data in a computer's files can be quickly and accurately changed, redesigned, and updated. A cartographer-draftsman team arranges map elements on color-separated master overlays to make required changes and to resolve any resulting graphic "clutter." Overlays are then sent to a printer for reproduction of the multi-colored maps. Using the new method, the same job can be performed in a fraction of the time directly from the screen of an IBM 2250 graphic display unit. With a light pen, a cartographer can alter the size or position of the symbols, lines, blocks of text, and other individual elements of maps assembled by a computer from data in its files and automatically displayed on the screen. Once necessary changes have been made, the cartographer pushes a button on the terminal keyboard, which automatically duplicates them in the computer's files. The computer automatically operates a connected plotter to create new color-separated maps to be sent directly to a printer.

Once perfected, an automated system will have the potential to streamline the entire map-making operation by eliminating data duplication through file consolidation, and reducing data handling and the possibility of human error as well as speeding up the production process.

NEW MEMBERS

The Section welcomes the following new members:

R. H. Blanpied	D. F. Partridge
G. C. Gupta	J. L. Pellegrin
A. K. Johnson	R. Robledo
A. S. Klein	

Contratulations to this member recently advanced to the grade of Senior Member:

K. L. Butler

FJCC Luncheon Speaker

Two distinguished educators involved with the impact of computer technology on today's society will be featured speakers for signal sessions of the 1968 Fall Joint Computer Conference here December 9-11.

Dr. William H. Davidow of Hewlett-Packard Co., general chairman, has announced Howard W. Johnson, president of Massachusetts Institute of Technology, as keynoter for the opening session.

Dr. Garrett Hardin, Professor of Biology at the University of California,

Santa Barbara, will address the conference luncheon December 10.

Mr. Johnson has been president of MIT since 1966, after being dean of the Alfred P. Sloan School of Management there beginning in 1959. He is a member of the President's Advisory Committee on Labor-Management Policy and the National Manpower Advisory Committee.

Dr. Hardin, who has degrees from the University of Chicago and Stanford, has numerous scientific honors. He is widely known as a lecturer. Among his books is "Nature and Man's Fate."

THIS IS THE KIND OF HARDWARE THAT A SOFTWARE HOUSE MAKES

It's not a bad start . . . but it's only the beginning. We're enlarging our engineering staff right now for new product development in the areas of ■ data conversion devices (such as the tape-to-tape converter shown here) ■ data terminal equipment ■ instrumentation systems and ■ voice input to computers (speaker identification and speech recognition).



Right now, we need design engineers at all levels of experience with the desire and ability to accept projects on an individual basis and to work as part of a small project team in the conception, design, and development of projects like these.

These are newly-budgeted, long-term developmental and marketing programs . . . amply supported by one of the most highly qualified software capabilities in the computer industry.

Senior Design Engineers:

M.S.E.E. preferred, with four or more years experience in analog equipment and digital systems design in computer peripheral equipment, interface logic, or CRT displays.

Design Engineers:


M.S.E.E. preferred, with one to three years experience in design of digital and analog circuits; logic design.

Instrumentation System Engineers:

B.S.E.E. required, with two to three years experience in designing and implementing test and measurement techniques applied to integrated circuits and other semiconductor products.

Mail your resume or call today for a prompt exploration of mutual interests:

Russ Kiessig
Manager of Industrial Relations
1001 West Maude Avenue
Sunnyvale, California 94086
408/245-0795

 **Mellonics Systems Development Division**
LITTON INDUSTRIES

*Mellonics pursues an affirmative policy
of nondiscrimination in employment*

Nicol Joins IEEE Educational Services Dept.



H. Lee Nicol has been appointed Manager, Public Relations and Promotion at IEEE Headquarters. He will be working with Mr. J. M. Kinn, Director, Educational Services, on coordination

of public relations and promotion activities and on special projects and enlargement of services in these areas.

The Educational Services Department is assigned responsibility for programs dealing with communication of electrical and electronics engineering knowledge. These programs include student affairs, continuing education, and career guidance. In addition to Public Relations, the Department also has responsibility for other activities within IEEE – Awards, Internal Communications, Intersociety Relations, the Joint Technical Advisory Committee (JTAC), and Professional Relations.

Before joining IEEE Mr. Nicol was with the General Electric Company, where he held various positions, including Manager, Audio Visual Section, Advertising and Public Relations Department and Writer-Executive Presentations in Engineering Services.

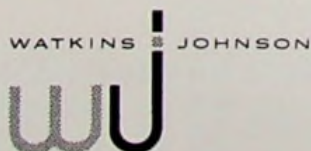
He holds a B.S. in Electrical Engineering from Iowa State University and is a member of Tau Beta Pi and Eta Kappa Nu.

PROGRAMMERS/ ANALYSTS

Watkins-Johnson, located on the San Francisco Peninsula, is a leader in research, development and manufacture of sophisticated microwave electronic devices, advanced systems, and solid state electronic components. The rapid growth of Watkins-Johnson over the past ten years has created a need for comprehensive information Systems. This will not be a conversion of present applications, but the development of an all new centralized information systems department! We offer ground floor growth opportunity and excellent starting salaries.

Our growth requires the talents of individuals with a strong background on a 3rd generation DOS, utilizing higher level languages, primarily COBOL. Openings are available for Programmers and Financial Analysts.

For immediate and confidential consideration, write today to Mr. M. M. Degmetich, Department CC12, 3333 Hillview Avenue, Palo Alto, California 94304. U.S. citizenship required. We are an equal opportunity employer.



SFBAEC Contest

The High School Engineering Essay Contest provides an excellent opportunity for IEEE San Francisco Section Engineers to meet young people and share their enthusiasm in engineering achievements. Engineers are invited to participate in Career Counseling and meet school officials and students as representatives of the engineering profession; they will help high school students select a subject, find reference material and will participate in the presentation of awards.

For this activity contact Mr. John Frease, Mechanical Engineering Department, University of California, at 642-3821.

The participating schools will be awarded a plaque and each school winner will be recognized at the Youth Recognition Ceremonies.

ESSAY CONTEST RULES:

The subject – "Engineering for Human Need" – the essay must be typed or hand written with ink on 8½ x 11 paper, bound between covers. It should include title, entrant's name, address, age, school year, advisor's name and date. The essay should be original in composition and include an introduction, conclusion and a list of references used for its preparation. The contest ends on January 15, 1969 and the winner will be announced by February 15, 1969. The contest is open to both boys and girls in Junior and Senior classes.

For further information and assistance on subjects and reference material, see your school engineering representative. Deadline January 15, 1969.

Sponsored by San Francisco Bay Area, ENGINEERING COUNCIL, 160 Sansome Street, San Francisco, California 94104; Phone 421-3184

Walter/Waltronics Expansion

Mr. Chuck Walter, President of Walter Associates, Inc., and Waltronic Sales, announces another major expansion. His firms, which represent and distribute products of some of the nation's leading microwave manufacturers, have moved from 175 Antonio Road to the Village Corner complex, El Camino Real and San Antonio Road, Los Altos, California. Mr. Walter is a member of the San Francisco Section of IEEE.

The same telephone number, TWX and Post Office Box have been retained.

THE FALL JOINT VISITS Source EDP

Source EDP IS A PERMANENT RESIDENT OF SAN FRANCISCO

That's why we know so much about computer opportunities in Northern California. That's also why Source EDP is the focal point during the conference for organizations wishing to meet with the best computer professionals available. Source EDP isn't just a room in the Hilton Hotel (although we will be there during the FJCC for your convenience, ask for Mike Parr) . . . we maintain a fully staffed career guidance center in San Francisco just as we do in Los Angeles, Dallas, Minneapolis, Chicago, Detroit and New York.

YOUR CAREER MEANS AS MUCH TO US AS IT DOES TO YOU

Source EDP has a single purpose: to improve your career. Our success depends on it. The growth of our firm over the past six years is evidence of this success. Source EDP is the largest recruiting firm in the United States dedicated solely to the computer field.

INFORMATION PROCESSING IS A "PEOPLE" BUSINESS

No recruiting firm is better than the people who work there. That's why Source EDP has a staff composed of top Directors of MIS, IBM Executives and Systems Management Consultants. The individual you talk to at Source EDP has already been where you would like to go. So he's able to help you plan your career on an intelligent, long-range basis.

OUR COVERAGE IS WORLDWIDE

Source EDP can provide selective exposure that can't be matched. With offices in major metropolitan areas, Source EDP is where the positions are. We stay up-to-the-minute on openings and personally visit our clients to gain a full understanding of their plans, environment and potential for the individual. In addition to openings in the United States, Source EDP is constantly being retained by its clients to fill computer positions throughout the world.

WE WORK FULL TIME ON YOUR FUTURE

Opportunities for the computer professional today are simply too varied and numerous to al-

low any one individual to survey the field adequately . . . particularly on a part-time basis. To optimize career success you need the full-time help of professionals. The type of help offered by Source EDP.

YOU MAY NEVER KNOW ABOUT THE BEST POSITIONS OF ALL


The one best position for you may be available *only* through Source EDP. Many Source EDP openings are exclusive. And most are not advertised. But whether the position is an exclusive or not, it can only be recommended to an individual whose interests and abilities are familiar to us. Since no one can tell when the right position for you might be available it's important that you make yourself known to us *now*.

HOW CAN WE PROVE OURSELVES? CALL 434-2410

Ask for Carl McNall, Rich Clark or Mike Parr. Make a date to get together to talk about career opportunities. When you talk to one of our people, ask him about *his* computer background.

SAN FRANCISCO: 111 Pine Street, Suite 1300 (415) 434-2410

Chicago—David B. Grimes, 100 S. Wacker Drive, (312) 782-0857
Dallas—Paul K. Dittmer, 7701 Stemmons Freeway, (214) 638-4080
Detroit—Charles C. Walther, 2990 West Grand Blvd., (313) 871-5210
Los Angeles—Robert G. Harrison, 3470 Wilshire Blvd., (213) 386-5500
Minneapolis—Fred L. Anderson, 801 Nicollet Mall, (612) 332-8735
New York—Edward R. Golden, 1414 Ave. of the Americas, (212) 752-8260

source  edp

A PROFESSIONAL PLACEMENT AGENCY

Walker Joins Dalmo Victor



Bayard F. Walker has joined Dalmo Victor, a Textron division, as section manager of television research.

In his new post Walker will be responsible for directing all research and development projects in low light level television and associated systems.

Walker comes to Dalmo Victor with over nine years experience in the field of low light level TV. Prior to joining DV he was engineering manager of the Electronics Department, Diecraft Division of Bausch & Lomb, Sparks, Maryland.

Walker received a B.S. in education in 1950 from Oregon State College and an M.S.E.E. in 1961 from Drexel Institute of Technology in Philadelphia. From 1950 to 1954 he also attended Oregon State, majoring in physics.

His professional memberships include the Society of Motion Picture & Television Engineers, Society of Photo Instrumentation Engineers, and Institute of Electrical & Electronic Engineers.

1969 Underground Conference

The technical program being planned for the 1969 IEEE Conference on Underground Distribution includes papers covering the latest developments in cables, transformers, capacitors, installation methods, load switching and combined power and telephone installations. Test and field experiences with sodium conductor cables will be presented.

A review of current underground distribution methods will be provided by a number of utilities in the United States. The methods being used in other countries such as Mexico, New Zealand, Sweden, Italy and Japan will also be presented. Other papers will probe the directions that underground distribution engineering, equipment and construction methods may take in the future. Panel discussions are planned to allow an open exchange of experiences and ideas.

The conference and exhibit will be held in the new Anaheim Convention Center near Disneyland, California, the week of May 12-16, 1969. Advance programs will be sent out in November. Contact the IEEE Los Angeles Council, 3600 Wilshire Boulevard, Los Angeles, California, 90005 for program or exhibit information.

Indoor exhibits from 113 exhibitors to date will fill over 20,000 square feet of space in the arena of the Anaheim Convention Center at the 1969 IEEE Conference on Underground Distribution the week of May 12-16, 1969. Progress in underground distribution methods and active interest by equipment suppliers will require double the exhibit area used at the 1966 Chicago Conference.

The exhibits cover the entire scope of underground distribution materials, apparatus and equipment. Manufacturers of terminals, cable, conduit, transformers, termination material, boxes, vaults, trenching and boring equipment, switches and fuses are represented.

A technical program including a review of underground distribution methods used throughout the world and panel discussions on future trends will complement the exhibits.

An outdoor exhibit area is planned for live demonstrations of undergrounding equipment. Contact the IEEE Los Angeles, California 90005 for program or exhibit information.

Water Resources Engineering Education Series

A three-day program/January 29-31, 1969, Wednesday through Friday, University of California Extension Center, San Francisco

WREES (Water Resources Engineering Education Series) is planned to meet the continuing educational needs of the professional engineer working on water resources within the State of California. Each program in the series covers a different topic in the water resources field and may be taken independently of the other programs. Faculty Member in Charge is David K. Todd, Professor of

Civil Engineering, University of California, Berkeley.

Program VI will be concerned with the legal aspects of water resources, including the background of water rights, present-day procedures for allocation of water, and an analysis of the problems and trends in water law. The material is planned to be of value to engineers, geologists, administrators, and managers who are concerned with the development and management of water resources and who have little or no formal background in the field of water law.



Foothill Electronics Museum begins to take shape. Construction of the new home for the famed Perham electronics collection on the northwest corner of the Foothill College Campus in Los Altos, California is shown in the photo. A shot from the interior centers on the two-story gallery which will surround a Foucault pendulum and will provide the space needed to display items such as the twelve-foot-high VA-842 klystron which are in the collection. Completion of the structure is scheduled for mid-1969.

What do 'Gold Records' have to do with Computers?

Since the Record Industry Association of America started presenting gold records for single records selling over a million copies, Capitol has won over 21 per cent of the total, more than twice its nearest competitor. Capitol Industries, Inc. is a dynamic leader in the exciting world of entertainment.

This growth, and our diversification in other areas, necessitates expanding our data processing staff. We have current openings for:

- Senior Systems Analyst
- Senior Programmer Analyst
- Programmer Analyst
- Senior Programmer
- Programmer

These assignments offer unusual diversification... in applications, in hardware, and in software development. Two or more years experience is required in COBOL or BAL, and 360 commercial applications. The above openings are at Hollywood and Vine; we also have an opening for a Computer Operations Supervisor at our Glendale facility.

We invite you to have a chat with our representative during the Fall Joint Computer Conference, at our St. Francis Hotel Suite.

If you are unable to see us in San Francisco, please write to Mr. T. L. Trout,

*Capitol Industries, Inc.**

1750 North Vine St.
Hollywood, California 90028
An Equal Opportunity Employer

*SUBSIDIARY COMPANIES:
Capitol Records, Inc.;
Audio Devices, Inc.;
Capitol Direct Marketing
Corporation



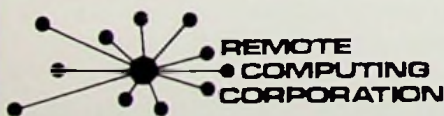
TIME-SHARING CONCEPT EXPLAINED

A new four-page brochure, compiled by recently-formed Remote Computing Corporation, describes the time-sharing concept of computer usage and analyzes the inherent advantages. Remote Batch processing and On-Site processing are explained, and various computer languages listed.

Remote Computing operates Burroughs B-5500 computer centers in Los Angeles and Palo Alto, and offers a broad range of computer services. COBOL, FORTRAN, ALGOL and BASIC languages are available for on-line use. In addition, Remote Computing offers program authors an opportunity to "publish" their programs and collect a royalty based on rate of usage by the firm's clients.

Briefly described in the brochure are the services offered, the system, and pricing concept. Rates are as low as \$5 per hour, for connect time, and 10 cents per second for cpu time.

To attain copies of this publication 10-108-01, write Director, Corporate Information Services, Remote Computing Corporation, No. 1 Wilshire Building, Los Angeles, California.



Need RF-shielded enclosures? LMI is here, not miles away.

Consultation, evaluation, design, engineering and manufacturing of RF-shielded enclosures isn't exactly easy. So why invite problems by working long distance? Use LMI's local strength from first call to complete installation.

In the San Francisco area call

LMI LectroMagnetics, Inc.

c/o Bill Coe & Associates

(415) 593-6057

P. O. Box 1383

San Carlos, California 94070

Call for Papers

The 1969 ELECTRICAL AND ELECTRONIC MEASUREMENT AND TEST INSTRUMENT CONFERENCE will be held May 5-7, 1969, at the Skyline Hotel, Ottawa, Canada. This is the first I & M symposium to be held in conjunction with the Electrical and Electronic Measurement and Test Instrument Conference.

The aim of the symposium is the advancement of electromagnetic measurements and instrumentation broadly useful in engineering application. Test and calibration instrumentation in the d-c, l-f, h-f, and microwave regions forms the core of the symposium. Measurements and instruments directed toward the solution of the technical aspects of broad social problems will be emphasized. For 1969, major emphases will be on automated test and calibration instruments and measurement techniques, and on instruments and measurement techniques applicable to the broad fields of observing, evaluating, and utilizing earth resources. International participation in this conference is encouraged since many of the problems such as national interests in ocean resources will require international agreement on methods of measurement.

The conference is sponsored by the Ottawa section and the Group on Instrumentation and Measurement, both of IEEE.

Papers should be submitted to the Chairman of the Technical Program Committee, Dr. George E. Schafer, Institute for Basic Standards, National Bureau of Standards, Boulder, Colorado 80302.

Six copies of an abstract and summary of each contributed paper should be included. The abstract should contain no more than 200 words. The summary should be limited to 500-1000 words and be designed to assist the Technical Program Committee in selecting suitable papers for the conference. The deadline for receipt of abstracts and summaries is January 15, 1969. Three copies of the complete manuscript, including original illustrations, must be submitted to the Conference Editor before or during the conference for normal review and possible publication in this issue. General questions concerning the conference should be addressed to Mr. W. J. M. Moore, Conference Chairman, 797 Dunlop Avenue, Ottawa 7, Ontario, Canada.

Dallas, Texas, welcomes the opportunity to host the 1969 IEEE INTERNATIONAL MICROWAVE SYMPOSIUM sponsored by the IEEE Microwave Theory & Techniques Group. The dates are May 5-8, 1969.

Papers are invited on subjects in the areas of solid state devices, integrated circuits including techniques of fabrication, bulk effect, oscillators, solid state sources, transmission lines, filters, switches, attenuators, magnetoelastic and acoustic devices for microwave applications, millimeter wave devices and components, optical techniques for microwave components, ferrite materials and components, computer aided design techniques, microwave superconducting devices, microwave subsystems, and other topics pertinent to the field of microwave theory and techniques. Authors should submit five copies of a summary and an abstract of each paper. Specifications are - summary: 500-1000 words; illustrations: 6 maximum; abstract: approximately 200 words with no illustrations. Summaries and abstracts should be received by January 10, 1969.

The 1969 SUMMER POWER MEETING of the Power Group of IEEE is scheduled to be held June 22-27 at the Sheraton-Dallas Hotel in Dallas, Texas. The theme of the meeting is "Reliability" and the technical program will encompass all subjects falling within the power field.

Authors should advise the Technical Conference Services Office of IEEE Headquarters without delay of their intent to submit a paper.

Deadline date for mailing of papers to be considered for presentation at the Summer Power Meeting is February 15. The papers will be evaluated for acceptance by the appropriate Technical Committee Chairman. It will be necessary to adhere strictly to the February 15 deadline as the final date for mailing of manuscripts to IEEE Headquarters.

Papers should be prepared and mailed in accordance with the instructions in the Author's Guide. The original copy typed on IEEE model paper is required. Authors are responsible for preparing their own slides which should be the standard 2" x 2" size.

FJCC

URS Invites you in for a visit

URS would like the opportunity to discuss with you subjects of interest including state-of-the-art software operations, systems problem analysis and solution, and, if convenient, URS' advanced program of professional development.

While attending the Fall Joint Computer Conference in San Francisco, stop by and visit us in our Hospitality Suite at the St. Francis Hotel, or visit our exhibit at Brooks Hall.

URS ■ SYSTEMS
C O R P O R A T I O N

1700 S. El Camino Real
San Mateo, California 94402
Phone (415) 362-8202

We are an Equal Opportunity Employer - BY CHOICE!

If unable to meet with the URS people at the Fall Joint Computer Conference, and you would like further information, please write or call us anytime.

Other Offices:

San Francisco, Palo Alto, and Burlingame, California ■ Washington, D.C. ■ Falls Church, Richmond, and Petersburg, Virginia ■ Killeen, Texas ■ Kansas City, Missouri ■ Seattle, Washington
■ Tucson and Sierra Vista, Arizona ■ Karlsruhe, Germany

ECM SYSTEMS ENGINEERS

Melabs, located in the Stanford Industrial Park, offers career broadening positions for senior level engineers. Work will involve technical leadership in the development and analysis of state of the art, integrated, active ECM systems. Positions available will require 5-10 years of related experience as well as M.S. or B.S.E.E. or Physics. In addition to excellent benefits, Melabs provides the challenge and opportunities of a small, growing company. Send resume or call Paul Schafer (415) 326-9500, ext. 247.



PALO ALTO, CALIFORNIA

3300 Hillview Ave. Palo Alto 94304
An equal opportunity employer.

ACQUISITION WANTED

Small Research Group Sought

Our client, a NYSE listed firm, has contracted for our services to locate a small highly technical team who wish to enjoy the large corporation benefits while retaining an independent and permissive research atmosphere. Prefer measurements orientation, no spectrum limitation.

All inquiries treated confidentially and professionally.



CAPABILITIES
DEVELOPMENT
CORPORATION

P.O. Box 396, Santa Barbara, Calif. 93102

Fellow Nominations

Victor Siegfried, chairman of the Section committee on Fellow nominations, invites suggestions from the membership for nominations during 1969 for the grade of Fellow for 1970.

Suggestions for nominations should be submitted by letter to Mr. Siegfried, c/o the Section office by February 15, 1969. This letter should include a biography of the candidate and an indication that you would serve as sponsor. A telephone call to Mr. Siegfried in Sunnyvale on 742-4731 or at home in Atherton on 854-3593 will get more details on what should be covered in this biography.

NOMINEES MUST MEET THE REQUIREMENTS FOR Senior Member as stated in the bylaws (even though they may hold the present grade of Member) and must have been a member in any grade for a period of seven years preceding nomination, other than in exceptional cases. The principal criterion is the nominee's unusual technical contributions to the profession.

Festive Program for FJCC Ladies

Women attending the 1966 Fall Joint Computer Conference in San Francisco this December 9-11 will enjoy a sampling of the Bay Area's scenic, shopping and entertainment attractions as well as share in the intellectual stimulation provided by the big international conference.

Mrs. Alvon Thoman of Hewlett-Packard Co., chairman for the ladies program, has announced three days of optional activities starting Monday morning, December 9, with welcoming hours between 9:30 and 11 AM in the Rosewood Suite of the Hilton Hotel. Local hostesses will assist visitors in making plans for shopping and side trips not on the scheduled program.

The first formal event, on December 9, is a visit to Ghirardelli Square. A special performance of "The Fantasticks," a musical, by a resident company of actors will take place at 2:30 PM.

That evening the ladies will be among guests attending the conference reception in the Imperial Ballroom of the Hilton.

At 10 AM on Tuesday, December 10, at the Hilton, Dr. John Osborne of the Institute of Medical Science at San Francisco's Presbyterian Medical Center will talk on "The Doctor and the Computer."

Winter Power Meeting

The 1969 IEEE WINTER POWER MEETING will be held January 26-31, 1969, in New York, New York. The Power Engineering Education Committee of the IEEE Power Group offers an exciting opportunity for those concerned with power system operation to participate in a unique tutorial session entitled, "Modern Dispatch Techniques of Interconnected Power Systems." The tutorial session is designed to acquaint one with the latest theory, hardware and modern dispatch techniques which are used in interconnected power systems to achieve maximum system economy and reliability. The Chairman of the session will be Dr. L. K. Kirchmayer.

The increase in generator sizes, transmission voltages and intercompany ties has forced the art and science of power system dispatching to undergo a revolutionary development.

We urge you to watch for the detailed session outline as it becomes available. Attendance will be limited to the first 100 who return the pre-registration form included in the program announcement for the 1969 IEEE Winter Power Meeting. Program announcements may be obtained by writing Technical Conference Services, IEEE, 345 East 47th Street, New York, New York, 10017. Programs will be available early December, 1968.

Communication Common Carriers

Mr. Bernard Strassburg, Chief
Common Carrier Bureau

Federal Communications Commission
4:15 PM Thursday December 12, 1968
Room 161J, School of Law,
Stanford University

First in a series of lectures by distinguished members of the telecommunications community on policy issues in this field. The President's Task Force on Telecommunications Policy has recently reviewed many of these issues and their report is expected shortly. Over the coming year speakers from a number of the organizations likely to be affected by changes in U.S. telecommunications policy will be asked to visit Stanford to discuss the issues and to describe their personal views of the institutions that they manage and operate within.

For further information, contact Professor D. A. Dunn, Ext. 73382, Dept. of Engineering-Economic Systems.



Engineers and Scientists: Diversified opportunities now available on Hughes AGM's

Increasing Air-to-Ground Missile activity at Hughes Aerospace Divisions has created many diversified growth opportunities for qualified Engineers and Scientists. Immediate openings exist at all levels on a variety of interesting projects such as: MAVERICK, Anti-Radiation Missiles, Radar-Guided Missiles and new advanced missile technologies.

Areas of interest include:

Laser	Trajectory Analysis
Radar	Operational Analysis
Infrared	Warheads & Fuzing
Television	Structural Design
Guidance & Control	Thermodynamics
Signal Processing	Aerodynamics
Digital Computer Simulation Studies	

All assignments require accredited, applicable degrees, U.S. citizenship and a minimum of 3 years of related, professional experience.

Please airmail your resume to:

Mr. Robert A. Martin
Head of Employment, Dept. 14
Hughes Aerospace Divisions
11940 W. Jefferson Blvd.
Culver City, Calif. 90230

HUGHES

HUGHES AIRCRAFT COMPANY
AEROSPACE DIVISIONS

An equal opportunity employer

Sladky in New Post



ROTODOME* ANTENNA EXTENDS NAVY'S SEE AT SEA — An AN/APA-143 ROTODOME radar antenna (large disk-shaped structure) is shown mounted atop a Navy E-2A Hawkeye, a Grumman-built carrier-based early warning aircraft.

(Photo Courtesy of Grumman Aircraft Engineering Corp.)



Kenneth E. Sladky has been named program manager for the E-2C ROTODOME* antenna at Dalmo Victor. In his new post, Sladky will be responsible for

the overall management, planning, coordination and customer liaison on the recently acquired E-2C ROTODOME radar antenna program. The antenna will become an integral part of the Grumman-built E-2C aircraft.

Sladky joined Dalmo Victor in 1959 as a reliability engineer, was elevated to reliability section head in 1962 and was promoted to manager of product assurance engineering in 1966. He transferred into DV's Marketing Department in June 1967 as eastern regional marketing representative, assigned to the Company's Washington, D.C. office.

Sladky, a member of the SF Section of IEEE, was an engineering major at both El Camino College, Los Angeles, and Santa Monica City College.

Satellite Communications Station In Chile

The first permanent earth station in Latin America for satellite communications has become operational in Chile. The station is serving as a ground terminal for voice, television, and data communications to and from an Intelsat II satellite in synchronous orbit over the Atlantic Ocean.

At the station, which was constructed by General Telephone and Electronics International for Empresa Nacional de Telecomunicaciones S.A. of Chile, radio signals are transmitted and received by the largest-size antenna presently used by a commercial earth station — a dish-shaped structure 29 meters (97 feet) in diameter, about the height of a ten-story building. The earth station enables Chile to transmit and receive television programs directly to and from other countries for the first time, as well as establish high-quality international telephone, telegraph, and data communications.

The earth station, which was completed in about 12 months, is located near Longoville, about 112 km southwest of Santiago, the capital of Chile.

Wincon Chairmen

Dr. G. Dale Bagley, special assistant to the general manager, TRW Systems, has been named technical program chairman of the 10th annual Winter Convention on Aerospace and Electronic Systems (WINCON) meeting.

Theme for the February 11-13 program, to be held at the Biltmore Hotel, Los Angeles, is "Electronics for Progress in the '70's."

General chairman for the forum, which annually attracts 3000-4000 nationally prominent educators, government and industry leaders, is Frederick Stevens, Northrop Corporation vice president.

The conference is designed to update top aerospace and government management on current technical developments, problems and solutions. Technical sessions are co-sponsored by the Los Angeles Council of IEEE and the Aerospace and Electronic Systems Group.

Concurrent classified sessions, sponsored by the U.S. Air Force and Hughes Aircraft Co., will be held during the three-day program with all three military services participating.

The Apollo Program

The Apollo Program will be the subject of a General Section Meeting to be held in San Francisco on Monday, January 27, 1969.

The East Bay Sub-Section is sponsoring the meeting and has arranged for Mr. Bradford A. Evans, Public Affairs Officer for Ames Research Center of NASA to review and discuss the Apollo effort.

The meeting will be held at the San Francisco Engineer's Club, 160 Sansome Street. The talk is scheduled for 7:30 PM and will be preceded by cocktails at 5:30 PM and dinner at 6:30 PM. Ladies are invited, and guests will be welcome. Further details will be given in the January GRID.



O'NEAL ADVERTISING

ART/LAYOUT/COPYWRITING/PHOTOGRAPHY
CONSULTING / TYPOGRAPHY / PRINTING
PROFESSIONALLY CREATED SPACE ADS
CATALOGS / DIRECT MAIL / PUBLICATIONS
444 MARKET STREET, SUITE 304
SAN FRANCISCO, CA 94111 (415) 433-4467



You can enjoy the benefits of San Francisco and those of working for the largest prepaid medical health organization in the State of California: California Blue Shield. Computer talents can be put to use on the latest and most sophisticated third-generation equipment.

San Francisco is known all over the world for its charm and personality. Nowhere on this green earth will you find more to do and see than here in Bagdad-By-The-Bay. Nowhere else will the computer professional find more to offer than California Blue Shield. Your resume of computer talents will receive an immediate response including a 20-page full color brochure on the charms of the San Francisco Bay Area. Contact us now.

AGGRESSIVE/CREATIVE EDP SYSTEMS

5-10 Years Experience Highly experienced (5-10 years) results-oriented systems talent with solid supervisory exposure and possessing the aggressiveness, human relation skills, and maturity necessary to deal with all levels of company management. This is a unique and challenging opportunity.

LEAD & SENIOR PROGRAMMER TALENT

Highly experienced individuals with a minimum of 4 to 7 years experience. Knowledge of magnetic tape-oriented computer systems, random access and COBOL is necessary. Must possess advanced programming techniques and be familiar with implementation of computer systems. Supervisory and project responsibilities required on some positions.

FALL JOINT COMPUTER CONFERENCE

To arrange a personal interview during FJCC please call us at 391-2720, ext. 481 or 482. If unable to arrange an interview at this time please forward your resume in complete confidence to Manager of Employment, 720 California, San Francisco, California. We are an equal opportunity employer.



CALIFORNIA
BLUE SHIELD

CALIFORNIA PHYSICIANS' SERVICE

Classified Advertising

CLASSIFIED ADVERTISING RATES

Members: \$15 for 1st col.-inch, \$10 for 2nd, \$5 for each additional. Non-members: \$20 for 1st col.-inch, \$15 for 2nd, \$10 for each additional. 10% frequency discount for 10 consecutive ads. None to exceed total of 4 col.-inches. Non-commissionable. Deadline: 1st of month preceding month of publication. Write or call: Ernesto A. Montano, IEEE Grid, Suite 2210, 701 Welch Rd., Palo Alto, Telephone (415) 327-6622.

ELECTRONIC TEST EQUIPMENT

Inspect the largest display of used electronic test equipment in the Bay Area. Save \$\$\$! Reduce delivery time for those company-funded projects on brand-name equipment.

Halted Specialties Company

Phone 969-0510

1690 Plymouth Avenue
Mt. View, California 94040

EQUIPMENT FOR SALE

ANSAFONE

Style KH-85-F — 4 years old. \$75.

Call the Section office —
(415) 327-6622.

ADVERTISER/AGENCY INDEX

Ampex	
(Hal Lawrence, Inc.)	5
California Blue Shield	
(Hal Lawrence, Inc.)	19
Capabilities Development Corp.	16
Capital Industries	
(Hal Lawrence, Inc.)	13
Cybercom	
(Hal Lawrence, Inc.)	Inside Front
Englert and Company	1
Geo Space Corp.	
(Hal Jones Advertising)	6
Halted Specialties Co.	20
Hughes Aircraft Co.	
(Foote Cone & Belding)	17
Lectro Magnetics, Inc.	
(Van Der Boom, McCarron, Inc.)	14
Melabs	16
Mellonics Div. of Litton Ind.	9
O'Neal Advertising	18
Philco-Ford Corporation	
(Hal Lawrence, Inc.)	7
Source EDP	
(Hal Lawrence, Inc.)	11
Sylvania	
(Hal Lawrence, Inc.)	3
Syntex	
(Hal Lawrence, Inc.)	Inside Back
URS Corp.	
(Hal Lawrence, Inc.)	15
Walter Associates	
(Stadler/Cowman Advertising)	20
Wanlass Electric Co.	
(Leland Oliver Co., Inc.)	Back Cover

Manufacturer/Representative Index

Aertech Jay Stone & Assoc.
Anadex Instruments Jay Stone & Assoc.
Applied Dynamics, Inc. J. D. Kennedy Co.
Applied Microwave Laboratories Jay Stone

Ballantine Laboratories, Inc. T. Louis Snitzer Co.
Basler Electric Co. Abbott Engineering Co.
Boonton Electronics Corp. O'Halloran Assoc.
Business Information Tech. T. Louis Snitzer Co.

Canoga ASD Jay Stone & Assoc.
Canoga ESD Jay Stone & Assoc.
Century Electronics

& Instruments T. Louis Snitzer Co.
Cherry Electrical
Products Corp. Abbott Engineering Co.
Chronetics, Inc. T. Louis Snitzer Co.
Circuitronics Div.,

R.N. Industries, Inc. Abbott Engineering Co.
Cober Electronics Jay Stone & Assoc.
Colburn Instruments V. T. Rupp Co.
Computer Instruments Corp. Bill Coe & Assoc.
Cunningham, James, Son & Co. J. Louis Snitzer
Custom Materials, Inc. Jay Stone & Assoc.
Cybetronics, Inc. Data Associates

Deltacorders, Inc. Components Sales Calif.
Deltron, Inc. L & M Engineering, Inc.
Digtronics Corp. Components Sales Calif.
Doric Scientific Jay Stone & Assoc.
Dynage, Inc. Jay Stone & Assoc.

E & M Laboratories L & M Engineering, Inc.
Eldorado Electronics T. Louis Snitzer Co.
Electronic Associates, Inc. O'Halloran Assoc.
Electronic Engineering Co. Data Associates
Elgar Corp. J. Louis Snitzer
Elgenco, Inc. V. T. Rupp Co.
Emcor-Borg-Warner Corp. T. Louis Snitzer Co.
EMI Gencom Div.,
Whittaker Corp. O'Halloran Assoc.

F.A.M. Engineering Jay Stone & Assoc.

Gombos Microwave Walter Associates
Guildline Instruments T. Louis Snitzer Co.

Hallmark Standards, Inc. T. Louis Snitzer Co.
Houston Instrument,
Div. Bausch & Lomb V. T. Rupp Co.

IKL, Inc. Components Sales Calif.
INSACO, Inc. Bill Coe & Assoc.
Instrumentation Technology
Corporation Components Sales Calif.
Interdyne J. Louis Snitzer
ITRON Corp. V. T. Rupp Co.

Kepeco, Inc. V. T. Rupp Co.
Krohn-Hite Corporation L & M Engineering, Inc.

Lectromagnetics, Inc. Bill Coe & Assoc.

McLean Engineering Labs T. Louis Snitzer Co.
Micro Instrument Co. Jay Stone & Assoc.
Micro-Power Inc. Walter Associates
Micro Tel Corp. Walter Associates
Microlab-FXR
Div. of Microlab L & M Engineering, Inc.
Microwave Electronics Corp. Jay Stone & Assoc.

Narda Microwave Corp. O'Halloran Assoc.
Norelco/Phillips
Electronic Instruments V. T. Rupp Co.

Omni Spectra Inc. Walter Associates

PRD Electronics T. Louis Snitzer Co.
Peninsula Microwave Labs., Inc. Jay Stone & Assoc.

Polaroid Electronic Instruments T. Louis Snitzer Co.
Precision Mechanisms Corp. Components Sales
Princeton Applied Research O'Halloran Assoc.

Quan-Tech Labs Jay Stone & Assoc.

Rayonic Corporation Abbott Engineering Co.
Rodda Company Walter Associates
Roytron Division, Litton Industries Costello

Sierra Electronic Div., Philco T. Louis Snitzer Co.
Solar Electronics Co. Bill Coe & Assoc.

Taylor-made Laboratories Data Associates
Telonic Instruments & Eng. T. Louis Snitzer Co.

Waltronic Sales Walter Associates
Watkins-Johnson Co. L & M Engineering, Inc.
Weinschel Engineering, Inc. Jay Stone & Assoc.
Wiltron Co. O'Halloran Assoc.

Representative Directory

Abbott Engineering Co. 2600 El Camino Real Palo Alto; 327-0830	O'Halloran Associates 3921 E. Bayshore Palo Alto; 326-1493	Walter Associates "The Village Corner" P.O. Box AN Los Altos; 941-3141
Bill Coe & Assoc. P.O. Box 1383 San Carlos; 593-6057	Rupp Co., V. T. 1182 Los Altos Avenue Los Altos; 948-1483	Snitzer Co., T. Louis 1020 Corporation Way Los Altos; 941-3141
Components Sales California 3980 Fabian Way Palo Alto; 326-5317	L & M Engineering 2620 The Alameda Santa Clara; 243-6661	Stone & Assoc, Jay 140 Main Street Los Altos; 948-4563



WALTER ASSOCIATES, Inc.

Northern California's Microwave
Instrument and Component Specialists.
Walter Associates, Inc.: Representing the Nation's
leading lines.

Waltronic Sales: Large stocks to better serve our
customers.

Post Office Box AN, Los Altos, Calif. 94022
(415) 941-3141/TWX 910-370-7458



A UNIQUE ENVIRONMENT FOR EDP OPPORTUNITIES

Syntex is an international ethical pharmaceutical company located on the San Francisco Peninsula, adjacent to Stanford University. We are a research oriented firm backed by sound business principles.

Continued expansion makes available challenging responsibilities within our innovative and progressive EDP group.

MANAGEMENT INFORMATION SYSTEMS MANAGER

In a creative environment you will participate in the long-range systems planning for the Corporation. You should have at least a BA or BS degree, with Masters preferred. Ability to communicate effectively and previous systems management experience mandatory. In addition, background in systems analysis and design desired.

MANAGER COMPUTER OPERATIONS

You will manage our Data Processing Services

Department. Varied liaison, administrative and supervisory duties requiring bachelor degree and strong background in EDP operations and equipment. You will also participate in computer feasibility and selection studies for a large third generation computer.

SENIOR PROGRAMMER

Requires minimum of three years experience in COBOL and Autocoder. We also desire knowledge of data processing procedures, PLI and FORTRAN. Primarily direct access applications on IBM 360/50. Must be capable of independent programming, related systems analysis and user liaison in inventory, purchasing, sales and accounting.

Qualified applicants are invited to submit resumes in confidence to:

Syntex, Mr. Ted Kromer, Department III, 3401 Hillview Avenue, Palo Alto, California 94304.

An equal opportunity employer.

SYNTEX

Syntex Laboratories, Inc.
Palo Alto

Syntex Corporation
Panama City, Panama

Syntex S.A.
Mexico City and Cuernavaca, Mexico

Syntex International A.T.S.A.
Mexico City

Syntex Research
Division of Syntex Corporation
Palo Alto and Mexico City

Arapahoe Chemicals Division
Boulder, Colorado

Bahamas Chemical Division
Freeport, Grand Bahama Island

Syntex Ltd.
Montreal, Quebec, Canada

Syntex Pharmaceuticals, Ltd.
Berkshire, England

Instituto Farmacologico Latino
Madrid, Spain

THE WANLASS CLIP-AC™

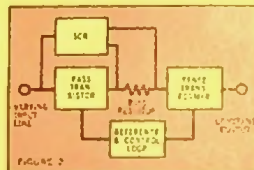
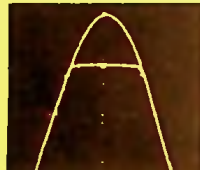
THE PRINCIPLE

The CLIP-AC™ Principle of AC voltage regulation is shown in Fig. 1 and Fig. 2. It will be noted that regulation is achieved by symmetrically clipping (dissipating) the peaks of the incident sinusoidal waveform. The unretouched scope photograph reproduced as Fig. 1 shows that except for these peaks, the CLIP-AC™ output waveform is identical to the input waveform.

Fig. 2 shows in block diagram form how CLIP-AC™ regulation is achieved. The output voltage is continuously monitored by a sensor which uses a zener diode as a reference. The associated control circuitry in turn adjusts the clipping level of the pass transistor in order to maintain the desired constant output. Economy of design has been realized by using a floated reference (hence, the sense transformer) and a diode bridge to make it possible for the same pass transistor to be used on both halves of the AC cycle. The SCR shown in the block diagram is used to accommodate short duration surge currents such as those encountered in charging capacitors, starting motors or starting lamp loads. Under such conditions, the bias resistor triggers the SCR and the excessive current surge is by-passed around the pass transistor. Should these excessive current conditions persist, the input fuse would be blown, thereby protecting the unit. Under normal operating conditions the SCR is inoperative.

By the appropriate choice of the sensor and the quality of the solid state componentry, any desired AC voltage regulation precision may be achieved with either true RMS, average, or peak voltage being held constant.

Fig. 1. CLIP-AC™ Input Trace Superimposed Over Output Trace. Note "Peak Clipping" of Output Waveform.



APPLICATION:

The CLIP-AC™ type AC regulator is the logical successor to the ferroresonant transformer for the bulk of the AC regulation requirements for up to 1 KVA. This is borne out by the following table which compares the CLIP-AC™ and ferroresonant principles of operation.

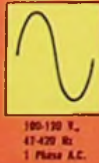
	CLIP-AC™ Principle	Ferroresonant Principle
Input Frequency	Wide range acceptable without degradation in regulation (47-420 Hz typical)	Single frequency (output voltage shifts 1.5% for 1% change in input frequency)
Line Regulation	Any reasonable degree of precision (0.1% easily achievable)	Cannot be modified (1-3% typical)
Load Regulation	Load compensation circuitry inherent design (1% typical)	No compensation (5-7% typical)
Power Factor	No problem	Shifts output voltage level appreciably
Phase Shift	None	Appreciable — dependent on load current
Response Time	Typically 10.50 μ sec	Typically 25,000 μ sec
Cost Size Weight	Smaller and Cheaper — less material content (typically 50%)	Inherent weight and expense of iron and copper

APPLICATION NOTES

HOW TO "DO YOUR OWN THING"™ CVR-120 APPLICATION NOTES

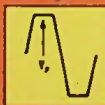
WANLASS ELECTRIC PRESENTS: A BLOCK DIAGRAM OF... "THE CHEAPEST MULTI-OUTPUT D.C. POWER SUPPLY IN THE WORLD"!

START WITH

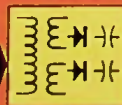


100-130 V,
47-420 Hz
1 Phase A.C.

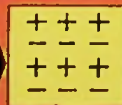
BUY & ADD



RESULT
 $V_o = 115$ V.



WITH WANLASS SLIDE RULE YOU DESIGN AND ADD MULTIPLE OUTPUT SPURS, RECTIFIER FILTER



FINAL RESULT
CHEAPEST MULTIPLE OUTPUT POWER SUPPLY IN THE WORLD

MODEL CVR-120

The CVR-120 is a CLIP-AC™ type peak clipping AC regulator designed specifically for use as the regulating component for your D. C. power supply designs. By symmetrically clipping the peaks of the unregulated input voltage, a constant peak-to-peak output waveform is produced. This voltage can be transformed into a variety of regulated output voltages through the use of an appropriate transformer. Rectification and passive filtering of these resultant voltages will then produce regulated D. C. output voltages.



Important Features Include:

- (1) **LOW COST** — one regulator element provides the regulation for many separate outputs.
- (2) **SIZE AND WEIGHT** — 120 watts of regulated power for 10 ounces!
- (3) **ADJUSTABLE OUTPUT VOLTAGE** — simple compensation for your manufacturing tolerances.
- (4) **FREQUENCY INSENSITIVE** — no variation of output voltage with varying line frequency. Use the same unit for 50, 60 and even 400 Hz power requirements.
- (5) **LINE AND LOAD REGULATION** — precision unattainable with ferroresonant transformers.

SPECIFICATIONS:

Type of Voltage Regulation	Peak
Regulation Technique	Peak Clipping
Type of Reference	Zener Diode
Input	100-130 VAC 47-420 Hz
Output	135 Volts (Peak) (270 Volts Peak-to-Peak) 120 VA
Power Capability	
Line Regulation ($\pm 10\%$ line variation)	$\pm 1.0\%$
Load Regulation (0 to Full Load)	$\pm 1.0\%$
Power Factor Regulation (+0.7 to -0.7)	$\pm 1.0\%$
Phase Shift	None
Response Time	10.50 μ Sec
Temperature Coefficient	0.025% per degree C
Ambient Temperature	0-40°C (higher with derating)
Dimensions	4" W x 4 1/2" H x 2 1/2" D
Weight	10 ounces

PRICES*:

1-9	\$23.00
10-24	21.85
25-49	20.70
50-99	19.50
100-999	16.50
1000-9999	14.00
10,000 over	12.00

*FOB Santa Ana
Patents pending

FREE SLIDE RULE OFFER!

Wanlass Electric has for several years pioneered the clipping-type AC voltage regulator and has incorporated this technique into a number of standard lines under the trade name CLIP-AC™. Now we are making this technique commercially available to you at the component level for incorporation within your own power supply designs... "Your Own Thing."

Specifically the model CVR-120 is an inexpensive regulator element that is capable of regulating 120 watts of DC output power to a regulation precision of less than 1% and all for only \$12.00 each in quantity. (Only \$23.00 each — unit price.)

We're so convinced that you'll be interested in this new component that we've established the following attractive introductory offer. If you will just invite our representative to visit you for a few minutes to discuss the CVR-120, then we'll see that he brings you the pocket slide rule and case as pictured below... absolutely free... no purchase required. Interested? Then just send your name and address and your slide rule will be on its way. (This introductory offer expires January 31, 1969.)

ABSOLUTELY FREE!

POCKET
SLIDE
RULE
and CASE

"YOURS
FOR THE ASKING"



AVAILABLE IMMEDIATELY FROM
DISTRIBUTOR STOCK. CALL (415) 626-1444
ZACK ELECTRONICS
1444 MARKET ST., SAN FRANCISCO, CALIF.

WANLASS ELECTRIC COMPANY
A SUBSIDIARY OF AMBAC INDUSTRIES INC.



1540 EAST EDINGER AVENUE
PHONE 714 546-8990

SANTA ANA, CALIFORNIA 92707
TWX 910-595-1526