

IEEE
Grid

APRIL 1966

SAN FRANCISCO SECTION
INSTITUTE OF ELECTRICAL
AND
ELECTRONICS ENGINEERS



1966

Region Six

ANNUAL CONFERENCE

*Theme: Future engineering
for earth and space*

TUCSON 26-27-28 APRIL



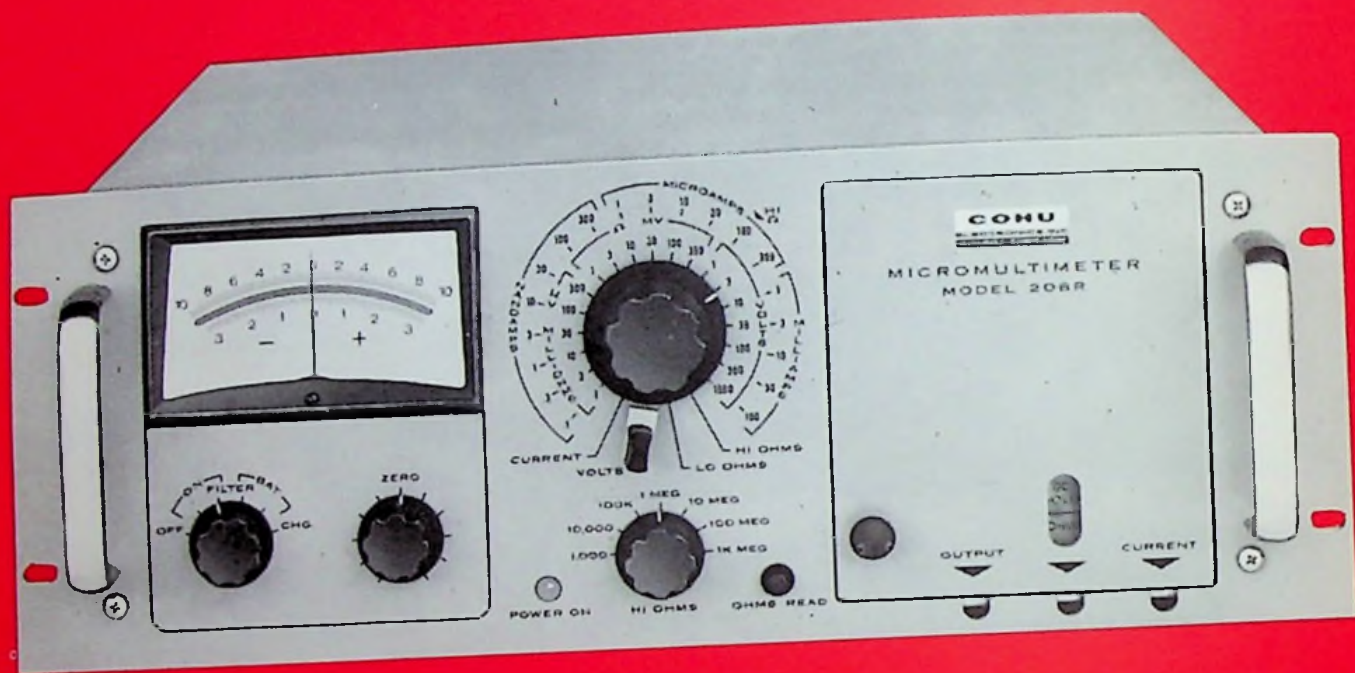
meeting reminder

- Aerospace & Electronic Systems, Tuesday, April 5, Tuesday, May 16
- Antennas & Propagation, Tuesday, April 12
- Automatic Control, Tuesday, April 19
- Circuit Theory, Tuesday, April 19
- Computer, Tuesday, April 12
- Communication Technology (EWS/SCVSS) Wednesday, May 11
- Electron Devices, Wednesday, April 13
- Engineering in Medicine & Biology, Tuesday, April 19
- Engineering in Writing & Speech (Comtech/SCVSS), Wednesday, May 11
- Fresno Subsection, Tuesday, April 19
- Information Theory, Thursday, April 28
- Instrumentation & Measurements, Wednesday, May 11
- Microwave Theory & Techniques, Thursday, April 21
- Nuclear Science, Tuesday, April 19, Tuesday, May 16
- Parts, Materials & Packaging, Tuesday, April 26
- Power, Wednesday, April 20
- Reliability, Monday, April 18
- San Francisco Section (SCVSS) Wednesday, April 20, Wednesday, June 15
- Santa Clara Valley Subsection (SFS) Wednesday, April 20, (Comtech/EWS), Wednesday, May 11
- Vehicular Communications, Tuesday, May 3

SUITE 2210, 701 WELCH ROAD, PALO ALTO, CALIFORNIA
POSTMASTER RETURN REQUESTED



COHU introduces FIVE precision test instruments IN ONE



Model 208R Micromultimeter

AT LESS COST, IN FAR LESS SPACE than closest equivalent instrumentation, Model 208R combines performance not previously available in one device.

HIGH RANGES AND LOW RANGES in one instrument give you the advantages of a DC microvoltmeter with ranges to 1000 volts, a microammeter, a wide range ohmmeter, an electronic galvanometer, and a narrow-band DC amplifier.

CHECK THESE FEATURES. Available for rack mounting or bench-top use, Model 208R operates from 115 or 230 volts, 50 to 400 cps, and from optional nickel-cadmium battery pack. Circuitry is solid state, chopper stabilized. Electrical output is suitable for driving a strip-chart recorder. Extra-long probes are stored on plug-in holders in a handy internal compartment, accessible from the front panel. \$1495. Additional export charge.

Send for product information or demonstration of the COHU Model 208R Micromultimeter, or any of COHU's line of precision instruments. Representatives located in all major cities.

REGIONAL OFFICE, 406 CHANNING AVE., PALO ALTO, CALIF. 94300, PHONE: (415) 327-3911

CHECK THIS PERFORMANCE:

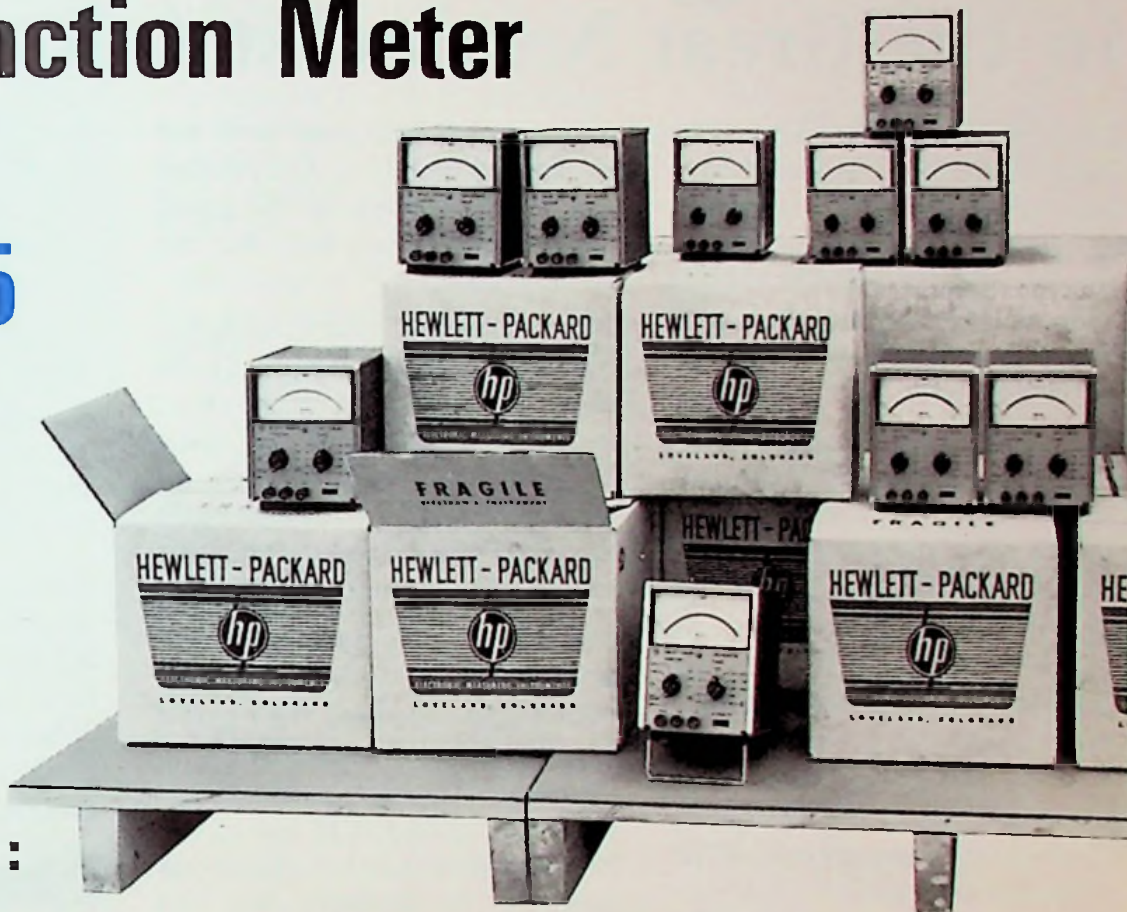
	VOLTAGE MEASUREMENTS	CURRENT MEASUREMENTS	RESISTANCE MEASUREMENTS
SCALES (full-scale indication)	10 ⁻⁶ to 10 ³ volts DC	10 ⁻¹⁰ to 10 ⁻¹ ampere DC	10 ⁻³ to 10 ⁹ ohms
ACCURACY	1% of full scale or 10 ⁻⁷ volt, whichever is greater	1% of full scale or 10 ⁻¹¹ ampere, whichever is greater	10 ⁻³ to 10 ⁸ ohms scales: 2% of full scale or 10 ⁻⁴ ohm, whichever is greater 10 ⁹ ohms scale: 3% of full scale
INPUT RESISTANCE	10 ⁻⁵ to 10 ³ volt scales: >10 ⁸ ohms 10 ⁻⁶ and 3 x 10 ⁻⁶ volt scales: >10 ⁷ and 3 x 10 ⁷ ohms	10 ⁻¹⁰ to 10 ⁻⁵ ampere scales: 10 ⁴ ohms 3 x 10 ⁻⁵ and 10 ⁻¹ ampere scales: 10 ¹ ohms	N/A
DRIFT (30 minute warmup)	<2 x 10 ⁻⁷ volts	<2 x 10 ⁻¹¹ amperes	<2x10 ⁻⁴ ohms

COHU
ELECTRONICS, INC.
SAN DIEGO CALIFORNIA

NEW

Hewlett-Packard Multi-function Meter

For Just
\$195



**Accurately
Measure:**

DC Voltage ± 100 mv to ± 1000 v full scale ($\pm 2\%$ accuracy)

AC Voltage 10 mv to 300 v rms full scale, 10 Hz to 1 MHz ($\pm 2\%$ accuracy)

Resistance 10 ohms to 10 megohms center scale ($\pm 5\%$ of midscale reading accuracy)

Here's Hewlett-Packard quality in a low-cost, solid-state, battery-operated multi-function meter, the new hp 427A!

And you can get it for the lowest cost—check it against *any* comparable instrument!

Minimum zero drift. For dc measurements you get 1 mv resolution. The ac meter is average-responding, calibrated in rms volts. Only one zero set for dc and resistance measurements... no need to re-zero when switching from dc to ohms measurements... seldom "zero" on the 1 v range and above.

Long battery life. Basically battery operated (battery supplied), the 427A uses a dry-cell battery with a regulator; front-panel battery check provided, reads under load regardless of range switch setting. 300 hours' typical operation per battery. AC-battery operation, 115/230 v, 50-1000 cps, optional for \$35 additional.

Floating input. Performance is the story: Broad measuring capability, high accuracy, at low cost. Floating input, 10-megohm input impedance and common ter-

minals for ac and dc, high resolution with 9 ranges for dc coverage, 10 ranges for ac, 7 for resistance. Individually calibrated taut-band meter. Has overload protection for all functions.

Highest value. The hp 427A is a *real buy*... the best instrument of its type you can find... at a price that gives you the best available performance at the lowest available price (\$195). There's no other meter to match it.

If you *need* a demonstration, call your Hewlett-Packard field engineer. If you merely need to know complete performance specifications in order to get this low-cost measurement tool working for you, write

**HEWLETT
PACKARD**  **NEELY**
SALES DIVISION

North Hollywood, (213) 877-1282 • Palo Alto, (415) 327-6500 • Sacramento, (916) 482-1463 • San Diego, (714) 223-8103 • Scottsdale, (602) 945-7601 • Tucson, (602) 623-2564 • Albuquerque, (505) 255-5586 • Las Cruces, (505) 526-2486 • Seattle, (206) 454-3971 • Denver, (303) 771-3455 • Salt Lake City, (801) 486-8166

Data subject to change without notice. Price f.o.b. factory.

Up in Seattle, we make basic tools for precision electronic measurement. We make them well. If you think you'd like to help us make them even better and live in the Great Northwest too, let's talk.

For almost a generation, we (The John Fluke Mfg. Co., Inc.) have been one of the world's leaders in metrology. Recently, the demand for our quality instrumentation has created a number of unusually fine professional employment opportunities.

So if you want to join a medium size, well-respected company where your contribution stands out and your identity means something to everyone from the president on down, this is a grand opportunity. Our engineers work in a sophisticated technical environment with great personal freedom to pursue design problems as they see fit. We pick up the total tab on a company-sponsored graduate program for eligible personnel at the University of Washington (now widely regarded as one of the 10 best universities in the Nation).

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.

If the outdoors is your after hours bailiwick, Washington State offers great skiing (with short lift lines), the nation's best boating, outstanding hunting and fishing (sometimes, the other guy on the stream is five miles away), and fine hiking and climbing.

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 Engineering Manager, Mr. Ted Thomsen, in confidence. Interviews will be arranged in Los Angeles, San Francisco, or Seattle at your convenience. Please address Mr. Thomsen at P. O. Box 7428, Seattle, Washington.

Design or Senior Engineers with communication theory background and/or interest in digital circuits. 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, digital 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.

AN EQUAL OPPORTUNITY EMPLOYER



MEMBERSHIP

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

- | | |
|-------------------|-----------------|
| D.C. Andrus | R.H. Hazen |
| R.H. Auld, Jr. | C.E. Hechathorn |
| R.B. Berry | A.B. Holbrook |
| W. Burnett-Jones | H.A. Keep |
| R.A. Carberry | K.N. Levitt |
| B.R. Clegg | R.L. Manildi |
| J.E. Edwards, Jr. | R.B. McCullough |
| E.V. Giddings | R.C. Nicol |
| D.A. Griffiths | W.A. Rytand |
| C.D. Gronlund | O.J. Tveit |
| R. Hassun | I.W. Wolf |

Following are the names of members who have recently entered our area, thereby becoming members of the San Francisco Section:

- | | |
|--------------------|----------------|
| R.L. Anderson | J.S. Kolp |
| J.S. Capps | D.J. Leonard |
| J.B. Chown | M.C. Mains |
| P.B. Clark | P.H. Nathes |
| W.E. Daly | I. Matthews |
| J. Drexler | D.E. Nelson |
| H. Dunlap, Jr. | B.F. Price |
| R.B. Earl | A.A. Recuperio |
| S.A. Erickson, Sr. | R.E. Sheldon |
| D.K. Fibush | K.E. Sladky |
| R. Gaebele | P. Surnasky |
| R.A. Hirschfeld | D.J. Veca |

The San Francisco Section covers 22 northern counties of California.

cover

Designed by G. B. Athey of Burr-Brown Research Corp., Tucson, the cover is descriptive of the research-oriented activities to be found in Region Six. Tucson and Kitt Peak have become noted astronomical and solar research centers; space explorations are planned and controlled from Pasadena and Alamogordo. Development of advanced concepts and equipment for air transport is in progress in several California locations and in Seattle. Future air-combat equipments are tested at Edwards AFB, California, and future ground and avionics equipment are tested at Fort Huachuca, Arizona.

San Diego is a center of undersea research, while a large percentage of electronic instrumentation originates in the Portland and San Francisco Bay areas. Solid-state circuit research and computer development are carried on in several locations in the region. An atomic overtone to all the above activities is supplied from various sites in Nevada, Idaho and New Mexico, and the entire region is linked with power-transmission networks which employ the most advanced engineering principles.

BRILL

OAKLAND • MOUNTAIN VIEW

● *2 locations*

○ *off-the-shelf*

● *immediate delivery*

○ *O.E.M. prices*



○ *capacitors*

● *semi-conductors*

○ *resistors*

● Sprague is a featured line at Brill and stocked in depth for prompt delivery. Send for free literature.



BRILL
ELECTRONICS

OAKLAND—610 E. 10th St. Phone 834-5888
MOUNTAIN VIEW—1065 Terra Bella Phone 961-1500

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

address all mail to
IEEE, Suite 2210, 701 Welch Road
Palo Alto, California 94304
Telephone: (415) 327-6622

Members: send address change promptly to IEEE, 345 East 47th St., New York, N.Y. 10017
Send copy of letter to Section Office

executive editor:
JAMES D. WARNOCK

advertising director:
ERNESTO A. MONTANO

editorial & advertising assistant:
MRS. JEAN HELMKE

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

contents

- The Section-Membership—3
- Meeting Calendar—4, 5, 6
- Meetings Ahead—4-15
- IEEE News—7, 11, 12, 13
- Region 6 News—8
- From the Chairs—Mem. Chair.—16
- Grid Swings—16, 17, 18, 20
- Mfg./Rep. Index—19
- Advertisers Index—20
- Classified Advertising—20

san francisco
section officers

- Chairman: Jack L. Melchor
- Vice Chairman: E. H. Hulse
- Secretary: Fred J. MacKenzie
- Treasurer: J. E. Barkle
- Membership Chairman: John Damonte, Daimo Victor, 591-1414

Publications Advisor:
David Kirby
Hewlett-Packard, 326-7000

Executive Secretary:
James D. Warnock,
Section Office, Suite 2210, 701 Welch Road
Palo Alto, California, 327-6622

Second class postage paid at San Francisco

advertising

California & National: E. A. Montano, IEEE,
7701 Welch Rd., Palo Alto, Calif. (415) 327-6622
East Coast: Cal Hart, Martin & Hart,
25 W. 43rd St., New York, N.Y., LW 4-1290

TURBULENT PLASMA

Dr. Harold Guthart, research engineer, electromagnetics science labs, SRI, will discuss scattering from an underdense turbulent plasma at the April 12 meeting of Antennas & Propagation chapter.

The bistatic radar cross section of an underdense, inhomogeneous turbulent plasma was measured at X-band and the results were compared with a theoretical model. The turbulent plasma is formed by seeding a premixed ethylene-oxygen flame in a combustion chamber and exhausting through an expansion nozzle into a low-pressure vessel. The theoretical scattering model was constructed using the Born approximation and the results of a diagnostic measurement program. Electrostatic probes, biased for ion collection were used to map the variation of the mean and rms electron density throughout the turbulent regions, as well as to measure the correlation coefficient of the plasma fluctuations.

Good agreement between theory and experiment has been obtained for the dependence of cross section on bistatic angle and for the spectrum of fluctuations of the scattered microwave signal. The predicted cross section underestimates the measured cross section by 6 to 11 dB when the measured cross sections are in the range from 10^{-5} to 10^{-5} square meters. The measured cross section was observed to have a square law dependence on electron density in agreement with the Born model for densities up to one percent of the critical electron density. For densities beyond this multiple scattering occurred and the cross section dependence on electron density became linear.

In September, 1959, Dr. Guthart joined the staff of Stanford Research Institute. At the present time, he is investigating electromagnetic interactions with turbulent plasmas, electromagnetic shock tube phenomena, and electromagnetic interactions with finite temperature plasmas. His previous work included studies of the quantum limitations of electromagnetic wave propagation, voltage breakdown phenomena, multidimensional antenna pattern synthesis, and high-power microwave filters.

student news

HEALD OFFICERS

Newly elected officers of the student branch at Heald Engineering College, San Francisco, are Ronald K. Johnson, chairman; Ronald A. Harkleroad, vice-chairman; William I. Russell, secretary; Phil Stevens, treasurer; and Keith A. Crockett, membership chairman.

Meeting Calendar

**APRIL 5, TUESDAY, 8:00 PM — Aerospace & Electronic Systems
Joint with AIAA, AAS and Chemical Engineering Society
Supersonic transport (SST)**

Richard Hepe, chief engineer for SST, Lockheed; William T. Hamilton, chief engineer for SST, Boeing; moderator: Ray D. Kelly, director of technical development, United Air Lines, retired

Place: Stanford University Memorial Auditorium (opposite Hoover Tower)
No dinner

**APRIL 12, WEDNESDAY, 8:15 PM — Antennas & Propagation
Scattering from an underdense turbulent plasma**

Dr. Harold Guthart, research engineer, electromagnetics science labs., SRI

Place: Lockheed Auditorium, Bldg. 202, 3251 Hanover St., Palo Alto

Dinner: 6:00 PM, Rick's Swiss Chalet

Reservations: Claes Elfving, 966-3551, by April 11

**APRIL 12, TUESDAY, 8:00 PM — Computer
Magneto-optics and thermo-magnetic recording**

Dr. C. D. Mee, magnetic storage manager, advanced technology program, IBM

Place: Room ee-134, McCullough Bldg., Stanford University

No dinner

**APRIL 13, WEDNESDAY, 8:00 PM — Electron Devices
Some recent developments in traveling-wave amplifier tubes and
backward-wave oscillators**

Dr. William E. Waters, Varian Associates

Place: PH 101, Stanford University

Dinner: 6:00 PM, Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto

Reservations: Mrs. Beverly House, 326-4000, Ext. 2304 by April 12

**APRIL 18, MONDAY, 6:30 PM — Reliability
Panel discussion: Failure mode analysis**

Richard C. Cornwell, supervisor, reliability/maintainability design support, Sylvania, Mountain View; Rolfe A. Folsom, Jr., vice president, senior scientist/engineer,

Sigma Corp., Los Altos; Ervin S. Dean, LMSC staff engineer, Sunnyvale

Place: Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto

Dinner: 6:30 PM at Rick's

Reservations: Dr. Stuart Bessler, 327-4212 by April 15

**APRIL 19, TUESDAY, 8:00 PM — Automatic Control
Social impacts of feedback control systems**

R. P. Loomba, associate professor of EE, San Jose State College

Place: Engineering Center, 551 University, Santa Clara

Dinner: 6:30 PM, Lucca's, 3160 The Alameda, Santa Clara

No reservations required

**APRIL 19, TUESDAY, 8:00 PM — Engineering in Medicine & Biology
Artificial kidneys and cardiac pacers**

Richard Dewey, M.D. and Noel Thompson, M.D.

Place: Room M-112—Stanford Medical School

Dinner: 6:15 PM, Red Cottage, El Camino Real, Menlo Park

Reservations: Con Rader, 326-1970, Ext. 328, by noon April 19

**APRIL 19, TUESDAY, 7:30 PM — Fresno Subsection
Engineering and maintenance of navigation aids**

O. B. Cox, chief, airways facilities section—FAA

Place: PG&E Bldg., 1401 Fulton, Fresno

No dinner

**APRIL 19, TUESDAY, 8:00 PM — Nuclear Science
X-Raying the Egyptian Pyramids**

Dr. Luis W. Alvarez, University of California, Berkeley

Place: LRL Auditorium, East end of Hearst Ave., Berkeley

Dinner: 6:30 PM, Spenger's Fish Grotto, 1919 - 4th St., Berkeley

Reservations: 447-1100, Ext. 7821 by April 15

APRIL 20, WEDNESDAY, 8:00 PM — Circuit Theory

Frequency multiplication & division for use in integrated circuits

William G. Howard, Jr., research assistant, University of California, Berkeley

Place: Ampex Cafeteria, 401 Broadway, Redwood City

Dinner: 6:30 PM, Red Cottage, El Camino, Menlo Park

Reservations: Jan Mulvihill, 367-3169 by April 19

APRIL 20, WEDNESDAY, 7:30 PM — Power

Engineering the intertie

W. R. Johnson, chief electric generation & transmission engineer, PG&E Co., S.F.

Place: Engineers' Club of San Francisco, 206 Sansome St., S.F.

Cocktails: 5:30 PM

Dinner: 6:30 PM, Engineers' Club

Reservations: GA 1-3184 by April 19

**APRIL 20, WEDNESDAY, 8:00 PM — Santa Clara Valley Subsection/
SF Section**

Pioneers' Night/Ladies Night — The Good Old Days

Joseph Cox, retired manager Westinghouse Sunnyvale facility; Smith De France, retired director of NASA Ames Laboratory; Vernal Diggs, retired chief engineer, Ohio Bell Telephone; Frederick E. Terman, vice president and provost emeritus, advisor to the president, Stanford University; L. E. Reukema, professor of electrical engineering emeritus, University of California, moderator

Place: Holiday Inn, Sunnyvale (Bayshore)

Social hour: 6:30 PM

Dinner: 7:15 PM, \$4.85 including tax & tip

Reservations: Mrs. Jean Helmke, Section Office, 327-6622 by April 18

**APRIL 21, THURSDAY, 8:00 PM — Microwave Theory & Techniques
Status of microwave acoustic developments, 1966**

Dr. Frank A. Olson, head of solid state R&D, Microwave Electronics, Palo Alto

Place: Hewlett-Packard Auditorium Room 1A, 1501 Page Mill Road, Palo Alto

Dinner: 6:30 PM, Rick's Swiss Chalet, 4085 El Camino Real, Palo Alto

Reservations: Ruth Thor, 854-3300, Ext. 196 by April 20

**APRIL 26, TUESDAY, 8:00 PM — Parts, Materials & Packaging
Automatic design engineering (ADE)**

Thomas C. Bean, manager; E. A. Crosse and N. D. Vandever, automatic design engineering, Lenkurt Electric Co., San Carlos

Place: Lenkurt Electric Co., Inc., 1105 County Road, San Carlos, Calif.

No dinner

**APRIL 28, THURSDAY, 8:15 PM — Information Theory
Waveforms & receivers for message estimation in pulse amplitude
modulation**

Donald W. Tufts, assistant professor, Harvard University

Place: Conference Room B, Bldg. 1, SRI, 333 Ravenswood Ave., Menlo Park

Dinner: 6:30 PM, L'Auberge, 2826 El Camino Real, Redwood City

Reservations: Miss Shirley Jackson, 966-3865 by April 27

**MAY 3, TUESDAY, 8:00 PM — Vehicular Communications
Efficient loud speakers for mobile communications intelligibility**

Paul Klipsch, president, Klipsch Associates, Hope, Arkansas

Place: Room 103, Physics Hall, Stanford University

Dinner: 6:00 PM, Rickey's Hyatt House, 4219 El Camino Real, Palo Alto

No reservations required

(Continued on page 6)



Mee

Loomba

meeting ahead

RECORDING TECHNIQUES

"Magneto-Optics and Thermo-Magnetic Recording" will be Dr. C. Denis Mee's subject at the Computer chapter's meeting on April 12.

Dr. Mee states that advanced recording techniques may be anticipated through the application of beam transducers and beam-sensitive storage media. In his presentation, he will consider recent developments in magnetic films with large magneto-optical and thermomagnetic effects for application as magnetic storage media operated upon by a laser beam transducer. He will present estimates of the recording and reading efficiencies for some transparent garnets, ferrites, and europium compounds. These estimates will indicate that for some of the materials used in beam-operated magnetic recording systems, very fast read-out rates from high-density recordings can be predicted.

(Continued on page 6)

meeting ahead

FEEDBACK CONTROL

R.P. Loomba, associate professor of electrical engineering and director of the engineering manpower research project at San Jose State College will discuss the social impacts of feedback control systems at the April 19 meeting of the Automatic Controls chapter.

Dr. Loomba will examine both the promise and the threat of automation to the American society. He will review the new challenges that automation and cybernation have presented to the nation's educational systems and to the preservation of human values.

Is automation a job creator or a job destroyer? Does automation require new solutions? Is man threatened by the possible rule of automation? Dr. Loomba will discuss these and other related questions.

Prof. Loomba has been a member of the faculty at Sa Jose State since September, 1962. In addition to teaching in the electrical engineering department, he is directing a study of the unemployment and re-employment experiences of engineers and scientists

(Continued on page 6)

FREQUENCY MULTIPLICATION AND DIVISION IN INTEGRATED CIRCUITS DESCRIBED

An approach to frequency multiplication and division suitable for use in integrated circuits will be presented by William G. Howard, Jr., research assistant, dept. of electrical engineering, UC, Berkeley at the April 20 meeting of the Circuit Theory chapter.

Frequency multiplication of single-frequency, sinusoidal signals requiring

minimal output filtering can be obtained using integrable electronic analog multipliers. The design of systems of this type is discussed.

Frequency division is possible in systems employing the above multiplication property. A narrow bandwidth method, based on a differential equation approach, is of relatively simple construc-

tion, whereas a phase-locked loop method allows multiplication over wider bandwidths at the expense of an increase in circuit complexity.

Experimental findings will be cited which verify the theoretical results obtained.

MORE COMPUTER CHAPTER

This approach satisfies some—although not all—of the requirements for future systems.

Dr. Mee speaks from a very extensive background in the magnetics field. As early as 1951, he was concerned with research on soft magnetic materials at the magnetic laboratory of the Steel Company of Wales, England. Since then, he has been associated with recording aspects of magnetics for the MSS Recording Company in England, for the CBS Laboratories, and for IBM. He is presently magnetics storage manager for the advanced technology program of the IBM systems development division laboratory, San Jose.

The meeting will be held at 8:00 pm in Room ee-134 of the McCullough Building on the Stanford University Campus. This building is located on Lomita Drive opposite the west side of the main Quad, to the south (toward the foothills), of the Physics Lecture Hall (round structure). Entrance to the building will be via the door opening to the covered walk between the building and the lecture hall.

MORE AUTOMATIC CONTROL CHAPTER

who were laid off by various companies in the San Francisco Bay Area during 1964.

Concurrent with his full-time duties at the college, Dr. Loomba is also a part-time staff member at Stanford Research Institute.

Before coming to San Jose, Dr. Loomba worked at the Jet Propulsion Laboratory, California Institute of Technology. Previous to joining the laboratory, he worked as a senior engineer at the laboratory for electronics in Boston.

Dr. Loomba received his B.Tech degree in 1957 from the Indian Institute of Technology, Kharagpur. He obtained his M.S. and Ph.D. degrees in electrical engineering from the University of Utah in 1959 and 1961, respectively. Dr. Loomba's strong interest in the social and political implications of technology has led him to do further graduate work at Stanford University; he received an M.A. degree in Communications in June 1964, and expects a Ph.D. in political communications in the near future.

Meeting Calendar

MAY 11, WEDNESDAY, 8:00 PM—Communication Technology / SCVSS/EWS/San Jose State Student Branch**Television for instruction; also a tour of college facilities**

Glen Pensinger, technical director, Instructional Television Center, San Jose State
Place: San Jose State College, Educational Bldg., Room 100, 7th & San Carlos Sts. (Parking: State garage, 25c, 7th near San Carlos St.)

Dinner: 6:15 PM, \$2.75 incl. tip, Spartan Cafeteria, San Jose State College
Reservations: Miss Wynne, 291-4039; Jim Shea, 294-6019, or C. G. Griffith, 591-8461, Ext. 525, no later than May 6. (Advance payment accepted)

MAY 11, WEDNESDAY, 8:00 PM—Instrumentation & Measurement
Astrometric camera system for 36 Lick refractor

Bob Rach, Stanford Research Institute

Place: Hewlett-Packard Co., 1501 Page Mill Rd., Palo Alto
Dinner: 6:00 PM, L'Omelette, 4170 El Camino Real, Palo Alto
No reservations required

MAY 16, MONDAY, 8:00 PM—Nuclear Science
Preparation and plans for experiments on Stanford 20 BeV accelerator

Prof. Joseph Ballam, associate director, SLAC, head, SLAC research division

Place: Stanford Accelerator Center Cafeteria

Dinner: 7:15 PM—Cafeteria

Reservations: Cherrill Johnson, 447-1100, Ext. 7421 by May 13

MAY 26, THURSDAY, 7:00 PM—Aerospace & Electronic Systems
Tour of Paul Masson Vineyards

Ladies welcome

Place: Paul Masson Vineyards

Dinner: 7:00 PM at the Vineyard

Reservations: Stephen Marx, 326-4350, Ext. 6048 by May 20

JUNE 15, WEDNESDAY, 8:00 PM—San Francisco Section/All Subsections and Chapters, ladies night
Annual meeting honoring 1966 Fellows; installation of 1966-67 Section Officers**Engineering education in Russia**

Dr. Frederick E. Terman, vice president and provost emeritus, and advisor to the president, Stanford University

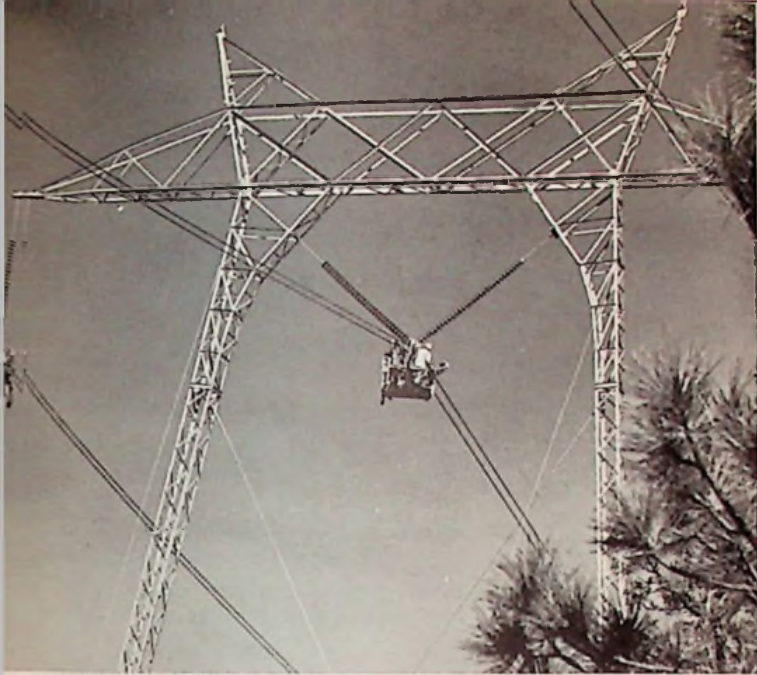
Place: The Bold Knight, 769 No. Mathilda Ave., Sunnyvale (2 blocks west of Bayshore)

Social hour: 6:00 PM (refreshments 65¢)

Dinner: 7:00 PM—roast sirloin of beef, \$4.50 incl. tax & tip

Reservations: Mrs. Jean Helmke, Section Office, 327-6622 by June 13

Tables of eight may be reserved for Subsections, Chapters, Committees and Companies



meeting ahead

ENGINEERING THE INTERTIE

W.R. Johnson, chief electric generation and transmission engineer, Pacific Gas and Electric Company, will speak on the systems engineering problems of the Pacific Northwest-Pacific Southwest high voltage Intertie system at the April 20 meeting of the Power chapter.

Previous reports have dealt mainly with structural and electrical design problems of the transmission facilities, many of which are now under construction. In addition to reviewing progress on this work, the speaker will also discuss briefly the organizational arrangements for coordinating engineering and operating matters.

The Pacific Northwest-Pacific Southwest Intertie has been described as "the biggest single electrical transmission program ever undertaken in this country" and involves the direct participation in construction and ownership of facilities of nine electric utilities or power agencies. Total construction costs have been estimated at \$700 million. Principal transmission links include two 500 KV AC lines and two 750 KV DC lines.

Mr. Johnson is chairman of the intertie system technical studies task force which is carrying out many of the studies relating to the intertie electrical design and capability. He is also chairman of the Edison Electric Institute joint task force on DC transmission which is engaged in a research program on parallel operation of AC/DC transmission systems.

Self-propelled hydraulic carts are used by Pacific Gas and Electric Company crews to install spacers between the paired bundled conductors of 500 kv transmission lines. PG&E is constructing 1,205 miles of these EHV lines in northern and central California for its system operations and as part of the Pacific Northwest-Southwest Intertie system. The carts are suspended from arms which swing out to negotiate passage past insulators. Construction crews at work on construction of 500 kv extra high voltage lines in Shasta County are shown at right.



Johnson



Olson

meeting ahead

MICROWAVE ACOUSTICS

Dr. Frank A. Olson, head of solid state R & D at Microwave Electronics, Palo Alto, will discuss the status of microwave acoustic developments, 1966, at the April 21 meeting of the Microwave Theory and Techniques chapter.

Microwave acoustics is a relatively new topic of microwave research dealing with generation, propagation, and control of acoustic waves in solids at microwave frequencies. Dr. Olson will discuss the principles of thin-film transducers, propagation in dielectric, ferrimagnetic and semiconductor crystals, and acoustic amplification. Miniature microwave components based on these principles, such as delay lines, dispersive filters, amplifiers and light modulators, will be described.

A graduate of Oregon State and Stanford Universities, Dr. Olson has been a research engineer at Sylvania microwave physics laboratory and the Air Force Cambridge research labora-

IEEE news

SWITCHING SYMPOSIUM

The seventh annual symposium on switching and automata theory, sponsored by the University of California and the switching and automata theory committee of the Computer Group, will be held at the University of California, Berkeley, on October 26, 27 and 28, 1966. Papers describing original research results in the general areas of theoretical switching theory, logical design and automata theory are being sought.

Authors are requested to send six copies of detailed abstracts (no word limit) to: Prof. David E. Muller, Mathematics Department, University of Illinois, Urbana, Illinois 61803, by May 2. Authors will be notified of acceptance or rejection by June 17. For inclusion in the proceedings, a typed copy of each accepted paper is due at the above address by August 12.

Local arrangements will be handled by: HEAD, Engineering Extension, University of California, Berkeley, California.

tories prior to his present assignment. At MEC since 1962, he heads the solid state R & D department working on microwave acoustics, nonlinear magnetics and bulk semiconductors. He has authored several papers in these fields and serves on the editorial board of the IEEE Transactions on Microwave Theory and Techniques.

**HELP THE SECTION GROW
BY PLEDGING YOURSELF TO
BRING IN A NEW MEMBER
IN 1966.**

IEEE REGION SIX CONFERENCE PLANNED FOR TUCSON, APRIL 26-28

Final details of the 1966 annual conference of Region 6 in Tucson, April 26-28 have been announced. Advance registration/reservation forms and full details of the technical program may be obtained by calling the San Francisco Section office or writing IEEE Region 6 Conference, P.O. Box 12826, Tucson, Ariz. 85711.

ADVANCE REGISTRATION and RESERVATIONS

Advance registration will be in effect through April 30, 1966. Make checks or money orders payable to 1966 IEEE Region Six Conference.

Advance registration fees are: Member, \$4.00; Non-member, \$5.00; Student, \$1.00; Student non-member, \$2.00.

Regular registration fees are: Member, \$6.00; Non-member, \$7.00; Student, \$1.00; Student non-member, \$2.00.

Registration will be conducted on the mezzanine of the Pioneer International Hotel, Tucson, where a general information center for the conference will be established. The registration desk will be open at the following times:

- Monday, April 25—1 p.m. - 7:30 p.m.
- Tuesday—7 a.m. - 5:00 p.m.
- Wednesday—7 a.m. - 12 noon.

Wives of registrants in attendance need not register or pay fees unless they attend technical sessions. They may attend all luncheons, banquets and tours by merely paying the special fee associated with the particular activity.

The registration badge will be required of all members and non-members for entry to all official conference activities. This includes banquets and luncheons, as well as technical sessions.

TOURS

Tuesday morning. April 26—Tucson Gas and Electric Company.

Tuesday morning. April 26—Titan Missile Site.

Wednesday morning. April 27—U.S. Army Electronics Proving Ground, Fort Huachuca.

TECHNICAL SESSIONS

Tuesday a.m., April 26

- A—Circuit Theory (Part I)
- B—Hybrid and Analog Computers
- C—Reliability
- D—Nuclear Generation of Power

Tuesday p.m., April 26

- E—Circuit Theory (Part II)
- F—Computer Organization
- G—Communications Systems
- H—High Voltage DC Transmission of Power

Wednesday a.m., April 27

- I—System Theory
- J—Solid State and Gaseous Plasmas
- K—Engineering Education

Wednesday p.m., April 27

- L—Information Theory
- M—Biomedical Engineering
- N—Rotating Machinery
- W—Military Electronics—Electromagnetic Compatibility (Part II) (Fort Huachuca)

Thursday a.m., April 28

- O—Automatic Control
- P—Integrated Circuits
- Q—Electromagnetics
- R—Basic Sciences

Thursday p.m., April 28

- S—Optimal Control
- T—Solid State Device Technology
- U—Propagation of Pulses
- V—Atmospheric Electricity

LUNCHEONS and BANQUET

Keynote Luncheon—Pioneer Hotel (\$2.75 per person). Tuesday, April 26. Noon-1:45 p.m., Dr. Richard Bellman, Keynote Speaker.

Region Six Banquet—Pioneer Hotel (\$6.00 per person). Tuesday, April 26. 6:30-9:30 p.m., Dr. W. L. Everitt, Banquet Speaker.

Lakeside Officers' Club Luncheon. Fort Huachuca (\$2.00 per person). Wednesday, April 27, 11:30 a.m.-1 p.m., Major General D. P. Gibbs, Luncheon Speaker.

Western Barbeque Dinner—Forty-Niner Guest Ranch (\$3.50 per person), Wednesday, April 27, 7-10:30 p.m.

Awards Luncheon. Pioneer Hotel (\$2.75 per person), Thursday, April 28, Noon-1:45 p.m., Dr. W. G. Shepherd, president, IEEE, luncheon speaker.

STUDENT ACTIVITIES

Student Paper Contest—Pioneer Hotel, forenoon of Tuesday, April 26.

Southern Arizona Future Engineers Show—Pioneer Hotel. Students exhibits will be on display in the mezzanine, the afternoons of Tuesday, April 26 and Wednesday, April 27. The judging will take place on April 27.

WOMEN'S PROGRAM

Many alternatives are offered the ladies during the three-day conference period. A ladies' lounge is maintained at the Pioneer Hotel which will be the central point from which all activities originate.

SPECIAL MEETINGS LOG

Arizona Council of WEMA. Tuesday, April 26—Evening banquet.

Region Six Directors Meeting, Thursday, April 28.

West Coast Subcommittee of IEEE Substations Communication.

West Coast Subcommittee of IEEE Transmission and Distribution.

CONFERENCE RECORD

Each paper presented at the conference will be published. *Conference Record*

copies are being sold for \$7.50 per copy to members. The fee for non-members will be \$15.00 per copy. The *Conference Record* may be reserved by using the advance registration form or reserved at the registration counter throughout the convention, will be sent by mail following the conference.

CONFERENCE "FOLLOW-ON" ACTIVITIES

Thursday evening, for those conference attendees staying over, an exposition, buffet dinner and dancing have been arranged by the Tucson Industry Assoc. Following the Thursday afternoon technical sessions, buses will transport you to the El Con Center for a preview look at Tucson industry exhibits. From there you will be escorted to the Skyline Country Club for a buffet dinner and dancing. Tickets for this activity will be sold for \$2.50 per person in the hospitality rooms located in the Pioneer Hotel.

meeting ahead

PACERS & KIDNEYS

Artificial kidneys and cardiac pacers will be discussed by Richard Dewey, M.D., and Noel Thompson, M.D., at the April 19 meeting of the Engineering in Medicine & Biology chapter.

Dr. Dewey will talk about the artificial kidney from the standpoint of the physician and patient. Particular attention will be given to the questions of cost (both in time and money), operation, and selection of patients for this treatment. The limits to its general application and associated complications will also be detailed.

Dr. Thompson will discuss problems in cardiac pacemaker design and development. His presentation will emphasize the materials and components aspects of such devices.

SELL SELL SELL

your products and services through the **GRID** the best electronic/electrical engineering medium in northern California.



DeFrance



Reukema

meeting ahead

3RD ANNUAL PIONEERS' NIGHT

Five eminent retired engineers, two of them educators, will participate as panelists and moderator at the 3rd annual pioneers' night jointly sponsored by the Santa Clara Valley Subsection and the San Francisco Section on April 20 at the Holiday Inn on Bayshore in Sunnyvale.

They are Joseph Cox, Smith De France, Vernal Diggs, Frederick E. Terman, and L. E. Reukema.

Joseph Cox graduated from MIT in 1923. He spent 35 years with Westinghouse including the service department in New York, the transmission department in East Pittsburgh and mercury are rectifier in Pittsburgh. He is a Life Member of IEEE, and is the inventor of the ignitron. He holds 25 patents, most of which cover the ignitron. From 1946 to his retirement, he was engineering manager of Westinghouse in Sunnyvale.

Dr. Smith J. De France is a veteran of 45 years in aviation and space research. He recently retired as director of Ames Research Center at Moffett Field. Dr. De France was a combat pilot in World War I before he finished college, and when he earned his degree in aeronautics engineering, he remained in the most exotic areas of flight. He designed huge wind tunnels for research more than 30 years ago, and directed the Ames Center at Moffett Field since 1940; he made the transition into space research when NASA was created in 1958. His leadership and aims have brought about many engineering and scientific achievements in our country's aviation and space programs.

Vernal Diggs graduated from Purdue in 1913. With the exception of service in World War I as Signal Corps captain, he was employed by various divisions of the Bell system until retirement as chief engineer of Ohio Bell in 1958. From 1958-61, he was communications consultant to NATO in Paris. Since his return to the US, he has resided in Pebble Beach.

Dr. Terman, whose honors and awards are literally too numerous to mention, is generally recognized as the

(Continued on page 10)

LOCKHEED
MISSILES & SPACE COMPANY

STRUCTURES
ENGINEERS

Recent contracts require qualified graduate CIVIL, AERONAUTICAL or MECHANICAL engineers for structural analysis in all phases of:

- Civil and Military Aircraft
- Helicopters
- Spacecraft
- Missiles

Deep Submersibles

Advanced Design and Structural Optimization studies in above areas

Basic structural analysis capability is required. Two to six years' experience desired but not mandatory. Structures engineers experienced in fatigue, sonic fatigue, creep, thermo stress, composite structures, shell stability, and failure modes are also needed. U.S. citizenship not required.

MASS PROPERTY
ENGINEERS

Design—Weight Engineers or Weight Analysts with two to four years' experience in mass property engineering are required to perform design, analysis, and control for various types of missiles, space vehicles and aircraft.

Engineers are invited to write Mr. K. R. Kiddoo, Professional Placement Manager, Sunnyvale, California. Lockheed is an equal opportunity employer.

LOCKHEED
MISSILES & SPACE COMPANY
A GROUP DIVISION OF LOCKHEED AIRCRAFT CORPORATION

UNUSUAL CAREER OPPORTUNITY

TECHNICAL LIAISON ASSISTANT

Henley and Co., a long established New York firm serving the metals and chemical needs of organizations and laboratories engaged in electronic and nuclear research and development, has a permanent requirement for a resident liaison representative in the Peninsula area.

This individual will serve as technical assistant to the president of our firm and perform various liaison assignments between the company's sales organization and clients in the California-Arizona area. In this capacity, he will call on organizations such as development and materials departments of firms engaged in semiconductor production, physics departments of universities, and research and development groups concerned with transistor diodes, rectifiers, and devices for electronic instrumentation. His assignment will include at least one annual trip to the East coast and Europe. Position orientation will include a one-month visit early this summer to production facilities in Germany.

Since the scope and responsibilities of the position are broad, we will give serious consideration to applicants from various disciplines or technical areas. While we feel that the ideal candidate would have technical experience in semiconductor production research or engineering, we also encourage inquiries from individuals from the academic field with experience in the area of materials such as germanium, silicon, etc. A degree in physics or physical chemistry is helpful but in no way essential; experience in our field of interest is more desirable than academic qualification.

Salary open, dependent on experience. Excellent employee benefits include profit sharing, pension plan, life insurance. Position presents opportunity to move into assignment of greater responsibility. Applicants may send confidential detailed resume with salary history to

Albert T. Henley
308 Bank of America Bldg.
San Jose 13, California

meeting ahead

X-RAYING PYRAMIDS

The master architects who planned the pyramids of Egypt—and perhaps managed to outwit countless generations of grave-robbers, explorers, vandals, archeologists, and idec-fixed Victorian clergymen—may bow before a twentieth-century physicist with a spark chamber.

The pyramids' secrets, secure for the past 4500 years, will be secrets no more if an ingenious plan proposed by LRL physicist Luis Alvarez ever bears fruit. He will discuss his plans at the April 19 meeting of the Nuclear Science chapter.

Alvarez' idea calls for using cosmic rays and spark chambers to "X-ray" the pyramids to search for presently undiscovered burial chambers. The project is the outcome of a long love-affair with archaeology and Egyptology which began in his boyhood and blossomed during a visit to Egypt three years ago.

Luis W. Alvarez received his Bachelor of Science Degree from the University of Chicago in 1932, a Master of Science Degree in 1934, and his Ph.D. in 1936. Dr. Alvarez joined the Radiation Laboratory of the University of California, where he is now a professor, as a research fellow in 1936.

Dr. Alvarez is now engaged in high energy physics, using the 6 billion electron volt Bevatron at the University of California Radiation Laboratory. His main efforts have been concentrated on the development and use of large liquid hydrogen bubble chambers, and on the development of high speed devices to measure and analyze the millions of photographs produced each year by the bubble chamber complex. The net result of this work has been the discovery by Dr. Alvarez' research group, of a large number of previously unknown "fundamental particle resonances."

education news

UC VISITING PROFS

Among engineering professors from other institutions spending their sabbatical leaves or leaves of absence teaching at Cal are F.B. Tuteur, Yale; Norman Balabanian, Syracuse; J.A. Brzozowski, Ottawa; Ruy-Wen Liu, Notre Dame; A.C. Soudack, University of British Columbia; Vaidyeswaran Rajaraman, Indian Institute of Technology, Kanpur; and Nathan Rynn, Princeton.



Alvarez

Pensinger

meeting ahead

INSTRUCTIONAL TV

Television for instruction and a tour of San Jose State's facilities will be featured at the May 11 joint meeting of the Santa Clara Valley Subsection, the San Jose State Student Branch, and the Communications Technology and Engineering Writing & Speech chapters.

Glen Pensinger, technical director, Instructional Television Center, San Jose State College, will describe various uses of television for instruction at the college. The talk will be augmented with slides, and videotape recordings. After the speech, a tour of the college facilities is planned.

Mr. Pensinger has been a television operating engineer for stations KNTV, KTVU and the ABC network. He is consultant in instructional television systems planning and has been associated with the ITV Center at San Jose State since its founding in 1956.

MORE PIONEERS' NIGHT

man responsible for making the San Francisco Bay Area a leading international center of electronics research and industry, largely through his leadership in engineering education. Past chairman of the San Francisco Section (IRE) and past president of IEEE (IRE), he has been awarded the society's Founders Award and Medal of Honor, among other honors.

The moderator, Lester E. Reukema, professor of electrical engineering emeritus, University of California, taught at that institution from 1923 through 1958, following undergraduate and graduate work there and at the Technical Institute of Munich. Well-known for his atomic research, his most recent papers have been on recent developments in atomic energy and man's future physical and physiological environment. He is a research scientist in electro-magnetic radiation for the U.S. government.

THE GRID

... is the best electronic/electrical engineering recruiting medium in northern California. Use it when you need manpower.

FAILURE MODE ANALYSIS

The approaches to and techniques for performing a failure mode analysis will be explored by a panel of experts at the April 18th meeting of the Reliability chapter. Failure mode analysis can be defined as the enumeration of the physical ways or modes in which a part, component or complete system can fail, the estimation of the expected frequency of failure in each mode, and the comparative assessment of the consequences of potential failures.

The ultimate objective of a failure mode analysis may be to determine critical failure modes which have the highest likelihood of occurrence, so that the effects of failures in these modes can be minimized. Other objectives may be simply to make an item "fail safe" or to eliminate to the extent possible the unsafe failure modes. When redundant equipment or circuits are to be used, a failure mode analysis may be used to determine the optimum techniques for automatic detection and circumvention of those equipment failures which may be critical to the system's performance.

The panelists for the meeting will be Richard C. Cornwell, supervisor for the design support reliability/maintainability organization at Sylvania Electronics Systems West; Rolfe A. Folsom, Jr., vice president and senior scientist/engineer with Sigma Corp., Los Altos; and Ervin S. Dean, LMSC staff engineer, Program 241, chief systems engineering office.

ieee news

BIOMEDICAL SYMPOSIUM

"From diagnosis to therapy" is the theme of the 1966 San Diego Symposium for Biomedical Engineering. The four day symposium, now in its sixth consecutive year, will be held June 6-9, 1966. Topics to be explored in both tutorial and state-of-the-art papers are: microanalytic diagnostic techniques (in vitro and in vivo), therapeutic effects of extreme environments, and prosthetics, artificial versus transplanted.

The symposium will be jointly sponsored by the San Diego Section and 117 societies, universities, foundations and agencies.

Captain Fred George, M.D., MC USN, U.S. Naval Hospital at San Diego, will serve as program chairman, Captain George should be contacted on all questions concerning submission of papers.

For further information contact: L. T. Gregg, publicity chairman, 2063 Cardinal Drive, San Diego, 92123.



MANUALS

CATALOGS

PERIODICALS

ALL TYPES OF BOOKS

ONE DAY SERVICE ON PROPOSALS & REPORTS.

Call 327-6254 for pickup & delivery



CLARK PRINTING SERVICE

(415) 327-6254

FAST ESTIMATES

291 LAMBERT AVE.

PALO ALTO, CALIFORNIA

TECHNICAL WRITER / ENGINEERING WRITER

Chained to your typewriter? Like to get your hands on the equipment you write about? Come to Farinon, where creativity and individuality are given free rein in a relaxed atmosphere. Put an end to the humdrum routine of ordinary writing assignments.

FARINON ELECTRIC

Manufactures microwave, radio, multiplex and carrier equipment used world-wide for high quality communications. We now have an opening for a **Technical Writer/Engineering Writer** with experience in writing communications equipment instruction material.

We are a group of big company alumni doing business the way we always wanted to—free of organization charts and red tape. No military contracts. No job description manuals. We staff with mature professionals and expect professional performance. The company is independent, financially sound, and of major importance. It's growing but not running away from us. Every employee shares profits. Every employee may buy stock.

Send your resume to Bill Farinon, President

FARINON ELECTRIC

935 Washington Street, San Carlos, California

an equal opportunity employer

University of California

LAWRENCE RADIATION LABORATORY

ELECTRONICS ENGINEERING POSITIONS

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

solid state circuit design
microcircuitry
microwave
digital computers
nuclear instrumentation

APPLIED RESEARCH PROGRAMS

- ★ **BIO-MEDICAL**
radiation effects on the
biosphere
- ★ **PLOWSHARE**
peaceful applications of
nuclear explosives
- ★ **PROPULSION**
reactors for propulsion
and power in space
- ★ **SHERWOOD**
controlled thermo-
nuclear fusion
- ★ **WHITNEY**
nuclear weapons for
national defense

For further information about our
programs and a listing of current
openings, write:

B. R. Graf

**Lawrence
Radiation
Laboratory**

P.O. Box 808, 17-26

Livermore, Calif. 94551

U. S. Citizenship Required

An Equal Opportunity Employer

IEEE NEWS

TRANSPORTATION MEET

The National Transportation Symposium, sponsored by the ASME, IEEE and ASCE is to be held at the Jack Tar Hotel in San Francisco, May 2-6. The Ninth ASME/IEEE Joint Railroad Conference is to be held concurrently at the same location on May 4-6, 1966. The railroad conference is sponsored by the railroad division of ASME and the land transportation committee of the Industry and General Applications Group of IEEE.

The Transportation Symposium is an effort to bring together the various facets of the transportation industry: i.e. manufacturers, operators, legislators and administrators for an appraisal of the present situation and a projection of future possibilities for airways, highways, railways and waterways. The objective is to utilize the base of systems analysis to integrate related inputs in order to provide information toward the solution of the urgent problems in transportation.

This meeting will be of interest and value to all individuals and organizations concerned with improving our transportation systems. Field types related to each transportation medium will supplement the technical program, which will feature prominent speakers.

The theme of the Ninth Joint Railroad Conference is rapid transit. Tremendous activity has taken place in the past year, resulting in the initial construction of new systems. Technology has been allowed to penetrate this long-dormant industry and technical papers will be presented on new concepts of propulsion, braking systems, truck design and automatic train control. Some of these are presently being demonstrated and will be the subject of a field trip to the Bay Area Rapid Transit System's test track at Concord. Current papers on locomotive equipment design improvements and maintenance aids will round out the program.

Because of the increasing importance and awareness of adequate and balanced transportation, railroad and transit people are urged to attend the Transportation Symposium as well as the Railroad Conference.

Principals involved in planning the arrangement details for both meetings are: Co-chairmen: Frank Kurz (ASME), Southern Pacific Company, 65 Market Street, San Francisco, Calif. 94105, 362-1212, Ext. 21661; and J. E. Barkle (IEEE), Bechtel Corporation, P.O. Box 3965, San Francisco, Calif. 94119, 433-4567, Ext. 3651.

Program and papers committee: D. N. Aboudara, chairman (IEEE), Bay Area Rapid Transit District, 814 Mis-



Barkle

Kurz

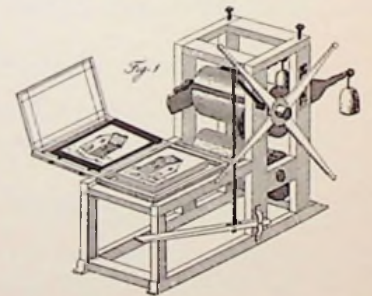
sion Street, San Francisco, California 94103, 986-1818, Ext. 270.

Further information, registration forms and programs may be obtained from the publicity co-chairmen: F. Hatch (ASME), Shell Oil Company, 100 Bush Street, San Francisco, California, 392-5400; and M. W. McLaren (IEEE), Bechtel Corporation, P.O. Box 3965, San Francisco, Calif. 94119, 433-4567, Ext. 3651.

Call the above chairmen of the San Francisco Section office for details of the technical program.

Fifteen technical sessions will deal with such topics as urban systems planning, future power systems, traffic control, education and manpower for transportation systems, national transportation agencies plans and programs, advanced vehicles, interface problems

WANTED



... one preferably unused
Star-Lever Cylinder Stone
Lithographing Press of the
Mitterer Design



We will spare no expense
to continue to modernize
our plant

NEAL, SENEFELDER & KERR
1025 Sansome, San Francisco 781-5886
printers, lithographers, graphic designers
Since 1906

UNDERGROUND DISTRIBUTION

A special technical conference on underground distribution will be held September 27-29 at the Palmer House in Chicago, sponsored by the Power Group. Authors submit a title, together with a brief outline of their proposed paper to technical program chairman, R. C. Graham, Rome Cable Division of Alcoa, Rome New York for consideration by the program committee. All submitters will be advised as soon as possible as to the recommended disposition of the proposed paper. Closing date for any papers accepted will be June 1, 1966.

and solutions, legislation, research and financing, and flow control.

More than 2000 transportation specialists, engineers, government personnel and city planners are expected to attend the meeting.

Special field trips to the Bay Area Rapid Transit District Facility, the Pacific Motor Trucking Terminal, and the United Air Lines Maintenance Base, are scheduled as part of the symposium.

A special policy session will present viewpoints of the United States, United Kingdom, and the European Common Market.

Members of ASME, ASCE, EIC, IMechE and members of the following IEC reciprocating societies ASEE, AAWA, AICE, ASTM, AACE, AICHe, ASAE, SAME, AIPE, AIE, ASTM, ASQC, CEC, AIME, ASHRAE will be admitted at the member rate, also cooperating societies and associations.


	Single Day	Two or More days
Members	\$ 7.00	\$10.00
Non-member	12.00	15.00

Payment of the one fee will admit conferees to any sessions listed in this program.

The registration desk will be located on the mezzanine of the Jack Tar Hotel and will be open during the following hours: Sunday, May 1, 4:00 p.m. to 9:00 p.m.; Monday thru Thursday, 8:00 a.m. to 5:00 p.m.

SHARE THE RESPONSIBILITY FOR THE SECTION

Take part in the membership pledge program. Bring in at least one new member in '66.



Your Western Source For This Famous Brand...
A Complete Stock... In Depth
Now You Can Place All Of Your TEXAS INSTRUMENTS METAL FILM RESISTOR REQUIREMENTS WITH ONE SOURCE
Catalog Available On Request
R. V. WEATHERFORD CO.
Sales and Service Warehouses

WESTERN DISTRIBUTORS FOR OVER 150 FAMOUS BRANDS

INDUSTRIAL COMMERCIAL & ELECTRONIC COMPONENTS & EQUIPMENT

6921 San Fernando Rd., Glendale, Calif. 91201 (213) 849-3451	1651 So. State College Blvd., Anaheim, Calif. 92805 (714) 532-6741 • 547-7521
3240 Hillview Ave., Palo Alto, Calif. 94304 (415) 321-5373	7903 Balboa Blvd., San Diego, Calif. 92111 (714) 278-7400
1917 North 25th Drive, Phoenix, Arizona 85002 (602) 272-7144	1095 E. Third St., Pomona, Calif. 91766 (714) 623-1261 • 331-7515

CUSHMAN ELECTRONICS, INC.

... has been growing steadily since 1959. Our business is strictly commercial and is not directly influenced by government buying. We have several openings for key people who can grow with us. If one of the positions listed below sounds challenging and you have been considering a change, send your resume or call Harold Anderson (739-6760) to arrange an interview.

OPERATIONS MANAGER Reports directly to the president and has responsibility over production (wiring & assembly), purchasing, electrical test, and quality control. Must have 6-10 years industrial experience in all phases of electronic equipment manufacturing. Knowledge & experience should be in areas such as supervision, production management, inventory control, scheduling, production control, P.C. board processes, sheet metal fabrication, O.C. inspection and other related fields.

ELECTRO-MECHANICAL DRAFTSMAN/DESIGNER Requires 3-5 years commercial industrial experience in electro-mechanical packaging & design. Experience should include: working from sketch concepts, development of detail layouts, assembly drawings, electrical schematics, P.C. board masters, silkscreen artwork, casting and sheet metal drawings.

ELECTRONIC TEST TECHNICIANS Requires 2 years formal electronic schooling or equivalent industrial or military experience. Work involves testing, trouble-shooting, and calibration of electronic instruments. Must have strong background in solid state circuitry and theory.

Employee benefits at Cushman include: Top salaries, major medical insurance, paid vacations, sick leave, and recognition of performance with periodic salary review.

CUSHMAN ELECTRONICS, INC.

166 San Lazaro Ave., Sunnyvale, California

An equal opportunity employer

ELECTRONIC ENGINEERS

Why Not
MOVE OUT and MOVE UP?
be appreciated at
UNITED CONTROL IN SEATTLE
the easiest-to-appreciate
climate in America



Living is great in the Pacific Northwest. We have year-round golf, five months of excellent mountain skiing within 45 miles, hunting, fishing... **REAL OUTDOOR LIVING.** A Wonderful place to raise your family. Good housing available five minutes from the office.

ELECTRONIC ENGINEERS (Several Levels)

Capable of preliminary design and equipment development involving advanced systems concepts and hardware techniques for control equipment used in aircraft and missiles. Analysis of closed loop control systems and computer simulations. Must have demonstrated ability in design—both analytic and hardware—development, and preparation for release to manufacturing of hardware consisting of such special basic building blocks as: Integrating amplifiers, logic circuitry, voltage comparators, inverters, flip-flops, choppers, and other special purpose circuitry.

United Control Corporation, together with its 700 employees, enjoys the reputation of being one of the Pacific Northwest's most modern, well equipped, financially sound, professionally managed firms in the electronic industry.

Send your resume in confidence to: Don Vawter



UNITED CONTROL
Overlake Industrial Park
Redmond, Washington 98052

an equal opportunity employer

meeting ahead

EFFICIENT LOUD SPEAKERS

Paul Klipsch, president of Klipsch & Associates, Inc., Hope, Ark., manufacturer of loud speakers, will address the May 3 meeting of the Vehicular Communications chapter. He will discuss efficiency distortion and acoustical requirements of loud speakers as they affect intelligibility in mobile communication systems.

The speaker is the author of numerous papers and holds patents in the fields of geophysics, acoustics, firearms, et al. He is a Fellow of IEEE and the Audio Engineering Society.



Klipsch



Terman

meeting ahead

SECTION ANNUAL MEETING

Dr. Frederick E. Terman, vice president and provost emeritus, and advisor to the president, Stanford University, will be the principal speaker at the section annual meeting scheduled for June 15 at the Bold Knight, Sunnyvale. He will present a report on his recent tour of engineering colleges in the U.S.S.R.

The annual event will honor 1966 Fellows and 1966-67 officers of the section, subsections and chapters. In addition to reservations for couples, tables of eight may be reserved for subsections, chapters, committees and companies by calling Mrs. Jean Helmke, 327-6622. Price of the dinner will be \$4.50, including tax and tip, with cocktails at 65 cents.

meeting ahead

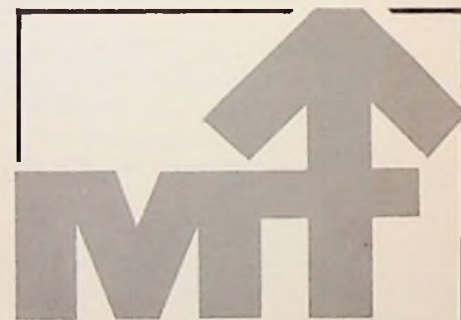
WAVEFORMS & RECEIVERS

Prof. Donald W. Tufts, Harvard University, will present a paper on waveforms and receivers for message estimation in pulse amplitude modulation at the April 28 meeting of the Information Theory chapter.

Intersymbol interference, additive noise and inexact synchronization, or timing jitter, are three common sources of distortion in data transmission systems. For pulse amplitude modulation communication links, the combination of transmitter waveform and linear receiver which minimizes the overall mean-square error arising from these sources is determined. Mean-square error vs. signal-to-noise ratio performance characteristics of the optimal systems are determined explicitly for several examples. These characteristics are compared both with those of certain suboptimal systems and with the optimum performance theoretically achievable (OPTA) derived from Shannon's theory of rate-distortion functions. The optimal PAM systems, which can be interpreted as the ideal combination of infinite memory convolution encoders and decoders, are seen to perform very close to the OPTA for low signal-to-noise ratios. For high signal-to-noise ratios, however, the optimal PAM system mean-square error decreases in proportion to the signal-to-noise ratio, while OPTA generally decreases exponentially. Accordingly, there exists a potential for realizing significant improvement at high signal-to-noise ratios by resorting to complex nonlinear coding techniques.

Dr. Tufts, a graduate of Williams College and M.I.T., is an assistant professor of applied mathematics and consultant to several electronics companies in the Boston area.

Thirty-three sections make up Region 6, largest in IEEE.



Highest Quality
PRECISION

sheet metal fabrication for
the electronics industry

Join our first-rate clients
who demand quality, precision
and service, along with
the competitive price we give
them.

M-T Electronics Company
536-A Lewelling Blvd.
San Leandro, Calif. 94579
Phone (415) 357-5262

AUTOMATIC ENGINEERING

The requirement to provide one-of-a-kind custom assemblies by use of standardized modules is common, particularly in electronics manufacturing. The ADE system (Automated Design Engineering) has made it practical to "teach" a computer to accept a customer-oriented specification and by the use of stored engineering logic test the specification for completeness and consistency and actually select all the modules required to satisfy the specification. Three ADE engineers will describe the system at the April 26 meeting of the Parts, Material and Packaging chapter.

By the use of random access file data these selections are physically positioned in shelves and on racks to provide a complete design. In addition, pricing, accounting and manufacturing data is accumulated and summarized. Comments are generated by the machine, pointing out unusual aspects of the specification or commenting on areas that have given difficulty in past circumstances.

The system is currently being used in the design of microwave and multiplex systems and has reduced the time from several days engineering down to minutes of computer time. This has also provided higher accuracy, improved consistency and substantial reduction in engineering clerical effort.

The system has been expanded to provide file-oriented processing of manual designs, enabling engineers to select units by check-off lists that are machine processed against the central magnetic file. The file performs the same pricing and detailing function and presents to the engineer a completely edited list of panels and parts, with critical items flags, worksheet notes selected and various bits of data needed to complete the design organized and presented on worksheets. Once again substantial reduction in clerical work has been achieved.

ADE and its associated files provide an ideal interface between a sales/marketing oriented functional numbering system and the digitalized stock-numbering system required by automated production control.

The ADE system was programmed by engineers without previous computer experience. The project took about two years to bring it to its present stage. The presentation will be made by Thomas C. Bean and two of the engineers primarily responsible for the entire project. N.D. Vandever will discuss the use of decision tables as a tool for capturing and programming engineering logic, using actual examples from his work with the micro-

(Continued on page 20)

ELECTRONIC ENGINEERS

If you have experience in circuit design work with capabilities in solid state pulse type digital and analog circuitry, we can offer interesting and challenging work involving assignments with military and commercial display systems, including general aviation aircraft instrumentations.

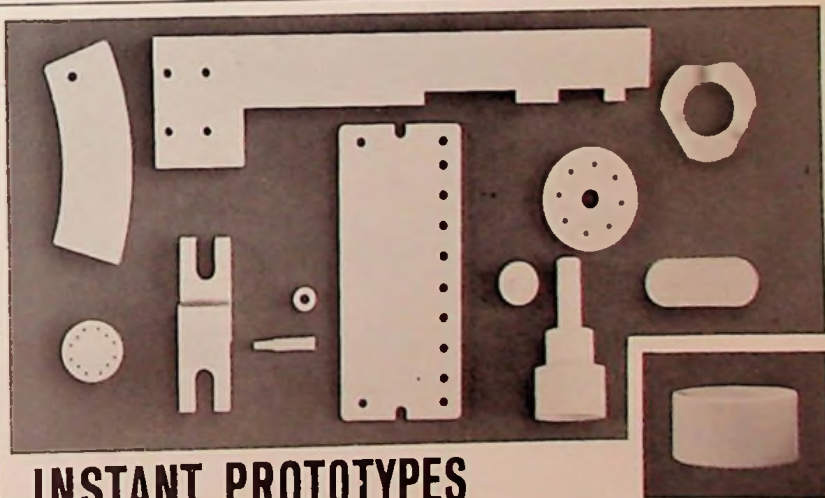
Several intermediate and senior level openings exist for circuit design engineers interested in receiving recognition for individual responsibility and progress. Requirements include BSEE, with two to five years circuit design experience.

Please send resume to:

KAISER AEROSPACE AND ELECTRONICS

1681 PAGE MILL ROAD, PALO ALTO, CALIFORNIA

An equal opportunity employer



INSTANT PROTOTYPES

Whether you need one part or a thousand, Wesgo's prototype facilities—in both the east and the west—are set up to turn out precision ceramic shapes in jig time. But there's nothing hurry-up about the quality; every part will measure up to Wesgo's traditional high standards.

Send for our brochure. Or, better yet, call the number below, send us the working drawings for the parts you need, and we'll respond with an instant quote.



PROTOTYPE SERVICE WESTERN GOLD AND PLATINUM CO.

in the east: 205 Oraton St., Newark, New Jersey (201) 483-7467

in the west: 525 Harbor Boulevard, Belmont, Calif. (415) 593-3121

ENGINEERS

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

Urgent Requirements
by Our Clients in
Commercial Product
Areas for Experienced
Hardware & Software

COMPUTER ENGINEERS

and

PROGRAMMERS

and in

COMMUNICATIONS
MICROWAVE SYSTEMS
DISPLAY SYSTEMS
DIGITAL INSTRUMENTS
SEMICONDUCTORS
CONTROLS & SERVOS

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

*Englert
and
Company*

Management Consultants

220 California Ave.
Palo Alto, Calif.
(415) 326-7390

grid swings

IT IS REPORTED:

International Business Machines is planning to establish a \$900,000 engineering laboratory on a six acre site in Menlo Park to provide consolidated headquarters for 150 engineers and staff of its systems development division, responsible for information handling and programming support.

Hugle Industries, Sunnyvale, has been founded by Dr. William B. Hugle and William Perrine, former executive vice president and production manager, respectively, of Stewart-Warner Microcircuits, Inc., Sunnyvale, and will produce an epitaxial reactor which will allow production of up to 240,000 transistors of 48,000 microcircuits a day.



Young

Rosen

Dr. Leo Young, Stanford Research Institute, Menlo Park, will be a tutor at the Institution of Electrical Engineers summer school in microwave techniques planned at the University of Leeds in July.

Bernard Rosen has been promoted to manager, systems div., of Watkins-Johnson Co., Palo Alto.

from the chairs

PROFESSIONAL INVENTORY BY SECTION MEMBERS URGED

April is a month that many people use to take inventory. Business firms are concerned with property tax calculations while individuals like you and I worry about income taxes.

It's a good idea to "take stock" once a year to see what we've accomplished and to plan what we hope to achieve.

One measure of our professional achievement is our relationship with IEEE.

- Have we written or presented technical papers?
- Have we attended and participated in technical meetings, conferences or symposia?
- Have we done our "homework"—by reading the *Spectrum*, the *Proceedings*, the *Transactions* and other pertinent publications?
- Have we served on committees or as officers of various IEEE organizations in an effort to promote the welfare of electrical and electronics engineering?
- Have we advanced in technical experience and professional maturity, as evidenced by advancing our grade of membership?

Each of these points is an important one. If we haven't done very well during the past years, let's resolve to do better this year!

Why not start—right now—by examining your membership status with IEEE? What is your grade of membership?

If you have an interest in electrical or electronics engineering, you may qualify as an Associate Member.

If you have a BS in EE from a school of recognized standing or have

been regularly employed in the fields of electrical or electronics engineering for a period of six years, you may qualify as a Member.

If you are an engineer, scientist, educator or technical executive with ten years of experience in the fields of electrical or electronics engineering, five of which are distinguished by:

- Publication of important technical papers,
- direction of significant technical work,
- contribution of original designs and inventions,
- establishment of scientific or engineering courses in a school of recognized standing, or,
- contributions in allied areas such as patent law, technical editing, etc., which serve to advance the engineering profession,

you may qualify as a Senior Member. Holding this grade enhances your prospects of serving on important headquarters committees and being elevated to Fellow.

How do you transfer to a higher grade of membership? Simply fill out an application form available from your company membership representative or the Section Office and forward it to IEEE, Suite 2210, 701 Welch Road, Palo Alto, Calif. 94304.

The dues for Associate Member, Member and Senior Member are the same, \$15.00 per annum.

Upgrading your IEEE membership is a positive step you can take toward professional advancement in 1966! DO it right now before you forget.

JOHN B. DAMONTE
Membership Chairman
San Francisco Section



Shoor



McNeilly

Bernard Shoor has been named vice president and general manager of Endeveco Laboratories, Mountain View, a division of the Pasadena headquarters firm, world's largest designer and manufacturer of piezoelectric instrumentation

Michael A. McNeilly has been appointed technical director for Apogee Chemical, Inc., Richmond, responsible for product development for the plastic and electronics industries.

Medical electronics sales increased 7% in 1965, according to *Electronics*, which predicted a 10% increase for 1966 to \$263.3 million and 1969 sales of \$280 million. Patient monitoring equipment is expected to increase by 40% this year to reach \$5 million.

Ampex Corp., Redwood City, has been awarded a \$2.5 million Canadian Broadcasting System contract for high band color video-tape recorders; a \$400,000 JPL contract for magnetic tape recorders; a \$500,000 Harvey Radio contract for stereo tape duplicating equipment; and a \$1.4 million Columbia Broadcasting System contract for high band color video tape recorders.

John Fluke Mfg. Co., Inc., Seattle, reported sales of \$2,004,521 and earnings of \$133,159 for the first quarter ended December 31, compared to \$1,431,550 and \$68,642, respectively, for the same period of 1964.

Lear Siegler, Santa Monica, reports sales of \$115,880,463 and earnings of \$4,311,962 for the six-month period ending December 31, highest in its 11-year history.

Data Technology Corp., Mountain View, has signed a licensing agreement with Tek Elec, Sevres, France, for estimated European sales of \$200,000 over three years of its digital voltmeter and plug-in units.

Marshall Laboratories, Torrance, has been awarded a NASA contract for a neutron/proton spectrometer which will determine how much radiation danger exists for commercial SST passengers at 70,000 feet.

United Technology Center, Sunnyvale, has been awarded a \$11,015,049 Air Force contract to manufacture 100 million pounds of napalm.

Lots of interested GRID-BULLETIN readers to tell about your WESCON exhibit ... in advance!*



*Several recent surveys in depth verify that those attending WESCON (a predicted 45,000 this year) spend most of their viewing time at exhibits they planned in advance to see!

HOW TO GET THE WORD TO THEM ABOUT YOUR EXHIBIT—IN ADVANCE?

There is no more effective medium than the Grid-Bulletin, IEEE's own official WESCON magazine, jointly published by San Francisco and Los Angeles IEEE. About 30,000 IEEE members in Region 6, the eleven western states, receive it through specially controlled lists in July and again early in August, when they're deciding how they'll budget their time at WESCON and whether or not they'll see your exhibit and talk to your people. An additional 3000 visitors pick up the August issue as they come in the door.

Rates are lower than any comparable magazine in the field—\$17 per K readers. **PLAN AHEAD!** If your firm wants in, let us know right away!

CLOSING DATES: June 17 for July issue. July 15 for August issue. You save \$90 on a page ad if you contract for both the July and August issues. **CONTRACTS AND ORDERS:** IEEE Grid-Bulletin, 701 Welch Rd., Suite 2210, Palo Alto, 94304. (415) 327-6622. **MOUNTED PLATES, COPY TO SET:** IEEE Grid-Bulletin, 3600 Wilshire Blvd., Los Angeles, 90005. (213) 387-1203.

Product: CHALLENGE!



RECEIVERS L AND S BAND

Frequency: 1435-1535 Mc and
2200-2300 Mc

Frequency
Stability: $\pm 0.0005\%$

Sensitivity: $4 \mu\text{v}$ at 6 db $\frac{S+N}{N}$ ratio (2 μv
with preamplifier module)

Interference
Control: MIL-I-26600

Power Supply: 115 vac, 400 cps, or 28 vdc

Temperature: -55°C to $+72^\circ\text{C}$ (operating)

Size: 7.50" x 2.50" x 4.0"

Company: PROGRESSIVE!

RS ELECTRONICS CORPORATION is engaged in the design and manufacture of airborne RF equipment. Our field of activity covers transmitters, receivers and decoders for command and telemetry; associated test equipment; as well as IF amplifiers. With the forthcoming move of telemetry to the UHF bands, our engineers are faced with new and unusual assignments. The miniaturized airborne receiver shown above is a recently completed design. Other jobs in this area are waiting to be done.

We would like to add two senior engineers to our staff. In a small company, they will be exposed to a wide range of responsibilities. They will manage projects, they will do design work, they will be in touch with management and customers. They will be compensated accordingly. If you are that flexible, please mail your resume or contact our Engineering Manager, Mr. John Isabeau, at 795 Kifer Road, Sunnyvale, California.

Telephone
(408) 739-3230

Or Write



RS ELECTRONICS

Corporation

795 Kifer Road
Sunnyvale, California 94086

an equal opportunity employer



Haines



Kneeland



Lape



Bitner

Fred J. Haines has joined Granger Associates, Palo Alto, to fill the new position of manager of video products, was formerly with Sylvania Electric Products, Batavia, and General Electric Co., Syracuse.

David R. Kneeland has joined the technical sales staff of The Cyclotron Corporation, Berkeley, was formerly associated with High Voltage Engineering Corp.

General Micro-Electronics, Inc., Santa Clara, has been acquired by Philco Corp. from Pyle-National Co. for approximately \$4,350,000.

Vacu-Blast Co. has acquired Tronic Corp., San Carlos, manufacturer of ultrasonic cleaning and vapor degreasing equipment.

Hewlett-Packard Co., Palo Alto, will build a \$1 million, 65,000 sq. ft. facility in Mountain View to house its Delcon division and western service center.

General Transducer Co., Santa Clara, has acquired the temperature-measuring and controlling instrument line of Royco Instruments, Menlo Park.

Donald S. Fletcher has been named technical information manager of URS Corp., Burlingame.

William J. Smith has been named manufacturing engineering manager of the Berkeley division of Beckman Instruments, Inc.

Lou Frisco, former director of the Johns Hopkins University dielectrics laboratory, has joined Raychem Corp., Redwood City, as head of the technical services laboratory.

Raytheon Co., marine products operation, South San Francisco, has been awarded a \$278,000 Navy contract for patrol boat radars.

Jack Pyle Co., San Mateo, electronic components sales representatives, has acquired Birnbaum Sales Corp., Redwood City, and representation of Marshall Industries Capacitor Div., Duncan Electronics Corp., Branson Corp., Cedar Engineering, Electro Assemblies, Inc., RCL Electronics, ATOHM, Voltronics Corp., and The Sloan Co. Already represented were Signetics Corp., Collins Radio (components div.) and Dickson Electronics.

Jean E. Lape has been named manufacturing engineering and quality control manager for Ultek Corp., Palo Alto, was formerly with the analytical instrument division of Varian Associates, Palo Alto.

James V. Bitner, a corporate vice president of Lear Siegler, Inc., Santa Monica, has been named president of the company's astronics division and will continue to serve as president of the instrument division at Grand Rapids, Mich.

Mike Economy, former manager of reliability assurance for Raytheon's semiconductor division, Mountain View, has been named manager of the reliability analysis and components department of space vehicle operations at Philco's WDL division, Palo Alto.

Frauman Associates, Menlo Park, has been named representative for Optical Electronics, Tucson.

GENISCO TECHNOLOGY CORPORATION

has established a
technical and sales facility
in The Bay Area
to represent the products
and services of its

ELECTRONIC COMPONENT DIVISION and GENISTRON DIVISION

For R.F. Interference
FILTERS,
WAVE FILTERS,
PRECISION RESISTORS,
CURRENT PROBES,
R.F.I. PROGRAM
MANAGEMENT
or R.F. ENGINEERING
SERVICES

Contact our office at
378 Cambridge Avenue
Palo Alto, California
Tel: 415-321-9242
TWX: 415-492-9291

Manufacturer | Representative Index

Abacus Div. Whittaker Corp.	Dietrich-Heffner Assoc.	Emcor-Borg-Warner Corp.	T. Louis Snitzer Co.	Polarad Electronic Instruments	T. Louis Snitzer
Aerotronics, Inc.	Frauman Associates	Eppley Laboratory, Inc.	W. K. Geist Co.	Precision Mechanisms Corp.	Components Sales
Aerospace Research, Inc.	SMA/WEST	Fabri-Tek, Inc.	Costello & Co.	Probescope	SMA/WEST
Bartech	Jay Stone & Assoc.	G T I Components	Wadsworth Pacific Mfg. Assoc.	Quan-Tech Labs	Jay Stone & Assoc.
American Electronic Labs	SMA-WEST	Glow-Lite Corp.	Wadsworth-Pacific Mfg. Assoc.	Ram Electronics, Inc.	Jay Stone & Assoc.
Applied Dynamics, Inc.	J. D. Kennedy Co.	Guidline/Hallmark	T. Louis Snitzer Co.	Remanco Inc.	Jay Stone & Assoc.
Applied Magnetics Corp.	The Thorson Co.	Hallmark Standards, Inc.	T. Louis Snitzer Co.	Rixon Electronics, Inc.	Costello & Co.
Astro Communication Laboratory	Costello & Co.	Holex, Inc.	The Thorson Co.	Rohde & Schwarz Sales Co.	V. T. Rupp Co.
Autronics Corp.	The Thorson Co.	Holt Instruments Laboratories	W. K. Geist Co.	Roytron Division, Litton Indus.	Costello
Bachman/Systems Division	V. T. Rupp Co.	Honeywell-Denver Div., Lab Standards	Geist	Sage Laboratories	The Thorson Co.
Bachman/Invar Electronics	T. Louis Snitzer Co.	Honeywell, Mpls., Enclosures	W. K. Geist Co.	Scott, Inc., H. H.	W. K. Geist Co.
Barnus Built-Instruments	Dietrich-Heffner Assoc.	Houston Omnigraphic Corp.	V. T. Rupp Co.	Sierra Electronic Div., Philco	T. Louis Snitzer Co.
Baylor-Knox	The Thorson Co.	Hyletronics Corp.	The Thorson Co.	Singer/Metrics/Gertsch	Dynamic Associates
Bayant Computer Products	Costello & Co.	Kepeco, Inc.	V. T. Rupp Co.	Sony Corp., Ind. Prod.	V. T. Rupp Co.
Burr-Brown Research Corp.	W. K. Geist Co.	Kinetics Corporation	The Thorson Co.	Taylormade Laboratories	Data Associates
Cambridge Scientific Industries, Inc.	Dietrich-Heffner Assoc.	Lambda Electronics Corp.	Jay Stone	Technipower, Inc.	Dietrich-Heffner Assoc.
Camoga Corporation	Jay Stone & Assoc.	Lind Instruments, Inc.	The Thorson Co.	Telonic Industries & Eng.	T. Louis Snitzer Co.
Century Electronics & Instruments	V. T. Rupp Co.	Lockheed Electronics Co.	Data Associates	Tenney Engineering, Inc.	The Thorson Co.
Ceramagnetics, Inc.	Wadsworth-Pacific Mfg. Assoc.	Magnetic Shield Division, Perfection Mica	Frauman Associates	Texas Instruments, Ind. Prod.	V. T. Rupp Co.
Ceramaseal, Inc.	Wadsworth-Pacific Mfg. Assoc.	McLean Engineering Labs	T. Louis Snitzer Co.	T R W Instruments	V. T. Rupp Co.
Chemtron Corporation	Costello & Co.	Measurements	O'Halloran Assoc.	Trymetrics Corp.	T. Louis Snitzer Co.
Chemung Electronic Devices	Costello & Co.	Melcor Electronics Corp.	Components Sales Calif.	United Precision Plastics, Inc.	Wadsworth-Pacific Mfg. Assoc.
Chemtronics, Inc.	Jay Stone & Assoc.	Metex Electronics, Inc.	Frauman Associates	Universal Voltronics Corp.	Dietrich-Heffner Assoc.
Chromatronics, Inc.	Data Associates	Metron Instrument Co.	Components Sales Calif.	Uptime Corporation	Costello & Co.
Circuit Technology Corp.	T. Louis Snitzer Co.	Micro Instrument Co.	Jay Stone & Assoc.	Utah Research & Development Co.	The Thorson Co.
Circuit Products Eng. Co.	Jay Stone & Assoc.	Microsonics, Inc.	SMA/WEST	Vero Corporation	Wadsworth-Pacific Mfg. Assoc.
Circuit Devices, Inc.	Costello & Co.	Microwave Electronics Corp.	Jay Stone & Assoc.	Wang Laboratories	Frauman Associates
Circuitronics Corp.	Components Sales	Millitest Corp.	Components Sales Calif.	Warren Components	Wadsworth-Pacific Mfg. Assoc.
Colorado Electronics	T. Louis Snitzer Co.	Motorola, Inc., Communications Div.	Frauman Associates	Weinschel Engineering, Inc.	Jay Stone & Assoc.
Electronic Engineering Co.	Data Associates	Nanosecond Systems	V. T. Rupp Co.	Wiltron Co.	O'Halloran Assoc.
Electronic Products, Inc.	Jay Stone & Assoc.	N-H Microwave	SMA/WEST	Wyle Laboratories	V. T. Rupp Co.
Electro Switch Corp.	Willard Nott & Co.				
Engenco, Inc.	V. T. Rupp Co.				

Representative Directory

Components Sales California P Palo Alto; 326-5317	Dynamic Associates 1011 Industrial Way, Burlingame; 344-2521	J. D. Kennedy Co. 770 Welch Road, Palo Alto; (415) 327-0413	SMA/WEST (Scientific Marketing Assoc.) 1094 West Evelyn Ave., Sunnyvale; 245-2500	The Thorson Company 2443 Ash Street, Palo Alto; 321-2414
Costello & Company 5335 Middlefield Road, P Palo Alto; DA 1-3745	Frauman Associates P. O. Box 357, Menlo Park; 322-8461	O'Halloran Associates 3921 E. Bayshore, Palo Alto; 326-1493	Snitzer Co., T. Louis 1020 Corporation Way, Palo Alto; 968-8304	Walter Associates Box 790, Menlo Park; 323-4606
Data Associates 11160 Terra Bella Avenue Mountain View; 961-8760	Geist Co., W. K. Box 746, Cupertino; 968-1608, 253-5433	Rupp Co., V. T. 1182 Los Altos Avenue, Los Altos; 948-1483	Stone & Assoc., Jay 140 Main Street, Los Altos; 948-4563	Wadsworth-Pacific Mfg. Assoc., Inc. 71 Parker Avenue, Atherton; 321-3619
Dietrich-Heffner Associates 22555 Park Blvd., P Palo Alto; 321-4321				Willard Nott & Co. 1485 Bayshore Blvd. San Francisco; 587-2091

GRID IS TYPESET PHOTOGRAPHICALLY EACH MONTH AT

Iconotype

Complete services for photographic typesetting, graphic arts photography, and preparation for lithography.

5219R STEVENS CREEK BOULEVARD, SANTA CLARA, CALIFORNIA 95050 • TELEPHONE 296-6915

**CUSTOM
DESIGNED
POWER
SUPPLIES
TO**

Mil-E-16400

Mil-E-5400

Mil-E-4158

Mil-T-21200

Mil-P-11268

NASA-200-2

Mil-I-983

Mil-F-18870

*Detailed data on facilities,
capabilities and contract
accomplishments on request.*

SBD
Systems, Inc.

90 ROME STREET,
FARMINGDALE, NEW YORK 11735
(516) MY 4-5484

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 15th of month.
Write or call: Ernesto A. Montano, IEEE Grid, Suite 2210, 701 Welch Rd., Palo Alto, Telephone (415) 327-6622.

Office for Short Lease

Whelan Bldg., Stanford Professional Center, 701 Welch Rd., Palo Alto, (opposite Old Barn), including air-conditioning, 5-day janitorial service, electricity, putting green, lunch room, and off-street parking. Ideal for one man and secretary. Call Section Office, 327-6622.

Sedillo Co., San Jose, has been named representative for Sigma Systems Corp., Dallas.

Montgomery Bros., Inc., Burlingame, has been named representative for the EIMAC division of Varian Associates.

MORE AUTOMATIC DESIGN

wave program. E.A. Crosetti will talk on the file orientation of the system showing the power of a centrally maintained high-speed access magnetic file for rapid reaction to changes and for ease of maintenance.

events of interest

WELDING CONFERENCE

The American Welding Society's western welding technical conference, sponsored by the Santa Clara Valley Section, will take place May 5-7, at Rickey's Hyatt House, Palo Alto, with technical sessions on electronics, aerospace, fabrication and non-destructive testing.

Registration fees are \$20 for AWS members, \$25 for non-members, \$10 for students, and \$15 for one-day attendance. For additional information, registration forms, call M.J. Higgins, technical conference director, 591-7161.

DEPENDABILITY . . .

That means you can count on us to supply competent, technical talent at a reasonable price. We really do what we promise.



Personnel available to work on your premises or in our design office

BARAN & ASSOCIATES

1155 CRANE
MENLO PARK, CALIF.
324-1615

"We are the job shop"

ENGINEERING SCIENCES

PERSONNEL SERVICE

AGENCY

582 MARKET STREET
SAN FRANCISCO, CALIF. 94104
SUtter 1-5720

Successor in San Francisco to
Engineering Societies
Personnel Service, Inc.

**ENGINEERS, SCIENTISTS
AND TECHNICIANS**

at every level in every field of
Industry—Business—Government
—Education—Plant—Field—
Laboratory—Office—School

JOBS FOR MEN MEN FOR JOBS

Fast referral service: phone, write, wire

A local, regional, and national
market place for engineering
jobs and men

Straube Associates, Menlo Park, has been named representative for McCullough flexible wiring connectors produced by Fischer & Porter Co., Warminster, Pa.

**Support Grid Advertisers
—they support the Section,
Subsections, and Chapters.**

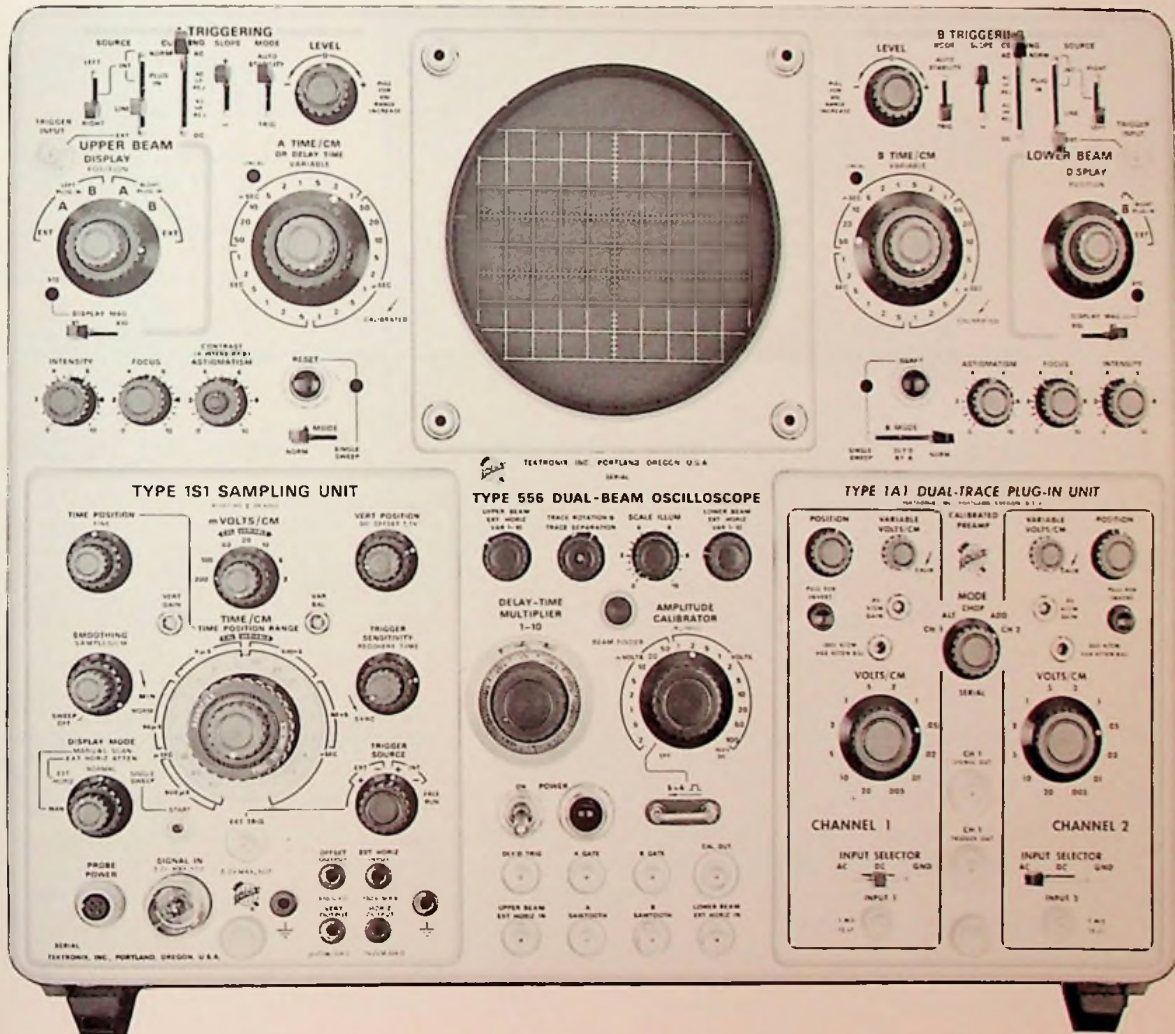
ADVERTISERS INDEX

Baran Associates	20
Brill Electronics	3
Clark Printing Co.	11
COHU Electronics-Kin Tel Div.	Cover 2
Cushman Electronics	13
Engineering Sciences Personnel Services	20
Englert and Company	16
Farinon Electric	11
Fluke Mfg. Co.	2
Genisco Technology Corp.	18
Grid-Bulletin	17
Albert T. Henley	10
Iconotype	19
Kaiser Aerospace & Electronics	15
Lawrence Radiation Lab	12
Lockheed Missiles & Space Co.	9
MT Electronics Company	14
Neal, Stratford & Kerr	12
Neely Sales Div. HP Co.	1
RS Electronics	18
SBD Systems	20
Tektronix, Inc.	Cover 3
United Control	14
Varian Associates	Cover 4
R.V. Weatherford Co.	13
Western Gold & Platinum Co.	15

New Tektronix Type 556

DUAL-BEAM DC-to-50 MHz Oscilloscope

with 10 ns/cm sweep rate on both beams and many new operating and convenience features



CHARACTERISTICS

New Dual-Beam CRT (with illuminated internal graticule)—provides "zero-parallax" viewing of small spot size and uniform focus over the 8 cm by 10 cm display area.

Calibrated Sweep Delay—extends continuously from 0.1 microsecond to 50 seconds, to permit expansion of a selected portion of the sweep.

Independent Sweep Systems—provide 24 calibrated steps from 0.1 μ s/cm to 5 s/cm; the $\times 10$ Magnifier extends the fastest sweep rates to 10 ns/cm.

Single-Sweep Operation—enables one-shot displays for photography of either normal or delayed sweeps.

22 Independent Triggering Systems—provide stable displays over the full bandwidth,

and to beyond 50 MHz. Both vertical amplifiers supply trigger signals to both of the time-base triggering systems.

Meets interference specifications of MIL-1-6181D over the following frequency ranges—Radiated (with CRT mesh filter installed): 150 kHz to 1 GHz; Conducted (power line): 150 kHz to 25 MHz.

Other Specifications—size is 15" by 17" by 24"; weight is \approx 80 pounds without plug-in units; power requirement is 100-130 V or 200-260 V, 50-60 Hz, \approx 850 watts.

Type 556 Dual-Beam Oscilloscope . . . \$3150
Rack Mount Type R556 Oscilloscope . . \$3250

Plug-ins illustrated

Type 1A1 Dual-Trace Unit \$600
(Dual-Trace: 50 mV/cm at DC-to-50 MHz, 5 mV/cm at DC-to-28 MHz. Single-Trace: 500 μ V/cm at 2 Hz-to-15 MHz. 5 Display Modes: Channel 1, Channel 2, Alternate, Chopped, Added Algebraically. Front-panel signal output.)

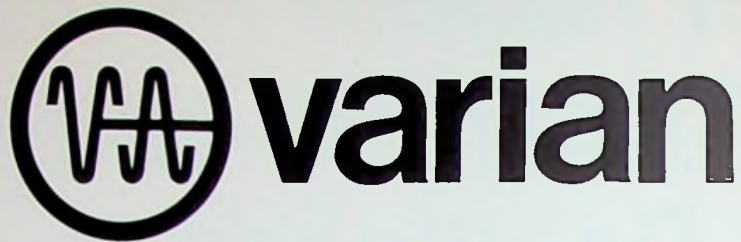
Type 1S1 Sampling Unit \$1100
(DC-to-1 GHz, internal triggering, built-in delay line. Sweep Rates: 100 ps/cm to 50 μ s/cm, with $\pm 3\%$ accuracy, normal or magnified (up to $\times 100$). DC Offset Range: greater than ± 1 V. 4 Display Modes: repetitive, single sweep, manual scan, or external scan.)

U.S. Sales Prices, f.o.b. Beaverton, Oregon

Call your nearby Tektronix field engineer for complete information or write Tektronix, Inc., P. O. Box 500, Beaverton, Oregon 97005.



Tektronix, Inc.



The growth of world-wide demand for Varian products in commercial, military, and industrial markets is providing new career opportunities for engineers. The following positions are among those now available:

<p align="center">SENIOR ENGINEER</p> <p>A background in Scientific instrument development and design of complicated systems necessary. Must be able to contribute to a team effort in product engineering. Should have MS in EE or Physics and mechanical background in design or development. Knowledge of spectrometers or similar instrumentation necessary.</p>	<p align="center">RESEARCH AND DEVELOPMENT ENGINEERS</p> <p>BS & MS levels in circuits and systems. Transistors, servo, RF, or microwave experience desired. Background or interest in Physics or Chemistry helpful.</p>	<p align="center">ELECTRONIC MANUFACTURING ENGINEER</p> <p>Engineer with ME, EE, or IE Degree. Experience in manufacture of electronic and electro-mechanical equipment, printed circuit assemblies and cabling. Requires understanding of production methods and cost reduction, and MIL Specs and NASA Standards.</p>
<p align="center">DEVELOPMENT ENGINEER</p> <p>Responsible for design and development of precision electronics equipment. Should have aptitude for advanced concepts important to frequency standards. Hydrogen masers and magnetometers. BS or MS in Physics or EE and desire to progress in growing division.</p>	<p align="center">TUBE ENGINEERS</p> <p>Experience in design, development, or manufacture of klystrons, BWOs, or TWTs. Should be familiar with microwave techniques and vacuum tube engineering. Experience in systems and evaluation helpful.</p>	<p align="center">MICROWAVE ENGINEER</p> <p>MSEE or equivalent. Requires understanding of electromagnetic and semiconductor device theory. Determine properties of and design techniques for microwave semiconductor devices.</p>

Many other technical and professional openings also exist and all inquiries will be welcomed. Successful candidates for these positions will work with technical staff members noted in the industry. Varian is one of the leading employers in Northern California, noted for its unique living, cultural, and educational environment.

For consideration of your qualifications, submit a resume in confidence to:

Technical Employment Manager



611 Hansen Way • Palo Alto, California

an equal opportunity employer