Aerospace & Electronic Systems, Thursday, March 24
Tuesday, April 5; Thursday, May 26
Audio & Electroacoustics, Thursday, March 24
Automatic Control, Tuesday, March 15
Circuit Theory, Wednesday, March 16
Communication Technology, Wednesday, March 30; Wednesday, May 11
Computer, Tuesday, March 29
East Bay Subsection, Monday, March 28
Electron Devices, Wednesday, March 9; Wednesday, April 13
Engineering in Medicine & Biology, Tuesday, March 15
Engineering Writing & Speech (Comtech: SCVSS), Wednesday, May 11
Industry & General Applications (SCVSS), Wednesday, March 23
Information Theory, Thursday, March 17
Instrumentation & Measurement, Wednesday, March 9
Microwave Theory & Techniques, Thursday, March 17
Nuclear Science, Monday, March 21
Reliability, Monday, March 14
Santa Clara Valley Subsection (IEEE), Wednesday, March 23,
(Comtech: EWS), Wednesday, May 11
Student Paper Contest, IEEE Bay Area, Friday, April 1
Vehicular Communications, Thursday, March 10
Solve any CCTV problem with one of these seven basic systems from Cohu.

**High-fidelity color**
1000 Series system includes the first CCTV camera with built-in references for correct registration and color balance. Compact, rugged, low-cost and easy-to-operate.

**Miniaturized**
Series 2000 cameras feature 3” outside diameter cylindrical housings that will accommodate remote-controlled 4:1 zoom lens. Many lens options available, including 10:1 zoom. Operate on 10 or 20 megacycle bandwidths.

**High-resolution self-contained**
Modular-designed 3100 Series offers choice of plug-in sync generators for EIA 525 or 729, 873 or 945-line scan rates. Automatically compensates for light level variations to 10,000:1.

**Industrial self-contained**
Complete with all camera control circuits, Model 20/20 cameras need only video cabling and any standard TV monitor to make a complete CCTV system. Highly versatile.

**Radiation-tolerant**
Get top quality TV pictures from radiation environments up to a cumulative dosage of $10^8$ roentgens and/or $10^{12}$ neutrons/cm² with 3-inch diameter 2500 Series cameras. Readily de-contaminated.

**Airborne**
3” or 6” diameter cameras weigh as little as 5 lbs. Unaffected by extremes of temperature, humidity, dynamic pressure, altitude, noise, vibration, shock or acceleration, within broad limits.

**Environment-resistant**
3000 Series cameras provide continuous-duty operation in up to 100% humidity, at temperatures from $-20^\circ$C. to $+60^\circ$C., ocean depths to 250 feet and altitudes out to deep space. Meet military explosion-proof specifications. Operate on 10 or 20 megacycle bandwidths.

**Which one solves yours?**
For details on the industry’s most complete CCTV line — including monitors, accessories and video switching systems — contact Cohu or your nearest Cohu representative.

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LECTRONICS, INC.
SAN DIEGO, CALIFORNIA
APPLICATION

Dymec Data Acquisition Systems are designed to measure analog data derived from a wide variety of sources, and to display and record that information in digital form. To present the information in its most useful medium, transducers are used. For direct reading by the operator, output on paper tape is provided. Outputs may be recorded on punched paper tape, or magnetic tape is used.

If you have a data acquisition application, just call your Hewlett-Packard field engineer for a solution—...from a data sheet. Dymec Division offers 32 basic configurations of standard medium-speed systems, one of which is sure to solve the problem. They're completely specified, field-proven, right off a production line (without special engineering)—and the economy of "off-the-shelf" delivery is passed along to you.

The four basic lines of systems are briefly specified in the chart. They differ primarily in the basic measuring instrument, and each series offers a wide variety of measuring parameters and an equally wide assortment of recorded outputs, including printed paper tape, perforated tape, punched card, magnetic tape and typewritten record.

For accurate measurement of low-level signals, especially in the presence of noise problems, look at the 2010 Series. For economical systems, offering a wide variety of voltmeter plug-in capabilities, the 2013 Series. High-speed, high-accuracy data acquisition can be solved by the 2015 Systems, while data acquisition from transducers with readout in engineering units (i.e., psi, rpm, °C or F) at the time of measurement is possible with the 2017 Series.

Complete information is available (on data sheets) from your Hewlett-Packard field engineer. Or write Hewlett-Packard, Dymec Division, 395 Page Mill Road, Palo Alto, California 94306, Tel. (415) 326-1755; Europe: 54 Route des Acacias, Geneva, Switzerland, Code "H.WRACK/001".
IMAGINATIVE ENGINEERING

INTEGRATED CIRCUIT DESIGN ENGINEERS, FREQUENCY AND TIME DIVISION—HP has immediate need of design engineers to expedite development of our state-of-the-art instruments. These men will be working on digital and linear circuits for commercial electronic instruments. MS degree preferred (BS degree required) plus two years experience in design layout and application of monolithic integrated circuits.

THIN FILM ENGINEERS, ADVANCED R & D—Engineers trained in thin film technology have a unique opportunity to work independently at Hewlett-Packard, directing development of specialized thin film devices. Positions require a BS degree in electronic engineering or physics.

CIRCUIT DESIGN ENGINEERS—HP has immediate openings for Electrical Engineers with experience in circuit design, from D.C. through microwave range. Work background in design of electronic instruments desirable. Here’s the chance to join one of the nation’s top engineering teams working on circuits for commercial electronic instruments. A BS in electrical engineering is necessary, and an MSEE degree is preferred.

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the section

MEMBERSHIP

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

W. F. Davison  J. B. Ghiringhelli
E. D. Finnigan  J. S. Inman
T. B. Fryer  R. W. Mangum
J. H. Gard  C. Pavsidis

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

T. Apostolos  D. W. Griswold
D. D. Arnold  R. H. F. Lloyd
J. W. Becker  C. D. Mabey
H. A. Berger  B. T. Marren
R. L. Bishop  J. D. Martin
W. E. Camp  T. D. McMahon
W. Chow  H. Pong
H. O. Conde  G. W. Purmal
L. O. Dassow  C. G. Smith
J. J. Dillman  J. Swigals
D. Edgar  G. Syty
J. E. Gardner  A. C. Watson, Jr.
J. T. Giggord  R. T. Westlake
E. S. Gordon  R. D. Williams
N. H. Wright

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

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Potter & Brumfield, for years the leader in relays, is now producing precision switches that will meet or exceed your own specifications. Their broad new line of general purpose, miniature, and subminiature switches is engineered in the tradition of P&B relays. Same pride of craftsmanship, same excellent cost-to-quality ratio. For fast off-the-shelf deliveries of these precision switches, designated the P&B A1 series, call Brill Electronics!

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MOUNTAIN VIEW—1065 Terra Bella  Phone 961-1500

grid—3
The development of an exclusive failure analysis laboratory, required extensive test experience, is needed for supporting the Agenda system. C. Ross Bumstead will describe the project at the March 14 meeting of the Reliability chapter.

The discussion will indicate why such a specific laboratory is necessary and what it is expected to accomplish. Some detail will be indicated on how the laboratory will operate and the types of equipment which will be required. A schedule for accomplishment of all phases of this facility will be discussed briefly as well as the various types of funding which are required for the design, fabrication, construction, and operation of such a laboratory. The method of controlling failure analysis within this division will be discussed and how this system fits into a complex failed equipment discrepancy report system and the method of reporting the results to the material review board for the proper corrective action will be described. In addition, a prototype piece of hardware will be displayed indicating a simplicity of hook-up to obtain electrical access to equipment and maximum versatility.

Mr. Bumstead received his BSEE from the University of Colorado and later attended both MIT and Bowdoin College. The majority of his Lockheed career has consisted of setting up and operating all types of laboratories including the environmental test labs at Sunnyvale and the Santa Cruz test base. The development of an exclusive failure analysis laboratory, having little precedent, required extensive test experience.

MARCH 9, WEDNESDAY, 8:00 PM — Electron Devices
Current status of plasma research
Dr. Fred Crawford, Stanford Electronics Lab
Place: PH 101, Stanford
Dinner: 6:00 PM, Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto
Reservations: Mrs. Beverly House, 326-4000, Ext. 2304

MARCH 9, WEDNESDAY, 8:00 PM — Instrumentation & Measurement
Precision temperature measurement using quartz thermometer
Don Hammond and Al Benjamin son, Hewlett-Packard Co., Palo Alto
Place: Hewlett-Packard Co., 1501 Page Mill Road, Palo Alto
Dinner: 6:30 PM, L'Omelette, 4170 El Camino Real, Palo Alto
No reservations required

MARCH 10, THURSDAY, 7:30 PM — Vehicular Communications
Thermoelectric power converters for remote telemetering systems
W. R. Hampton, Farinon Electric, San Carlos
Place: SRI Conference Room B, 333 Ravenswood Ave., Menlo Park
No dinner

MARCH 14, MONDAY, 8:00 PM — Reliability
The development of a failure analysis laboratory
C. Ross Bumstead, Lockheed, Sunnyvale
Place: PH 101, Stanford University
No dinner

MARCH 15, TUESDAY, 8:00 PM — Automatic Control
Some control problems associated with the Stanford relativity experiment
Benjamin O. Lange, assistant professor, Stanford University
Place: Stanford University Room EE 128
No dinner

MARCH 15, TUESDAY, 8:00 PM — Engineering in Medicine & Biology
Mechanical impact: a model for auditory excitation and fatigue
H. D. Crane, staff scientist, SRI
Place: Stanford Medical School, Room M-112
Dinner: 6:30 PM, Red Cottage, Menlo Park
Reservations: Con Rader, 326-1970, Ext. 328 by noon, March 15

MARCH 16, WEDNESDAY, 8:00 PM — Circuit Theory
Some minor topics in network design
H. I. Orchard, senior staff engineer, Lenkurt Electric Co.
Place: SRI Bldg. 1, Conference Room B, 333 Ravenswood Ave., Menlo Park
Dinner: 6:30 PM, Red Cottage, Menlo Park
Reservations: Jan Mulvihill, 367-3169 by March 14

MARCH 17, THURSDAY, 8:15 PM — Information Theory
Trainable pattern classifying systems
Dr. Nils J. Nilsson, head of artificial intelligence group, SRI
Place: SRI Bldg. 1, Conference Room B, 333 Ravenswood Ave., Menlo Park
Dinner: 6:30 PM, Cote D'Azur, 3301 El Camino, Atherton
Reservations: Miss Shirley Jackson, 966-3865 by March 16

MARCH 17, THURSDAY, 8:00 PM — Microwave Theory & Techniques
Trends in the education of electrical engineers
Panel discussion: Dr. Glen Wade Moderator; Dr. Richard W. Grow, Dr. Diogenes J. Angelakos, Dr. Alan Peterson, Dr. Max Weiss, Dr. Kenneth Mallory
Place: Hewlett-Packard auditorium Room 1-A, 1501 Page Mill Rd., Palo Alto
Dinner: 6:30 PM, Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto
Reservations: Ruth Thor, SLAC, 854-3300, Ext. 711 by March 16
VOGEL'S CRYSTALS

The photomicrography of the liquid crystal state will be the subject of a joint March 23 meeting of the Santa Clara Valley Subsection and Industry and General Applications chapter. The photomicrographs is this exhibit show something familiar in a new way. They are the work of Marcel J. Vogel, staff chemist for the Los Gatos Laborator of the advanced systems development division, who was singled out as one of IBM's outstanding inventors in 1962 and again in 1963.

Many awards, including the 1963 Watson Trophy for photography in IBM, San Jose, have come to Mr. Vogel. In the 1963 competition sponsored by the Biological Photographic Association, "Methyl Succinic Anhydride," he won first place and earned the Charles S. Foster Memorial Citation for exceptional achievement in photomicrography.

In this exhibit, Mr. Vogel draws chiefly on his studies of the liquid crystal state which occurs in some compounds during the transition from liquid to solid. He records critical phases of his experiments with an integrating camera and polarizing microscope (the Zeiss Ultraphot II). A sample may be examined as a melt or at room temperature; immediately after abrupt cooling, or long after it has cooled. It is viewed in polarized light, with or without phase contrast, and with bright or dark field illumination. It may be magnified as much as 2500X.

STUDENT PAPER CONTEST

The IEEE student paper contest for Northern California and the Bay Area will be held April 1 in the science building at San Francisco State College, beginning at 7:30 p.m., following a 6 p.m. dinner in the college cafeteria.

Participating will be representatives of student branches in the San Francisco and Sacramento Sections, who will compete for first, second and third prizes of $50, $30 and $20 in graduate and undergraduate divisions. First prize winners will also be sent, with expenses paid, to compete in the Region 6 student paper contest in Tucson on April 26, during the annual regional conference. Winners of the regional conference will receive $300 and be sent to New York to compete against other regional winners.

Section members are invited to attend. Dinner reservations may be made by calling Prof. Rene Marxheimer, S.F. State College, 584-2300, Ext. 706.

(Continued on page 6)
Mr. Hammond will discuss the properties of quartz crystals as applied to thermometry. Particular emphasis will be placed on linearization of frequency-temperature characteristics, susceptibility to shock and response to transients in temperature.

A review of the use of platinum resistance thermometry and Quartz Thermometers in achieving accurate temperature measurements from near 0°K to 500°K will be given by Mr. Benjaminson.

Mr. Hammond is general manager of the physics research and development group, where he directs work on quantum electronics, electroacoustics and high vacuum devices. Mr. Benjaminson is engineering manager for transducer development of the Dymec division and was responsible for the quartz thermometer development.

**Meeting Ahead**

**THERMOMETRY**

Donald L. Hammond and Albert Benjaminson, Hewlett-Packard Co., Palo Alto, will discuss precision temperature measurement technique at the March 9 meeting of the Instrumentation and Measurement chapter.

Mr. Hammond will discuss the properties of quartz crystals as applied to thermometry. Particular emphasis will be placed on linearization of frequency-temperature characteristics, susceptibility to shock and response to transients in temperature.

A review of the use of platinum resistance thermometry and Quartz Thermometers in achieving accurate temperature measurements from near 0°K to 500°K will be given by Mr. Benjaminson.

Mr. Hammond is general manager of the physics research and development group, where he directs work on quantum electronics, electroacoustics and high vacuum devices. Mr. Benjaminson is engineering manager for transducer development of the Dymec division and was responsible for the quartz thermometer development.

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**Meeting Calendar**

(Continued)

**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

**MAY 11, WEDNESDAY, 8:00 PM** — Communication Technology/SCVSS/EWS
Television for instruction

*Glen Pensinger, technical director, instructional television center, San Jose State College*

Place: Educational Bldg., San Jose State College, San Jose, Calif.
Dinner: to be announced

**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
Type RM564 general-purpose oscilloscope

with added feature of STORAGE

SPLIT-SCREEN permits simultaneous operation as a storage oscilloscope and as a conventional oscilloscope

Display shows ability of the Type RM564 to store single-shot events. Waveforms represent displacement of leaf springs due to imparted shocks given them during test. Split-Screen Facility—with independent storage and erase of upper and lower half of the crt—permits easy comparison of test waveforms to a reference display.

- presents stored or conventional displays—The Type RM564 presents full-screen stored displays or full-screen conventional displays. Or—with the split-screen—stored displays can be presented on either the upper or lower half of the crt with conventional displays on the other half.

- saves film—The Type RM564 permits detailed waveform analysis and simplified waveform comparisons, in many instances, without resorting to photography. Just store and analyze—for periods up to one hour, with quick erase in less than one-fourth second.

- saves space—The Type RM564 occupies only 7 inches of standard rack height, yet has a full 8-cm by 10-cm display area.

- accepts combinations of 28 plug-in units—The Type RM564 adapts easily to such applications as multi-trace, low level differential, sampling, spectrum analysis, others—including matched X-Y displays using the same type amplifier units in both the amplifier and time-base channels. Plug-in units offer capabilities from 100uV/cm sensitivity (3A3) and 10MHz passband (3A1, 3A6), to 0.5 μsec/cm sweep rate (3B1, 3B3) and sweep-delay applications (3B1, 3B2, 3B3).

- trace photography is easier and can cost less—Stored displays can be recorded at one’s convenience, without the need for high-speed lens or film.

- trace photography is easier and can cost less—Stored displays can be recorded at one’s convenience, without the need for high-speed lens or film.
AUDITORY MODEL

H. D. Crane, staff scientist, Stanford Research Institute, will discuss "mechanical impact: a model for auditory excitation and fatigue," at the March 15 meeting of the Engineering in Medicine & Biology chapter.

Quite good models exist for auditory mechanics from the outer ear to the excitation and response of the cochlear partition with its complex array of membranes and hair cells. The precision of the modeling breaks down, however, at the level of hair-cell excitation because of an incomplete picture of the mechanism of hair-cell stimulation.

An auditory model will be described in which hair-cell excitation is based on mechanical impact of the cochlear hairs against the tectorial membrane, and auditory fatigue is based on a relatively slow mechanical bending of the "silly putty" tectorial membrane. In this model the cochlear system is treated as a spatially distributed, mechanical, envelope-detection system.

This model evolved out of a study of novel, high-frequency mechanical impact devices which are useful for abstracting the envelope of a modulated wave and for generating subharmonic oscillations. The nature of these devices will be discussed as an introduction to the auditory model.

It will be shown how the model can explain a relatively wide range of auditory data such as pitch and threshold shifts with pure-tone fatigue, modulation of a steady, high-frequency tone by a simultaneous low-frequency tone, and rapid high-frequency cut-off in "tuning curves" recorded from single auditory fibers. The model leads to a reinterpretation of such features as pitch sharpening, missing fundamentals, and fatigue.

EE EDUCATIONAL TRENDS

Trends in the education of electrical engineers will be considered by a panel at the March 17 meeting of the Microwave Theory & Techniques chapter.

Dr. Glen Wade, University of California at Santa Barbara, will serve as moderator. Other participants will be Dr. Richard Grow, University of Utah, Dr. Diogenes Angelakos, University of California at Berkeley, Dr. Alan Peterson, Stanford, Dr. Max Weiss, Aerospace Corp., El Segundo, and Dr. Kenneth Mallory, Stanford.

To be covered are curriculum changes taking place and recommended, the advantages to students of wider choice of courses and the effects on advisors, and changes in curriculum which will help universities better meet the needs of industry and research laboratories.

NETWORK DESIGN

At the March 16 meeting of the Circuit Theory chapter H. J. Orchard, senior staff engineer at Lenkurt Electric Co., Inc., will talk about a number of minor items of possible interest to the network designer.

Mr. Orchard joined the Post Office Research Laboratories in England in 1947 where he was mainly concerned with network design and circuit theory. In 1961 he emigrated to the U.S. and joined Lenkurt Electric Co., Inc. in San Carlos; he is presently in charge of the networks and mathematics section in the advanced development department. He received the B. Sc. and M. Sc. degrees in mathematics from the Universities of London and Liverpool, respectively.
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.

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.

**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.

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 in 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.

But, though the job is the main thing, living in the Pacific Northwest shouldn't be ignored either. About 85% of our employees live in 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).
ACCELERATOR 80% COMPLETE

The entire 10,000 feet of the two-mile Stanford linear accelerator have been manufactured, 8,000 feet have been installed in the underground housing, and the original $114 million authorized by Congress "still appears to be adequate for the machine's completion," project director Wolfgang K. H. Panofsky reports.

"The project is approximately 80 per cent complete," he notes in a report circulated to the university's board of trustees. "The full 10,000-foot electron beam will be activated for the first time next May, according to present schedule. About six months of 'shake-down' will ensue and full-scale experiments should begin before the end of 1966."

The accelerator construction is on schedule with plans announced in July 1962, when ground was broken.

Panofsky says. Building construction is under the direction of SLAC's joint-venture subcontractor, Aetron-Blume-Atkinson, while nearly all design and construction of the accelerator itself is being done by SLAC personnel.

Procurements awarded to industry for accelerator parts and equipment now total $41,300,000. The SLAC staff stands at approximately 1,160. About 275 are senior staff or faculty members, scientists, and engineers. About 180 are temporary employees during construction.

Tests of the accelerator, 2,000 feet at a time, are under way, he reports. Tests with an actual electron beam in the first 666 feet (two sectors of the eventual 30) are continuing.

"The energy and beam quality observed during these tests fully agree with design expectations," Prof. Panofsky comments.

SLAC ON DISPLAY

Components and scale models of the accelerator will be shown at Stanford Museum through March 15 (10-5 weekdays, 1-5 Sat. and Sun.) in an exhibit entitled "Design for Nuclear Research" prepared by the SLAC staff and the department of art and architecture.

THE GRID

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

Prof. Steven Schwarz, University of California at Berkeley, will discuss lasers and laser applications at the March 28 meeting of the East Bay Subsection.

Dr. Schwarz will demonstrate a helium-neon laser and describe present applications and long-range uses. A graduate of Harvard and Cal Tech, he engaged in full and part-time work from 1962-64 with Hughes Research Laboratories, where he worked with the group which discovered the Q-switched laser and the Raman laser. He has also worked on the application of high-power lasers to plasma diagnosis. He is presently working in quantum electronics.

Nils J. Nilsson, head of the artificial intelligence group in the applied physics laboratory of Stanford Research Institute, will discuss trainable pattern classifying systems at the March 17 meeting of the Information Theory chapter. He has been active in pattern recognition research for the past four years and has recently published a book entitled Learning Machines: Foundations of Trainable Pattern Classifying Systems (McGraw-Hill, 1965). Dr. Nilsson has taught courses in pattern recognition at both Stanford University and the University of California.

Several prominent pattern recognition techniques will be examined and compared. These techniques include parametric and non-parametric statistical decision methods, adaptive or learning methods exploiting the knowledge gained from recent biological research. Emphasis will be given to those techniques currently under intensive study in the artificial intelligence group at Stanford Research Institute. Results of recent experiments applying these methods to the recognition of hand-printed characters will be presented. The talk will conclude with a discussion of outstanding unsolved problems in pattern recognition research and the directions being taken by present attempts to solve these problems.

BSEE or BSME-Reliability design review:
Experienced with small electrical components and semiconductors. Prepare procurement, test and design specifications.

BSEE-Reliability analysis:
Experienced in circuit design and analysis. Perform detailed reliability analyses of complex electronic parts and circuits and recommend improvements in design reliability.

BSEE-Reliability test engineering:
Prepare test procedures for electrical and electronic packages and coordinate procedures with test laboratories, conduct proofing of test procedures and test equipment.

BSME-Reliability and inspection:
Perform mechanical and structural reliability analyses. Provide for inspection planning and review prints to determine inspection attributes. Experience in metallurgy and NDT helpful.

Non-destructive testing:
Background in electronics and applied physics plus knowledge of instrumentation related to the use of X-rays, sound waves, electrical fields and optics.

Write Mr. K. R. Kiddoo, Professional Placement Manager, Lockheed Missiles & Space Company, P.O. Box 504, Sunnyvale, California.
WESTERN ELECTRONIC SALES INCREASE 11% IN 1965, SIMILAR 1966 GAINS FORECAST

The west is again pacing U. S. electronics growth.

Sales of electronic companies in the western states increased 11% to $4.3 billion in 1965 and will show a gain almost as great in 1966, according to a survey just completed by WEMA.

Western companies are forecasting 1966 sales of $4.74 billion—nearly 26% of the nation’s expected electronics output of $18.25 billion—the WEMA survey reveals.

This could mean upwards of 20,000 new jobs in electronics in the west this year, said WEMA President Wendell B. Sell in announcing results of the survey at the association’s annual congressional luncheon in Washington, D. C.

More than 50 senators and representatives from the 13 western states heard the optimistic report by Dr. Sell, who is president of Packard Bell Electronics Corp., Los Angeles.

Electronics employment in the west totals 267,300 today, compared to 243,100 a year ago, the WEMA official said. Employment had dropped in 1963 and 1964 when sales reached a temporary plateau, he explained.

Noting that all regions in the west are once more running ahead of the national electronics growth rate, Dr. Sell pointed out that the upswing is due primarily to commercial and other non-defense business rather than Viet Nam.

“The step-up in military buying is boosting sales for some companies, particularly those in microwave and other segments of the industry affected adversely by government cutbacks two years ago,” Dr. Sell said.

“However, new technology and rapidly expanding use of electronics in consumer and industrial applications are the major forces behind the present industry expansion.”

Pacing the west’s growth today are Arizona and the Los Angeles and San Francisco Bay areas of California.

Sales of companies in the San Francisco area topped $1 billion for the first time in 1965 as output expanded 17% over the previous year. Employment has increased 6,000 the past 12 months to the current total of 55,500 in the Bay Area. A sales increase of 13% is forecast for this region in 1966.

Arizona continues to grow at the fastest rate. As employment jumped from 18,600 to 27,000 last year, sales boomed from $325 million to $425 million—a 30% increase resulting almost entirely from non-military business. Sales this year should top $500 million and firmly entrench Arizona as the third largest electronics region in the West.

Well over half of the total electronic sales and employment in the west are still provided by the Los Angeles area, added such nationally known companies as Hewlett-Packard, Ampex, Litton and IBM to its manufacturers’ roster, is becoming an increasingly important factor in the western electronics picture, Dr. Sell said.

While detailed statistics for Colorado are not yet available, the burgeoning electronics complex around Denver is showing signs of rapid expansion, the WEMA president added.

Sales of firms in Colorado, New Mexico, Utah and Nevada totaled $205 million in 1965 and should reach $230 million in 1966, according to forecasts.

If you plan to move from the section area notify headquarters and your new section headquarters three weeks in advance to avoid missing important publications and meeting information.

<table>
<thead>
<tr>
<th>ELECTRONIC INDUSTRY EMPLOYMENT</th>
<th>1964</th>
<th>1965</th>
</tr>
</thead>
<tbody>
<tr>
<td>Los Angeles area</td>
<td>143,000</td>
<td>150,000</td>
</tr>
<tr>
<td>San Francisco Bay Area</td>
<td>49,500</td>
<td>55,500</td>
</tr>
<tr>
<td>Arizona</td>
<td>18,600</td>
<td>27,000</td>
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<tr>
<td>San Diego</td>
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<tr>
<td>Pacific Northwest</td>
<td>10,000</td>
<td>11,000</td>
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<td>Balance of the West</td>
<td>11,200</td>
<td>12,300</td>
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<tr>
<td><strong>Western Totals</strong></td>
<td><strong>243,100</strong></td>
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<td><strong>U. S. Totals</strong></td>
<td><strong>1,010,000</strong></td>
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<table>
<thead>
<tr>
<th>ELECTRONIC INDUSTRY SALES</th>
<th>1964</th>
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<th>1966 (Estimated)</th>
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<tr>
<td>Los Angeles area</td>
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<td>Arizona</td>
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<td>205</td>
<td>230</td>
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<tr>
<td><strong>Western Totals</strong></td>
<td><strong>3,860</strong></td>
<td><strong>4,300</strong></td>
<td><strong>4,740</strong></td>
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<tr>
<td><strong>U. S. Totals</strong></td>
<td><strong>16,135</strong></td>
<td><strong>17,000</strong></td>
<td><strong>18,250</strong></td>
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</tbody>
</table>

The four largest chapters of the San Francisco Section are Aerospace & Electronic Systems (540), Computer (515), Electron Devices (484), and Microwave Theory & Techniques (429).
SPACE TRAVEL HAZARDS

William E. Price, senior engineering specialist, Philco Corp. WDL, Palo Alto, will present a review of space radiation flux and distribution within the magnetic field of earth at the March 21 meeting of the Nuclear Science chapter. Curves showing distribution of protons between 0.1 and 5 Mev and above 30 Mev and electrons above 40 Kev and above 1.6 Mev will be given and also an argument in favor of low energy radiation testing of semi-conductor devices. Specific spacecraft failures due to radiation damage will be discussed. Radiation damage to materials and electronic devices with examples of choices which may be made to avoid radiation induced problems in systems exposed to space radiation will be covered. A display of samples of irradiated materials demonstrating visible damage will be discussed.

Mr. Price recently joined Philco after leaving NASA’s Goddard Space Flight Center. In two years at Goddard he was responsible for the design of a complex radiation facility which is being built for simulation of space radiation on spacecraft. Prior to that Mr. Price worked five years at Lockheed Research Laboratories on radiation effects to spacecraft systems and dosimetry of laboratory and space radiation.

COMPUTER RESEARCH

The March 29 meeting of the Computer chapter will feature a panel discussion on promising avenues for computer research as a repeat of one of the most popular sessions at the recent Fall Joint Computer Conference at Las Vegas. Rex Rice of Fairchild Semiconductor will be the chairman of the session, and the other panelists will be L. C. Hobbs of Hobbs Associates, T. B. Steel of System Development Corporation, and K. Uncapher of Rand Corporation.

The discussions will be based on projections that by 1970, monolithic circuit elements will be produced so efficiently that they will be available at costs of

(Continued on page 20)
1966 PLANS ANNOUNCED

An attendance of 45,000 or more persons has been predicted for the 1966 Western Electronic Show and Convention, scheduled for Los Angeles August 23-26.

WESCON's 1966 executive committee has announced that exhibit applications materials for 1100 display booths are now in the hands of prospective exhibitors.

The huge electronic exhibition and conference will require all facilities of Los Angeles Memorial Sports Arena and Hollywood Park racetrack for product displays, and will utilize the Biltmore hotel for the four-day technical program.

WESCON's exhibitor prospectus, which carries an "eight-shows-in-one" theme, emphasizes the categorization of all exhibits by area of technical product interest. Two of the eight categories—packaging and production, and instrumentation, will be located at Hollywood Park. The remaining six, including circuit components, communication and detection, computers and data processing, audio-TV and automatic control, air and space control systems, and publishing, will be presented in the Sports Arena.

A new special event, the keynote luncheon, will be presented on opening day, replacing the former dinner-dance which was held later in the week. Other major activities will include the distributor-manufacturer-representative conference, industrial design awards, Future Engineers show, all-industry cocktail party, and women's activities. The WEMA corporate luncheon will also be held during WESCON.

IEEE NEWS

OCEAN ELECTRONICS

The IEEE Ocean Electronics Symposium, sponsored by the Hawaii Section, will take place at the new Ilikai Hotel convention hall in Honolulu, August 29-31, and will include four technical sessions, field trips to marine and oceanic facilities on Oahu, optional field trips to Kauai, Maui and Hawaii, and a complete ladies' program.

The symposium has been scheduled to follow WESCON (August 23-26) by only three days as a convenience to members wanting to attend both events.

The purpose of the meeting is to stimulate growth and further the state of the art in the field of ocean electrical and electronics engineering, including acoustics, communications, deep submergence, instrumentation, magnetics, man-in-the-sea, military ocean technology applications, mining and salvage applications, and underwater cables. Two luncheons, a reception and banquet are scheduled. Proceedings will be published. Exhibits are not planned.

A "call for participation" in the 1966 Western Electronic Show and Convention technical program has been issued to engineering educators and executives throughout the free world, it was announced by John J. Guarrera, WESCON director and 1966 convention director.

Guarrera reported that the technical program committee, headed by Dr. Samuel Sensiper (Space-General Corp.) and Robert Muchmore (TRW Systems), chairman and vice chairman, has completed publication of the call, and that it is in process of circulation to about 5000 persons directly and to many thousands more through media notices.

The call differs from the traditional invitation to technical authors to submit abstracts for consideration by a selection committee. Instead, it invites proposals for the organization of full technical sessions on specific technical topics. The format is very similar to the 1965 WESCON pattern, Dr. Sensiper noted.

He said that there will be 25-30 WESCON technical sessions in the 1966 program, all to be held in meeting rooms of the Biltmore hotel during WESCON week, August 22-26. The program will be made up of "contributed sessions," proposed and organized by a single group on a single subject, but presenting authors from different organizations, and "invited sessions" made up of speakers specifically invited by the technical program committee to explore a particular subject of technical interest. Dr. Sensiper also noted that the science film theater, in which engineering and other technical motion pictures will be presented on a continuing daily schedule, will also be a part of the technical program presentation.

Deadline for submission of letters-of-intent to submit a session proposal is March 10, Dr. Sensiper said, and fully developed session proposals will be due April 15.

Guarrera also announced that plans are now complete for presentation of three concurrent technical symposia. Each will last two days (August 22 and 23), and is being organized by a sponsoring group or technical society. The 7th International Electronic Circuit Packaging Symposium will be presented cooperatively by WESCON, EDN, and the University of Southern California on the USC campus; the IEEE Group on Electron Devices will hold a two-day tutorial symposium at the Statler-Hilton hotel; and the Society of American Value Engineers will present a two-day technical meeting at the Ambassador hotel.

---

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- Lower Cost
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- Smaller Size
- Lighter Weight
- Frequency Insensitive
- Power Factor Insensitive

**COMPETITIVE COMPARISON**

<table>
<thead>
<tr>
<th></th>
<th>R-3200/60VA</th>
<th>TYPICAL 60VA FERRITE REGULAR TRANSFORMER</th>
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<tbody>
<tr>
<td><strong>PRICE</strong></td>
<td>$22.00</td>
<td>$23.00</td>
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<td><strong>RESPONSE TIME</strong></td>
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<td><strong>REGULATION</strong></td>
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<td>1%</td>
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<tr>
<td>LOAD</td>
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<tr>
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<tr>
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<td>60 CPS</td>
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<tr>
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</tr>
<tr>
<td><strong>UNITS TO BE MOUNTED</strong></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>AVAILABLE IN SIZES</strong></td>
<td>15-30-60-120-250VA</td>
<td>*AVAILABLE IN 400 CPS</td>
</tr>
</tbody>
</table>

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For immediate attention, please forward your resume stating qualifications and salary requirements in confidence to Director, Applications Engineering, 150 East Standard Avenue, Richmond, Calif. 94804.

SECTION IEEE PARTICIPANTS
Twenty members of the San Francisco Section will take part in the technical program of the IEEE International Convention and Exhibition, New York, March 21-25. The participants, their session numbers and subjects:
- P. D. Dodd, F. B. Wood, IBM, Los Gatos; 5. Transmitted signal design.
- D. C. Aliai, IBM, Los Gatos; 13. Received signal processing.
- H. J. Shaw, D. K. Winslow, Stanford University; 37. Recent advances in microwave theory and techniques.
- W. R. Vincent, Stanford Research Institute, Menlo Park; 40. Present status and future utilization of advanced technology in high frequency systems engineering.
- M. M. Atalla, Hewlett-Packard Co., Palo Alto; 42. Solid state devices and integrated circuits.
- Dean Joseph Pettit, Stanford University; 53. Goals of engineering education.
- C. A. Desoer, K. K. Wong, University of California, Berkeley; 70. Circuit theory II—network analysis and synthesis.
- D. D. Siljak, University of Santa Clara; 74. Linear systems and applications.
- L. A. Zadeh, University of California, Berkeley; 75. Computer and information sciences in electrical engineering education and the IEEE.
- W. G. Howard, Jr., University of California, Berkeley; 80. Circuit theory III—special structures.
- B. M. Oliver, Hewlett-Packard Co., Palo Alto and junior past president of IEEE, will take part in a special symposium on Tuesday evening, March 23 at 8 p.m. in the grand ballroom of the Hilton: "After Apollo—What?", along with a distinguished panel.

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

ANNUAL CONFERENCE
The 1966 annual conference of Region 6 will be held April 26-28 at the Pioneer International Hotel, Tucson, co-hosted by the Tucson and Fort Huachuca Sections with the theme "Future Engineering for Earth and Space.”

The three-day meeting will feature 125 technical papers and an exceptional group of invited luncheon and dinner speakers, including Dr. Richard Bellmen, University of Southern California; Dean W. L. Everett, University of Illinois; Maj. Gen. David P. Gibbs, USA; and Dr. W. G. Shepherd, president, IEEE.

Two sessions on military electronics (electromagnetic compatibility) will be held at the U.S. Army electronic proving grounds at Ft. Huachuca, southeast of Tucson, all other sessions being in the hotel. Technical tours will include the proving grounds, a Titan ICBM installation, and Tucson Gas & Electric Co.

Supplementing the technical program will be the Region 6 student paper contest and a full program for the ladies.

For advance registration forms or paper abstracts, write: IEEE Region 6 Conference, P.O. Box 12826, Tucson, Ariz. 85711.

Technical sessions and chairmen: circuit theory (1), M. E. Van Valkenburg; hybrid analog computers, G. A. Korn; reliability, I. Bazyk; nuclear generation of power, N. Hillberry; circuit theory (II), B. R. Myers; computer organization, H. G. Kolsky; communication systems, J. C. Hancock; high voltage DC transmission, E. W. Kimball; system theory, A. V. Balakrishnan; solid state and gaseous plasmas, S. J. Buchsbaum; engineering education, S. S. Shams;

Information theory, N. Abramson; biomedical engineering, F. S. Grodins; rotating machinery, E. C. Guilford; military electronics (I), L. E. Kililton; military electronics (II), J. J. Lamb; automatic control, J. A. Aseltine; integrated circuits, D. O. Pederson; magnetism, L. Felsen; basic sciences, A. Papoulis; optimal control, G. Leitmann; solid state device technology, I. A. Lesk; propagation of pulses, J. R. Wait; atmospheric electricity, M. Brook.
IT IS REPORTED:

General Electric's atomic power equipment dept., Sunnyvale, has signed a $79 million contract with Commonwealth Edison of Chicago for a new atomic power reactor for the Dresden power station, Morris, Ill., bringing capacity to 1.8 million kilowatts, a world's record.

Eimac Division of Varian Associates has received three government contracts totaling $511,000 to supply electron tubes to the defense electronics supply center at Dayton, Ohio.

Robert G. Moore has been appointed systems application engineer for ULtek Corp., Palo Alto, was formerly national sales manager for Photomation, Ill.

Itk Corp. will request stockholder approval of the purchase of Pennsylvania Optical Co., Reading, Pa., for $9 million.

Prof. Glenn H. Keitel has been named acting chairman of the San Jose State College electrical engineering dept., succeeding Prof. James C. Mace, who has returned to full-time teaching.

Richard MacMillan has been named chief engineer for Kaiser Aerospace & Electronics, Phoenix.

Prof. John G. Linvill, electrical engineering dept., Stanford, has been awarded an honorary doctoral degree of applied science by Belgium's University of Louvain.

William D. Rollnick has been appointed to the new post of vice-president of finance and administration at Data Technology Corp., Mountain View. He was formerly assistant secretary and military marketing manager at Fairchild Hiller Corp.

Dr. Charles E. Enderby has been named director of research and development of Electro Optics Associates, Palo Alto, was formerly a senior scientist at the General Electric microwave laboratory, Palo Alto, responsible for high power traveling-wave tube design and optical modulation, detection and system programs.

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**More Swings**

Quantic Industries, Inc., San Carlos, has been awarded a $200,000 Air Force contract to develop a new horizon sensor for the primary reference systems of an earth-orbiting satellite.

Pacific Plantronics, Santa Cruz, manufacturer of lightweight telephone headsets, announced sales of $751,309 and earnings of $64,390 for the first half of the fiscal year ending November 30.

Dalmo Victor, Belmont, a division of Textron Corp., has been awarded a $1.4 million Air Force contract to develop and manufacture an automatic, tape-controlled test system for checking out wiring in fighter aircraft.

Elmar Electronics, Inc., 21 year-old distributor of electronics parts, has completed moving its headquarters from Oakland to a new $650,000, 40,000 square foot building at 2288 Charleston Road, Mountain View, including its former Palo Alto division. Pencor, now merged into Elmar. Sales of $8.12 million and net income of $411,696 were reported for the fiscal year ending October 31. There are 88 employees in Mountain View and 22 at the Oakland facility, now operated as a branch store.

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ADVERTISERS INDEX
Baran Associates ........................................ 19
Brill Electronics ........................................ 3
COHU Electronics Kin Tel Div. .................... Cover 2
Costello & Co. ......................................... 20
Cushman Electric ....................................... 15
Dickson Electronics Corp. .......................... 16
Englel & Co. ............................................ 17
Fairchild Electric ....................................... 13
Fluke Mfg. Co. .......................................... 9
General Radio .......................................... Cover 4
Granger Associates ..................................... 18
Hewlett-Packard Co. .................................. 2
Industrial Training .................................... 14
Kaiser Aerospace & Electronics ............... 17
Lockheed Missiles & Space Co. ................. 11
National Press ......................................... 18
Neal, Stratford & Kerr ................................. 20
Neely Sales Div. HP Co. ............................. 1
Noller Controls ........................................ 16, 20
Pulse Engineering Inc. ............................. 19
Singer Co.-Metric Div. ............................. Cover 3
Gertsch Instruments ................................. Cover 3
Spartan Employment Agency ..................... 18
Tektronix, Inc. ......................................... 7
Wanlass Electric Co. .................................. 15
Western Gold & Platinum Co. .................... 13

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MORE COMPUTER RESEARCH
the order of three cents per circuit. For example, Mr. Rice has forecast that it may be possible to produce as many as 3,250 circuits on a single die at a sales price of $100, including costs of packaging and testing. Availability of "near-zero-cost" hardware circuit elements will most certainly have a great impact on the organization and use of computers. The concept of the "personal" stand-alone computer as contrasted to time-shared, on-line facilities for use by the individual will be explored. Other vital factors such as simplification of software, and improvement of the man-machine interface through development of better input/output concepts and hardware will also be discussed. During the first part of the meeting, the panelists will present their views of data processing of the year 1970. Audience participation will be invited during the latter part of the meeting.
The meeting will be held at 7:45 pm in Room ce-134 of the McCullough Building on the Stanford campus. This building is located on Lomita Drive opposite the west side of the main Quad, to the south of the (round) Physics Lecture Hall (toward the foothills). Entrance to the building will be via the door opening to the covered walk between the building and the lecture hall.

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