

EDITOR'S PROFILE of this issue

from a historical perspective ...

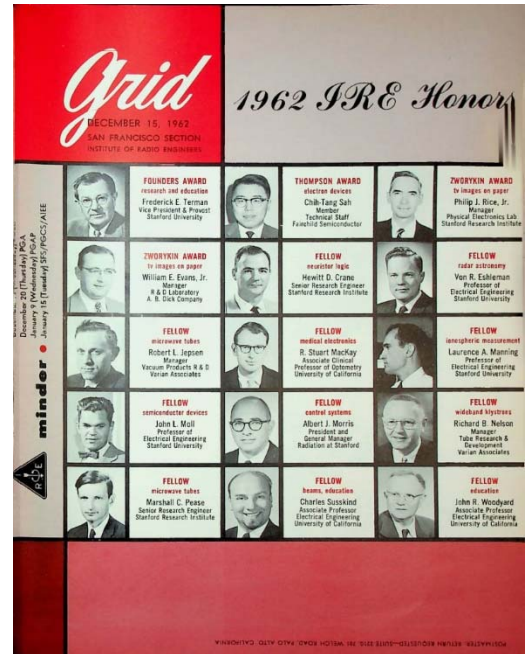
with Paul Wesling, SF Bay Area Council GRID editor (2004-2014)

December, 1962 (mid-month):

Cover: shown are the 15 IRE award winners from our Section – more than for any other Section in the IRE. John Moll is elected a Fellow of the IRE; he joined Stanford from Bell Labs. When I was studying semiconductors, we used a preprint of his book, which featured the Ebers-Moll model of the transistor. He went on to Fairchild, then Hewlett Packard, and then received the IEEE's Edison Medal in 1991.

Page 8: Fred Terman of Stanford (see cover) has won the IRE's Founders Award, which is given only on special occasions; the citation is for "distinguished leadership in the organization and administration of, and contributions to, scientific research and education." Only 6 have been given. he chaired the IRE in 1939, headed up the wartime Radio Research Laboratory at Harvard, and developed Stanford's EE department into the nation's largest producer of doctoral graduates. He (and Stanford president Wally Sterling) started the Stanford Industrial Park, now with 40 tenants. An article about him is in the December 1962 Readers Digest.

Page 8: The Bio-Medical Electronics chapter lays out the agreements in principle for merging with the AIEE's similar chapter; the plan is to cooperate now on joint meetings/activities, and complete the integration with election of IEEE officers next summer.



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

https://ethw.org/IEEE_San_Francisco_Bay_Area_Council_History

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

July, 2021

Contact p.wesling@ieee.org

Grid

DECEMBER 15, 1962
SAN FRANCISCO SECTION
INSTITUTE OF RADIO ENGINEERS

1962 IRE Honors



FOUNDERS AWARD
research and education
Frederick E. Terman
Vice President & Provost
Stanford University



THOMPSON AWARD
electron devices
Chih-Tang Sah
Member
Technical Staff
Fairchild Semiconductor



ZWORYKIN AWARD
tv images on paper
Philip J. Rice, Jr.
Manager
Physical Electronics Lab
Stanford Research Institute



ZWORYKIN AWARD
tv images on paper
William E. Evans, Jr.
Manager
R & D Laboratory
A. B. Dick Company



FELLOW
neuristor logic
Hewitt D. Crane
Senior Research Engineer
Stanford Research Institute



FELLOW
radar astronomy
Von R. Eshleman
Professor of
Electrical Engineering
Stanford University



FELLOW
microwave tubes
Robert L. Jepsen
Manager
Vacuum Products R & D
Varian Associates



FELLOW
medical electronics
R. Stuart MacKay
Associate Clinical
Professor of Optometry
University of California



FELLOW
ionospheric measurement
Laurence A. Manning
Professor of
Electrical Engineering
Stanford University



FELLOW
semiconductor devices
John L. Moll
Professor of
Electrical Engineering
Stanford University



FELLOW
control systems
Albert J. Morris
President and
General Manager
Radiation at Stanford



FELLOW
wideband klystrons
Richard B. Nelson
Manager
Tube Research &
Development
Varian Associates



FELLOW
microwave tubes
Marshall C. Pease
Senior Research Engineer
Stanford Research Institute



FELLOW
beams, education
Charles Susskind
Associate Professor
Electrical Engineering
University of California



FELLOW
education
John R. Woodyard
Associate Professor
Electrical Engineering
University of California

December 20 (Thursday) PGAP
January 9 (Wednesday) PGAP
January 15 (Tuesday) SFS/PGCS/AIEE

minder





circuit designers...is your appointment in space with Hughes?

Today at Hughes you will find one of the country's most active space-electronics organizations. Important new and continuing projects, including SURVEYOR, SYNCOM, Missile Defense and POLARIS guidance systems are growing at unprecedented rates.

This vigor promises the qualified engineer or scientist more and bigger opportunities for both professional and personal growth.

Many immediate openings exist. The engineers selected for these positions will be assigned to the following design tasks: the development of high power airborne radar transmitters, the design of which involves use

of the most advanced components; the design of low noise radar receivers using parametric amplifiers; solid state masers and other advanced microwave components; radar data processing circuit design, including range and speed trackers, crystal filter circuitry and a variety of display circuits; high efficiency power supplies for airborne and space electronic systems; telemetering and command circuits for space vehicles, timing, control and display circuits for the Hughes COLIDAR (Coherent Light Detection and Ranging).

If you are interested and believe that you can contribute, make your appointment today.

Please airmail your resume to:
Mr. Robert A. Martin
Head of Employment
Hughes Aerospace Divisions
11940 W. Jefferson Blvd.
Culver City 37, California

We promise you a reply within one week.

Creating a new world with ELECTRONICS

HUGHES

HUGHES AIRCRAFT COMPANY
AEROSPACE DIVISIONS


An equal opportunity employer.

A 300 KC Solid State Counter for \$750


rugged
reliability





Measure frequency and ratio directly; measure speed, rpm, pressure, temperature, acceleration or any phenomena that can be converted with transducers to ac or pulses.

The same design, circuitry and construction features of all new transistorized  counters are incorporated in this low-priced, general-purpose counter. Time base is derived from the power line, providing 0.1% accuracy—fully adequate for many frequency measurements. The counters have a maximum counting rate of 300 KC. 0.1 v sensitivity permits low-level measurements.

Model 5211A has gate times of 0.1 and 1 second. Model 5211B has an additional gate time of 10 seconds. Otherwise, the instruments are identical. A storage feature, which can be disabled by a rear-panel switch, provides a continuous display, each reading held on the 4-digit neon columnar readout until the count itself changes. The counters provide a 1-2-2-4 BCD code output for systems use or recording devices. Manual gate allows the 5211 counters to be controlled by the front panel, or be operated remotely by contact closure or suitable pulses.

Solid state design and construction provide low power consumption, low heat dissipation, operation over a wide temperature range. The counters are housed in the new  modular cabinet for bench and rack mount. Plug-in circuit modules and ready accessibility simplify maintenance. Both models weigh but 10 lbs. and can easily be carried in one hand. Conservative design features, such as the use of decade dividers in the gate generating circuits, provide operational stability and eliminate calibration problems.

Specifications

- Maximum counting rate: 300 KC
- Display: 4 digits, neon column
- Input sensitivity: 0.1 v rms sine wave
- Temperature range: -20 to 50°C
- Time base: 50 or 60 cps power line
- Manual gate: Controlled by front panel function switch, by external contact closure, or by 3 volt peak positive pulses at least 10 μ sec wide at half amplitude point.
- Frequency measurement: 2 cps to 300 KC; accuracy ± 1 count, \pm time base accuracy
- Ratio measurement: Reads: (f_1/f_2)
 - Range: f_1 : 2 cps to 300 KC (0.1 v rms)
 - f_2 : 100 cps to 300 KC (1 v rms into 1000 ohms)
 - Accuracy: ± 1 count of f_1 , \pm trigger error of f_2
- Dimensions: 16 $\frac{3}{4}$ " wide x 3 $\frac{1}{2}$ " high x 11 $\frac{1}{2}$ " deep, 10 lbs.
- Price:  5211A, \$750.00;  5211B, \$825.

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

HEWLETT-PACKARD COMPANY

CONTACT OUR ENGINEERING REPRESENTATIVES, NEELY ENTERPRISES, FOR INFORMATION—Los Angeles, 3939 Lankershim Blvd., North H'wd., TR 7-1282 and PO 6-3811; San Carlos, 501 Laurel St., 591-7661; Sacramento, 1317 Fifteenth St., GI 2-8901; San Diego, 1055 Shafter St., AC 3-8103; Scottsdale, 771 S. Scottsdale Rd., 945-7601; Tucson, 232 So. Tucson Blvd., MA 3-2564; Albuquerque, 6501 Lomas Blvd., N.E., 255-5586; Las Cruces, 114 S. Water St., 526-2486.

SILICON-STEEL LAMINATIONS

For Audio Transformers

Power Transformers

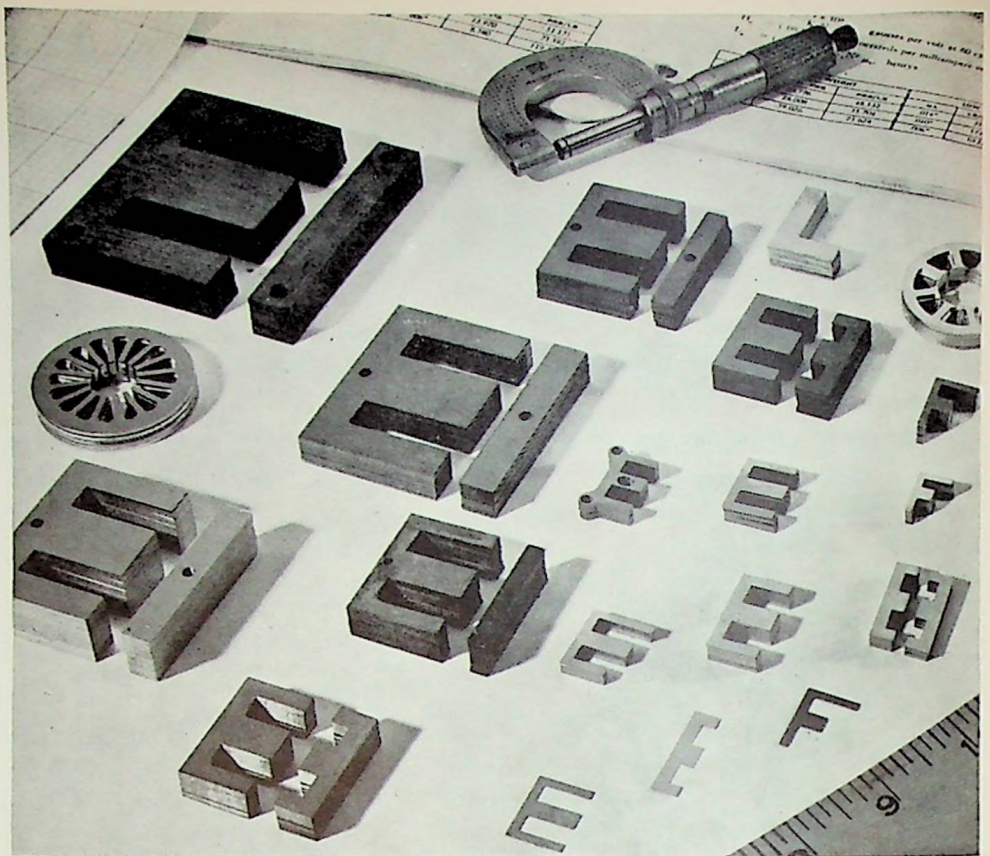
Rotors and Stators

NICKEL-IRON LAMINATIONS

For High Frequency Transformers

Inductors

Relays



ORDER FROM ARNOLD'S PACIFIC DIVISION

... your only source of QUALITY laminations west of the Rockies



WRITE FOR THE ARNOLD PACIFIC CATALOG

This 64 page booklet contains complete specifications and detailed drawings of all standard Arnold nickel-iron and silicon-steel laminations. Also illustrates line of stamped metal components for electronics.

ADDRESS DEPT. TG-12

Your best bet for *quality* laminations—accurate to size, shape and performance; clean-cut and free from burr—is to specify and use Arnold Pacific products.

Arnold's Pacific Division plant, sales office and warehouse facilities are located right in the heart of the electronics industry on the West Coast. We have the capacity and experience to give you superior service, and you can count on the expert assistance of our entire staff on any problem you may have.

Once your specifications have been accurately determined and checked, your order is quickly produced from our extensive inventories of silicon and nickel-iron alloys. Modern facilities and methods, and careful attention to annealing procedures assure the utmost in magnetic properties and smooth, clean lamination surfaces, free from scale.

● *Let us serve you.* Inquire today about Arnold's complete line of standard laminations and other components for the electrical and electronics industries.

**ARNOLD**
SPECIALISTS in MAGNETIC MATERIALS

THE ARNOLD ENGINEERING COMPANY, Main Office: MARENGO, ILL.

SAN FRANCISCO, Office: 701 Welch Road, Palo Alto, Calif.

Telephone: DAvenport 6-9302

3883A

EXECUTIVE EDITOR: James D. Warnock

Address Editorial and Advertising to:

IRE OFFICE, SUITE 2210, 701 WELCH ROAD, PALO ALTO, CALIFORNIA

SECTION MEMBERS: Send address changes to IRE national headquarters, 1 East 79 Street, New York 21. MAILING OFFICE OF PUBLICATION: 394 Pacific Ave., Fifth Floor, second-class postage paid at San Francisco, California

SUBSCRIPTION: \$2.00 (members); \$4.00 (others); \$5.00 (foreign) per annum

contents

Meeting Calendar	6
WESCON News, Papers Call, Chairmen Named	6, 7
Remarks from the Chairs, Section-WESCON Director	7
Awards and Fellows	8
Meeting Ahead (PGA)	8
Consolidation Notes, Agreements in Principle	8
Meeting Reviews (PGAC, EBSS)	9, 10, 12, 13
Events of Interest, IRE Meeting Summary	13
WEMA News, Election of Officers	14
Grid Swings—News of the Industry	14, 15
Manufacturer/Representative Index and Representative Directory	16, 17
Section Membership—New Members and Grade Changes	18
Index to Advertisers	18

cover

Fifteen distinguished IRE members grace our cover as award winners and fellows, for the second year in a row more than found in any other section of IRE, pointing again to the achievement being

accomplished in electronic engineering in the San Francisco Bay Area. For more about their honors to be observed at the IRE Show in March and the SFS annual meeting in June, see page 8.

section officers

Chairman—Peter Lacy
Wilfron Co., 717 Loma Verde, Palo Alto

Treasurer—Jack L. Melchor
HP Associates, Palo Alto

Vice Chairman—Charles Susskind
Cory Hall, University of California, Berkeley 4

Publications Advisor—Peter N. Sherrill
West Associates, Palo Alto

Secretary—Alan T. Waterman, Jr.
Stanford University

Membership Chairman—Fred MacKenzie
Stanford Research Institute, DA 6-6200

Executive Secretary—James D. Warnock
Section Office: Suite 2210, 701 Welch Rd.
Palo Alto, DA 1-1332

advertising

BAY AREA & NATIONAL: Ernesto Montano, IRE, Suite 2210, 701 Welch Road, Palo Alto, California, DA 1-1332

EAST COAST: Cal Hart, H & H Associates, 501 Fifth Ave., New York 17, N.Y., YU 6-5886

SOUTHERN CALIFORNIA: Jack M. Rider and Associates, 1709 W. 8th St., Los Angeles 17, California, HU 3-0537

BRILL

What's a tube?

Believe-it-or-not, this question is often asked today. It's the old saw, "out of sight, out of mind."

The fabulous semi-conductor is the reason for such forgetfulness, since it plays so important a role in today's emphasis on exotic systems for missiles and electronic devices.

However, let's not forget the reliable, dependable, work horse—the VACUUM TUBE.

Klystrons, Magnatrons, Thyratrons, Ignitrons, Phototubes, Nuvistors... they are called by many names, but remember they're tubes and still have a big place in industry.

We at BRILL ELECTRONICS know what tubes are, and have a warehouse fully stocked to prove it! We are ready to give immediate delivery on such name brands as, Amperex, Eumac, General Electric, Raytheon-Machlett, Mullard, National Electronic, National Union, RCA, Sylva, United Electronics, and many others.

The next time you need tubes, think of BRILL. We have semi-conductors, too!

Be a BRILL-iant Buyer!

BRILL ELECTRONICS

610 E. 10th Street • Oakland 6, California
Phone No. 834-5888

MEETING CALENDAR

Grid

reporters

EAST BAY SUBSECTION

N. K. (GENE) LITTLE, LAWRENCE
RADIATION LABORATORY

PROFESSIONAL GROUPS:

AUDIO: HERB RAGLE, AMPEX CORP.

AUTOMATIC CONTROL: A. S.
McALLISTER, SAN JOSE STATE
COLLEGE

ANTENNAS AND PROPAGATION:
ROLPH B. DYCE, STANFORD
RESEARCH INSTITUTE

BROADCASTING: BEN WOLFE, KPAX-
TV

BIO-MEDICAL ELECTRONICS: JAMES
BLISS, STANFORD RESEARCH
INSTITUTE

COMMUNICATIONS SYSTEMS:
MAURICE H. KEBBY, LENKURT
ELECTRIC COMPANY

CIRCUIT THEORY: R. E. KIESSLING,
ITT LABORATORIES

ELECTRON DEVICES: MAHLON
FISHER, SYLVANIA, MICROWAVE
DEVICE DIVISION

ELECTRONIC COMPUTERS: WILLIAM
DAVIDOW, GENERAL ELECTRIC
COMPUTER LABORATORY

ENGINEERING MANAGEMENT:
LEONARD M. JEFFERS, SYLVANIA
E. D. L.

ENGINEERING WRITING AND
SPEECH: DOUGLAS WM. DUPEN,
ASSOCIATED TECHDATA INC.

INFORMATION THEORY: CHARLES
H. DAWSON, PHILCO W. D. L.

INSTRUMENTATION: JAMES HUSSEY,
GENERAL RADIO COMPANY

MICROWAVE THEORY AND TECH-
NIQUES: ROBERT J. PRICKETT,
HEWLETT-PACKARD CO.

MILITARY ELECTRONICS:
J. WEITSTEIN, LOCKHEED

PRODUCT ENGINEERING AND PRO-
DUCTION: W. DALE FULLER,
LOCKHEED

RADIO FREQUENCY INTERFERENCE:
JOHN W. WATTENBARGER, SIERRA
ELECTRONICS CORPORATION

RELIABILITY AND QUALITY CON-
TROL: W. WAHRHAFTIG, PHILCO
CORPORATION

SPACE ELECTRONICS AND TELEM-
ETRY: TOM LINDERS, LOCKHEED

HISTORIAN: EARL G. GODDARD,
VARIAN ASSOCIATES

production staff

EDITORIAL ASSISTANT:
DORIS GOULD

ADVERTISING ASSISTANT:
CAROLYN JURGENSEN KASTOR

SAN FRANCISCO SECTION

7:30 P.M. • Tuesday, January 15, 1963

(Joint meeting with PGCS and AIEE)

"Oblique Ionosphere Soundings and Radio Propagation"

Speaker: Raymond D. Egan, manager, advanced communications, Granger Associates

Place: Auditorium, Crown Zellerbach Bldg., Market and Sansome, San Francisco
Dinner: 6:00 P.M., Mirror Room, 2nd Floor, Veneto Restaurant, Mason and Bay, San Francisco

Reservations: Mrs. Doris Gould, DA 1-1332

(Parking available at restaurant and Zellerbach Bldg.)

PROFESSIONAL GROUPS

Antennas & Propagation

8:00 P.M. • Wednesday, January 9, 1963

"Space Research Program from the Point of View of Education"

Speaker: Professor Samuel Silver, University of California, Berkeley

Place: University of California

Dinner: Faculty Club, University of California Campus; time to be announced

Reservations: To be announced

Audio

8:00 P.M. • Thursday, December 20

"Noise in Recording Systems"

Speaker: Bob V. Markevitch, research division, Ampex Corporation

Place: Stanford Research Institute, Conference Room B

Dinner: 6:30 P.M., Atherton Club, 3391 El Camino Real, Atherton

Reservations: Herb Ragle, EM 9-7111, Ext. 821

Communications Systems

7:30 P.M. • Tuesday, January 15, 1963

(Joint meeting with San Francisco Section, IRE and AIEE, see above)

Electron Devices

8:00 P.M. • Wednesday, December 19

"Thermo-magnetic Cooling"

Speaker: Dr. Kermit F. Cuff, research scientist, Lockheed Research Labs

Place: Physics Lecture Hall, Room 100, Stanford University

Dinner: 6:30 P.M., Red Shack, 4085 El Camino Way, Palo Alto

Reservations: None required

SAN FRANCISCO SECTION OF AIEE

Communications Division

7:30 P.M. • Tuesday, January 15, 1963

(Joint meeting with San Francisco Section, IRE and PGCS, see above)

wescon news

1963 PAPERS CALL

A call for papers for the technical program of the 1963 Western Electronic Show and Convention has been issued by the committee headed by Dr. Jerre D. Noe, director of the Engineering Sciences Division of Stanford Research Institute.

Dr. Noe has announced April 15 as the closing date for submissions. To be furnished are three copies each of abstracts running 100 to 200 words, and summaries of from 500 to 1000 words indicating related work and new contributions. Advance clearances should be made where needed.

Submissions should note an IRE professional group classification as an indicator of the technical field into which the subject falls.

Dr. Noe has also reported that no convention record of the 1963 WESCON technical program will be published.

Vice chairman of the technical program committee is Dr. John G. Linvill, professor of electrical engineering at Stanford University.

Authors should submit abstracts and summaries as follows: Dr. Jerre D. Noe, WESCON Technical Program Chairman, Suite 2210, 701 Welch Road, Palo Alto, California.

Plans for the 1963 WESCON being well under way, as you will read in other articles in this issue of *Grid*, a final review of the 1962 event is in order.

Total registration for this year's event (46,152) was almost 6000 more than in any previous year, and well ahead of even the most optimistic predictions, largely attributed to the excellent publicity program, including the special issues of *Grid-Bulletin* and heavy coverage in metropolitan Los Angeles newspapers.

Almost 6000 of those attending were in management capacities, and 18,677 were in various engineering positions. For those exhibitors displaying production devices, almost 3300 attendees were primarily interested in this field.

More than 85 percent of the entire registration came from the eleven Western states making up the seventh region of IRE, while 65 percent of the exhibitors came from states other than these eleven, showing the strong national interest in displaying products and developments to the Western electronics industry.

In the important field of technical papers, the preprint experiment, with two successful years behind it, has proved to be worthwhile, and will undoubtedly be continued. Copies of either 1961 or 1962 papers may be obtained by writing directly to Western Periodicals Co., 13000 Raymer Street, North Hollywood, Calif. This firm has also printed a permuted index to all WESCON papers available for the period 1957 through 1962.

A total of 31 students participated in the 1962 Future Engineers Show and Symposium. Extremely rewarding letters have been received by the committee from these students, expressing their very successful experiences with the entire week of activities. Five students shared in the \$2800 scholarship funds offered the entrants.



For the first time, WESCON made awards for outstanding company displays, in a program to raise the standards for exhibits and to encourage companies to consider the various phases which make an exhibit more beneficial to visitors, as well as the company. Winners of awards were: Collins Radio Co.; Omni Spectra, Inc.; Tektronix, Inc.; Sylvania Electric; and Consolidated Electrodynamics Corp.

More than 850 companies exhibited in 1230 booths, to make this the largest exhibit of electronic products ever presented, slightly larger than the IRE Show from the standpoint of exhibit space, and unquestionably the largest trade show of any kind ever held in a city west of Chicago. The unanimous opinion of exhibitors, based on a survey conducted by the exhibits committee, made up of representatives of exhibiting companies, was that the 1962 WESCON was the greatest in which they had ever participated, anywhere, from consideration of traffic flow, the inquiry card system, and the highly debated question of show hours. Opinion still seems to be equally divided regarding evening hours of exhibit.

A survey in depth regarding the technical sessions has been carried out for WESCON by Facts Consolidated and will be reported on in an early issue of *Grid*, as will be detailed plans for the 1963 event at the Cow Palace, August 20-23, as they further develop.

MEYER LEIFER
SECTION-WESCON DIRECTOR

1963 CHAIRMEN NAMED

Committee chairmen and vice chairmen for the 1963 WESCON have been announced by John C. Chartz, Dalmo Victor Co., show director, and Meyer Leifer, Ampex Instrumentation Products Co., convention director. Section members wishing to serve on committees are requested to write or call the WESCON office, 701 Welch Road, Suite 2210, Palo Alto, DA 1-1332, indicating the committee of their choice.

Banquet chairman and vice chairman are Cort Van Rensselaer, Hewlett-Packard Co., and William A. Melchior, Eichorn & Melchior, Inc.

Cocktail party chairman and vice chairman are Phillip L. Gundy, Technical Systems, Inc., and George Ewing, Lenkurt Electric Co.

Distributor-rep conference chairman and vice chairman are Elvin W. Feige, Elmar Electronics, and Charles N. Meyer, Meyer & Ross.

Exhibits chairman and vice chairman are Berkley J. Baker, Litton Industries, and Harry J. Lewenstein, Hewlett-Packard Co.

Facilities chairman and vice chairman are William W. Wilson, Neely Enterprises, and Henry Schroeder, Melabs.

Future Engineers Show chairman and vice chairman are Alan T. Waterman, Jr., Stanford University, and Charles H. Merritt, Ampex Corp.

Hospitality cochairmen are Donald B. Harris, Stanford Research Institute, and Albert J. Morris, Radiation at Stanford.

Industrial design chairman and vice chairman are Fred Hill, Lenkurt Electric Co., and Hugh Kennedy, Granger Associates.

Public relations chairman and vice chairman are Charles Elkind, IBM Corp., and Thomas D. Boyd, Stanford Research Institute.

(Continued on page 10)

TERMAN, OTHERS HONORED

The man largely responsible for making the San Francisco Bay Area a leading international center of electronics research and industry will be awarded one of the two highest honors conferred by the IRE.

Dr. Frederick E. Terman, vice president and provost of Stanford University, will receive the IRE Founders Award at a banquet on March 27, 1963, at the Waldorf-Astoria Hotel in New York City.

The presentation will be one of the highlights of the first national meeting of the Institute of Electrical and Electronics Engineers.

Given only on special occasions for outstanding contributions to the profession, the Founders Award will be presented to Dr. Terman for "distinguished leadership in the organization and administration of, and contributions to, scientific research and education." Six others, including Dr. David Sarnoff of the Radio Corporation of America, have received the award since it was established ten years ago.

Dr. Terman was chairman of the San Francisco Section of IRE in 1939. After World War II he was one of the first to recognize the importance of educational institutions in the economic development of electronics. Largely through his efforts during and after his tenure as dean of Stanford's School of Engineering, the university has become the nation's largest producer of doctoral graduates in electronics.

His ideas are further reflected in the 400-acre Stanford Industrial Park, whose 40 tenants include some of the nation's leading electronics firms. He is featured in the current issue (December, 1962) of "Reader's Digest" in an article describing the San Francisco Bay Area's electronics development.

Dr. Terman is a fellow and a past president of the IRE and was the recipient of its other top award, the Medal of Honor, in 1950. He was decorated by the British government in 1946, and in 1948 received the highest U.S. civilian honor, the Medal for Merit, for his wartime work as head of the Radio Research Laboratory at Harvard.



Bob V. Markevitch

*meeting ahead***NOISE IN THE SYSTEMS**

General recording system noise, with particular emphasis on magnetic tape, photographic, and electron beam recording systems, will be discussed at the December meeting of PGA by Bob V. Markevitch, research division, Ampex Corp.

Additive and multiplicative noises will be discussed and applied to the several systems. A concept used in photography will be introduced, expressing the capacity of a system to store information in the presence of multiplicative noise by measuring the number of distinguishable levels within the dynamic range of the film, a technique readily extended to electronic equipment and memory devices.

Bob Markevitch joined the applied research section of the Ampex research department in 1961. He specializes in theoretical analysis and the sensitometry of electron beam recording materials.

The speaker has been associated with studies on magnetic and non-magnetic rapid access storage systems, video recording equipment for medical fluoroscopy, and related inquiries. He received the B.S.E.E. from UC, Berkeley, in 1954 and the M.S.E.E. in 1956.

*pgbme notes***FIRST CHAPTERS**

The San Francisco Chapter of PGBME is one of two original groups in this specialty formed within IRE, the other being the Buffalo Chapter. The meetings of both are heavily attended by a broad representation of the medical profession and have done much to integrate engineering techniques into medicine.

THE URGE TO MERGE

The first meeting of the merger committees of the San Francisco Sections of AIEE and IRE was held November 20 at the Engineers Club, San Francisco, under the cochairmanship of Robert E. Grady, AIEE, and Stanley F. Kaisel, IRE.

Attending were members of the AIEE merger committee, J. E. Barkle, J. C. Beckett, and Robert H. Miller; members of the IRE merger committee, Albert J. Morris and Peter Sherrill; and Victor E. Kaste, chairman, SFS, AIEE.

Five tentative agreements in principle were arrived at:

1. A target date of July 1, 1963, for complete merger of all activities was set within the limits that financial considerations dictate.
2. An IEEE slate of officers will be proposed to the respective memberships for election to office starting July 1, 1963.
3. Whenever possible, activities which are common in function will be encouraged in order to work together informally, immediately, and to allow members to become familiar with each other's scope of activity, as the basis for a plan for the merging of each activity.
4. Most difficult problems of the merger (finances, publications) will be given maximum time for solution in order not to force an artificial decision, but this should not prevent early action in areas where common activity poses no difficulties.
5. Administering the evolved merger plan being the responsibility of new officers to be elected in May, accomplished but unsatisfactory solutions to problem areas should not be rushed into by the merger committee.

These principles of consolidation are tentative and subject to further consideration at subsequent meetings. Final detailed plans for consolidation must be reviewed and approved by the respective executive committees of AIEE and IRE.

Thirteen specific areas were covered at the first meeting and will be reviewed in detail in early issues of Grid.

THE HAND

PGAC held its first meeting of the season in October at Stanford University. The speaker was Dr. Hans Ernst of the control system research department of IBM, San Jose, whose subject was a computer-controlled hand.

The servo-manipulated hand built by Dr. Ernst was an attempt to allow a digital computer to come into direct contact with the physical world, to sense its environment, and to react to this environment in trying to achieve certain specified goals.

The hand was allowed to perceive its environment by giving it a sense of touch consisting of several pressure-sensitive transducers mounted in many locations over the surface of the hand.

The hand was allowed to react to its environment by means of seven servo motors.

Although much time and energy was spent in perfecting the sense-of-touch transducers, only very inexpensive, low-quality motors and feedback potentiometers were used for movement. Instead of depending upon accuracy of positioning, the hand was forced to rely on its senses to determine its location, much as is done by humans.

If standard, deterministic programming had been used to program the digital computer to move the hand, the system would not have been very different from an automated machine tool. Little use would have been made of the hand's senses, and the system would hardly be "reacting" to the world at all. Rather, a heuristic type of programming was used where the course of action at any point was determined by the results of previous steps. If, in performing an assigned task, the hand encountered a situation that it did not expect, it was told to search back through its program for a similar situation and to act as it had previously. In this way the hand was given the ability to react "intelligently" to a changing environment.

The speaker presented a film showing the hand in action. It built a tower of blocks by sensing the positions of several blocks and then placing them on top of one another. In another task, it was told to place blocks in a box. After finding the box, it searched

(Continued on page 10)

COMPLETE NORTHERN CALIFORNIA COVERAGE FROM MOXON.....

A modern manufacturer's representative is no longer a happy-go-lucky fellow with a battered briefcase... It takes a large, technically competent field staff plus complete service, sales, and advertising backup to give you the coverage you need... Moxon Electronics, an organization of over 30 people, is this type of representative... Call your Moxon Man often.

MEET THE SAN MATEO STAFF



Dave Peters
Regional Manager

Dave is one of the oldest (in experience) Moxon Men, having joined the firm in 1957 B.Sp. (Before Sputnik). Before coming north to head up the San Mateo office, he was one of the top Moxon Sales Engineers covering the San Fernando Valley and Southern Coast which included the important Pacific Missile Range and Vandenberg Air Force Base.



Gene Ward
Sales Engineer

Gene recently joined the Moxon organization after four years at MELABS where he was branch engineering manager. He has had extensive experience in microwave instruments and systems, and holds an EE degree from the University of California.



Gary Schmidt
Service and Inside Technical

A welcome addition to the San Mateo office is Gary, who joins Moxon after four years with Neely Enterprises in customer and field service. In addition to acting as application engineer Gary will also set up a local service department.



Vivian Stikes
Office

Vivian has been with Moxon Electronics since 1955 and knows the products backwards and forwards... so for accurate prices, delivery dates, and fast follow-up information, ask for Viv.

PLUS IMPORTANT SALES, SERVICE, AND ADVERTISING BACKUP

Our first office was located in the basement of Mox's San Mateo home in 1951, and Mox still spends a good portion of his time calling on Bay Area customers... Another frequent visitor is Larry Courtney, who is responsible for the company's advertising and promotional activities... our Service Manager, Darrell Tomlinson, is "on call" at all times to assist our new Northern California service man in the shop, in the field, or in the training of customers... That's why we say, "You get complete coverage from Moxon Electronics."



15 41st Avenue, San Mateo, California
Flreside 5-7961

SERVING NORTHERN CALIFORNIA FOR OVER 10 YEARS

REPRESENTING
ALFRED, ATI, ASTRODATA, CLAIREX, CMC, J-OMEGA, MARCONI,
RUTHERFORD, SYSTEMS RESEARCH, TALLY, TRYGON, AND VIDAR.

ENGINEERS SCIENTISTS MANAGERS

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

Top openings for:

CIRCUIT DESIGNERS
SYSTEMS ENGINEERS
ENGINEERING
MANAGERS

in

Communications Systems
Data and Telemetry Systems
Control and Servo Systems
Microwave and Propagation
Solid-State Devices
Microwave Tubes
Microcircuitry

For personal and
confidential referrals
to our Client Companies'
Management
and Engineering
Staffs, at no charge
to you, submit resume
or phone for appointment

NORTHERN CALIFORNIA PERSONNEL

(a technical agency)

407 CALIFORNIA AVE.
PALO ALTO
DA 6-7390

meeting review

REMARKABLE THINKING MACHINE

Sixty members of the East Bay Subsection, their wives, and friends met at the Pleasanton Hotel in Pleasanton, November 19, for a very informative evening.

John Lavrischeff, chairman, started the speaker's portion of the evening by announcing the EBSS sponsorship of "Junior Scientists and Engineers of the East Bay." This will be a project for seniors of the various high schools, with awards for the best project or paper presented.

Cliff Proffit introduced Hyman Olken, who spoke on "The Human Nervous System as a Thinking Machine." Mr. Olken is an electronics engineer at LRL Livermore, whose hobby, since 1950, has been the study of the human nervous system. He outlined the main features of the nervous system anatomy and explained a theory he has evolved on how these features accomplish mental functions. Significance of theories of brain function for new developments in communication engineering, such as random networks and neuristors, was pointed out.

Mr. Olken showed slides of an engineer's view of anatomy, illustrating trunk lines from various control zones to the brain. The building blocks for these trunk lines are the individual

MORE WESCON

Registration chairman and vice chairman are Fred J. MacKenzie, Stanford Research Institute, and Thomas A. Christiansen, Hewlett-Packard Co.

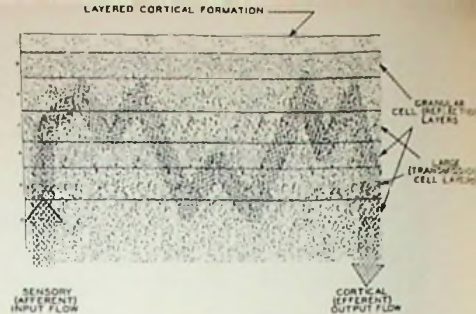
Technical program chairman and vice chairman are Jerre D. Noe, Stanford Research Institute, and John G. Linvill, Stanford University.

Technical tours chairman and vice chairman are Robert E. Miller, Stanford University, and John W. Summers, Varian Associates.

Visitors services chairman and vice chairman are Norman Hiestand, Varian Associates, and William C. Weber, Jr., Compar Corp.

Women's activities chairman and vice chairman are Mrs. William P. Doolittle and Mrs. Stanley F. Kaisel.

Only women may volunteer for the last committee named, according to Director Leifer. All letters from those wishing to serve should be addressed to the WESCON-IRE office.



nerve cells, and each nerve cell is composed of many axons. These building blocks are of three types: transducer, relay, and effector.

The speaker pointed out how these are organized in the body. Some respond to temperature, some to pressure. Responses of these cells are in the millisecond range.

We can achieve a model of the functional organization of the nervous system that adheres closely to the system's known anatomical structure if we postulate these basic concepts:

First, that transmission channels in the brain are not specific and fixed, but are formed by the repetitive input of sensory signals over two-way transmission channels between the brain's central exchange—the thalamus—and various regions of the cortex.

Second, that the continuous inflow of sensory input penetrates farther and farther into the mass of the cortex by a zigzag path produced by bouncing of the input back and forth between cortical layers. In this way a sensory input can be stored at any point in the cortical mass, and a succeeding, similar input can search the entire mass until it happens upon, and thus "recalls," the originally stored engram.

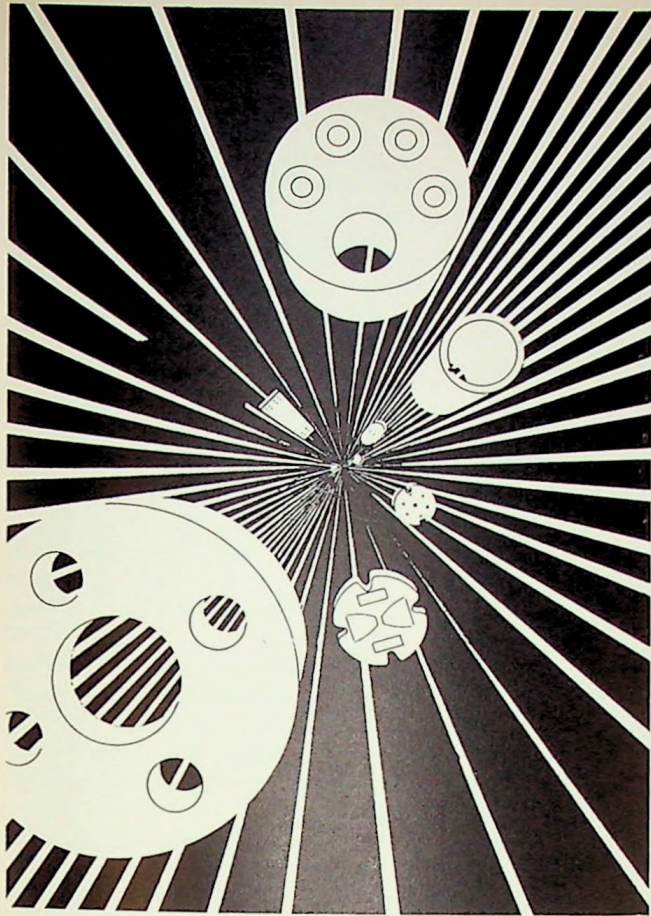
(Continued on page 12)

MORE REVIEW

for the blocks and started placing them as directed. When the box was moved, it merely searched for the box again and continued. Several other very interesting examples of changing environment were demonstrated.

Dr. Ernst concluded his talk by noting several possible applications of his work. Perhaps the most intriguing of these was the use of the heuristic approach to the programming of automatic explorers of the moon. Unexpected events and communication delays that would otherwise ruin a mission might be handled with ease.

A. S. MC ALLISTER



Ceramics to infinity

Wesgo capability can provide an endless number of shapes and forms in quality high alumina ceramics for your most demanding applications.

Dense, vacuum-tight Wesgo alumina ceramics, with up to 99.5% Al_2O_3 , are strong, hard and abrasion resistant. They offer high thermal conductivity, exceptional chemical inertness and superior electrical properties at microwave frequencies—even at high temperatures.

Wesgo ceramics are available in sizes and shapes to meet your individual specifications. Manufacturing is to tight dimensional tolerances; parts are of uniform density, free from internal and surface defects. All are quality controlled to meet unparalleled performance standards.

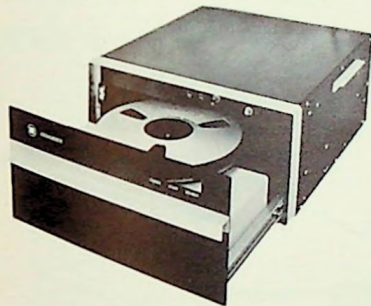
Write today for a brochure describing these premium ceramics or Wesgo's precious metal brazing alloys

WESGO — Where Quality is the Chief Consideration



WESTERN GOLD & PLATINUM COMPANY

Dept. G-12, 525 Harbor Blvd., Belmont, California
LYell 3-3121 Area Code 415



AUTOMATIC TAPE DEGAUSSER

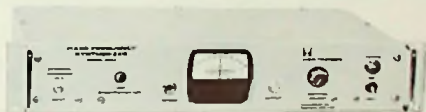
This compact degausser erases a full 14-inch reel of 1-inch magnetic tape in 35 seconds. After erasure, residual signal and peak noise are at least 80 db below saturation recording level at all points on the tape. Tapes from 1/4 inch to 1 inch in width and reels from 7 inches to 14 inches in diameter are accommodated.

Operation is fully automatic; the operator merely places the reel on the turntable, closes the drawer, and presses a start button. The reel is then automatically rotated in a diminishing a-c degaussing field. The degausser will operate continuously, erasing a reel of tape every 48 seconds, without overheating. Peak power required is only 1080 watts drawn for 4 seconds during the degaussing period.

The degausser, designated DG-2, is available in a cabinet or a standard rack mount 19 inches wide and 8 3/4 inches high. Availability: 30 days after receipt of order. Price: \$975 less quantity discount.

Magnetic Industries, Inc., 3941 E. Bayshore Blvd., Palo Alto, Calif.

new product capsule advertisements



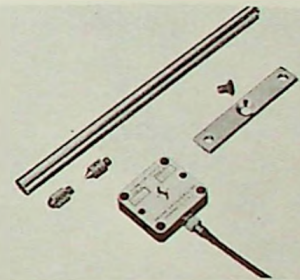
FIXED-FREQUENCY SYNTHESIZER

Accepting a standard frequency input, the new Montronics Model 301 Synthesizer can provide any customer-specified frequency from 1 to 32 Mc in increments as small as 100 cps. With accessory multipliers, this frequency range can be extended to 480 Mc. Long-term stability and accuracy are that of the reference standard.

Adaptable and versatile, this synthesizer features excellent short-term stability; harmonic content of 40 db below fundamental; spurious content of 70 to 90 db below desired frequency; and standard input of 100 kc, 250 mv into 50 ohms (with 1 Mc input also available). Typical applications include use in standards or scientific laboratories, and with navigation, radar, and communications systems.

Dimensions are 3 1/2" high by 19" wide by 11" deep, in rack-mounted modular construction. Plug-in modules facilitate changing the output frequency. Available now, the Model 301 sells for \$1175 (in kc increments of 1, 1.25, 2.5, and 5) and \$1375 (in cps increments of 100, 125, and 500).

Montronics, Inc., P.O. Box 135, Bozeman, Montana.



SENSITIVE VIBRATION PICKUP

The 61CP is a piezoelectric transducer which responds to acceleration, the generating element being Lead Zirconate Titanate (PZT) which is inertially actuated. High sensitivity, high capacitance, flat frequency response, and rugged construction make this an ideal unit for general vibration measurement, normally held in the hand but adaptable through stationary mounting bracket included. Output voltage is directly proportional to acceleration due to vibration throughout the linear range of the instrument. Although the instrument measures acceleration, a signal proportional to velocity may be derived from a simple RC integrator.

Included is a complete set of adapters including 8" extension rod, ball tip, point tip, and 7' single conductor vinyl-jacketed shielded cable. Applications include selecting shock mountings; pickup for protection systems; analysis of stress; balancing rotating systems; detection of leaks and wear points; and surface smoothness measurements.

Shure Microphones and Electronic Components, 222 Hartrey Ave., Evanston, Ill.

EXPORT MANAGER

Management position available for qualified engineer with extensive experience in systems engineering and marketing of magnetic tape data instrumentation equipments. Must be familiar with transducers, data recording, and reduction techniques using magnetic tape.

CHIEF APPLICATIONS ENGINEER

Senior position available for BSEE with five years' experience in design or applications of electromechanical instrumentation, including telemetry. Will supervise applications engineers and be responsible for translation of systems requirements into hardware.

Please submit confidential résumé to John Jipp, Marketing Manager, or call E. R. Scott, collect, at DA 1-5615, for interview.



PRECISION INSTRUMENT

Instrumentation and magnetic tape recording

3170 Porter Drive, Palo Alto, Calif.

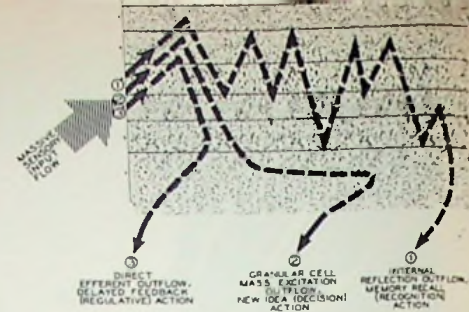
An equal opportunity employer

MORE REVIEW

Third, that the supersedence of one thought by another (decision) is effected by a joint action of the nerve cells and the blood channels between them, whereby the mass of nerve cells in which one idea is stored progressively absorbs some of the cells from the area in which the other idea is stored, until the expanding nerve area of the predominant idea obliterates the nerve area of the idea that is suppressed.

This is the grand scheme or gross pattern of organization of the human nervous system as a thinking mechanism which one can surmise on the basis of its anatomy. It is only a gross picture and one that will be clarified by the detailed analysis of its major parts, which follows. But even this gross picture provided the following further insight into how the brain functions as a thinking mechanism.

The cortex is formed by intermixed concentrations of efferents, inter-layer neurons, and granular cells. Hence, on the basis of the above pic-



ture, the constant massive sensory input flow to the cortex will divide into these three main output streams:

1. Those inputs which go directly to efferents. These will form an output stream only slightly delayed behind the input flow. As it reaches back down through the subcortical centers, it will form a feedback which reacts with the inputs that are causing present bodily actions, to effect a graded, smooth regulation of those actions. A practical example of this would be the smooth, continuous adjustment of the hand holding the tennis racket as one watches the ball coming over the net in a game of tennis.
2. Another main output stream would be formed by the inputs which bounced back and forth between

when
TIME
and
QUALITY

are
a must

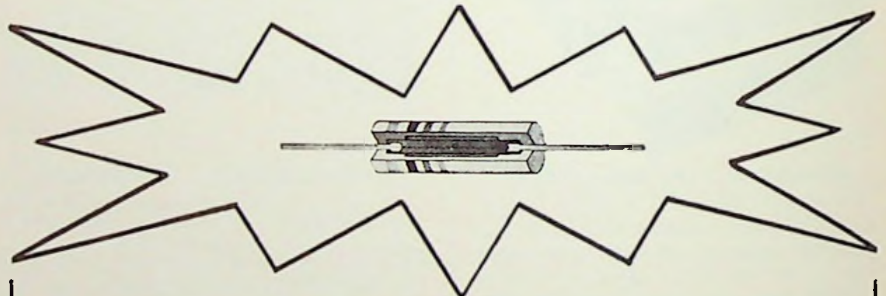


THE NATIONAL PRESS
850 Hansen Way • Palo Alto, California
Telephone 325-3294-3295



MIL-SPEC MOLDED CHOKES

MOLDED COILS CONFORM TO MIL-C-15305 B



MILLER SERIES 9360

(MS 91189)

Mold Size: 0.281 ± .031 diameter; 0.937 ± .062 length.

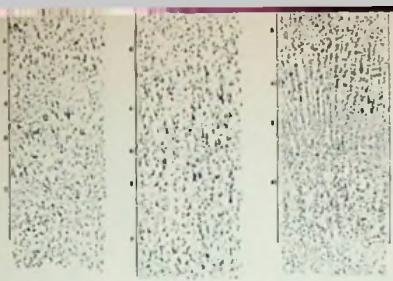
Leads: AWG #21 TCW; 1.500 ± .125 length.

Power Rating: 1/2 Watt Max. at 90° C.

PART NO.	L uh	Q MIN.	TEST FREQ. (Mc)	Fo (Mc)	Rdc. MAX.	Ma. MAX.	CORE MTL.
9360-01	1.1 ± 20%	60	10.0	200	.09	2800	PHENOLIC
9360-02	2.2 ± 20%	65	10.0	165	.32	1800	PHENOLIC
9360-03	3.3 ± 10%	50	6.0	130	.60	1500	PHENOLIC
9360-04	4.7 ± 10%	45	5.0	100	1.10	1100	PHENOLIC
9360-05	6.8 ± 10%	40	4.0	90	1.10	800	PHENOLIC
9360-06	10.0 ± 10%	40	3.5	70	1.80	600	PHENOLIC
9360-07	15.0 ± 10%	40	3.0	55	3.00	500	PHENOLIC
9360-08	22.0 ± 10%	30	2.5	27	3.00	1500	IRON
9360-09	33.0 ± 10%	45	2.0	21	.60	1100	IRON
9360-10	47.0 ± 10%	70	1.5	16	1.20	700	IRON
9360-11	82.0 ± 10%	85	1.2	14	2.20	600	IRON
9360-12	100.0 ± 10%	85	1.0	14	2.80	500	IRON
9360-13	120.0 ± 10%	85	1.0	13	4.00	400	IRON

For a Complete Listing of MILLER PRODUCTS ask for a copy of our Latest General Catalog on your Company Letterhead.

J. W. MILLER COMPANY • 5917 So. Main St., Los Angeles 3, Calif.



layers. This stream would excite many memory traces and thus produce the memory-modulated inputs which cause such mental actions as pattern recognition.

3. A third portion of the massive input stream would excite the large granular cell masses and thus cause some cell domains to absorb others and thereby produce that outflow of new ideas which underlies all judgment and creative thought.

Naturally each of these actions will take place predominantly in the area best suited for it; that is, direct feedback will take place in the area that has high concentration of transmission cells relative to granular cells, which occurs in motor cortex.

Secondly, extensive bouncing back and forth between layers, thus causing memory recall and therefore recognition, will occur in well-layered areas, such as visual and auditory cortical areas.

Finally, conception of new ideas will occur in the area where there is a relatively large portion of granular cells and comparatively small concentration of transmission neurons. This occurs in the frontal area; hence that is where what we call "interpretive" or projection mental function is concentrated. These functionally determined structural differences between major cortical areas are strikingly evident when they are seen side by side.

N. K. LITTLE

events of interest

Jan. 21-24—9th National Symposium on Reliability and Quality Control. Sheraton Palace Hotel, San Francisco, Calif. Program: L. W. Ball, Boeing Co., P.O. Box 3707, Seattle 24, Wash. Proceedings: Order from IRE Headquarters after Symposium.

Jan. 30-Feb. 1—4th Winter Convention on Military Electronics. Ambassador Hotel, Los Angeles, Calif. Exhibits. Program: IRE L.A. Office, 3600 Wilshire Blvd., Los Angeles 5, Calif.

where an understanding of products and people is prerequisite!



To know our Engineers is to know the products they represent, and O'Halloran Associates are well known for both. LET US HEAR FROM YOU...



O'HALLORAN ASSOCIATES

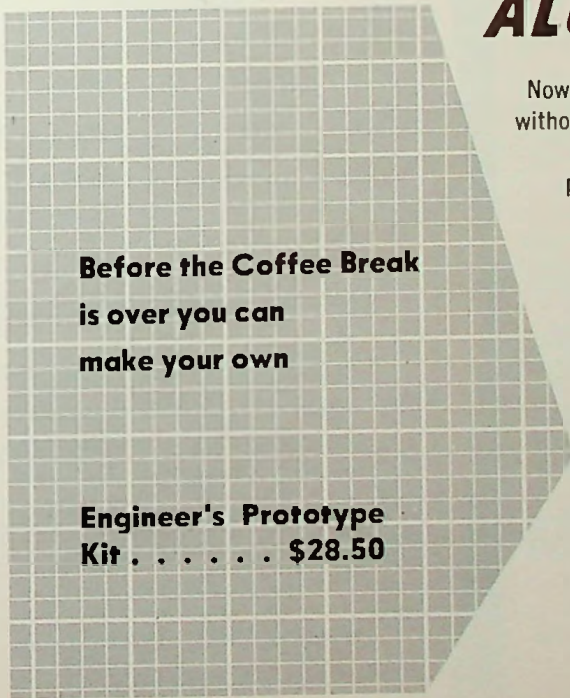
ELECTRONICS ENGINEERS • SALES REPRESENTATIVES
11636 VENTURA BLVD., NORTH HOLLYWOOD, CALIFORNIA

- No. Hollywood, California Triangle 7 0173
- Palo Alto, California Davenport 6 1493
- San Diego, California Academy 4-2824
- Phoenix and Tucson, Arizona Enterprise 1200

MANUFACTURERS REPRESENTED

- | | | | |
|---|--|---|---|
| Boonton Electronics Corp.
Morris Plains, New Jersey
Datapulse, Inc.
Inglewood, California
Dielectric Products Engineering Co.
Raymond, Maine | Diginamics Corporation
Minneapolis, Minnesota
Electronic Measurements Co., Inc.
Easton, New Jersey
Erie-Eldorado
Berkeley, California | Microdot Inc.
South Pasadena, California
Narda Microwave Corp.
Plainfield, N.J.
Optimized Devices, Inc.
Torrance, New York | Radiation at Stanford
Palo Alto, California
Time & Frequency
Batavia, Illinois
Wiltron Company
Palo Alto, California |
|---|--|---|---|

Fotofoil • **ANODIZED ALUMINUM**



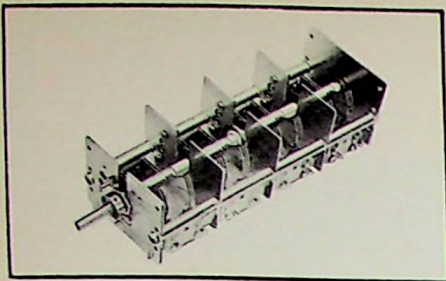
Now . . . without skilled labor,
without darkroom facilities . . .
you can have on-the-spot
production in minutes for:

**Before the Coffee Break
is over you can
make your own**

**Engineer's Prototype
Kit \$28.50**

- Name Plates
- Plant Identification
- Secret Production
- Instructions
- Serial Numbers
- Panels
- Labels
- Scales
- Schematics
- Templates
- Etched Photographs

AUDIO-VISUAL CENTER 460 Cambridge Avenue, Palo Alto, Calif., DA 5-5619



NEED A "SPECIAL"?

Hammarlund capabilities for producing special capacitors are second to none—extensive engineering and manufacturing facilities are dedicated to the design and production of unique capacitors for government and industry to meet the most critical specifications and unusual applications.

For variable capacitors—special or standard—specify Hammarlund—backed by more than half a century of successful design and manufacturing experience.

For complete details, call or write:

R. W. THOMPSON ASSOC., INC.
4135 El Camino Way, Palo Alto, California
Davenport 1-6383

ENGINEERS

...exclusively

RESULTS

...outstanding

We serve but one field: engineering. By specializing, we can keep abreast of contract awards, opportunities and salaries.

No wonder engineers and engineering firms alike have made FORUM one of their prime sources for personnel or positions.

Complete "job campaigns"; resume preparation and referrals, inquiry letters, interviews.

For prompt, confidential service, *come in, call or write*

FORUM
PERSONNEL AGENCY



378 Cambridge
Palo Alto
California
321-6582

w e m a n e w s

NEW OFFICERS ELECTED

One of the West's pioneer electronics executives, Emmet G. Cameron, has been elected president of WEMA. He was among the founders 20 years ago and has been an active industrial and civic leader.

Elected vice presidents were Burgess Dempster, president, Electronic Engineering Co. of California, Santa Ana; William H. Heflin, general manager, Beckman & Whitley, Inc., San Carlos; Orison Wade, assistant chief engineer, General Dynamics/Astronautics, San Diego; Philip E. Renshaw, chairman of the board, Tally Register Corp., Seattle; and Virden E. Scranton, assistant general manager, Motorola Semiconductor Products Division, Phoenix.

Kenneth T. Larkin, associate director of electronics research, Lockheed Missiles & Space Co., Palo Alto, was elected secretary, and Robert M. Ward, vice president, Beckman Instruments Inc., Fullerton, has been named treasurer.

E. E. Ferrey, formerly executive director of WEMA, was elected executive vice president.



Cameron

Shannahan

grid swings

IT IS REPORTED:

E. E. (Jack) Shannahan has joined Sylvania Electronic Systems, Mountain View, as EDL personnel manager after serving with Lenkurt Electric Co. as manager of employment and training since 1956.

W. M. Hawkins, Jr., has been named sales manager of the Electronic Engineering Co., Santa Ana, responsible for all field sales activities, including supervision of EECO sales rep organizations throughout the United States, Canada, Western Europe, and Japan.



TECHNICAL ADMINISTRATOR

Engineers experienced in technical administration of R & D projects are invited to inquire about administrative opportunities in our Communications Research Laboratory.

This position involves major administrative responsibility within a group whose projects are performed in several field locations throughout the world.

*For further information,
please call:*

DA 6-6200, Ext. 3440

**STANFORD RESEARCH
INSTITUTE**

An equal opportunity employer

*we don't need
engineers right
now... but think
about us*

We're a small, energetic, and congenial company where the growth is rapid but planned and controlled for the long range. We specialize in the design and manufacture of proprietary electronic instrumentation for control and data systems. Our management represents the best in training and experience.

WE NEED DESIGN ENGINEERS for solid-state circuit design to work on special analog and digital data instrumentation. Each assignment is carried through from preliminary design to production.

IN PRODUCT DEVELOPMENT we need creative men for continued R & D to expand our product line.

Salary, benefits, and participation commensurate

Write a letter or send a résumé to

VIDAR
CORPORATION

2296 Mora Drive, Mountain View,
California

An equal opportunity employer



Goodrich

Hanson

James L. Goodrich announces formation of a new rep organization specializing in precision components and instruments, James L. Goodrich & Associates, headquartering at 68 Allston Way, San Francisco, OV 1-3874.

Richard D. Hanson, president of Zeltex, Inc., Concord, has announced establishment of engineering and manufacturing facilities for solid-state instrumentation specializing in development and manufacturing of high-reliability solid-state operational amplifiers and automatic checkout systems. Development of amplifier product lines is now completed, and production facilities are being readied at the new plant.

coming events

1200 MEETING ON FARM

More than 1200 scientists and engineers will attend two major scientific meetings at Stanford University during the Christmas holidays (December 27-29). The American Geophysical Union will hold its second Western national meeting under sponsorship of the Stanford School of Earth Sciences and the Departments of Civil and Electrical Engineering. At the same time, physicists will gather for the American Physical Society's winter meeting in the West. The Stanford Physics Department will serve as host.

The two meetings will open with a joint session at 10:00 a.m. Thursday, December 27, in Dinkelspiel Auditorium. Thereafter, each group will hold separate meetings in campus lecture halls. About 500 scientific papers will be presented.

A highlight of the APS meeting will be the dedication of the Russell H. Varian Laboratory of Physics at 1:30 p.m. on the opening day. The \$2,500,000 building will be the new home of Stanford's Physics Department.

Electronic Engineers and Scientists

Drop in for a free ABACUS and learn about the opportunities for career advancement with our many client firms on both the West and East Coast.

(Companies pay the fee, of course)

PROFESSIONAL AND TECHNICAL RECRUITING ASSOCIATES

(A division of the Permanent Employment Agency)

825 San Antonio Road, Palo Alto, California, DA 6-0744

WARREN ENNIS announces the opening of

Beau Brummell

Party Occasion Catering for Parties Anywhere

COMPLETE DINNERS or BUFFETS

Receptions • Cocktail Parties • Executive Functions

Consultation without Obligation

CALL 967-6981
2249 Grant Road, Los Altos

SPECIALISTS IN HANDLING

PRECISION EQUIPMENT

Electronic & Other

with **T.L.C.***

AROUND THE BAY AREA OR HALFWAY AROUND THE WORLD
SUNNYVALE • OAKLAND • BRISBANE • SAN FRANCISCO

*T. L. C. means Tender Loving Care. T. L. C. is the special electronic division of Allied Van Lines, Inc.



MANUFACTURER/REPRESENTATIVE INDEX

Accurate Instrument Co.....	Jay E. Stone & Assoc.	Duncan Electronics, Inc.....	Birnbaum Sales Co. Inc.
Ace Engineering & Machine Co.....	R. W. Thompson Assoc.	Dymec, Division of Hewlett-Packard.....	Neely Enterprises
Adcom Corporation.....	W. K. Geist Company	Dynatran Electronics Corp.....	G. H. Vaughan
Ad-Yu Electronics Labs, Inc.....	Peninsula Associates		
Aircorn, Inc.....	Components Sales California, Inc.		
Airflow Company.....	Richard A. Strassner Co.	Eastern Air Devices.....	James S. Heaton Co.
Alfred Electronics.....	Moxon Electronics	E-H Research Laboratories, Inc.....	V. T. Rupp Co.
Antenna Systems, Inc.....	McDonald Associates	Elco Corporation.....	James S. Heaton Co.
Antlab, Inc.....	Jay E. Stone & Assoc.	Elcor, Inc.....	T. Whychell Company
Applied Research, Inc.....	Jay E. Stone & Assoc.	Eldema Corporation.....	James S. Heaton Co.
Applied Technology, Inc.....	Moxon Electronics	Electra Manufacturing Co.....	Birnbaum Sales Co. Inc.
Associated Testing Laboratories, Inc.....	Ault Associates	Electro Assemblies, Inc.....	Birnbaum Sales Co. Inc.
Astrodata, Inc.....	Moxon Electronics	Electro Cords Company.....	Tom G. Maier Company
Astron (Skottie Electronics) Corp.....	Long & Assoc., Inc.	Electronic Measurements Co.....	O'Halloran Associates
Avnet Instrument Corp.....	W. K. Geist Co.	Electronic Modules Corp.....	Walter Associates
		Electronic Production & Development, Inc.....	Belsco
		Elgin-Advance.....	James S. Heaton Co.
Baldwin-Lima-Hamilton, Electr. Div.....	Neely Enterprises	Emcor, Ingersoll Products Div.....	T. Louis Snitzer Co.
Ballantine Labs, Inc.....	Carl A. Stone Assoc., Inc.	Empire Devices, Inc.....	Carl A. Stone Assoc., Inc.
Barnes Engineering Company.....	Costello & Co.	Eppley Laboratory, Inc.....	W. K. Geist Co.
Basler Electric Company.....	Tom G. Maier Company	Erie/Eldorado.....	O'Halloran Assoc.
Bausch & Lomb, Inc.....	Perlmuth Electronics	Etchomatic, Inc.....	James S. Heaton Co.
Bay State Electronics Corp.....	Perlmuth Electronics		
Beckman/Berkeley Division.....	V. T. Rupp Co.		
Behlman/Invar Electronics Corp.....	T. Louis Snitzer Co.	Fabri-Tek, Inc.....	Costello & Co.
Block Associates, Inc.....	W. K. Geist Co.	Fairchild/Dumont Labs.....	R. W. Thompson Associates
Bogart Mfg. Corp.....	Jay E. Stone & Assoc.	Ferrotran Power Supply Company.....	Peninsula Associates
Boonshaft & Fuchs, Inc.....	W. K. Geist Co.	Fil-Shield Div. of Filtron, Inc.....	Carl A. Stone Assoc., Inc.
Boonton Electronics Corp.....	O'Halloran Associates	Filters, Inc.....	Compar San Francisco
Boonton Radio Corp.....	Neely Enterprises	Flow Corporation.....	G. H. Vaughan Co.
Burr-Brown Research Corp.....	W. K. Geist Co.	Fluke Mfg. Co., John.....	McCarthy Associates
		Forbes and Wagner, Inc.....	James S. Heaton Co.
		Franklin Systems, Inc.....	Carl A. Stone Assoc., Inc.
California Technical Industries.....	Perlmuth Electronics	General Instrument, Capacitor Div.....	J. Logan & Assoc.
Cascade Research.....	Moxon Electronics	General Instrument, Semiconductor Div.....	J. Logan & Assoc.
Caswell Electronics Corp.....	R. W. Thompson Assoc.	General Meters, Inc.....	Long & Assoc., Inc.
Chalco Engineering Corp.....	Walter Associates	Genistron, Inc.....	James S. Heaton Co.
Cimron Corporation.....	Ault Associates	Globe Industries.....	Long & Assoc., Inc.
CircuitDyne Corp.....	T. Louis Snitzer Co.	Gruenberg Electric Company.....	Peninsula Associates
Clairex Corp.....	Moxon Electronics		
Clary Arithmetic Centers.....	American Wireless		
Components Engineering & Mfg. Co.....	Premmco		
Computer Instruments Corp.....	Components Sales Calif.	Hammarlund Manufacturing Co.....	R. W. Thompson Assoc.
Computer Measurements Co.....	Moxon Electronics	Hammer Electronics.....	McCarthy Associates
Consolidated Ceramics & Metalizing.....	Artwel Electric, Inc.	Harrison Labs., Div., H-P.....	Neely Enterprises
Continental Connector Co.....	J. Logan & Assoc.	Heli-Coil Corp.....	Premmco, Inc.
Continental Sensing, Inc.....	Birnbaum Sales Co. Inc.	Hewlett-Packard Company.....	Neely Enterprises
Continental-Wirt Electronics Corporation.....	Tom G. Maier Company	Hitemp Wires.....	James S. Heaton Co.
Control Logic, Inc.....	Jay E. Stone & Assoc.	Holt Instruments Laboratories.....	W. K. Geist Co.
Control Switch Div., Controls Co. of America.....	Belsco	Hudson Tool & Die Co., Inc.....	John E. Striker Co.
Coopertronix, Inc.....	T. Louis Snitzer Co.	Hughes Aircraft Co., Instruments.....	Walter Associates
CTS Corp.....	J. Logan & Assoc.	Hughes Vacuum Tube Products Division.....	Belsco
Dage Div., Thompson Ramo Wooldridge.....	Neely Enterprises	IMC Magnetics Corp.....	Richard A. Strassner Co.
Dale Electronics.....	James S. Heaton Co.	Industrial Instruments, Inc.....	G. H. Vaughan
Datamec Corporation.....	Moxon Electronics	Inland Motor Corp.....	Costello & Co.
Datapulse, Inc.....	O'Halloran Associates	International Resistance Co.....	J. Logan & Assoc.
Dielectric Products.....	O'Halloran Associates		
Diginamics Corp.....	O'Halloran Assoc.		
Digital Devices.....	Moxon Electronics	Jerrold Electronics Corp.....	Instruments for Measurements
Digital Equipment Company.....	Peninsula Associates	J-Omega Company.....	Moxon Electronics
Digitronics Corp.....	Components Sales California, Inc.	J-V-M Microwave.....	James S. Heaton Co.

REPRESENTATIVE DIRECTORY

American Wireless 22 Devonshire Blvd., San Carlos; 591-6260	Cain & Company 175 So. San Antonio Road, Los Altos; 968-0995	Dynamic Associates 1011-D Industrial Way, Burlingame; 344-1246	Logan & Associates, Jack 801 Mahler Road, Burlingame; OX 7-6100
Artwel Electric, Inc. 1485 Bayshore Blvd., San Francisco; JU 6-4074	Compar San Francisco 120 Santa Margarita Menlo Park; DA 6-1760	Geist Co., W. K. Box 643, Cupertino, Calif.; YO 8-1608, AL 3-5433	Long & Associates, Inc. 505 Middlefield, Redwood City; EM 9-3324
Ault Associates 120 Santa Margarita, Menlo Park; DA 6-1760	Components Sales California, Inc. Palo Alto; DA 6-5317	Heaton Co., James S. 413 Lathrop St., Redwood City; EM 9-4671	Maier Co., Tom G. Suite 276, 375 S. Mayfair Ave., Daly City; PL 5-5566
Belsco Box 907, Palo Alto; DA 1-8501	Costello & Company 535 Middlefield Road, Palo Alto; DA 1-3745	Instruments for Measurements 251 So. Murphy Ave., Sunnyvale; RE 6-8680	McCarthy Associates 1011-E Industrial Way, Burlingame; 342-8901
Birnbaum Sales Company, Inc. 626 Jefferson Ave., Redwood City; EM 8-7757			McDonald Associates 716 Wilshire Blvd., Santa Monica; 394-6610

MANUFACTURER/REPRESENTATIVE INDEX

<p>Keithley Instruments..... T. Louis Snitzer Co. Kapco, Inc..... V. T. Rupp Co. Kulka Electric Corp..... Richard A. Strassner Co.</p> <p>Lavoie Laboratories, Inc..... McCarthy Associates</p> <p>Magnetic Metals, Inc..... Compar San Francisco Marconi Instruments..... Moxon Electronics McLean Engineering Labs..... Neely Enterprises McMillan Laboratory, Inc..... R. W. Thompson Associates Melabs..... Perlmuth Electronics Melcor Electronics Corp..... Components Sales Calif., Inc. Merrimac Research & Development..... G. H. Vaughan Methode Electronics Co..... John E. Striker Co. Metron Instrument Co..... Components Sales California, Inc. Microdot, Inc..... O'Halloran Assoc. Micro-Power, Inc..... Walter Associates Micro-Tel Corp..... Walter Associates Microtran Company Inc..... Richard A. Strassner Co. Microwave Associates..... Elliott Recht Assoc. Microwave Electronics Corp..... Jay E. Stone & Assoc. Microwave Technology, Inc..... Walter Associates Mid Eastern Electronics, Inc..... Perlmuth Electronics Millitest Corp..... Components Sales California, Inc. Molecular Dielectrics..... Artwel Electric, Inc. Molex Products Company..... Tom G. Maier Company Moseley Co., F. L..... Neely Enterprises Motorola, Inc..... Perlmuth Electronics MSI Electronics, Inc..... Walter Associates</p> <p>Narda Microwave Corp..... O'Halloran Associates National ResisTronics, Inc..... Richard A. Strassner Co. Neff Instrument Company..... Ault Associates NJE Corporation..... Ault Associates North Hills Electronics, Inc..... G. H. Vaughan</p> <p>Omni Spectra, Inc..... Walter Associates Optimized Devices..... O'Halloran Associates</p> <p>Panoramic Electronics, Inc..... Carl A. Stone Assoc., Inc. Peerless Electrical Products..... Birnbaum Sales Co. Inc. Philco (Microwave Div.)..... Compar San Francisco Phillips Control Relays..... Long & Assoc., Inc. Physics Research Laboratories, Inc..... W. K. Geist Co. Plastic Capacitors, Inc..... Richard A. Strassner Co. Plastic Stampings, Inc..... John E. Striker Co. Plastoid Corporation..... Tom G. Maier Company Polarad Electronics..... T. Louis Snitzer Co. Potter and Brumfield..... Elliott Recht Assoc. Precision Mechanisms Corp..... Components Sales Calif., Inc. Probescope Company, Inc..... T. Louis Snitzer Co.</p> <p>Quan-Tech Labs..... Jay E. Stone & Assoc.</p> <p>Radiation at Stanford..... O'Halloran Associates Radiation Instr. Devel. Labs., Inc..... R. W. Thompson Assoc. Rapid Electric Company..... Peninsula Associates</p>	<p>Raytheon - Distributor Products..... Perlmuth Electronics Raytheon (Industrial Division)..... McCarthy Associates Reeves Soundcraft..... James S. Heaton Co. Remanco, Inc..... Cain & Company Rese Engineering, Inc..... T. Louis Snitzer Co. Rixon Electronics, Inc..... Costello & Co. RHG Electronics Laboratory..... Walter Associates Rohde & Schwarz Sales Co..... W. K. Geist Co. Rowan Controller Co..... Artwel Electric, Inc. Rutherford Electronics Co..... Moxon Electronics</p> <p>Sanborn Company..... Neely Enterprises Sangamo Electronics Div..... Perlmuth Electronics Scott, Inc., H. H..... W. K. Geist Co. Sealectro Corporation..... Richard A. Strassner Co. Sensitive Research Instrument..... McCarthy Associates Shielding Division, Shieldtron, Inc..... McDonald Associates Sierra Electronic Div. of the Philco Corp..... T. Louis Snitzer Co. Solid State Products, Inc..... James S. Heaton Co. Somerset Radiation Labs..... Peninsula Associates Sorensen & Co., Inc..... McCarthy Associates Sperry Microwave Company..... McCarthy Associates Sperry Rand, Electronic Tube Div..... Cain & Company Star-Tronics, Inc..... Richard A. Strassner Co. Stevens Manufacturing Co..... Artwel Electric, Inc. Systems Research..... Moxon Electronics Systron-Donner Corporation..... Ault Associates</p> <p>Tally Registor Corp..... Moxon Electronics Tamar Electronics, Inc..... Premmco, Inc. Telonic Industries and Engineering..... T. Louis Snitzer Co. Test Equipment Corp..... V. T. Rupp Co. Tevco Insulated Wire..... Tom G. Maier Company Time & Frequency..... O'Halloran Associates Torrington Manufacturing Company..... Tom G. Maier Company Tower Manufacturing Corporation..... Tom G. Maier Company Triconix Inc..... Peninsula Associates Trimm Inc..... R. W. Thompson Associates Trygon Electronics, Inc..... Moxon Electronics</p> <p>United Shoe Machinery Corp..... Premmco, Inc. Unitorde Transistor Corp..... Compar San Francisco</p> <p>Valor Instruments, Inc..... BelSCO Varian Associates, Recorder Division..... McCarthy Associates Varian Associates..... Neely Enterprises Vidar Corporation..... Moxon Electronics</p> <p>Ward-Leonard Company..... Long & Assoc., Inc. Waterman Electronic Tube Company..... Tom G. Maier Company Waters Corporation, The..... G. H. Vaughan Watkins-Johnson Co..... Perlmuth Electronics Weinschel Engineering, Inc..... Jay E. Stone & Assoc. Welwyn..... Compar San Francisco Westrex Div. Litton Industries..... American Wireless Wilk Instruments..... V. T. Rupp Co. Wiltron Co..... O'Halloran Associates Wincharger Corp. (Zenith Radio Corp.)..... Premmco, inc. Winchester Electronics, Inc..... Long & Assoc., Inc. Winslow Electronics, Inc..... Peninsula Associates</p>
--	---

REPRESENTATIVE DIRECTORY

<p>Moxon Electronics 15 - 41st Avenue, San Mateo; FI 5-7961</p> <p>Neely Enterprises 501 Laurel, San Carlos; LY 1-7661; 1317 - 15th St., Sacramento; GI 2-8901</p> <p>O'Halloran Associates 3921 E. Bayshore Palo Alto; DA 6-1493</p> <p>Peninsula Associates 1345 Hancock Street, Redwood City; EM 9-1226</p>	<p>Perlmuth Electronics 941 Charleston Road, Palo Alto; DA 1-5064</p> <p>Premmco, Inc. 2406 Lincoln Ave., Alameda; LA 3-9495</p> <p>Recht Associates, Elliott 175 S. San Antonio Road, Los Altos; 941-0336</p> <p>Rupp Co., V. T. 1182 Los Altos Avenue, Los Altos; WH 8-1483</p> <p>Snitzer Co., T. Louis 510 So. Mathilda Avenue, Sunnyvale; RE 6-6733</p>	<p>Stone Associates, Carl A. 800 N. San Antonio Road, Palo Alto; DA 1-2724</p> <p>Stone & Assoc., Jay E. 349 First Street, Los Altos; 948-4563</p> <p>Strassner Company, Richard A. 885 No. San Antonio Rd., Box 927, Los Altos; 948-3334</p> <p>Striker Company, John E. P.O. Box 548, San Carlos; LY 1-0736</p>	<p>Thompson Associates, R. W. 4135 El Camino Way, Palo Alto; DA 1-6383</p> <p>Vaughan Co., G. H. Box 1253, Palo Alto; DA 1-1347</p> <p>Walter Associates Box 790, Menlo Park; DA 3-4606</p> <p>Whychell Company, T. 580 Spargur Drive, Los Altos; 948-0355</p>
---	---	---	--



PHYSICISTS AND MICROWAVE ENGINEERS

Stanford Research Institute is performing research for government and industrial clients in the following areas:

- * Lasers
- * Microwave Components
- * Low- and High-Power Microwave Filters
- * Solid-State Filters
- * Parametric Devices
- * Antennas

Physicists or Microwave Engineers interested in combining theoretical and experimental research in these areas are invited to inquire about current opportunities.

Enjoy industrial-level salaries and benefits in a university-type research atmosphere.

DA 6-6200, EXT. 3440

STANFORD RESEARCH INSTITUTE

333 Ravenswood, Menlo Park

An equal opportunity employer

III YOUR III BEST SOURCE FOR CONNECTORS • POTENTIOMETERS SEMICONDUCTORS • CAPACITORS SWITCHES • COAXIAL CABLE

EXAMPLE: WE STOCK



- ✓ Choice of mounting styles and contact terminations
- ✓ Available with crimp type removable snap-in contacts
- ✓ Machined, spring-tempered, closed-entry socket contacts

Write for RELAY-TO-SOCKET cross reference data

III MOULTON
ELECTRONICS DISTRIBUTORS, INC.
1058 TERMINAL WAY, SAN CARLOS,
CALIFORNIA. LY 3-7667, LY 1-8292

the section

MEMBERSHIP



Reyling

Spilker

Following are the names of members who have recently been transferred to a higher grade of membership as noted:

Senior Member

G. F. Reyling
James J. Spilker, Jr.

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

Z. J. Balogh	B. C. McIntosh
K. C. Bulsara	J. V. Miller
R. A. Clair	G. T. Moore
E. B. Croson	W. H. Sanders
J. M. Donachy	L. E. Selmer
A. F. Gaetano	E. G. Shoemaker
F. K. Gates	J. W. Simonton
E. Gee	W. B. Tiffany
M. C. Harding	C. P. Tinebra
A. A. Kaplan	J. M. Tresidder
R. E. Larson	H. Van Ardenne
N. H. T. Lowe	R. A. Zebell
D. J. McAuley	

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

C. L. Allen	W. L. May
E. J. Archibald	K. K. Mei
Robert B. Ash	L. Meier III
Albert Blodgett, Jr.	T. C. Nelson
J. J. Boncer	R. P. Noble
C. S. Burrus	J. C. Nord
R. M. Callahan, Jr.	H. J. Nyser
K. Chew	G. R. Oeh
W. A. Cross	J. E. Ohlson
J. E. Daniels	J. L. Osborne
J. R. Einfalt	J. E. Rogers
R. A. Fiedler	R. L. Rollins
R. D. Harris	W. E. Root
L. R. C. Hawley	P. R. Roshon
W. H. Haydl	L. E. Rucker
Harold F. Howarth	J. C. Samuels
J. J. Y. Huang	N. D. Seilstad
R. P. Iwens	J. B. Shrock
P. A. Johanson	G. L. Skelberg
O. K. Julian	W. L. Skinner
Leung Kai Chu	G. M. Smith
D. F. Kidder	O. L. Watson III
P. A. Litot	W. B. Windus
G. K. S. Luke	E. Wong
C. N. Ly	R. C. Yingling

Opportunity in Montana

As a result of the expanding program at the Electronics Research Laboratory of the Endowment and Research Foundation at Montana State College, the Laboratory has openings for experienced research and development engineers in systems synthesis, solid-state microwaves, communications, direction finding and antennas.

Send résumé to:

C. M. Sorvaag, Staff Member, Electronics Research Laboratory, Montana State College, Bozeman, Montana

INDEX TO ADVERTISERS

Arnold Engineering Co.	4
Audio Visual Center	13
Beau Brummel Catering	15
Brill Electronics	5
Forum Personnel Agency	14
General Radio Company	20
Hammerlund Mfg. Co./R. W. Thompson	14
Hewlett-Packard Company	3
Hughes Aircraft Company	2
Magnetic Industries, Inc.	11
Market Street Van and Storage	15
Miller Company, J. W.	12
Montronics, Inc.	11
Moulton Electronics	18
Moxon Electronics Corp.	9
Montana State College	18
National Press, The	12
Northern California Personnel	10
O'Halloran Associates	13
Precision Instrument Company	12
Professional & Tech. Recruiting Assoc.	15
Shure Brothers Inc.	11
Stanford Research Institute	14, 18
Tektronix, Inc.	19
Vidar Corp.	14
Western Gold & Platinum Company	11

NEW VALUE PACKAGE

Sampling sweep and sampling dual-trace plug-in units with the Tektronix Type 561A Oscilloscope

• illuminated internal graticule • rectangular ceramic crt

This new low-drift sampling system is as easy to operate as a conventional oscilloscope — but with sensitivity and bandwidth possible only through sampling.



HERE'S WHAT YOU CAN DO WITH THIS SAMPLING SYSTEM:

- 1 Measure millivolt wide-band signals with either 0.4-nsec risetime sampling channel. Time-measurement range extends to 100 microseconds.
- 2 Trigger internally from A and B signals. Matched internal delay lines in both channels assure accurate time comparisons.
- 3 Display repetitive signals on 15 calibrated equivalent sweep rates from 0.2 nsec/cm to 10 μ sec/cm, accurate within 3%. Magnifier provides 10X sweep expansion . . . time per dot remains the same for digital readout (with auxiliary equipment).
- 4 Measure millivolt signals in the presence of a ± 1 -volt dc component by means of a dc-offset voltage, monitorable at the front panel.
- 5 Reduce time jitter and amplitude noise, if needed, on the more sensitive vertical ranges and faster sweep rates by means of a smoothing control.
- 6 Show X-Y (lissajous) patterns, observe single or dual-trace displays, add signals algebraically.
- 7 Change the signal-source impedance without affecting the dot transient response.
- 8 Vary sweep delay through 100 nanoseconds.
- 9 Drive X-Y plotters or similar readout accessories.
- 10 Select calibrated vertical sensitivities from 2 to 200 mv/div.
- 11 Choose signal probes for higher input impedances, various attenuations.

TYPE 561A CHARACTERISTICS

UNIQUE CRT • 5-inch rectangular ceramic-envelope tube • Illuminated no-parallax internal graticule on high quality parallel-ground plate-glass face • Controllable graticule lighting— for convenient trace photography • Monaccelerator design and 3.5-KV accelerating potential — for a bright, sharply-defined trace of small spot size •

OTHER FEATURES Improved regulated power supplies • Regulated dc heater supply • Z-axis input • Amplitude calibrator with 18 steps from 0.2 mv to 100 v • Operation from 105 v to 125 v or 210 v to 250 v, 50 to 400 cps.

TYPE 561A Oscilloscope	\$470
(without plug-ins)	
TYPE 3S76 Dual-Trace Sampling Unit	\$1100
TYPE 3T77 Sampling Sweep Unit	\$650
Probes:	
Type P6032 Cathode-Follower Probe	\$160
Type P6034 Miniature Passive Probe	\$35
(10X attenuation)	
Type P6035 Miniature Passive Probe	\$35
(100X attenuation)	

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

The Type 561A also accepts other plug-ins for differential, multi-trace, and wide-band applications, plus the two latest which provide high sensitivity, wide-band, dual-trace operation combined with calibrated sweep delay.

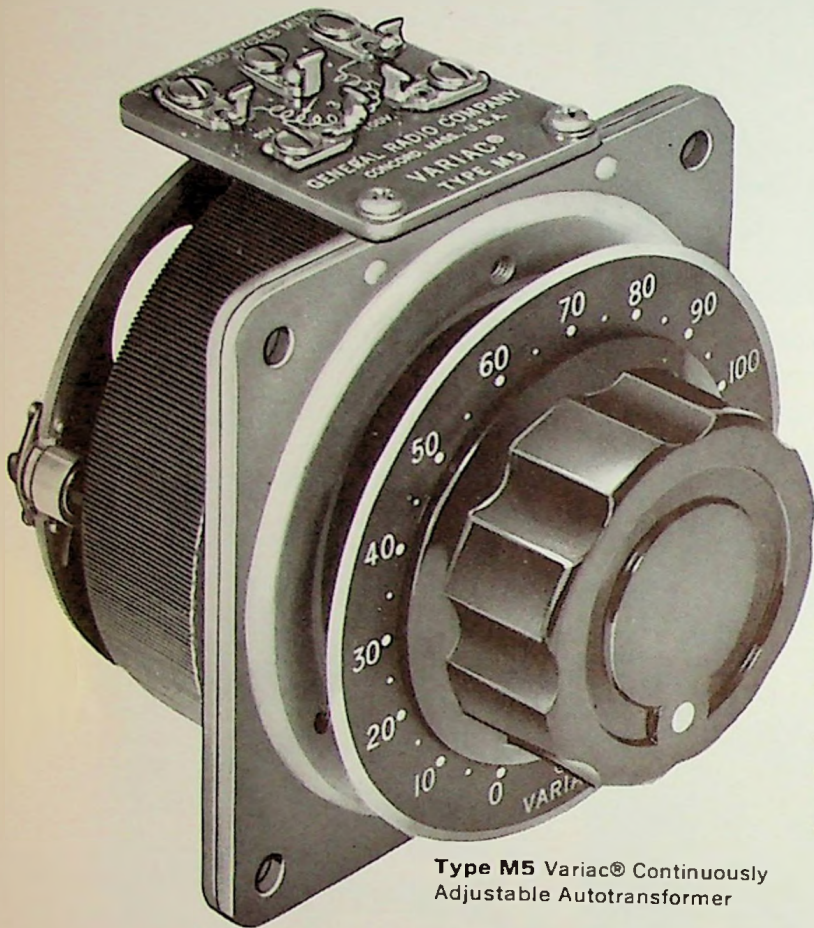
For more information on a Type 561A Oscilloscope and plug-in combinations, please call your Tektronix Field Engineer.

Tektronix, Inc. SAN FRANCISCO FIELD OFFICES

3944 FABIAN WAY • PALO ALTO, CALIF. • DAvenport 6-8500
3530 GOLDEN GATE WAY • LAFAYETTE, CALIF. • YELLOWstone 5-6101
From Oakland, Berkeley, Richmond, Albany and San Leandro: CLifford 4-5353

Militarized Variacs

for 350- to 1200-cycle applications



Type M5 Variac® Continuously Adjustable Autotransformer

- ★ Approximately 60% lighter in weight than their 60-cycle equivalents.
- ★ Built to withstand shock, vibration, and extreme environments . . . meet many military specifications.
- ★ Moisture-fungicide protected.
- ★ Core completely enclosed by two cup-shaped winding forms of molded phenolic, not fiber or tape wrap-arounds — precision molded grooves insure positive positioning of turns.
- ★ Patented DURATRAC brush contact surface prevents track deterioration and permits momentary overloads up to 1000% without damage.
- ★ Triple Formvar-coated copper wire provides high breakdown strength between banked turns at elevated temperatures.
- ★ Terminal board equipped with both screws and soldering lugs — imprinted with terminal numbers, wiring diagram, and nominal voltage between taps.
- ★ Large radiating surface — protects brush and track from heat damage.
- ★ Counterbalanced rotating parts hold setting under shock and vibration.
- ★ Low-loss, high-silicon steel, strip-wound core.
- ★ Brush designed for constant and correct contact pressure.
- ★ Resin-impregnated glass cloth insulation between coil and base.
- ★ Winding taps concealed for protection from damage.
- ★ 2-ampere model (Type M2) has over 400 turns for applications requiring high resolution.
- ★ Overvoltage taps standard on all models.
- ★ Ganged and motor-driven models available.

Continuously Adjustable Output Voltage from 0-120 volts or 0-140 volts

TYPE	RATED INPUT VOLTAGE	LINE-VOLTAGE CONNECTION				OVERVOLTAGE CONNECTION		NET WEIGHT POUNDS	PRICE
		OUTPUT KVA AT MAXIMUM OUTPUT VOLTAGE	RATED OUTPUT CURRENT AMPERES	OUTPUT VOLTAGE RANGE	MAXIMUM OUTPUT CURRENT AMPERES	OUTPUT VOLTAGE RANGE	*RATED CURRENT AMPERES		
M2	120	0.37	2.4	0-120	3.1	0-140	2.4	2	\$14.50
M5	120	0.94	6	0-120	7.8	0-140	6	3½	18.50
M10	120	1.56	10	0-120	13	0-140	10	6½	30.00
M20	120	3.12	20	0-120	26	0-140	20	13	48.00

*Rated current should not be exceeded for the overvoltage connection.



Write for the new Variac Bulletin.

GENERAL RADIO COMPANY
WEST CONCORD, MASSACHUSETTS

Sales Engineering Office in SAN FRANCISCO: 1186 Los Altos Avenue, Los Altos, California
James G. Hussey • Donald M. Vogelaar
Tel: 415 948-8233 • TWX: 415 949-7964

General Radio
(Overseas)
Zurich, Switzerland

IN CANADA
(Toronto) 246-2171