IEEE Grid
December 1965
SAN FRANCISCO SECTION
INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS

1966 Fellows

SAN FRANCISCO SECTION

NELSON M. BLACHMAN
Contributions to statistical communication theory and information theory

JAMES B. ANGELL
Technical, professional, educational contributions in solid-state electronics

JOSEPH FEINSTEIN
Contributions to crossed-field microwave tubes

GORDON S. KINO
Contributions to the design of electron guns and high frequency behavior of gaseous plasmas

TETSU MORITA
Contributions in the fields of antennas and the interaction of electromagnetic energy with plasmas

ROBERT N. NOYCE
Leadership in research, development and manufacture of semiconductor devices

meeting reminder

Aerospace & Electronic Systems, Thursday, December 16; Thursday. January 27
Audio & Electroacoustics, Tuesday, December 14 (CT/EMB)
Circuit Theory, Tuesday, December 14 (A&E/EMB)
Computer, Wednesday, December 8 (I&GA/SFS)
East Bay Subsection, Wednesday, January 12 (SFS/EM/I&GA)
Engineering in Medicine & Biology, Tuesday, December 14 (A&E/CT)
Engineering Management, Wednesday, January 12 (SFS/EBSS/I&GA)
Industry & General Applications, Wednesday, December 8 (C/SFS); Wednesday, January 12 (SFS/EBSS/EM)
Information Theory, Thursday, December 16
Reliability, Tuesday, December 14
San Francisco Section, Wednesday, December 8 (C/I&GA); Wednesday, January 12 (EBSS/EM/I&GA)

HUGH C. ROSS
Contributions in the development of high vacuum switching equipment

ANTHONY E. SIEGMAN
Contributions to the theory and application of masers and lasers to communications

ALAN T. WATERMAN, JR.
Contributions to the science and practice of trans-horizon radio propagations

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But, though the job is the main thing, living in the Pacific Northwest shouldn't be ignored either. About 85% of our employees live on wooded acres within 10 minutes of the plant. You can buy twice the house in Seattle for the same dollars you spend in San Francisco or Los Angeles. And the taxes aren't too steep either (there is no state income tax).

Schools are good. The State of Washington ranks among the first three in literacy and number one in terms of college graduates per thousand population. Art, theatre and music flourish in the great new Seattle Center, built for the World's Fair.

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The company offers in addition to your salary (which is as good or better than anywhere else) profit sharing, medical insurance, and retirement benefits. So if all this excites you and you fit one of the job descriptions below, write our president, John M. Fluke, in confidence. Interviews will be arranged in Los Angeles, San Francisco, or Seattle at your convenience. Please address Mr. Fluke at P. O. Box 7428, Seattle, Washington.

Design or Senior Engineers with communication theory background, interest in digital circuits, and preferably an MSEE. Minimum experience, two years. Should be familiar with digital circuit design and frequency calibration techniques.

Design or Senior Engineer with minimum of one year's experience in feedback theory and analog circuitry. Applicant should be familiar with differential amplifiers, amplifier and feedback design, AC-DC converters, and state of the art measurement instruments. MSEE desired.

Associate Engineer with good scholastic record and BSEE. No experience necessary. Applicant should have an interest in analog and/or digital circuit design and knowledge of solid state circuitry.

Electronic Package Design Engineer with either BSEE or BSME. Applicant should be familiar with packaging methods in the MHz to 10 GHz region. Two to six years' experience with good mechanical design aptitude required.

Industrial Engineer with three years' experience in electronics or associated industry. Should possess a BSIE. A BSEE or BSME is acceptable if applicant has industrial experience. Candidate must have knowledge of methods, value, and process analyses, and work simplification.

Senior Production Engineer with four years' experience. Should be a mechanical engineer familiar with electronics or an electronic engineer familiar with mechanical engineering. Applicant must possess a BSME or BSEE. Must be able to carry new product from design to production.

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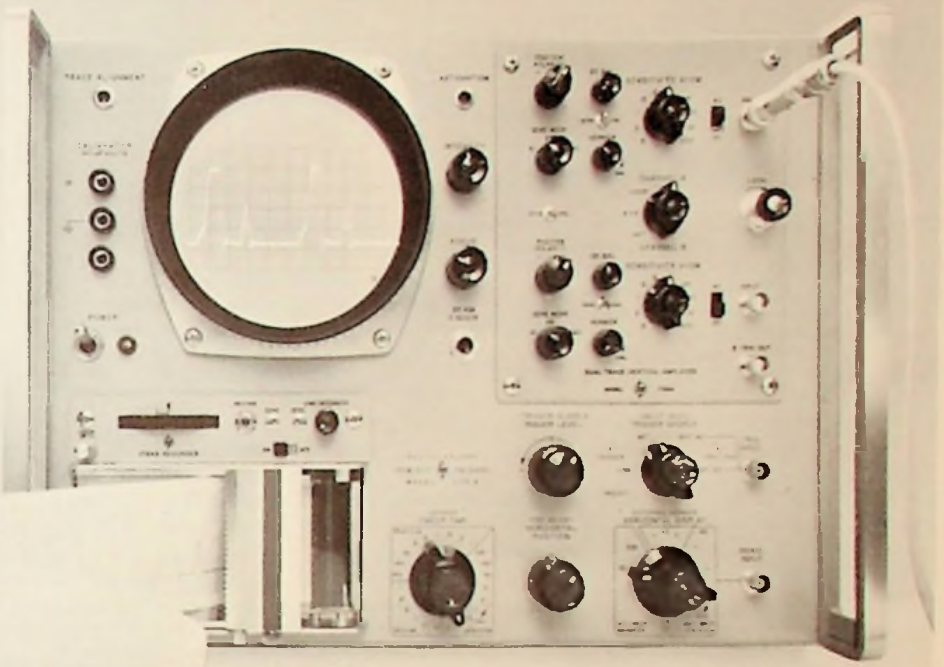

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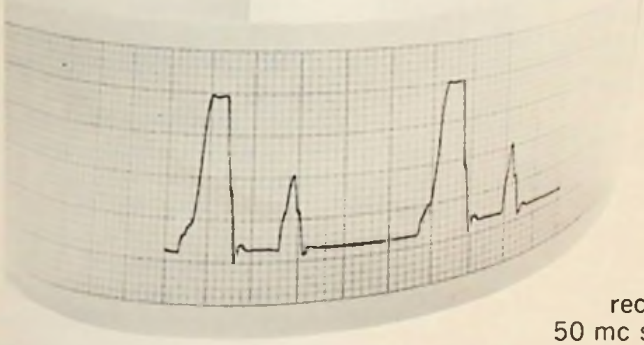

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section news

1966 FELLOWS

Backgrounds of the nine San Francisco Section members elevated to the grade of Fellow for 1966 follow:

James B. Angell

Cited for technical, professional, and educational contributions in solid-state electronics, he is a professor of electrical engineering and director of the solid-state electronics laboratory at Stanford, currently concerned with research on components for adaptive systems and on techniques for exploiting redundancy in electronic circuits and systems. A consultant to industry and the military, he was chairman of the 1965 International Solid-State Circuits Conference of IEEE, program chairman of the conference for six years, and organized the IRE-AIEE technical subcommittee on masers and reactance amplifiers. A member of the Electron Devices ADCOM, he has been a member of the joint semiconductor devices subcommittee since 1954. Formerly associated with the research laboratory of electronics at M.I.T. and the research division of Philco Corp., Philadelphia, he holds the B.S., M.S., and Sc.D., all from M.I.T.

Nelson M. Blachman

Cited for contributions to statistical communication theory and information theory, he is senior scientist, serving as consultant on communication theory, at the systems branch of Sylvania's Electronic Defense Laboratory, Mountain View. He is the author of some four dozen scientific papers, and his book, "Noise and Its Effect on Communication," will be published late in 1966. Formerly associated with the underwater sound laboratory and Cruft Laboratory at Harvard University, Brookhaven National Laboratory, where he was concerned with the theory and design of the Cosmotron, and the mathematical sciences division of the Office of Naval Research, he served the London branch of ONR from 1958 to 1960. Recently returned from a Fulbright lectureship in Spain, he holds the B.S. from Case Institute of Technology, the M.A. and Ph.D. from Harvard.

Joseph Feinstein

Cited for contributions to crossed-field microwave tubes, he is vice president, research, Varian Associates, where his area has included research and development of forward wave crossed-field amplifiers, noise generator studies, and investigations of quadrupole amplifiers. Work in millimeter waves and in low-noise microwave tubes, as well as theoretical work in

(Continued on page 9)

meeting ahead

SIMULATED HUMAN EAR

Dr. John L. Stewart, president, Santa Rita Technology, Inc., Menlo Park, will describe progress in the simulation of the human ear at a joint meeting of the Audio & Electroacoustics, Circuit Theory, and Engineering in Medicine & Biology chapters on December 14.

An analog simulation for mechanical vibrations of the human ear has revealed how non-Fourier frequency filtering results in a space-time pattern for complex signals such as speech. Studies of physiological and behavioral phenomenon in insects and birds have suggested an evolutionary line to man in which neural processing takes place subsequent to mechanical analysis in the external ear. Results can be interpreted in terms of a two-dimensional motion-picture-like display containing measures of both naturalness and intelligibility. Applications and interpretations in connection with such things as speech recognition, prosthesis, bandwidth compression, echoranging, and psychoacoustics will be discussed.

Dr. Stewart was educated at Stanford, receiving the Ph.D. in electrical engineering in 1953. Previously he had contributed to guidance theory and design of early Corporal missiles at JPL and to AMTI radar at Hughes Aircraft Co.

After receiving the doctorate, he began a teaching career at University of Michigan, subsequently moving to California Institute of Technology, University of Southern California, and University of Arizona. His analog ear research was begun in 1960 at Arizona. He left the university in 1962, continuing his research as president of Santa Rita Technology, Inc., which he founded in Tucson. The company and its work moved to Menlo Park in 1963.

Dr. Stewart has authored three textbooks and a number of papers in engineering and life sciences journals.

meeting ahead

RELIABILITY & SMOG

The effects of reliability and smog on the daily lives of space electronics engineers and managers will be discussed at the December 14 meeting of the Reliability chapter.

The speaker, Lt. Col. William D. Greenfield, chief of the vehicle engineering division of the Agena space vehicle directorate, AFSSD, Los Angeles, received the B.S.E.E. at the Institute of Technology, Wright Air Force Base, and the M.S.E.E. at Stanford University.

Stewart

Berlekamp

meeting ahead

CONVOLUTIONAL CODES

Dr. Elwyn R. Berlekamp, assistant professor of electrical engineering, University of California, Berkeley, will address the December 16 meeting of the Information Theory chapter. He will discuss convolutional codes, invertible arrays, and noise bursts.

The ability of convolutional codes to detect or correct many types of noise bursts depends on the invertibility of certain matrices whose elements are coefficients of the code's generating polynomial. The speaker shows that by proper choice of these elements one can construct codes which are uniquely optimum in their ability to correct erasure bursts or detect error bursts with the minimun delay. He will elaborate on a structure which can be exploited to make decoding of the erasure bursts unusually simple.

Prof. Berlekamp is a consultant to the communications systems research section at Jet Propulsion Laboratories. He earned his Ph.D. at M.I.T. as a National Science Foundation Fellow.

meetings ahead

EAST BAY SUBSECTION

Program plans for 1966 for the East Bay Subsection have been announced by E. D. Jackson, publicity chairman: January 24, Space Communications—Dr. Reukema; February 28, Oceanography; March 28, Vallecitos Atomic Power Plant; April 25, Student Meeting; May 20, Ladies Night and installation of new officers —electrical and electronic aspects of wine tasting at a winery to be announced. All but the March and May meetings will be held at the PG&E Center, 4801 Oakport, Oakland.

meeting ahead

AMES TOUR

The Aerospace & Electronic Systems chapter will sponsor a tour of Ames Laboratory, Moffett Field, on January 27. Reservations will be required for the meeting, which will be limited to 50 persons.

meeting ahead

TECHNOLOGY IN GOVERNMENT

The first opportunity for many to hear an analysis of state government studies recently conducted by members of the California technical community will be presented at the December 8 ladies' night dinner meeting jointly presented by the Section, the Computer chapter, and the Industry & General Application chapter. Harold R. Walt, deputy director, Dept. of Finance, State of California, will discuss the role of technology in state government.

Mr. Walt intends to talk particularly about the application of systems engineering to improve government. He will discuss four feasibility studies which are examples of the application of systems engineering in the fields of waste management, information retrieval, crime and delinquency and transportation. California is applying Department of Defense techniques with problems that are getting out of hand, and should be solved more inexpensively than by other methods.

Former assistant budget director of Kaiser Industries, Mr. Walt has served the University of California, Berkeley, as assistant dean of men, project business manager of the biological laboratories, budget director of the Berkeley campus, administrative assistant to the chancellor, and assistant director of University Extension. He holds three degrees from the university, including a B.S. and M.B.A. in business administration. As deputy director, he has been assigned primary responsibility in state government for economic development, planning, and reconversion.

Early reservations for the dinner meeting are urged.

region 6 news

ANGWIN HONORED

Bruce S. Angwin, electronic components division, General Electric, Los Angeles, and director, Region 6, was among the 125 members recently elevated to Fellow grade for 1966, his citation reading "for dynamic leadership in the growth of the electronics profession."

Chairman of the Los Angeles Section (IRE) in 1954, he was a member of the WESCON board of directors from 1955 to 1962 and has served IRE, IEEE, and WESCON in many capacities, including those involving region and section bylaws and merger matters.

Thirty-three sections make up Region 6, the eleven western states, largest in IEEE.

ieee news

NEW IEEE PRESIDENT

Dr. William G. Shepherd, vice president, academic administration, University of Minnesota, has been elected president of the IEEE for 1966, it has been announced by the IEEE board of directors. Dr. Shepherd succeeds Dr. Bernard M. Oliver, vice president of research and development, Hewlett-Packard Company, Palo Alto. As president, Dr. Shepherd will head the world's largest engineering society, which now has an international membership of over 146,000 engineers and scientists in the electrical and electronics field.

One of the vice presidents for 1966 will be Walter K. MacAdam, vice president, government communications, American Telephone and Telegraph Company, New York, who previously served on the board of directors as a director-at-large from 1964 to 1965.

Also elected were the following delegates-at-large/directors-at-large for the term 1966-1968: Dr. Edwin L. Harder, Westinghouse Electric, and Dr. John G. Truxal, Polytechnic Institute of Brooklyn.

In addition, the following regional delegates/regional directors were appointed for the 1966-1967 term: Dr. W. Crawford Dunlap, National Aeronautics and Space Administration; Prof. Rufus G. Fellers, University of South Carolina; Prof. Carl R. Wischmeyer, Rice University; and Allan B. Oxley, Canadair, Montreal, Quebec.

The remaining two vice presidents, secretary, treasurer and directors will be announced following the annual assembly of the IEEE.

ieee news

1966 CONVENTION

The IEEE International Convention is scheduled for March 21-25 at the New York Hilton and New York Coliseum. Watch the **IEEE Spectrum** for complete details.

ieee news

INSURANCE PROGRAM

Complete information kits on the IEEE insurance program, including the group life insurance plan for members and their eligible dependents (underwritten by New York Life Insurance Co.) and accidental death and dismemberment coverage for members and their spouses (underwritten by American Casualty Co.), may be obtained by writing to: Administrator, IEEE Insurance Program, 1707 L St., N.W., Suite 800, Washington, D.C. 20036.

Moore *Lamm*

wescon news

1966 OFFICERS

Hugh P. Moore has been elected chairman of the eight-man WESCON board of directors for 1966, and Ralph A. Lamm will serve as chairman of the executive committee.

Moore is president of Computer Equipment Corp., Los Angeles, and Lamm is manager, advanced requirements, of Bendix Pacific Division, North Hollywood.

William J. Moreland, general manager of the Conrac Division of Giannini Controls Corp., will be WESCON's show director, and John J. Guarrera, president of Guide Industries, Inc., Sun Valley, Calif., will serve as convention director.

MORE SKY PILOTS

served as assistant rabbi, director of religious education, and director of youth activities at Temple Beth El, Detroit, Michigan, from 1947 to 1951, and was rabbi of Temple Beth El, Berkeley, for ten years.

Rev. Good is associate professor of religion and Hebrew, Stanford University, and earned the B.A. from Westminster College, Pa., the B.D. from Union Theological Seminary, N.Y., after attending Princeton Theological Seminary, and the Ph.D. from Columbia University. He has taught at Union, Princeton, Pacific School of Religion, and Starr King School for the Ministry, joining the Stanford faculty in 1960.

You are IEEE's best membership salesman. Return the pledge card in this issue and deliver the application form to one of your colleagues, following up to see that he completes and mails it with his check.

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Moreland

Guarrera

Moore, Lamm, Guarrera, Moreland, and Don Larson, general manager, make up the 1966 executive committee.

Two new members of the board of directors were also announced. They are Emmet G. Cameron, vice president, engineering, of Varian Associates, and John C. Beckett, government relations manager, Hewlett-Packard Co. They succeed John A. Chartz, Dalmo Victor Co., and John S. McCullough, Litton Industries, both retiring from the board.

Phillip L. Gundy, president of Vega Electronics Corp., and Meyer Leifer, vice president of Energy Systems Inc., both of Palo Alto, are holdover members of the board.

WESCON's eight-man board of directors is traditionally made up of four executives from southern California and four from northern California. Each of WESCON's co-sponsors, the IEEE and the Western Electronic Manufacturers Association, nominates four directors. Directors serve four-year terms.

The four directors from the current year "host city" for WESCON—in 1966, Los Angeles is the host city—are members of the executive committee for the year, along with the general manager.

WESCON will be held in Los Angeles August 23-26, 1966.

MORE FELLOWS

high efficiency lasers, was also carried out under his direction. Formerly associated with ITT's Federal Communications Laboratories, New York, National Bureau of Standards, Washington, D.C., and Bell Telephone Labs, Murray Hill, N.J., his major technical contributions during this period include the invention of the coaxial magnetron, the development of slow-wave circuits for crossed-field amplifiers, and the theoretical work on electron interaction in the magnetron amplifier. He holds the B.S. from Cooper Union, the M.A. from Columbia, and the Ph.D. from N.Y.U.

Gordon S. Kino

Cited for contributions to the design of electron guns and to high frequency behavior of gaseous plasmas, he is a professor of electrical engi-

(Continued on page 10)

MORE FELLOWS

neering at Stanford now working mainly on collective effects in solid-state materials. The group at Stanford he headed developed analytic methods which have been applied, in particular, to design of new types of crossed-field and magnetron injection guns. In the plasma field, he and his students were the first to observe parametric oscillations in a plasma, to obtain beam-plasma amplification in a thermally ionized cesium plasma, and to provide a detailed understanding of the rf properties of the plasma sheath. He was formerly associated with Mullard Radio Valve Co., Surrey, England, and Bell Telephone Labs, Murray Hill, N.J. He holds a B.Sc. and M.Sc. from London University and a Ph.D. from Stanford.

Tetsu Morita

Cited for contributions in the fields of antennas and the interaction of electromagnetic energy with plasmas, he is manager of the electromagnetic sciences laboratory at Stanford Research Institute, where he has been engaged in antenna research, including evaluation of ECM and missile guidance antenna performance and power handling limitations of antennas. More recently his research has been in electromagnetic interactions with plasmas. As manager he is supervising research in re-entry physics, environmental effects on antenna systems, and electromagnetic interference problems. He is the author of numerous articles. Formerly head of the antenna research group at Harvard, he holds the B.S. from the University of Nebraska, the M.S. and Ph.D. from Harvard.

Robert N. Noyce

Cited for leadership in research, development and manufacture of semiconductor devices, he was one of the founders of Fairchild Semiconductor and is now group vice president with responsibility for the semiconductor and instrumentation divisions. His contributions to the development of diffused silicon devices include extension of design theory and development of a diffused silicon field-effect transistor, an explanation of the previously unexplained leakage currents in silicon junctions, and data in junction transistors design and fabrication techniques. He holds twelve patents on semiconductor methods, devices and structures. Formerly associated with Philco Corp., where he was leader of a solid-state physics group which worked on the development of germanium and silicon high-frequency transistors, and Shockley Semiconductor Laboratory, where he directed the design and development of diffused silicon transistors and investigated the basic recombination process in semiconductors, he holds the A.B. from Grinnell and the Ph.D. from M.I.T.

Hugh C. Ross

Cited for contributions in the development of high vacuum switching equipment, he is president of Ross Engineering Corp. and owner of Ross Engineering High Voltage Consultants, currently developing and manufacturing HV switches, relays, and devices. He has been responsible for major development and application in HV electronic and power devices, including vacuum relays, capacitors, and the vacuum power interrupter. Other areas of invention include HV vacuum tube voltmeters, the triggered vacuum spark gap, very low inductance energy storage systems, and determination of corona and X-radiation from cold emission associated with HV devices, with eight patents issued and pending. Past chairman of the Santa Clara Valley Subsection, he was formerly associated with Jennings Radio and received the B.S. from Stanford, with post graduate work at the Ryan High Voltage Laboratory.

Anthony E. Siegman

Cited for contributions to the theory and application of masers and lasers to communications, he is a professor

(Continued on page 12)

ATTENDANCE RECORD FOR WESCON IN SAN FRANCISCO VERIFIED BY AUDIT

WESCON has announced verification of 37,960 industry visitors to the four-day exhibit and convention in San Francisco in August.

In a report to exhibitor-companies, General Manager Don Larson noted that the attendance total topped the previous all-time high for a WESCON held in San Francisco, which was 35,026 visitors in 1963. The 1965 total, plus individual totals by industry category, occupation, departmental assignment, and geographical location, was verified by Lybrand, Ross Bros. & Montgomery, certified public accountants, in Los Angeles.

The verified attendance analysis, first undertaken by WESCON in 1964 as the pioneer effort in an Association of National Advertisers program to encourage auditing of attendance at major trade and technical conventions, again meets all basic requirements of the ANA program.

Commenting on the 1965 results, Larson said that WESCON directors found that "an increase of nearly 3000 visitors to WESCON seems particularly significant, since many major trade shows have reported leveling off or decreases in total attendance."

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Quan-Tech Labs ..... Jay Stone & Assoc.

Ram Electronics, Inc. ..... Jay Stone & Assoc.
Remanco Inc. ..... Jay Stone & Assoc.
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Royal McBee Corp., Ind. Prod. Div. ..... Costello
Rutherford Electronics ..... Moxon Electronics

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2555 Park Blvd.,
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Dynamic Associates
1011-D Industrial W
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Frauman Associates
P.O. Box 357
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Geist Co., W. K.
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968-1608, 253-5433

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(Scientific Marketing Assoc.)
1094 West Evelyn Ave.,
Sunnyvale; 245-2500

[illegible]izer Co., T. Louis
[illegible]020 Corporation Way,
Palo Alto; 968-8304

[illegible]ne & Assoc., Jay
[illegible]40 Main Street,
Los Altos; 948-4563

[illegible] Thorson Company
[illegible]443 Ash Street,
[illegible]alo Alto; 321-2414

Walter Associates
Box 790, Menlo Park;
323-4606

Wadsworth-Pacific Mfg. Assoc., Inc.
71 Parker Avenue, Atherton;
321-3619

Willard Nott & Co.
1485 Bayshore Blvd.
San Francisco; 587-2091

the section

MEMBERSHIP

Following are the names of individuals who have been elected to current membership:

Mason E. Byles
Lyle C. Eyer
Hampson Lum
Walter F. Lutzweit
Marion D. Swadley

MORE FELLOWS

of electrical engineering at Stanford currently directing a research program in optical masers and their applications. He has published numerous technical articles in the fields of microwave electron tubes, parametric amplifiers, microwave and optical masers, and modulation and demodulation of light, including a book on microwave solid-state masers. He was a member of the steering committees for the quantum electronics conferences of 1959 and 1961, is a delegate from the IEEE Group on Microwave Theory and Techniques to the recently formed Joint Council on Quantum Electronics, and will be program chairman of the Fourth International Conference on Quantum Electronics in 1966. He holds an A.B. from Harvard, an M.S. from U.C.L.A., and a Ph.D. from Stanford.

Alan T. Waterman, Jr.

Cited for contributions to the science and practice of trans-horizon radio propagations, he is a professor of electrical engineering at Stanford whose research field is the propagation of short electromagnetic waves (micro, millimeter and optical) through atmosphere. He is currently chairman of the IEEE Group on Antennas and Propagation and secretary of the U.S. National Committee of International Scientific Radio Union (URSI) and formerly was chairman of the San Francisco Communication Systems chapter, chairman of the Commission II of URSI, and treasurer and secretary of the San Francisco Section (IRE). He has served on various committees, panels and consulting arrangements in government and industry. He holds an A.B. from Princeton, a B.S. from Cal Tech, an M.A. and Ph.D. from Harvard.

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Write or call: Ernesto A. Montano, IEEE Grid, Suite 2210, 701 Welch Rd., Palo Alto, Telephone (415) 327-6622.

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Experience in design development or manufacture of klystrons BWO or TWT's. Should be familiar with microwave techniques and vacuum tube engineering. Experience in systems and evaluation helpful.

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Duties will include design of temperature control devices, electro and permanent magnets and some mechanisms design. Servo mechanism design experience helpful. Should be familiar with scientific instrument packaging oriented toward productizing designs for factor production.

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To handle transfer of products from development into manufacturing. Prefer strong background in the electronics or instrumentation field. Experience in production processes and methods necessary.

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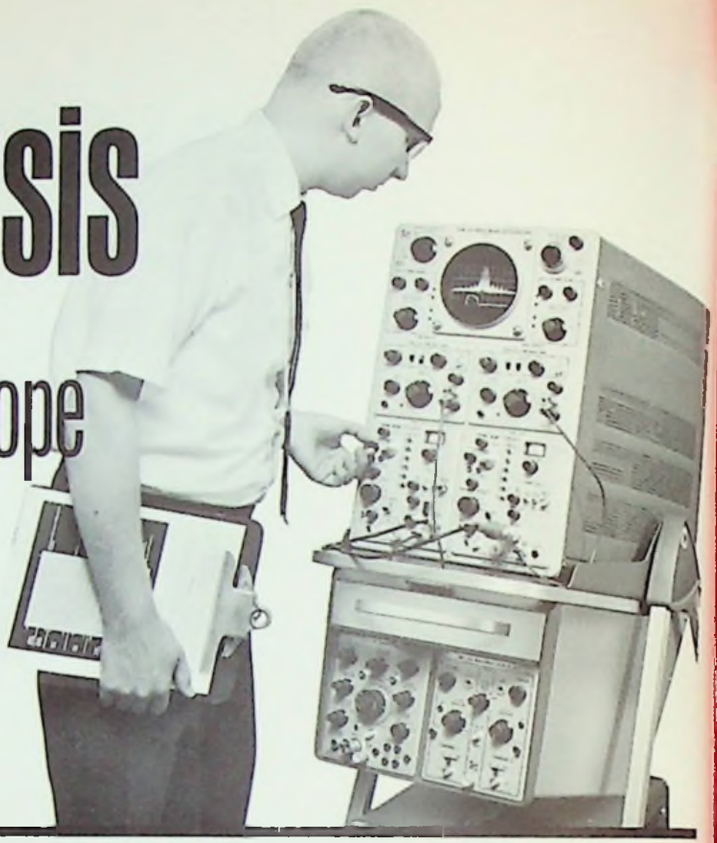

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10 MHz · 4.2 GHz	**925 MHz · 10.5 GHz**

These new spectrum analyzer plug-in units can be used in all Tektronix oscilloscopes that accept letter-series plug-ins. They provide a rapid and accurate method for display and analysis of energy distribution over a wide range of frequencies. *Type 1L10 with similar features covering frequency range from 1 MHz to 36 MHz also available.*

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other characteristics	Type 1L20	Type 1L30
Frequency Range	10 MHz—4.2 GHz	925 MHz—10.5 GHz
Minimum Sensitivity	110—90 (-dBm)	105—75 (-dBm)
Incidental FM	With Phase Lock, less than 300 Hz on fundamental.	
Dial Accuracy	±(2 MHz ±1% of rf input frequency)	
IF Attenuation	51 dB ±0.1 dB/dB in 1-dB steps	
IF Gain	50 dB, variable	
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