

EDITOR'S PROFILE of this issue

from a historical perspective ...

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

May, 1970:

Cover: This picture of Seattle is used to promote the Region 6 Conference being held there. More on page 8-9.



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

Grid
MAY 1970

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Region Six Conference



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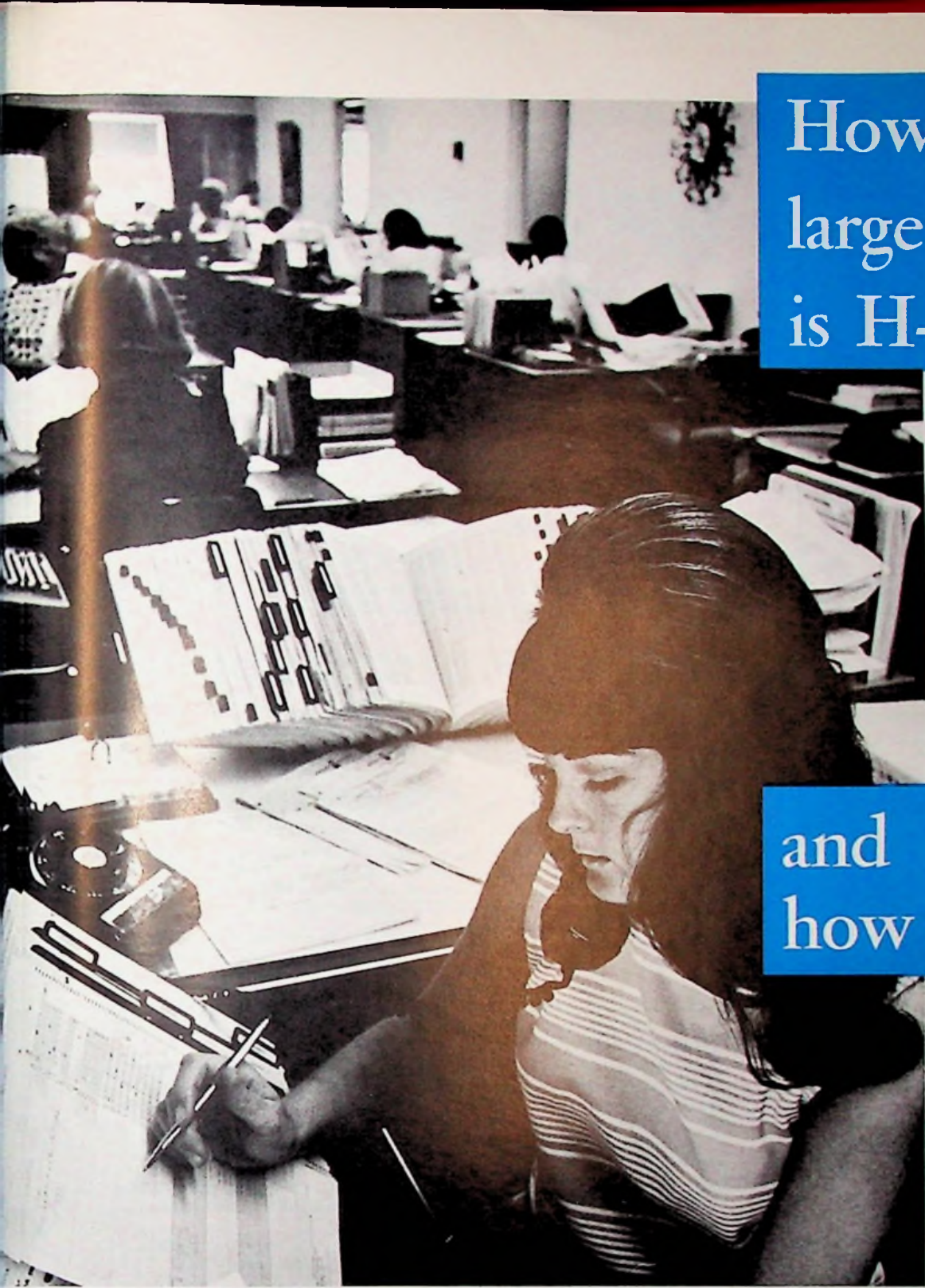
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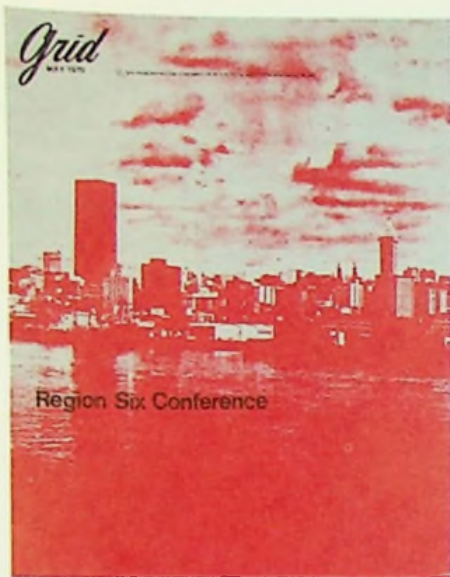
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ON THE COVER

The cover picture is an interesting shot of the Seattle Skyline. The Seattle Section of IEEE will host the 1970 Sixth Region Conference May 26-28 at the Washington Plaza Hotel, the theme being "West Into the 70's."

The complete technical program is the feature of this month's issue of the Grid.

Grid

volume 16
number 9

MAY 1970

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meeting

AEROSPACE & ELECTRONIC SYSTEMS MAY 21

MAY 21, Thursday (date subject to change) 6:30 PM. Arrangements in process. Estimated cost \$5.25 per person. Details to be mailed to group members. Others wishing to attend or obtain additional information call Roger Winslow or Pat Hoppe at 326-4350 ext. 6143 or the Section office, 327-6622.

ANTENNAS & PROPAGATION MAY 20

Story on
page 12

LASER PHOTOCOAGULATION OF EYE TISSUE. Dr. H. Christian Zweng, Prof. of Surgery (Ophthalmology), Stanford School of Medicine. Ladies night.

MAY 20, Wednesday, 8:00 PM dinner meeting, Rickey's Hyatt House, 4219 El Camino, Palo Alto. Cocktails: 7:00 PM, dinner and meeting at 8:00 PM. \$5.90 per person, incl. tax & tip. Roast sirloin of beef. Reservations: George Oeh, 966-2444 by May 13th.

AUTOMATIC CONTROL MAY 12

Story on
page 13

THE SYNTHESIS OF COMPENSATING NETWORKS USING STATE VARIABLE TECHNIQUES. Prof. Arthur E. Bryson, Jr., Chairman, Dept. of Applied Mechanics, Stanford Univ. NOTE: ELECTION MEETING

MAY 12, Tuesday, 8:00 PM, Lockheed Auditorium, Bldg. 202, 3251 Hanover St., Palo Alto. Dinner: 6:15 PM, Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto. No reservations.

CIRCUIT THEORY MAY 27

Story on
page 6

THE DIGITAL FILTER - ITS IMPLEMENTATION AND SOME APPLICATIONS. Dr. James F. Kaiser, Information Processing Research Dept., Bell Telephone Labs, New Jersey.

MAY 27, Wednesday, 8:00 PM, 134 McCullough Hall, Stanford University. Dinner: 6:00 PM, Ming's of Palo Alto, 1700 Embarcadero Rd., E. Palo Alto. Reservations: Section office 327-6622 by May 26th.

COMMUNICATION TECHNOLOGY MAY 21

Story on
page 10

A NEW CONCEPT IN MULTI-HOP MICROWAVE SYSTEM ENGINEERING. E. A. Gilmore, Mgr., Microwave Development, Farinon Electric Co.

MAY 21, Thursday, 8:00 PM, Lenkurt Electric Co., Auditorium, Brittan Ave. and Industrial Road, San Carlos. Cocktails: 5:30 PM; dinner 6:30 PM, Marriott Motor Inn, Ralston Ave. at Bayshore Freeway in Belmont. Reservations: Milt Seymour 593-8491, Don Kidder 591-8461 or Paul Ahern (408) 291-4631 by May 20th.

COMPUTER MAY 26

Story on
page 12

LSI COMPUTER SYSTEMS: THE INTERCONNECTION PROBLEM (and how to approach it). Rex Rice, Digital Systems Research Dept., Fairchild Semiconductor, Palo Alto.

MAY 26, Tuesday, 8:00 PM, Skilling Auditorium, Stanford (next to McCullough Bldg.) Dinner: 6:15 PM, Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto. Reservations: Mary McGlone, 321-3300 ext. 270 by May 25th.

ELECTROMAGNETIC COMPATIBILITY MAY 18

Story on
page 11

RECENT DEVELOPMENTS IN THE STUDY OF P-STATIC AND CORONA DISCHARGE NOISE. Dr. J. E. Nanevich, Stanford Research Institute.

MAY 18, Monday, 8:00 PM, Hewlett-Packard Auditorium, 5301 Stevens Creek Blvd., Santa Clara. Dinner: 6:00 PM, Custom House, 20060 Stevens Creek Blvd., Cupertino. Reservations: Paul Gagner, 969-1050 by May 18th.

ENGINEERING MANAGEMENT MAY 1

MANAGEMENT AND THE GOVERNMENT. Congressman Charles S. Gubser. Ladies Night.

MAY 1, Friday, 8:00 PM, Rickey's Hyatt House, 4219 El Camino, Palo Alto. Dinner: 6:30 PM (\$4.25 and up). Please call Bill Wise, 967-1159 by April 30th.

ENGINEERING IN MEDICINE & BIOLOGY MAY 19

Story on
page 5

MATHEMATICAL MODELING OF THE GASTRO-INTESTINAL SYSTEM. Thomas S. Nelsen, M.D., Associate Professor of Surgery, Stanford Medical School.

MAY 19, Tuesday, 8:00 PM, Stanford Medical School Room M-110. Dinner: 6:00 PM, Red Cottage, 1706 El Camino, Menlo Park. No reservations.

GOLDEN GATE SUBSECTION MAY 27

Story on
page 5

FUTURE OF SAN FRANCISCO BAY. Joseph E. Bodovitz, Executive Director, S.F. Bay Conservation and Development Commission.

MAY 27, Wednesday, 12 noon, Leopard Cafe, 140 Front St., San Francisco. Luncheon meeting. Call Art Wells, 467-1880 for reservations by May 20th.

INFORMATION THEORY MAY 21

Story on
page 11

A GAMBLER'S APPROACH TO DECODING BLOCK CODES. Prof. James K. Omura, UCLA.

MAY 21, Thursday, 8:30 PM, Stanford Research Institute, Bldg. 1, 333 Ravenswood Ave., Menlo Park. Dinner: 6:15 PM, Ming's of Palo Alto, 1700 Embarcadero Rd., E. Palo Alto. Reservations: Tom Magill, 326-4350, ext. 6162 by May 20th.

calendar

MICROWAVE THEORY & TECHNIQUES MAY 7

Story on
page 5

MAY 7, Thursday, 8:00 PM, Stanford Linear Accelerator Center Auditorium, Sand Hill Road, Menlo Park (near 280 expressway). Cocktails: 5:30 PM; dinner: 6:30 PM, Village Pub, Woodside. Reservations: Call Kathi, 969-9304 by 5 PM, May 6th. \$5.00 incl. tax & tip.

NUCLEAR SCIENCE MAY 19

Story on
page 10

MAY 19, Tuesday, 6:00 PM for winetasting; 7:30 PM dinner; 8:30 PM meeting. Dinner and meeting: at the Livermore Ranch, 875 Rincon Ave., Livermore. Choice of entree: Ranch Steak \$4.75 or prawns \$4.00. Dinner reservations: June Costa, 447-1100 ext. 7036 by May 15th.

PARTS, MATERIALS & PACKAGING MAY 5, 12, 19, 26

MAY 15, 12, 19, 26, Tuesdays, 7:30 PM, Varian Associates Research Lecture Hall, Bldg. 7, 611 Hansen Way, Palo Alto. No dinner.

POWER MAY 12

Story on
page 9

MAY 12, Tuesday, 7:30 PM, Engineers Club of San Francisco, 160 Sansome St., S.F. Cocktails: 5:30 PM; dinner 6:30 PM. Reservations: 421-3184, by May 11th.

RELIABILITY MAY 14

Story on
page 12

MAY 14, Thursday, 8:00 PM, the Brave Bull, Mathilda at Central Expressway, Sunnyvale. Dinner: 7:00 PM (same place). Reservations: Gil Bowers, 962-4111 by May 13th.

SANTA CLARA VALLEY SUBSECTION MAY 20

Story on
page 6

MAY 20, Wednesday, 8:00 PM, Umunhum Room in College Union, 9th and San Antonio, San Jose State College. No dinner. Coffee and doughnuts will be served.

SYSTEMS SCIENCE & CYBERNETICS MAY 28

Story on
page 13

MAY 28, Thursday, 8:00 PM, Stanford Research Institute Main Bldg., Conference Room B3, 333 Ravenswood Ave., Menlo Park. Dinner: 6:00 PM, Zhivago's, 1037 El Camino, Menlo Park. Reservations: Kathy Spence, 326-6200 ext. 3984 by noon, May 28th.

VEHICULAR TECHNOLOGY MAY 18

MAY 18, Monday, 8:00 PM, International Inn, 326 S. Airport Blvd., South San Francisco. Dinner: 7:00 PM, International Inn. Reservations: W. H. Nye, 328-1200 or Al Isberg, 526-1446 by May 15th.

MICROWAVE TECHNIQUES IN HIGH SPEED COMMUNICATIONS. Guest Chairman, Lou Cuccia, Philco-Ford Corp. Part I: MICROWAVE PROBLEMS IN SATELLITE COMMUNICATIONS. Paul Nordquist, Mgr., Earth Stations Systems, GT&E. Part II: INTERCONNECTS AND HIGH SPEED DIGITAL CIRCUITS. Dr. Frank S. Greene, Jr., Fairchild Semiconductor.

WINE TASTING at Concannon Winery on Tesla Rd., Livermore. (Compliments of the winery — no reservation needed). THE ROLE OF ENGINEERS IN THE BIO-MEDICAL PROGRAM. Paul Phelps, Lawrence Radiation Lab.

MICROELECTRONICS COURSE — Second series. Course Director: Dr. William Cox, Hugel Industries, Sunnyvale. See April Grid for details and registration.

COMMUNICATION WITH LIFE IN OUTER SPACE. Prof. Lester E. Reukema, University of California, Berkeley. LADIES NIGHT.

RELIABILITY ENGINEERING PROCEDURES FOR COMMERCIAL PRODUCTS. A. D. Babbitt, Senior Reliability Design Engineer, AMPEX Corp., Redwood City.

JOINT MEETING WITH SAN JOSE STATE STUDENT BRANCH. An informal discussion. Coordinators: Dr. O. T. Purl, VP Devices Group, Watkins-Johnson Co. and Larry Johnson, San Jose State Student Chairman.

THE PRENATAL DEVELOPMENT OF EARTHQUAKE PREDICTION. Dr. R. B. Vaile, Consultant.

MOBILE VOICE SCRAMBLERS AND VOICE SECURITY DEVICES. W. Eramo, Marketing Mgr., Technical Communications Corp.; R. Griesse, Raymarg Co., Controlonics Corp.; C. Roellig, Sales Mgr., Melabs Corp.

SAN FRANCISCO SECTION JUNE 5

JUNE 5, Friday. Cocktails: 6:30 PM; dinner 8:00 PM and dancing from 9:00 PM to 1:00 AM. \$7.50 per person including tax & tip. Tickets available through Section office 327-6622. Please make reservations as soon as possible. Arrangements may be made for tables of 4 and up. The location is the San Mateo Lodge No. 1112 BPOE, 229 West 20th Ave., San Mateo.

INDUSTRY & GENERAL APPLICATIONS MAY 5-7

MAY 5-7, Jack Tar Hotel, San Francisco. See April Grid for details.

ANNUAL MEETING. Honoring the Section's 1970 Fellows and introducing the officers for 1970-71.

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THE Chairman's Message



John B. Damonte

The 1970 IEEE International Convention is now just a memory; however, the keynote Session – The Emerging Seventies – is still fresh in my mind. What impressed me most was the revolution that is about to take place in the field of person-to-person communication. Dr. J. P. Molnar, Executive Vice President of the Bell Telephone Laboratories, demonstrated a four-way conference call using the Picturephone. A large image was projected on a screen for the auditorium audience. The other three participants were located in downtown New York City, Holmdel and Murrayhill, N.J. A bandwidth of 1MHz and a data compression system are used to produce a good quality picture. Three sets of ordinary twisted pair telephone lines are required. One pair carries the voice signal and the other two pairs carry the video signal. The conference connection was voice-controlled – the person who was speaking had his picture presented on all Picturephone screens. Dr. Molnar demonstrated the rapidity with which control could be switched from one participant to the other by having each say one word of a sentence as rapidly as possible. The operating principles of the Picturephone were described by utilizing the tilt mirror assembly which permits one to view the top of one's desk. Real time sketches outlined the system and a sample of the photo diode screen explained how the image was generated. An electronic zoom lens control permits some close-up photo capability.

The Picturephone was also connected to a computer and the possibilities of various engineering calculations were demonstrated with appropriate data presented on the viewing screen. This particular computer had been programmed to convert written text to computer synthesized speech. As we watched the message on the screen, the computer vocally thanked the IEEE audience for listening to the Picturephone presentation and wished us good night!

Oh! Imagine the office of an engineer 5 years hence with Picturephone and shared computer!

ENGINEER: "Computer!" (not the name of his secretary)

COMPUTER: "Working!"

ENGINEER: "Connect me with Signore Gino Damele in Varazze, Italy."

COMPUTER: "Signore Damele is on Channel B, sir."

ENGINEER: "Ciao Gino, look at the beautiful new solid-state transmitter that we have developed for your new space satellite program . . ."

Oh perhaps this –

ENGINEER: "Computer!"

COMPUTER: "Working!"

ENGINEER: "Connect me with the Electrical Engineering

Library and search for a 1-year recent article on high gain spacecraft antenna systems."

COMPUTER: "The best data appears in a special issue of the IEEE Transactions on Antennas and Propagation for July 1974."

10 titles with authors appear on the viewing screen.

COMPUTER: "Do you wish more?"

ENGINEER: "No. Present article number 3."

Page 1 of article number 3 appears on the screen.

ENGINEER: "Next page."

Page 2 appears, etc.

At the end of the article the engineer could review other articles. If he sees something of special interest, he pushes the "copy" button and a hard copy is printed for him.

The use of a time-shared computer – even today – is almost as common as the use of a slide rule a few years ago. The Picturephone would eliminate the slow and noisy teleprinter and the possibilities of vocal dialogue in programming are tremendous.

ENGINEER: "Computer!"

COMPUTER: "Working!"

ENGINEER: "Prepare to calculate a Fraunhofer Radiation pattern."

COMPUTER: "Do you need assistance?"

ENGINEER: "Yes. Display best routines for a circular symmetric Cassegrain reflector system."

Three routines with accuracy and limits appear on the viewing screen.

COMPUTER: "Do you need further assistance?"

ENGINEER: "No. Execute Routine 2 and plot contour pattern over 4π radians at 2db intervals."

COMPUTER: "Working! Ready to compute. Provide primary feed data."

The engineer inputs data via a cassette of magnetic tape and a contour pattern plot appears on the screen. Hard copies of the plot and the routine would be available by pressing a "copy" button.

These and other applications of the Picturephone and the computer will revolutionize communication and the practice of engineering to the same degree that television replaced radio and revolutionized home entertainment. Satellite communication systems will soon make it possible to dial directly to any spot on the globe. Picturephones will personalize the communication and extend the dimensions of the information that can be transmitted. One can study a sketch or contemplate the nuances of a smile, a raised eyebrow, or a frown. Business travel can be cut to a minimum. Computers will do the work and make all of this effortless. There's a wonderful future ahead and I can hardly wait to see it happen!

The Section year is drawing to a close. I hope that many of you will be able to join us at the Annual Meeting, Friday evening June 5th. This dinner dance will honor our newly-elected Fellows and Officers. There will be hors d'oeuvres and cocktails starting at 6:30 PM, a fine dinner at 8:00 PM, the presentation of Fellows and Officers, with dancing and socializing at 9:00 PM. IEEE Members and their guests are welcome. Organize a party and come join us in the fun!

John B. Damonte, Chairman
IEEE San Francisco Section.

See April Grid for details. Story on page 10.

1970 International Conference on Communications

A special session is planned for the 1970 International Conference on Communications (ICC-70). Under the title "Communications for the Communities of Man," the special session will be one of the highlights of ICC-70 which will be held June 8 through 10th at the Hilton Hotel in San Francisco, Calif.

ICC-70 is an annual meeting sponsored by the IEEE Communications Technology group. This year's meeting, also sponsored by the San Francisco section of IEEE, is expected to be attended by from 1500 to 2000 communications engineers from the United States and many other countries.

Although the participants in the "Communications for the Communities of Man" session will prepare papers for publication in the conference record, their papers will not be read at the session. Instead, a panel approach will be used, and maximum participation will be encouraged from those attending the session. The session organizers will prepare a one-or-two-page listing of key points to be available to all members of the audience who will be asked to take up these points by questions associated with them.

Gerd Wallenstein, international activities chairman of ICC-70 and organizer of the special session, has announced

that three internationally-recognized educators have agreed to participate in the program. They are Dr. Colin Cherry, Dr. Harold E. Hoelscher, and Dr. Fred Bates.

Dr. Cherry is Professor of Telecommunications at the Imperial College of Science and Technology in London. He has lectured and written extensively on the Socio-economic aspects of communications over the past few years, and has published an important book entitled "On Human Communications."

Dr. Hoelscher is Dean of Engineering at the University of Pittsburgh. He is an outspoken leader with a reputation for seeking to broaden the scope of engineering education.

Dr. Bates is head of the Department of Sociology at the University of Georgia. In this position he has made valuable contributions to an understanding of the significant changes made in our society as the result of technological developments.

In discussing his motivation for organizing this special non-technical session, Mr. Wallenstein states that "It is an unfortunate fact that most engineers have an allegiance to technology and their particular work with little serious concern for its effect on the humanity it is supposed to serve. I believe this to be in conflict with the primary role played by engineers in the changes affecting our society. By providing an opportunity such as will be offered by the Communications for the Communities of Man session, engineers attending ICC-70 will undoubtedly be stimulated to further analyze their own roles in the social changes taking place today."

Dr. Allen Peterson, Professor of Electrical Engineering at Stanford University, is chairman of the technical program. Requests for copies of the program should be sent to him.

For further information contact: Gerd Wallenstein, (415) 591-8461 or Harry Lewenstein, (415) 593-8491

Future of San Francisco Bay

The Golden Gate Subsection will hold its May meeting on the 27th at 12:00 noon in the Leopard Cafe in San Francisco. Joseph E. Bodovitz will discuss the future of San Francisco Bay. Mr. Bodovitz is the Executive Director of the Bay Conservation and Development Commission, a position he has held since 1965.

Mr. Bodovitz received his BA with honors from Northwestern University in 1951 and his MS in Journalism from Columbia University in 1956. From 1956-62 he was a reporter for the San Francisco Examiner, specializing in coverage of education, city and regional planning, transportation, housing, urban renewal, and local government. From 1962-65 Mr. Bodovitz was associate executive director of the San Francisco Planning and Urban Renewal Association (SPUR). From September 1964 to January 1965 he served as study director for the San Francisco Bay Conservation Study Commission. For reservations, call Artwell Electric, 467-1880, by May 20th.

MTT Announces a Special Program on High Speed Communications

Microwave techniques are playing an increasingly important role in communications systems. No longer limited to simply supplying a high frequency carrier, microwave engineers are now being called upon to apply their techniques to a variety of communication system problems, including high speed logic and sophisticated modulation techniques. To better acquaint Bay Area engineers with their possible future in communications applications, a special program has been arranged on the use of microwave techniques in communications systems. The meeting is scheduled for May 7, 8 PM, at the Stanford Linear Accelerator Center on Sand Hill Road (just east of the 280 expressway) in

Menlo Park.

Two speakers will be presented. Paul Nordquist, Manager of Earth Stations Systems for GT&E in Waltham, Mass. will speak on "Microwave Problems in Satellite Communications." Dr. Frank S. Greene Jr. of Fairchild Semiconductor Research in Palo Alto will speak on "Interconnects and High Speed Digital Circuits." Guest Chairman for the evening will be Mr. Lou Cuccia, well-known local expert in microwave techniques and communications systems. This will be the final MTT program this spring, so join your MTT companions and the guest speakers for dinner prior to the meeting. See calendar for dinner particulars.

Mathematical Modeling of the Gastrointestinal System

For the past 15 years Dr. Thomas S. Nelson has conducted research in gastrointestinal physiology. As a result of this research he and his colleagues have developed a model to explain the coordination and integration of gastrointestinal motor activity. He will discuss this and other mathematical models of the gastrointestinal system at the Tuesday, May 19, meeting of the Engineering in Medicine and Biology Chapter.

Dr. Nelson received his MD from the University of Washington in 1951. He was resident in surgery at the University of Chicago Clinics from 1952-59, serving as Chief Resident from 1958-59. In 1960 he joined the Stanford Medical School, where he now is Associate Professor of Surgery.

The 8:00 PM meeting will be held in Room M110 at the Stanford Medical School. Dinner is scheduled for 6:00 PM at the Red Cottage on El Camino Real in Menlo Park. No reservations are required.

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Career Guidance Meeting Scheduled at San Jose State

The Santa Clara Valley Subsection and the San Jose Student IEEE branch will sponsor a joint meeting on May 20 with a vocational theme.

Both graduate IEEE members, as well as undergraduates at local colleges and universities, are invited to participate. Informality will prevail with the majority of the time devoted to small group discussions where student questions are encouraged. Representatives of a wide variety of industries in the Bay Area will be available to explain professional requirements within their organizations.



O. T. Purl

Tom Purl, Vice President, Devices Group, of Watkins-Johnson Company, and Larry Johnson, San Jose State Student Chairman, will coordinate activities and act as co-chairmen of the meeting.

Some of the engineers leading discussions are: Marv Rudin, President, Analog Integrated Microsystems, Inc.; Dick Towle, President, Towlelectronics; Howard Turner, Building Engineer, Pacific Telephone & Telegraph Co.; Carl Hollstein, Staff Engineer, IBM; Bob Eanes, Engineering Specialist for RF Equip-



Larry Johnson

ment Dept., Philco-Ford; Bill Kunz, Manager, Solid State Div., Watkins-Johnson Co.

Local area students and graduate engineers interested in participating are cordially invited.

Place: UMUNTHUM Room in the college Union, 9th and San Antonio, San Jose State College.

Time: 8:00 PM, May 20. Coffee and doughnuts will be served.

Digital Filter — Implementation and Application

After reviewing briefly some of the general properties of digital filters, factors affecting digital filter design and implementation will be described by J. F. Kaiser at the May 27 Circuit Theory Chapter meeting. One approach to the implementation of digital filters will then be presented that employs a small set of relatively simple digital circuits. The circuits are readily multiplexed to process multiple data inputs or to effect multiple, but different, filters (or both), thus providing for efficient hardware utilization. The filters are easily modified to realize a wide range of filter forms, transfer functions, multiplexing schemes, and round-off noise levels. The range of possible application will then be explored.

James F. Kaiser received the EE degree in electrical engineering from the University of Cincinnati in 1952 and the SM and Sc.D. degrees in electrical engineering from the Massachusetts Institute of Technology, Cambridge, in 1954 and 1959 respectively. During his stay at MIT he was associated with the Electronic Systems Laboratory and later as an Assistant Professor in Electrical Engineering.



J. F. Kaiser

He joined the Bell Telephone Laboratories, Murray Hill, New Jersey, in 1959 and first engaged in speech processing studies. More recently he has been concerned with general problems of data processing, system simulation, digital filters and computer graphics as a member of technical staff in the Communication Principles Research Laboratory.

Dr. Kaiser is a member of the CO-SINE Committee of the Commission on Education of the National Academy of Engineering. He is co-author of two books in control systems and applications of digital computers. He is a member of the IEEE.

The meeting is scheduled for 8:00 PM and will be preceded by dinner at 6:00 PM. See calendar.



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1970 Region Six Conference in Seattle

The Seattle Section will host the 1970 Sixth Region Conference May 26-28 at the Washington Plaza Hotel, to the theme "West Into the 70's."

The Opening Luncheon will be held at noon, Tuesday, May 26, at which time local officials will welcome the conferees.

The Blake Island Salmon Barbeque is the highlight of the Conference. This event will take place on Wednesday, May 27, starting at 5:30 PM. Cost will be \$10.00 per person. Included in this cost is a complete buffet style salmon barbeque cooked in the authentic Indian Style, free liquor service on the boat and all costs of boat and bus transportation.

Arrangements are being made for a tour Thursday afternoon, May 28, starting at 2:30 PM. This tour will cover a very timely subject of interest, either with one of the Boeing Company's major projects in the Greater Seattle Area, or with another major Seattle industry.

Technical sessions of Computer Application, Industry and General Applications, Laser Applications, Ocean Engineering, Bio Engineering, Electromagnetic Compatibility, Control Theory and Power, are scheduled for your convenience.

Copies of each technical paper presented will be available at the Conference. Bound copies of the complete Conference will not be available.

TECHNICAL PROGRAM IEEE SIXTH REGION CONFERENCE Tuesday Morning, May 26

Session 1A OCEAN ENGINEERING 1

Chairman: S. R. Murphy, Univ. of Washington
ACOUSTIC CONTROL AND TELEMETRY SYSTEMS FOR SUB-SEA DRILLING OPERATIONS, W. Currie, H. Sullivan, Honeywell, Marine Systems Center, Seattle.
A COMPUTER-COUPLED ACOUSTIC DATA LINK, J. Okerland, Applied Physics Laboratory, Univ. of Washington.
A FREE-FALL ELECTROMAGNETIC CURRENT METER FOR OCEAN CURRENT MEASUREMENTS, R. Drever, T. Sanford, Woods Hole Oceanographic Institution.
DEEP WATER TELEMETRY SYSTEMS FOR IMPACT LOCATION, C. Leedham, Defense Research Laboratory, General Motors, Goleta.

Session 1B BIOENGINEERING 1—CLINICAL

Chairman: C. C. Johnson, Univ. of Washington
PROBLEMS IN STUDYING THE EFFECTIVENESS OF PATIENT CARE, J. Gilson, University of Washington.
PREPAID GROUP PRACTICE AS AN ADMINISTRATIVE APPROACH TO THE DELIVERY OF HEALTH CARE, R. Handschin, Group Health Cooperative of Puget Sound.
MEDICAL COMPUTER SERVICES, S. Yarnall, Univ. of Washington.
EXPERIENCE WITH COMPUTERIZED INTENSIVE CARE MONITORING, R. Gardner, H. Warner, Univ. of Utah.
NON-NUMERIC COMPUTATION: A CONTRADICTION?, T. Kehl, Univ. of Washington.
AUTOMATION AND COMPUTER TECHNIQUES IN THE CLINICAL CHEMISTRY LAB, P. VanDreal, Univ. of Washington.
THE ARTIFICIAL KIDNEY PROGRAM: PAST ACCOMPLISHMENTS AND FUTURE TRENDS, T. G. Christopher, Univ. of Washington.

Session 1C ELECTROMAGNETIC COMPATIBILITY

Chairman: W. Cooley, Seattle University.
The two EMC sessions are of a tutorial nature designed to provide a quantitative, broad coverage of some very important aspects of EMC science. Audience participation and questioning is encouraged.
SHIELDING THEORY AND PRACTICE, W. S. Adams, Martin Marietta Corp., Denver.
CABLE AND WIRE INTERFERENCE COUPLING, T. Herring, Boeing Co., Seattle.
FILTERS FOR EMC, H. Schlicke, Allen Bradley Corp., Milwaukee.

Tuesday Afternoon, May 26

Session 2A COMPUTER APPLICATIONS 1

Chairman: J. Andersen, Univ. of Washington.
SPARSITY TECHNIQUES: THEORY AND PRACTICE, W. F. Tinney, E. C. Ogbuobiri, Bonneville Power Administration, Portland.
EFFICIENT NUMERICAL COMPUTATION FOR SOLVING LINEAR ALGEBRAIC EQUATIONS, A. M. Erisman, The Boeing Co., Seattle.
ROUNDING ERRORS AND THE TRANSFORMATION TO PHASE CANONICAL FORM, A. F. Fath, The Boeing Co., Seattle.
OPTIMAL DESIGN OF AN FM DISCRIMINATOR USING TWO NON-UNIFORM DISTRIBUTED RC ELEMENTS, S. B. Park, Oregon State University, Corvallis.
COMPUTER ANALYSIS OF NONLINEAR FORCED OSCILLATING NETWORKS, E. M. Baily, Univ. of Idaho.
COMPUTER-DESIGNED FEEDBACK COMPENSATION NETWORK IN THE FREQUENCY DOMAIN, R. E. Griscom, International Business Machines Corp., Poughkeepsie.
A COMPUTER AIDED FILTER APPROXIMATION TECHNIQUE, C. Myrick, The Boeing Co., Seattle.

Session 2B INDUSTRY AND GENERAL APPLICATIONS

Chairman: J. Skog, Beverly A. Travis and Associates, Seattle.
DEVELOPMENT OF BIMETALLIC CONTACT RAIL AND APPURTENANCES FOR WAYSIDE POWER SUPPLY, G. N. Houck, Kaiser Aluminum Co., Oakland; E. F. Huston, The Ohio Brass Co., San Francisco; G. Scott, Composite Structures, Orinda.
SCHEDULING A CARGO SHIP FLEET OF CONSTANT CAPACITY, G. B. Killinger, Univ. of Pittsburgh; D. E. Rathbone, Univ. of Idaho.
UNDERGROUND SATELLITE TRANSIT SYSTEM, SEATTLE-TACOMA INTERNATIONAL AIRPORT, E. E. Hogwood, Westinghouse Electric Corp., E. Pittsburgh.

Session 2C LASER APPLICATIONS 1

Chairman: B. P. Hildebrand, Battelle Northwest.
HOLOGRAPHY (Keynote address), E. N. Leith, Univ. of Michigan.
LASER APPLICATIONS IN THE CONSTRUCTION INDUSTRY, J. D. Tompkins, Spectra-Physics, Inc.
APPLICATIONS FOR HELIUM-CADMIUM LASER LIGHT, J. D. Tompkins, Spectra-Physics Inc.
PRECISION ALIGNMENT WITH TOOLING LASERS, K. F. Skutley, The Boeing Co., Seattle.
LASER WELDING AND HOLE DRILLING, R. L. Waters, Union Carbide Corp., Santa Monica.

Wednesday Morning, May 27

Session 3A BIOENGINEERING 2 — BIOINSTRUMENTATION

Chairman: C. C. Johnson, Univ. of Washington.
AIR POLLUTION INSTRUMENTATION: PAST, PRESENT AND FUTURE, R. J. Charlson, Univ. of Washington.
INCREASING THE CLINICAL USEFULNESS OF TRANSILLUMINATION, P. Hayden, B. Henshaw, C. Johnson, Univ. of Washington.
APPLICATION OF ULTRASOUND TO THE STUDY OF VOCAL FOLD MOTION, S. Hamlet, Univ. of Washington.
PULSE DOPPLER TECHNIQUES: STATUS AND FUTURE PROSPECTS, D. Baker, J. Reid, G. Bennett, V. Simmons, J. Ofstad, Univ. of Washington.
APPLICATION OF ULTRASONIC METHODS IN THE EVALUATION OF PERIPHERAL VASCULAR DISEASE, D. E. Strandness, Veterans Admin. Hospital, Seattle.
SPECTRAL ANALYSIS OF THE URINARY STREAM, A. Sterling, N. Zinner, R. Ritter, D. Harding, D. Baker, Univ. of Washington.
DATA PROCESSING TECHNIQUES IN THE ULTRASONIC DIAGNOSIS OF FLOW SYSTEMS IN THE BODY, J. Harris, R. Albright, Univ. of Washington.

Session 3B ELECTROMAGNETIC COMPATIBILITY 2

Chairman: W. Cooley, Seattle University.
This session is a continuation of the tutorial session EMC 1.
INTERFERENCE SIGNAL CHARACTERISTICS, W. Swift, Hewlett-Packard Co., Palo Alto.
MANAGEMENT FOR EMC, E. S. Hughes, Autonetics, Anaheim.
EMC MEASUREMENT SPECIFICATIONS AND STANDARDS, W. Cooley, Seattle University.

Session 3C POWER 1

Chairman: E. J. Harrington, Bonneville Power Admin., Portland.
ELECTRICAL POWER AND THE ENVIRONMENT — SOME ALTERNATIVES WE FACE, P. Mann, Univ. of Idaho.
EFFECTS OF HIGH TEMPERATURES (WARM WATER) ON VEGETABLE GROWING, B. Price, Eugene Water and Electric Board, Eugene.
STATUS REPORT ON NUCLEAR POWER, L. P. Bupp, Oregon State University, Corvallis.
PROBLEMS OF THERMAL PLANT SITING, R. S. Downie, Snohomish County PUD, Everett, Wash.
NUCLEAR PLANT COMPUTERIZATION, P. N. Adkins, Portland General Electric Co., Portland.

Wednesday Afternoon, May 27

Session 4A COMPUTER APPLICATIONS 2

Chairman: J. Andersen, Univ. of Washington.
A COMPUTER CONTROLLED AIR-GROUND COMMUNICATION SYSTEM FOR AIR TRAFFIC CONTROL AND NAVIGATION, R. W. McLaren, A. A. Mahmoud, Univ. of Missouri-Columbia, Columbia.
AN ADVANCED DATA HANDLING SYSTEM FOR ENVIRONMENTAL TESTING OF SATELLITES, P. E. Muller, McDonnell Douglas Astronautics Co., Huntington Beach.
INFORMATION-FLOW CHARACTERISTICS OF MULTI-ACCESS COMPUTER SYSTEMS, W. A. Cornell, Bell Telephone Laboratories, Holmdel, New Jersey.
THE INTERACTIVE USE OF COMPUTERS FOR SOLVING PROBLEMS IN LOGIC CIRCUIT DESIGN, R. C. Duncan, A. D. C. Holden, Univ. of Washington.
APPLYING A TIME-SHARED COMPUTER TO THE PROBLEM OF ECONOMIC SELECTION OF ALTERNATIVES, L. W. Parsons, Pacific Northwest Bell, Seattle.
A COMPATIBLE CHINESE CHARACTER ENCODING SYSTEM, Te-Yao Kiang, Univ. of California, Berkeley.
ON THE SPECIFICATION OF PROGRAMMING LANGUAGE TRANSLATORS, L. Presser, Univ. of California, Santa Barbara.

Session 4B INDUSTRY AND GENERAL APPLICATIONS 2

Chairman: J. Skog, Beverly A. Travis and Associates, Seattle.
MOTOR APPLICATION ENGINEERING: A LOST ART?, R. L. Nailen, Louis Allis Co., Milwaukee.
LOAD SHARING OF D-C "CONVEYOR" MOTORS, L. H. Berkeley, Reliance Electric Co., Seattle.
CONTROL NETWORKS IN BEER PREPARATION, S. G. Yates, B. H. Borg, Sicks' Rainier Brewing Co., Seattle.
ELECTRICAL ENGINEER AS A SAFETY ENGINEER, D. R. Murphy, Bovay Engineers Inc., Spokane.

Session 4C LASER APPLICATIONS 2

Chairman: B. Hildebrand, Battelle Northwest.
A SURVEY OF POTENTIAL LASER APPLICATIONS IN THE NORTHWEST, J. R. Kerr, Oregon Graduate Center and Morvue Electronic Systems, Inc.
EXPERIMENTAL EVIDENCE INDICATING A BEAM DIVERGENCE SMALLER THAN THE DIFFRACTION LIMIT $1.22\lambda/D$ FOR THE

PULSES EMITTED FROM A MODE-LOCKED Nd^{3+} : GLASS LASER, T. Gilmore, Jr., Battelle Northwest.
GENERALIZED TIME-AVERAGE HOLOGRAPHY, C. C. Aleksoff, Univ. Michigan, Ann Arbor.
LASER HOLOGRAPHY, R. F. Wuerker, L. O. Heflinger, TRW Systems Group, Redondo Beach.
SURFACE ROUGHNESS MEASUREMENT USING OPTICAL HETERODYNING TECHNIQUES, J. D. Jensen, B. P. Hildebrand, Battelle Northwest.
MULTI-MODE LASERS IN SYSTEMS WITH SQUARE LAW DETECTION, C. C. Aleksoff.

Thursday Morning, May 28

Session 5A OCEAN ENGINEERING 2

Chairman: S. R. Murphy, Univ. of Washington.
CURRENT STATUS OF NATIONAL AND GLOBAL PROGRAMS INVOLVING TELEMETRY OF OCEANOGRAPHIC DATA, J. Snodgrass, Univ. of California, La Jolla.
THE TELEMETRY OF OCEANOGRAPHY DATA FROM THE NORTH PACIFIC OCEAN, R. Devereux, General Dynamics/Convair, San Diego.
THE GENERATION OF THE HIGH FREQUENCY ASSIGNMENT FOR OCEAN TELEMETRY SYSTEMS, U.S. Coast Guard Study, author to be announced.

Session 5B CONTROL THEORY AND APPLICATIONS

Chairman: P. R. Johannesen, The Symbionics Co., Waltham, Mass.
STABILITY OF LINEAR FEEDBACK SYSTEMS USING MINIMUM ORDER STATE ESTIMATES, R. Ash, Proctor and Gamble Co., Cincinnati.
LINEAR OPERATORS APPLIED TO FEEDBACK SYSTEM STABILITY, M. Damborg, Univ. Washington.
THE USE OF SIMPLIFIED TARGET ESTIMATORS IN TRACKING SERVOS, T. Knutrud, Sylvania Applied Research Labs., Waltham.
APPLICATIONS OF OPTIMAL CONTROL THEORY TO MANAGEMENT INFORMATION SYSTEMS, S. Gajwani, Electronic System Division, Sylvania West, Mountain View, Calif.
HOW TO LIE WITH SIGNAL PROCESSING, R. Weiss, Univ. of Washington.

Session 5C POWER 2

Chairman: E. J. Harrington, Bonneville Power Administration, Portland.
REVIEW OF THE REPORT BY WASHINGTON STATE UNIVERSITY ON "CORROSION STUDIES IN URD INSTALLATION OF THE PUGET SOUND POWER AND LIGHT CO.", J. Jacobs, Puget Sound Power and Light Co., Bellevue.
SPOT NETWORK PROTECTION, M. W. Anderson, City of Seattle, Department of Lighting.
138 KV SOLID DIELECTRIC CABLE — A PROGRESS REPORT, E. Hazan, Kaiser Aluminum and Chemical Corp., Bristol, Rhode Island.
A SOLID STATE POWER FAILURE-PROOF SYSTEM, A. A. Mahmoud, R. W. McLaren, Univ. of Missouri-Columbia, Columbia.
POWER LINE RI IN THE TELEVISION SPECTRUM, M. O. Loftness, Bonneville Power Administration, Olympia, Wash.

Communication With Life in Outer Space



The possibilities of intelligent beings beyond our solar system and the possibilities and techniques for communicating with this intelligence is the intriguing subject of Professor Reukema's presentation at the annual Ladies Night meeting of the Power Chapter, Tuesday, May 12.

Dr. Reukema, professor emeritus of electrical engineering, University of California, began teaching at the university in 1923. During that time he did research on the development of the atomic bomb for the Manhattan Project at the Lawrence Radiation Laboratory in Berkeley.

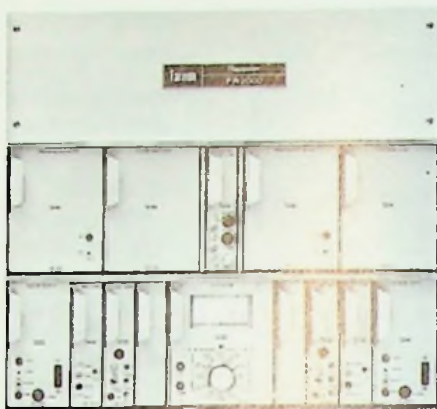
He has been a member of the U.S. Board for Research and Development and, awarded a Guggenheim Fellowship, he studied at the Technische Hochschule in Munich, Germany, during 1928 and 1929. Dr. Reukema is a fellow of both AIEE and IRE, and served as chairman of the IRE.

This month's meeting will be annual Ladies Night. So fellows, bring your wives and girl friends. The meeting will begin at 7:30 p.m. in the Engineers' Club of San Francisco, 160 Sansome. Dinner will be served at 6:30 preceded by a social hour.

New Concept in Multi-Hop Microwave Systems

Rapid advances in the development of solid-state microwave devices have led to a correspondingly rapid change in the types of solid-state microwave equipment available, particularly in the past five years. Now, with both discrete components and integrated circuits operating at microwave frequencies, complete new generations of equipment are being introduced. One of the most significant of the new equipment developments is a novel 2 GHz microwave repeater which provides gain directly at microwave frequencies. This new repeater is the first economically practical device to eliminate the need for demodulation and remodulation at each repeater in order to get the amplification necessary in multi-hop systems. In other words, a true rf repeater is now available.

An important aspect of this new device is that it changes the manner in which multi-hop systems are engineered. For example, it can eliminate the need for even considering the use of the IF repeaters which made the early long-haul systems possible. It also changes the effects of fading in multi-hop systems which means new techniques are



required for system engineering. Mr. E. A. Gilmore, Manager of Farinon Electric's Microwave Development Department, will describe the new repeater at a meeting of the San Francisco Chapter of the Communication Technology Group on May 21. An important part of Mr. Gilmore's presentation will be a discussion of the new system engineering techniques. He will also explain how the repeater can be used in both new and existing systems, and what its advantages and limitations are. Emphasis is placed on how rf repeaters may affect the design of multi-hop point-to-point

routes in the future.

Ernie Gilmore is a native of Oklahoma and holds a BSEE from Oklahoma A&M. Prior to joining Farinon Electric in 1964 he was a founder of Pacific Communications and Electronics Co. He has also held responsible positions at Lenkurt Electric Company and Cities Service Gas Company.



Ernie Gilmore

The meeting will be held at 8:00 P.M. at the Lenkurt Electric Auditorium at Brittan Avenue and Industrial Road in San Carlos. Dinner before the meeting will be at the Marriott Motor Inn, Ralston Avenue and Bayshore in Belmont at 6:30 P.M. An additional feature of the meeting will be the announcement of the Chapter election results and the introduction of new officers.

Engineers Role in Bio-Medical Program

The speaker, Paul L. Phelps Jr., joined the Lawrence Radiation Laboratory Electronics Engineering Department in 1957. He has participated in a variety of programs, including research on the release of electrical energy from ferroelectrics. He has worked on the design of diagnostic systems and instrumentation for the underground testing of nuclear devices and was instrumental in developing germanium lithium-drifted detector systems for biological applications. In his present assignment he serves as the Project Leader for Electronics Engineering in the Bio-Medical Division and has responsibility for special projects. Mr. Phelps obtained his BSEE from California State Polytechnic College, San Luis Obispo. He has taken additional course work at the University of California in radiation biology and bio-engineering.

The Bio-Medical Division was established by the Atomic Energy Commission at the Lawrence Radiation Laboratory in Livermore to study the impact of the radionuclides upon man and his environment.

The generation of electric power is an

important example in the use of atomic energy. By the year 2000 most of the electric power in the United States will be produced from nuclear reactors. Another example is the application of nuclear explosives to the recovery of fossil fuels, especially the recovery of natural gas from heretofore uneconomical or nonproducing geological media. Also it is possible that nuclear explosives could be used for excavating harbors and canals. Most of these applications will release minute quantities of radionuclides to the biosphere. The electronics engineer plays a key role in the study of radionuclides. He supports and conducts research programs to answer questions about how these radionuclides reach man, interact with his environment, and affect his life. The speaker will describe briefly the overall mission of the Bio-Medical program at Livermore and will give examples of the various projects conducted by electronic engineers. One of them is the development of the highly sensitive solid-state counting systems required to detect and measure extremely low quantities of radionuclides.



Paul Phelps

Once again the May meeting of the Nuclear Science Chapter combines the pleasantness of wine, women, and an interesting, though not too technical, talk. Members, other interested persons, their wives, and friends are all invited to attend. The meeting, on May 19, will begin with a wine-tasting (premium red and white wines accompanied by bread and cheese) at the Concannon Winery in Livermore. Dinner will follow at the Livermore Ranch House. See calendar.

After dinner, Mr. Paul Phelps of the Bio-Medical Division of the Lawrence Radiation Laboratory will discuss the engineer's role in the Bio-Medical program at the laboratory. The results of the election of officers will also be presented.

AA Gambler's Approach to Decoding Block Codes

A simple new probabilistic approach to decoding binary block codes transmitted over a binary symmetric channel will be considered by Professor J. K. Omura at the May 21 meeting of the Information Theory Chapter. This approach consists of taking a random but educated guess at the codeword given the received block. The probability of finding the correct codeword on any given try is computed and shown to depend on the number of errors that occur in the received block. For a (60, 20) code with 5 errors, for example, this probability is .12. A (125, 25) code with 15 errors has a probability of .3 that a single guess is correct. Allowance is made for enough guesses so that the probability of not finding the transmitted codeword is as small as the probability of error for optimum decoding. This approach has been used to find the minimum weight codeword of a block code and has been extended to binary convolutional codes.



Prof. J. K. Omura

Dr. Omura received B.S. and M.S. degrees in Electrical Engineering from M.I.T. in 1963 and a Ph.D. degree from Stanford in 1966. In June 1966, Dr. Omura joined SRI where he was concerned with signal optimization for feedback communication systems, statistical data analysis, VLF communication systems, laser communication systems, coding techniques, spread-spectrum communication systems, and analysis of tree codes. He taught a graduate course, "Communication Channels," at Stanford in 1967. In August of 1969, Dr. Omura joined the University of California at Los Angeles where he is now an Assistant Professor. He is a past chairman of the San Francisco chapter of the Information Theory Group.

The meeting will be held in Building 1 at SRI at 8:30 PM following a dinner scheduled for 6:15 PM at Ming's of Palo Alto. See calendar.

Static Noise— Talk & Demonstration

Dr. J. E. Nanevicz from SRI will talk on "Recent Developments in the Study of P-Static and Corona Discharge" at the May 18 meeting of the Electromagnetic Compatibility Group. To supplement his talk Dr. Nanevicz will operate a portable device to generate static discharges for demonstration of different noise effects to the audience.

The talk will describe theoretical and laboratory studies that have been made to predict the nature and severity of the precipitation static problems expected on supersonic aircraft. Measurements indicate that maximum particle charging and resultant noise will increase in severity to about 1400 MPH, and that charging should decrease rapidly at speeds above 1500 MPH. Instrumentation to verify these results in flight have been fabricated and flight tests are planned.

Corona discharge fundamentals will be reviewed and a demonstration will be made to illustrate the character of the noise generated. Dust blowing techniques used to generate streamer discharge on antenna insulation and dielectric surfaces will be demonstrated.

In his talk Dr. Nanevicz will discuss the application of useful devices for alleviating precipitation static discharge and corona discharge. He will approach the subject matter from a fundamental comprehensive viewpoint such that it should be of interest to the general section audience.

Dr. Nanevicz received the BSEE (magna cum laude) and MSEE degrees from the University of Washington, and the Ph.D. from Stanford University in 1951, 1953 and 1958, respectively.

Since joining Stanford Research Institute in 1954 he has specialized in theoretical and experimental studies of precipitation static interference in airborne electronic equipment. He has been active in the development and testing of devices for precipitation static elimination. He is currently Program Manager, Electromagnetic Sciences Laboratory, Stanford Research Institute.

Dr. Nanevicz is a member of Phi Beta Kappa, Sigma Xi and Tau Beta Pi. He is a Senior Member, IEEE Professional Technical Group on Antennas and Propagation.

The meeting will be held at 8:00 at the Santa Clara Hewlett-Packard Auditorium. Dinner before the meeting will be at the Custom House. See calendar.

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LSI to Computer Systems

Mr. Rex Rice will be the speaker at the Computer Chapter meeting on May 26th. He will discuss a problem common to LSI and Computer Systems — interconnections. Aside from reasons of reliability, size, weight, etc. if interconnections were free, LSI would be economically uninteresting. However, the cost of interconnections in the system is proportional to pin count plus overhead (such as silicon, power, etc.). It has become increasingly apparent that the cost of interconnections will cause a new design philosophy which is already appearing in some newly-announced systems.

The use of busing, local control decoding, and functional design will dominate this new philosophy and will lead to making parallelism economically attractive. When considering design of a system, LSI does not necessarily imply enormous numbers of pins per package to provide good function per dollar. Likewise, a high number of interconnections throughout the system do not necessarily imply the most economical design. The key insight is that both at the LSI level and at the system level, functional design approaches can provide significant gains in function per dollar.

Mr. Rice will discuss Function per Dollar vs. Pins per package tradeoffs in LSI during his talk. He will also show how to use standard bus oriented LSI functions to implement various machine classes from PDP-8's to ILLIAC IV's.

Rex Rice received a BA degree in

mechanical engineering from Stanford in 1940. He was employed by Douglas Aircraft, Northrop Aircraft, and IBM prior to joining Fairchild Semiconductor in Palo Alto in 1963 where he established the Digital Systems Research Department. He is presently directing study programs to investigate the interactions between integrated circuits, system packaging and information processing systems.



Rex Rice

Mr. Rice has participated in SJCC and FJCC programs since 1959 and has served on technical program committees for several Joint Computer Conferences. He served as Technical Program Vice Chairman for the 1968 FJCC. In 1968, he served as Technical Adviser to the Program Committee for the Second Annual IEEE Computer Group Conference on "LSI." A Fellow of the IEEE, Mr. Rice has six issued U.S. patents and seven applications pending in the computer field plus a number of issued foreign patents. Please see calendar for meeting details.

Reliability Procedures for Commercial Products

Reliability engineering is an established part of military and space programs. The techniques of analysis and predictions have been described in government specifications and standards, and the customer recognizes that a substantial amount of money must be committed to fulfilling this portion of the contract. The approach is different in the commercial field: the purse strings are tight; procedures are not officially proscribed; assumptions may have an entirely different basis. The varied approaches should, however, lead to the same end.

High-performance commercial equipment may serve an end use directly or it may be intended as part of a larger system. In the latter case, the engineer must know the constraints of the overall system and the effect of interfacing, as

well as the reliability apportionment allowed for his subsystem.

Reliability engineering starts with the original design and must be closely allied with design engineering throughout the program. Moving with the designers, the reliability engineer must contribute to the evaluation and choice of components, to design review, failure analysis and product test.

A. D. Babbitt, Senior Reliability Design Engineer at Ampex, will describe reliability engineering procedures for commercial products at the May 14 meeting of the Reliability Chapter. His talk begins at 8 PM at the Brave Bull, Town & Country Shopping Center, Mathilda at Central Expressway, Sunnyvale. Pre-meeting dinner at 7 PM is optional at \$4.60. If you plan to attend either, reserve by May 13. Call Gil Bowers at 962-4111.

Laser Photocoagulation of Eye Tissue

Wednesday, May 20, 1970, has been declared Wives' Night at the Antennas and Propagation Chapter social dinner meeting. Accordingly, wives and guests are cordially invited to attend this social event. The featured speaker will be the distinguished Dr. H. Christian Zweng, Professor of Surgery (Ophthalmology), Stanford University School of Medicine. He will describe the recent development in the cure of eye diseases through the application of laser energy. Since 1962, the speaker and his associates have been performing research in laser photocoagulation of eye tissue by utilizing the solid-state pulsed ruby laser and more recently the argon gas ion laser. Experiences in retinal surgery will be described.



Dr. Christian Zweng

Dr. Zweng received his MD from Stanford Medical School in 1949. After internship at the Receiving Hospital, Detroit, Michigan, he undertook postgraduate training in Ophthalmology at Wayne University and Kresge Eye Institute. He is presently Clinical Associate Professor of Surgery (Ophthalmology), Stanford University School of Medicine; Staff Ophthalmologist, Palo Alto Medical Clinic; Senior Research Associate, Palo Alto Medical Research Foundation; and Senior Research Associate, Stanford Research Institute.

The dinner meeting will be held at Rickey's Hyatt House, 4219 El Camino Real, Palo Alto. Cocktails and dinner are planned for 7:00 and 8:00 PM, respectively. The dinner, roast sirloin of beef, is \$5.90 per person, tax and gratuity included.

For reservations please contact George Oeh, 966-2444 by May 13, 1970.

AC Chapter Presents Professor Arthur Bryson

"The Synthesis of Compensating Networks Using State Variable Techniques" will be presented at the May 12 Automatic Control Chapter meeting by Prof. A. E. Bryson, Jr., Chairman of the Department of Applied Mechanics at Stanford. Bryson's talk will attempt to relate classical lead-lag compensators to the idea of state variable "observers" (Luenberger) and state variable feedback (Kalman et. al.).

Linear feedback of the state variables for stationary linear systems permits choice of the gains to place poles of the controlled system in desired locations. To use such a scheme, estimates of the state variables must be made continuously from available measurements; a simple approach to designing such an estimator (called an "observer") has been developed by Luenberger. Under certain conditions, the "observer" and the Kalman filter are identical. Luenberger has also shown how to construct observers of lower order than the plant.

If the state variable feedback gains are used with the estimated quantities from the observer the resulting network is a compensator design. The fascinating and useful feature of such a design is that the poles of the overall controlled system are simply the poles of the observer plus the poles of the system assuming direct state variable feedback.

Arthur Bryson received his Ph.D. in Aeronautics at the California Institute of Technology in 1951. He joined the Harvard staff as an Assistant Professor in 1953 and became a Professor in 1961. In 1968 he came to Stanford as Professor of Applied Mechanics, Aeronautics, and Astronautics and became Chairman of the Department of Applied Mechanics in 1969. He has done consulting work for numerous companies and is the author of 50 technical papers on fluid mechanics, flight mechanics, and automatic control. He is co-author with Y. C. Ho of "Applied Optimal Control," Blaisdell Publishing Co.,



Prof. Arthur Bryson

1969. Prof. Bryson is a Fellow of AIAA and has been quite active in both AIAA and ASEE.

This is an ELECTION meeting and will be held at Building 202, Lockheed Auditorium, 3251 Hanover Street, Palo Alto at 8:00 PM. Please attend. See calendar.

The Prenatal Development of Earthquake Prediction

Living on the San Andreas Fault is like sitting on a time-bomb without a view of the clock. What do we know, what can we learn, and what would we do if we knew more?

Many methods of earthquake prediction have been proposed, a few have been implemented, and none have been proven. Some common hypotheses about the causes of earthquakes will be discussed, and several prediction techniques will be presented by Dr. R. B. Vaile at the May 28 Systems Science and Cybernetics Chapter meeting. Current dogma and some speculation regarding the minimization of damage will also be put forth.



Dr. R. B. Vaile

Dr. Vaile received a Ph.D. in Electrical Engineering from Cal Tech, developed underwater ordnance at the Naval Ordnance Laboratory during World War II, was Assistant Chairman of the Physics Department of Armour Research Foundation shortly thereafter, and retired as Director of the Physics Department of Stanford Research Institute in 1968. He is currently on the staff of Agbabian Jacobsen Associates and is also engaged in private consulting.

The meeting is planned for 8:00 PM in Conference Room B of the Main Building at SRI. Dinner will be at Zhivago's, 1037 El Camino Real in Menlo Park at 6:00 PM. Reservations. See calendar.

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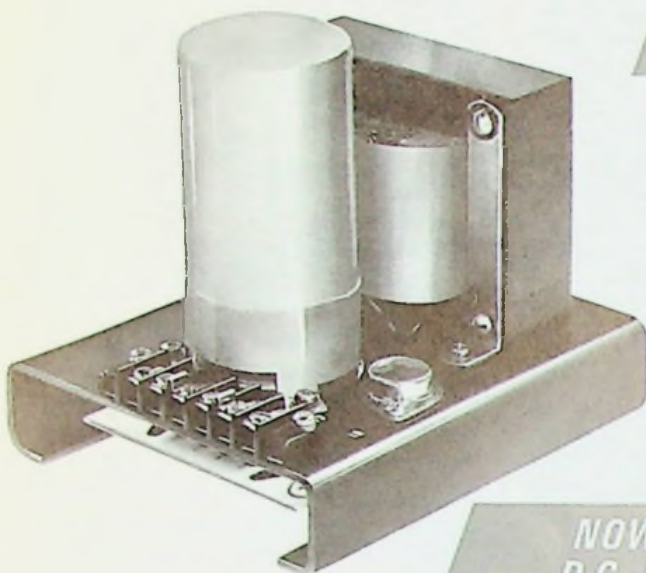
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RADIO PRODUCTS
HARRY STARK'S INC.
SUMMITT DISTRIBUTORS
ZACK ELECTRONICS

NOW AVAILABLE IN 8 DIFFERENT
D.C. OUTPUT VOLTAGES

SPECIFICATIONS:

A.C. INPUT: 115/230V. $\pm 10\%$ 47-63 Hz, 1 ϕ .

D.C. OUTPUTS: See tabulation for available.

REGULATION: For A.C. Line changes $\pm 1\%$
For D.C. Load changes $\pm 1\%$
(regulation stated applies for $\pm 10\%$ Line changes
and for Load changes no load to full load and full
load to no load).

RIPPLE: Less than 0.1% +10mV rms.

D.C. OUTPUT VOLTAGE ADJUST: $\pm 5\%$ ($\pm 20\%$
with proportionate derating in current).

PROTECTION: No fuse! Automatic "foldback" cur-
rent limiting set at approximately 120% provides
overload and short circuit protection.

GROUNDING: Output floating — may be connected
for (+) or (—) to any common or ground.

CONSTRUCTION: Aluminum chassis — open type
construction — optional cover available specify op-
tion "C".

COOLING: Self cooled by convection. No forced air
required.

WEIGHT: 6 lbs. net.

OPERATING TEMPERATURE: 0-52°C; (TO 70°C with
derating, see temperature rating chart on reverse
side of this bulletin).

DIMENSIONS: 5"w. x 5.5"h. x 6"l. (see reverse of
this bulletin for mounting dimensional data).

AVAILABILITY: Always immediately available from
factory stock.

Model No.	Tabulation D.C. Output		Prices*	
	Voltage	Current	Qty.	Unit Price
I-OEM 5-5	5 volts	5 amps	1 - 9	\$50.00
I-OEM 6-5	6 volts	5 amps	10-24	\$47.50
I-OEM 10-5	10 volts	5 amps	25-49	\$45.00
I-OEM 12-5	12 volts	5 amps	50-99	\$42.50
I-OEM 15-4	15 volts	4 amps	100-499	\$36.00
I-OEM 18-3	18 volts	3.3 amps	500-999	\$34.50
I-OEM 24-2.5	24 volts	2.5 amps	1000-9999	\$31.00
I-OEM 28-2	28 volts	2.1 amps	10,000	\$27.00

FOR OPTIONS } { A. overvoltage protection \$15.00
ADD SUFFIX } B. 19" rack mounting panel \$20.00
AS SHOWN. } C. Perforated Metal cover \$25.00

* Various voltages may be grouped for quantity discounts.

WANLASS ELECTRIC COMPANY

A SUBSIDIARY OF **AMBAC** INDUSTRIES INC.



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