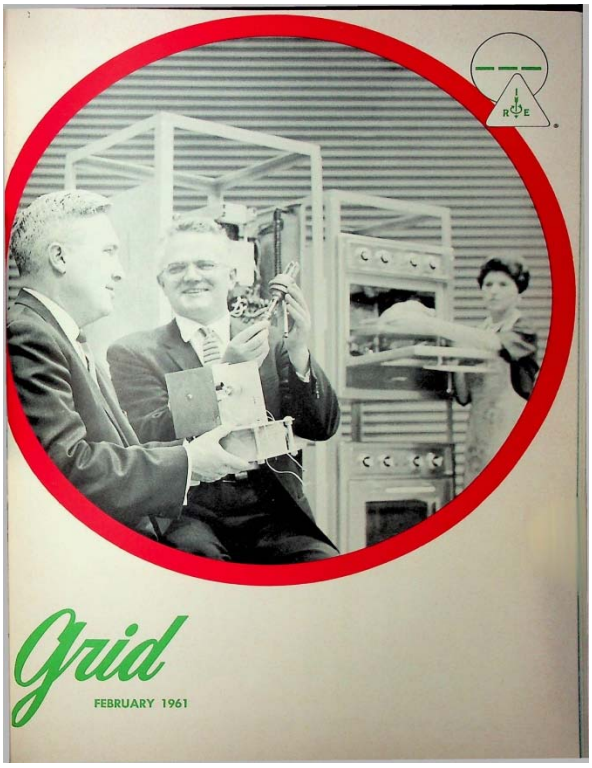
EDITOR'S PROFILE of this issue

from a historical perspective …

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



FEBRUARY, 1961:

Cover: Today, microwave ovens are in every home. Back in 1961, though, this was fairly new. Shown is the Litton L-3189 magnetron (dubbed the "microtron") that provides energy for the Tappan oven shown in the background on a test system. Litton's tube division (in San Carlos) was the successor to Eimac's klystron tube business.

P 10: We get a preview of WESCON (The Western Electronic Show and Convention), to be held this year in Northern California at the SF Cow Palace. WESCON is owned by the SF and LA Sections of the IRE, and the Western Electronic Manufacturers Association (WEMA – p. 22). We see the eligibility rules for manufacturers and their distributors. There is concern that the space at the Cow Palace may not be enough, and extra space may be rationed.

p. 15: PGPEP shares a profile of a typical "Silicon Valley" startup. Melabs is self-funded by four founders, with 80% owned by the principals. All 175 employees have stock or stock options. Most revenue is from government contracts, such as ferrites used in masers. This was in the days before general availability of venture capital, but it fits the profile of a Silicon Valley startup.

P. 16: A new Professional Group gets started to cover Radio Frequency Interference – the 17th Group. It follows startup of a Circuit Theory Group (see p. 6). This grew into our current EMC Society.

p. 32: Wernher von Braun, of NASA, speaks at the local meeting of the American Institute of Electrical Engineers (AIEE). We'll be seeing more coverage of AIEE later this year as a potential merger with the IRE comes under discussion.

Grid

FEBRUARY 1961

FOR MICROWAVE
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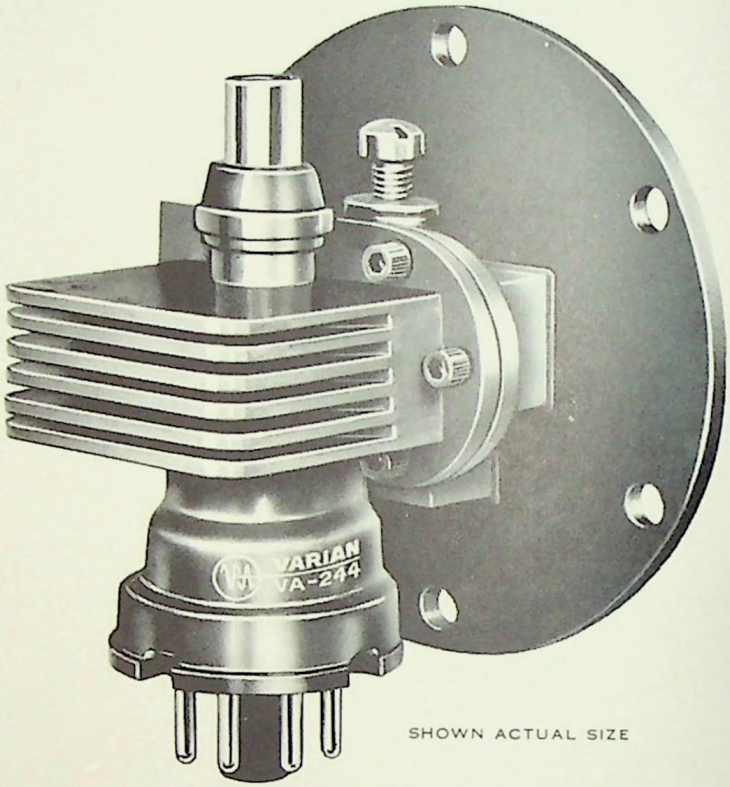

SHOWN ACTUAL SIZE

FREQUENCY RANGE

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TUBE #3: VA-244C 7.1-7.9 kMc

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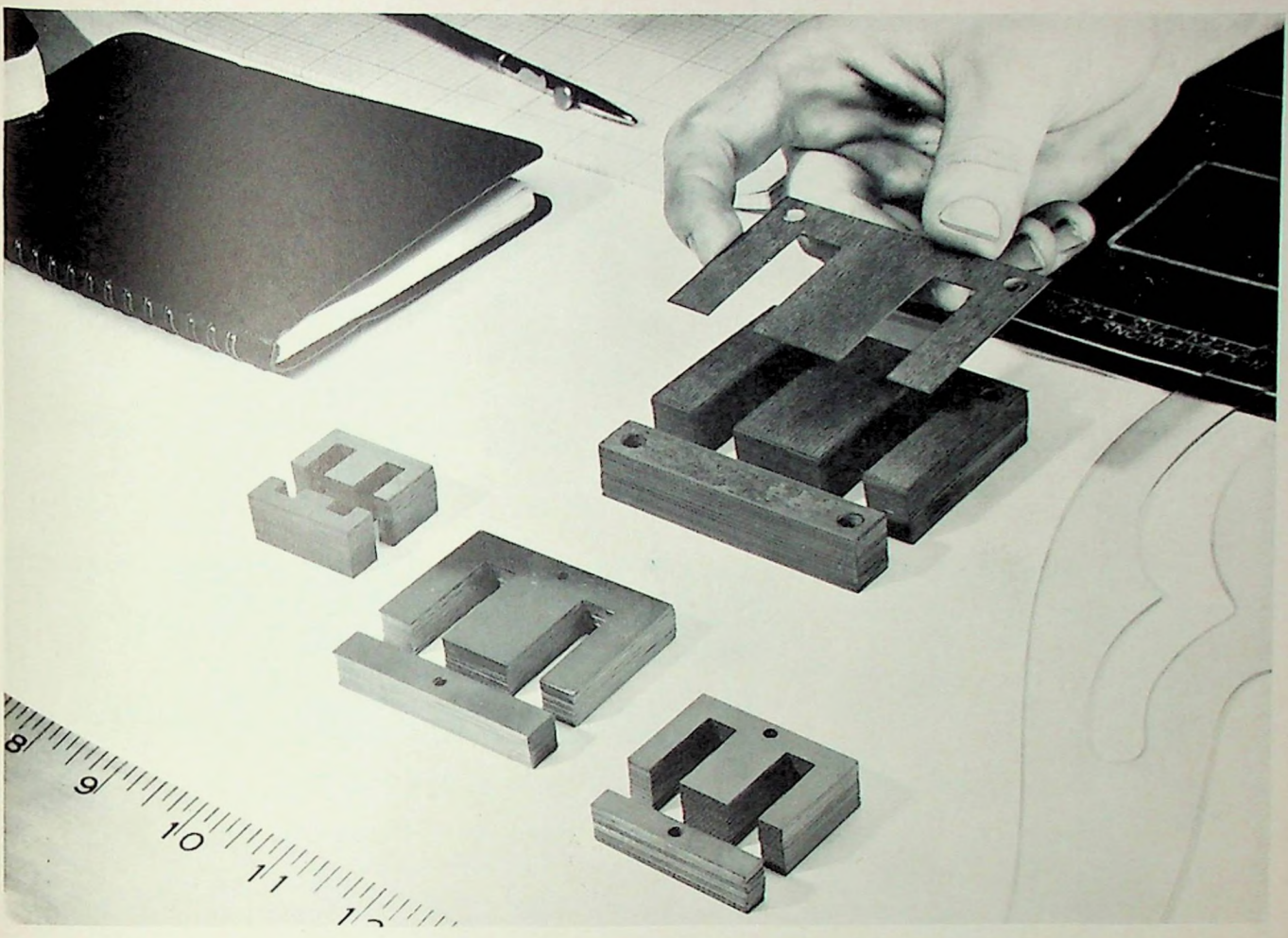

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number 6

Grid

February 1961

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contents

cover

Four-minute crisp bacon, cooked on a paper towel, is one of the standard menu items for the new Tappan domestic electronic range, just introduced. Power for the r-f section is produced by an L-3189 Litton magnetron operating in a complete electromagnetic assembly christened a Microtron and seen in the hands of Norman Moore on the front cover. Moore is general manager of the Litton electron tube division in San Carlos. Paul W. Crapuchettes, seen holding the tube, is technical director of the division.

In the background, testing proceeds on a completed unit. Other IRE people involved in the Litton development include Vinton D. Carver, previously Salt Lake City manager, now assistant general manager of the division; Larry Hansen, senior engineer; Edward Krajewski, project engineer and food technician; and James Schussele, chief engineer, crossed-field department.

from the chairs

BACK TO FUNDAMENTALS

Historically, the IRE was created by men who wished to discuss the behavior of electric circuits at other than power frequencies. That original group of men has now grown to more than 80,000. As the Institute has grown, some 28 sub-groups have been created to simplify the problem of internal communication between various specialists.

A rather astute history professor has noted a similar phenomenon that takes place in political committees as they grow. Thus, a scholar with a broad point of view has discovered a fundamental law of organizational behavior. It is not my purpose to discuss organizational behavior and its growth, but the role of Circuit Theory in the San Francisco Section.

The field of interest for the group is Circuit Theory which includes the techniques of analysis, synthesis, and design. This field of interest is a restatement of the historical purpose of the IRE. Thus, the group on Circuit Theory is continuing the basic discipline of the Institute of Radio Engineers.

The purpose of creating a CT chapter is to establish a communication channel emphasizing the circuit point of view. We have innumerable applications of the discipline of circuit theory. These range from Audio to Vehicular Communications. Information gained in one field is of value in the other. Since Circuit Theory is common to all groups of the IRE, the Chapter can serve the Section by providing a common meeting place for the exchange of technical information. One example is the use of an antenna-pattern computer routine which was used for the factorization of a complex polynomial for a filter synthesis problem.

Several individuals have commented that we have too many groups. I agree with this observation. I further believe that a chapter on Circuit Theory will emphasize the fundamentals of the IRE. Emphasis of the fundamentals will strengthen the bond between the specialists rather than weakening the IRE.

Circuit Theory is a tool which can be used by the specialists to accomplish their objectives. While the study of circuits and systems of circuits is worthy of our full attention, such a procedure can lead to a sterilization of Circuit Theorists by inbreeding. One example of sterilization might be the position of the modern filter theorist. He has yet to provide a simple means of designing better filters than the classical Zobel types. Perhaps the use of a computer will make the design of filters using modern techniques "simple."

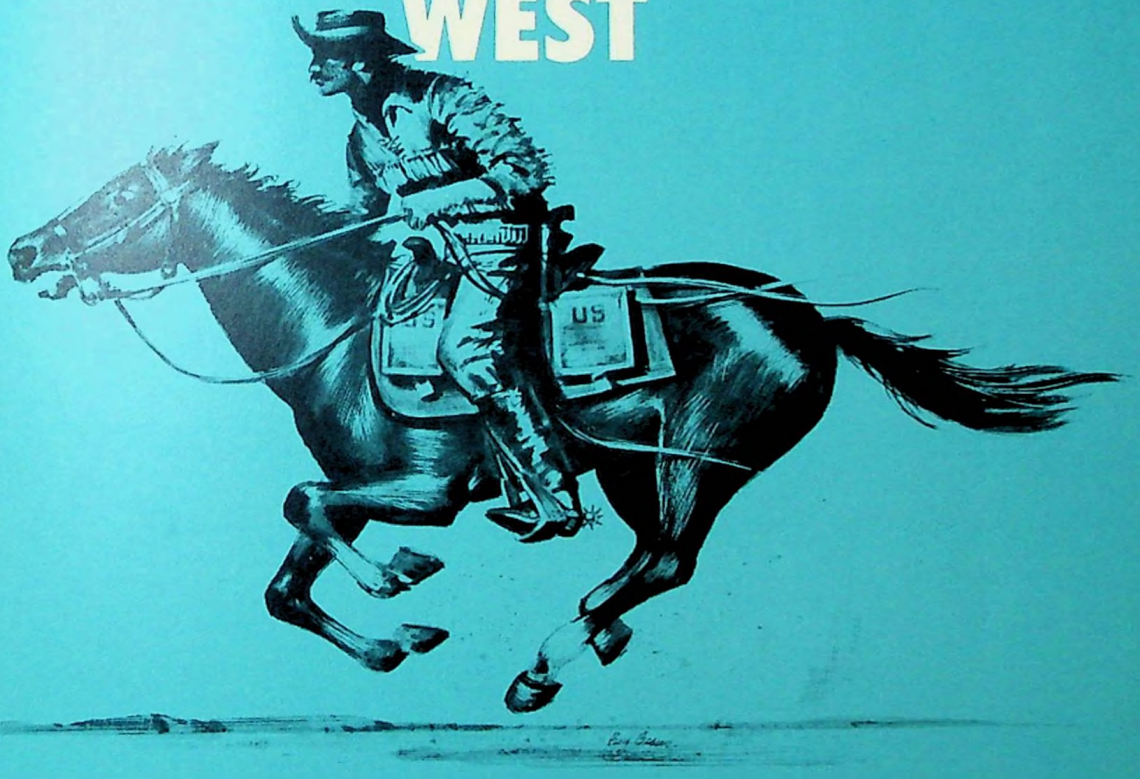
Originally the IRE did not have enough channel capacity to handle the internal communications of the specialist. Now, with 28 groups and their chapters, we have adequate channel capacity. But, are we losing information because it is impossible to monitor all the channels? The problem is one of communication. We should expect a solution from a Communication Theorist—or perhaps a Circuit Theorist analyzing a system of circuits.

In closing, I wish to invite all members of the IRE to participate in establishing a Chapter of the PGCT. The purpose of the Chapter is to establish a technical communications channel in the general field of circuit theory. Help is needed in all areas of the chapter organization.

Robert C. Kiessling

—ROBERT C. KIESSLING
INTERIM CHAIRMAN, PGCT

IN THE NEW WEST



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AUDIO
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Harmon H. Woodworth, Stanford Research Institute

BROADCASTING
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MEETING CALENDAR

PROFESSIONAL GROUPS

Antennas & Propagation
8:00 P.M. • **Wednesday, Feb. 15**

"Communication Potentialities of Exospheric Scatter"
Speaker: Dr. Von R. Eshleman, associate professor, electrical engineering department, Stanford University
Place: Room 101, Physics Lecture Hall, Stanford University
Meet-the-speaker dinner: 6:30 P.M. (Social Hour, 6:00 P.M.), The Red Shack, 4085 El Camino Way, Palo Alto
Reservations: Odette Moore, DA 6-6200, Ext. 2414

Antennas & Propagation
8:00 P.M. • **Wednesday, March 8**

"Collision Cross Sections and Collision Frequency"
Speaker: Dr. Charles Cook, manager, molecular physics section, Stanford Research Institute
Place: Room 101, Physics Lecture Hall, Stanford University
Meet-the-speaker dinner: 6:30 P.M. (Social Hour, 6:00 P.M.), The Red Shack, 4085 El Camino Way, Palo Alto
Reservations: Odette Moore, DA 6-6200, Ext. 2414

Bio-Medical Electronics
8:00 P.M. • **Wednesday, Feb. 15**

"Physiological Requirements and Problems Associated With Flight Motion Simulators and Airborne Vehicles"
Speaker: Capt. H. A. Smedal, USN (MC)
"Ames Physiological Instrument Systems"
Speaker: George R. Holden, research engineer, NASA
"Differential Amplifier for Physiological Instrumentation"
Speaker: Joseph R. Smith, Jr., research engineer, NASA
(Each speaker is associated with Ames Research Center, NASA, Moffett Field)
Place: Room M-112, Medical School Building, Palo Alto Stanford University Medical Center. Room M-112 is located in the courtyard of the wing in the Center nearest Hoover Tower. Approach from Palm Drive on Stanford Campus, which is the extension of University Ave., Palo Alto
Dinner: 6:00 P.M., Red Cottage Restaurant, 1706 El Camino Real, Menlo Park
Reservations: Ken Gardiner, DA 6-6200, Ext. 2659

Circuit Theory
8:00 P.M. • **Wednesday, March 1**

Details to be announced

Communications Systems
8:00 P.M. • **Thursday, Feb. 23**

(Joint meeting with PGMIL and PGSET)
"A Synchronous Satellite Relay for Communication"
Speaker: Donald Williams, Hughes Aircraft Co.
Place: Room 100, Physics Lecture Hall, Stanford University
Dinner: 6:00 P.M., The Red Shack, 4085 El Camino Way, Palo Alto
Reservations: Donna Jean Harapat, RE 9-2344

Electron Devices
8:00 P.M. • **Wednesday, Feb. 15**

(Joint meeting with PGMTT, see next column)
"Project M"
Speaker: Gregory A. Loew, research associate, Stanford University
Place: Room 320, Geology Building, Stanford University
Dinner: 6:30 P.M., The Red Shack, 4085 El Camino Way, Palo Alto
Reservations: Odette Moore, DAvenport 6-6200, Ext. 2414

MEETING CALENDAR

Electron Devices 8:00 P.M. • Wednesday, March 1
"Ion Propulsion"
Speaker: Dr. George Brewer, electron dynamics department, Hughes Research Laboratories
Place: Room 101, Physics Lecture Hall, Stanford University

Electronic Computers 8:00 P.M. • Tuesday, Feb. 28
"System Reliability"
Speaker: Dr. Larry Hunter, section head, General Telephone & Electronics Laboratory, Inc., Menlo Park
Place: Bldg. 202, Lockheed Auditorium, 3251 Hanover Street, Palo Alto
Dinner: 6:00 P.M., The Red Shack, 4085 El Camino Way, Palo Alto
Reservations: None required

Instrumentation 8:00 P.M. • Tuesday, Feb. 28
"Large Scale Data Handling Concepts"
Speaker: Robert L. Sink, associate director, Datalab Division, Consolidated Electrodynamics Corp.
Place: Cubberley Auditorium, Stanford University

Microwave Theory & Techniques 8:00 P.M. • Wednesday, Feb. 15
(Joint meeting with PGED, see above)

Military Electronics 8:00 P.M. • Thursday, Feb. 23
(Joint meeting with PGCS and PGSET, see above)

Product Engineering & Production 8:00 P.M. • Tuesday, Feb. 28
"Hidden Gold Through Work Simplification"
Speaker: Thomas E. Scatchard, director of manufacturing, Beckman/Berkeley Div.
Place: Beckman/Berkeley Division, 2200 Wright Avenue, Richmond, Calif.
Plant tour following lecture

Radio Frequency Interference 8:00 P.M. • Tuesday, March 14
"Interference in Power Systems"
Speakers: Fred Rowe, Northern California Electrical Bureau; and Richard Lake, Pacific Gas and Electric Company
Place: The Gold Platter, 1000 El Camino Real, San Carlos
Dinner: 7:00 P.M. (Happy Hour 6:00 P.M.), The Gold Platter
Reservations: Peter Spencer, DA 1-2280

Space Electronics & Telemetry 8:00 P.M. • Thursday, Feb. 23
(Joint meeting with PGCS and PGMIL, see above)

CHRONOLOGICAL RECAP

February 15—Antennas & Propagation, Bio-Medical Electronics, Electron Devices/Microwave Theory & Techniques
February 23—Communications Systems/Military Electronics/Space Electronics & Telemetry
February 28—Electronic Computers, Instrumentation, Product Engineering & Production
March 1—Circuit Theory, Electron Devices
March 8—Antennas & Propagation
March 14—Radio Frequency Interference

Thomas E. Scatchard

meeting ahead

LEFT TO WRIGHT

The next meeting of the PGPEP will be on February 28. Other details in Calendar.

Thomas E. Scatchard, director of manufacturing at the Berkeley division of Beckman, will discuss work simplification.

Beckman/Berkeley has successfully, for several years, employed work simplification with full employee participation. The history and accomplishments will be persented by the speaker after which will follow a plant tour at which the participants can see the results of the work simplification program.

To reach the plant, drive north on Eastshore Freeway to Hoffman Boulevard (toward San Rafael bridge), past Safeway distribution center, and left on 22nd Street to Wright.

meeting ahead

THE ELECTRICAL PUSH

On the first of March, when PGED convenes, George R. Brewer of Hughes will talk on Ion Propulsion. Other essential data appear in the Calendar.

Use of electrical means for accelerating particles to provide propulsion for space vehicles is becoming increasingly attractive as such electrical propulsion devices reach a higher state of development. Brewer's talk will cover several aspects of the subject of ion engines, viz: 1) systems application, to show the relative advantages of ion and chemical engines; 2) the principal technical problems associated with the development of suitable ion engines; 3) the techniques currently being used, and 4) a brief description of the work to date by Hughes in the ion-propulsion field.

Brewer has a PhD degree in electrical engineering (1952) from the University of Michigan. He has been engaged principally in research and development of electron tubes; from 1943 to 1944 at the radiation laboratory, MIT, from 1944 to 1947 at the Naval Research Laboratory, and from 1947 to 1951 at the engineering research institute of the University of Michigan. He is now in the Hughes research laboratories as head of electron dynamics.

Highly instrumented PGI workshop in January has cctv monitors (right, camera front and center), even blackboards as Cliff Moulton of Tektronix describes new 1-kmc oscilloscope

meeting review

PGI WORKSHOP

PGI's January meeting, an experiment in "workshop" presentation, was a great success. Complimentary remarks from many of the 90-odd members and guests who attended clearly indicate the value of such a meeting. Addressing themselves to the subject of nanosecond sampling versus direct nanosecond display, Messrs. Rod Carlson of Hewlett Packard Company and Cliff Moulton of Tektronix gave excellent accounts of their contributions to the 1 kmc oscilloscope field. A special word of thanks is due Jack Ingersoll (Neely Enterprises) for providing the closed-circuit tv system which gave everyone a front-row seat as the speakers conducted their experiments.

As lead-off speaker, Carlson mentioned that the sampling technique has been developed to a very high point since its first published use around 1880. When the repetition rate of the phenomenon is high enough a sufficiently large number of samples can be made in a reasonably short time to yield a large, bright display on a conventional crt. The HP Model 185-A combines 1000 samples per trace and a minimum effective trace time of 1 nanosecond for such a display. The Boff switching diode permits the remarkably fast sampling time of < 0.5 nsec. As a consequence of the low duty cycle (sampling time vs. sample rate) low-bandwidth deflection amplifiers can be employed and yet realize an effective dynamic range of over 80 db.

Charles Süsskind, Cliff Moulton, Rod Carlson, and Nick Pappas at the January PGI meeting

The advantage of redundance in the data sample is denied the observer of a one-shot phenomenon. The only out is to develop the total system bandwidth—as became more and more apparent as Moulton described the development of the Tektronix Type 519. Of great interest to the audience was the distributed deflection crt and the method employed to minimize vswr of the deflection system. An important aspect of the engineering effort in this instrument is the minimization of energy taken from the signal to start the sweep. High sensitivity and bandwidth are combined with the fast rise time of a tunnel diode to maintain a virtually constant sweep starting point independent of trigger amplitude.

Moulton brought the group back to the reality of "real time" when, after exhausting the more modern means of mass communication (motion pictures, lantern slides, closed circuit tv) at his disposal, he had to fall back on the old chalkboard to make his point!

—JAMES HUSSEY

meeting review

HOW TO GET THE BUSINESS

For its January meeting, PGEWS brought together a panel of speakers associated with one phase or another of the mysterious and oft-vexing subject of proposals. The purpose of the panel discussion was to air individual problems, to discover common pitfalls, and to benefit from each other's experi-

(Continued on page 12)

wescon-north 1961

NEW EXHIBITOR REGULATIONS

In its first major revision of exhibitor rules, WESCON has moved to distribute its limited floor space at the San Francisco Cow Palace for better equity among large and small manufacturers while imposing conditions ensuring a broader sampling of products important to the industry and, by a new grouping arrangement, improving the locating convenience of show attendees.

Among the innovations:

1. A new distributor-marketed components exhibit area, for the special convenience of distributors wishing to concentrate on line products. Exhibitors will have the option of locating displays in this new area or in the general components and equipment sections—but not in both.

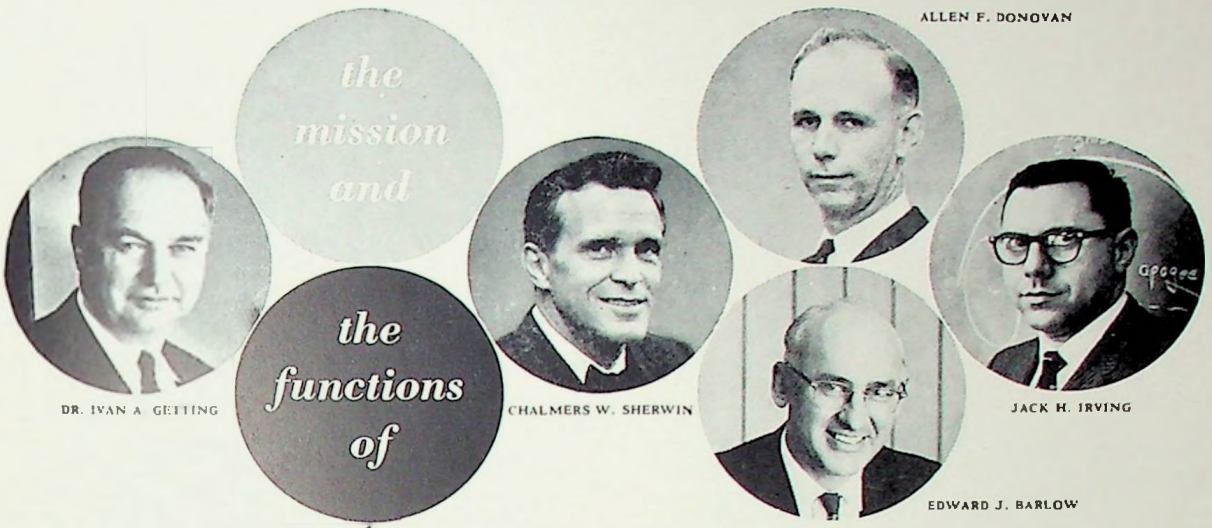
2. A special-interest area for production and processing materials, hardware, services and raw materials, designed to appeal to production engineers or managers and mechanical engineers.

3. New eligibility rulings to avoid duplication. Exhibitors must be manufacturers of products displayed or manufacturers' representatives showing products of eligible companies. To qualify, manufacturers' representatives must exhibit products of two or more manufacturers in each single booth contracted for, to the limit of two booths.

4. The maximum number of booth spaces an exhibitor may apply for with assurance cannot exceed that held by the company in the 1960 WESCON. Veteran exhibitors may ask for one additional booth space, but such requests will be treated as new applications and placed on the assignment order waiting list.

5. No company, or division of a company, may separately hold more than two booth spaces. To maintain this restriction, WESCON will require exhibitors holding contracts for more than two booths to declare the names of participating divisions.

6. Booths must be manned at all times by persons qualified to discuss the products displayed.



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ences. For purposes of definition, it was resolved that a proposal is essentially a sales document performing three functions: sale persuasion, initial specification, and institutional advertising.

In the first and primary function, the proposal must sell the product as the best available at the most reasonable cost. Secondarily, it must provide the prospective buyer with complete data so that he will know exactly what the proposer is committing himself to provide. And thirdly, each proposal must represent the best a company has to offer: the proposal may be the only contact with the impression of the company which the prospective buyer receives. Even though the particular contract is lost, the proposal must have helped to implant a lasting reputation for the company.

When the question of "Who prepares proposals?" was raised, there was less agreement among the panelists. Depending upon the individual speaker's company's size, product area, industrial philosophy, and internal organization, the originator of a proposal varied over a list of people: the technical specialist, the contract administrator, the field sales engineer, the marketing analyst, management, or a specially designated proposal engineer. Generally, however, the proposal always passes through a technical writer or editor before publication if time permits. From the mien of the panel, it seemed that time seldom permits.

A discussion on the proper content of proposals emphasized three essential ingredients. The proposal must first demonstrate that the company has a complete understanding of the problem area and the requirements to be fulfilled. The proposal must then set forth the company's suggestions for solution of the problem or method of meeting the requirement. And finally, the proposal must demonstrate that the proposer is fully capable of providing the most advantageous solution.

Panel members were: C. A. Smith, head of technical liaison, Sylvania EDL; Randall R. Faerber, market requirements planning, IBM; William G. Notz, supervisor of engineering presentations, Philco WDL; Martin Grushkin, manager of research and development planning, Lenkurt; Norris James, research technical publications, LMSD; Joseph E. Bert, chief scientific advisor to the commanding officer, U. S. Army signal electronic research unit; and Paul M. Reinhardt, supervisor of technical publications, Sylvania RSL.

The meeting closed after a floor discussion in which Bert, as the sole panel member on the receiving and evaluation end of proposals, endeavored to satisfy several questions from the floor which had bothered unsuccessful generators of proposals.

The panel was moderated by Chairman Arthur Walters after being introduced by Program Chairman James Weldon. Fifty-four members and guests were in attendance.

—DOUGLAS DUPEN

meeting review

FINITE-STATE MACHINES

Arthur Gill, assistant professor, University of California, spoke at a meeting of the local PGEC chapter in January. His topic was Finite-State Machines.

The theory of finite-state machines is today about where Shannon's information theory was ten years ago. The theory has many application. It is helpful in determining machine minimization, and the identification and characterization of machines in this finite-state class.

A finite-state machine is a system consisting of a finite input alphabet, a finite output alphabet, a finite state-set and a pair of functions. The present output of a machine and the next state are uniquely determined by the present input variables and the present state. One might consider the state of a machine to be the cumulative effect of all past inputs and states.

Gill demonstrated with a simple example how a machine could be represented in tabular, diagrammatic, and matrix forms and how these forms helped in the identification and characterization of finite-state machines.

Gill, born in Haifa, Israel, received his BS and MS at MIT. He later received his PhD from the University of California. He is also associated with the electronics research laboratory where he is working on information-theory problems.

—J. A. BOYSEN

meeting review

ANTENNAS: PERIODIC AND OTHERWISE

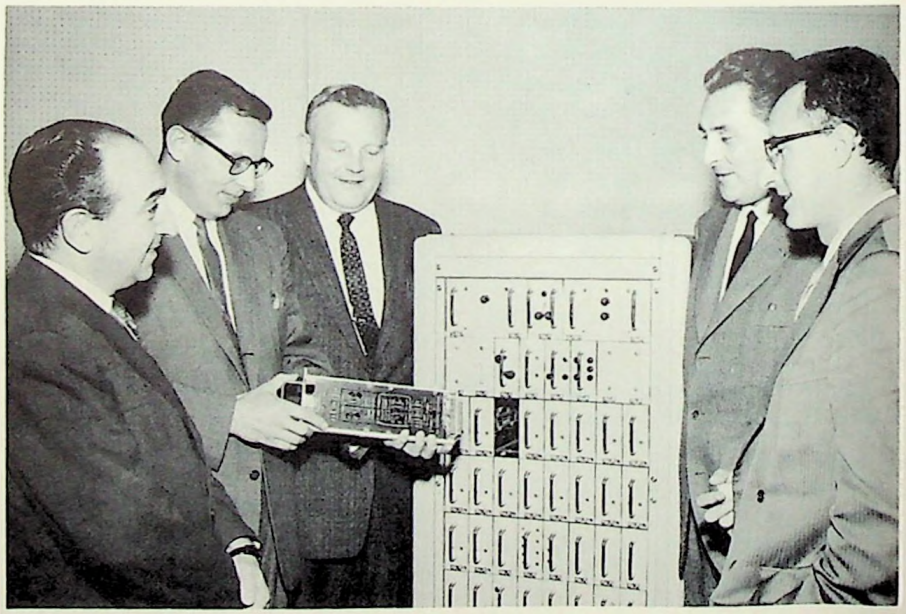
In mid-January J. William Carr spoke to the San Francisco Chapter of PGAP at Stanford University on Some Recent Antenna Innovations.

The speaker gave a discussion of three different types of antennas on which he has conducted experimental research during the past year at Lockheed. The antennas considered are those adaptable to application on missiles and space vehicles. For these applications, antenna types which can be unfurled in space are of special interest.

The first antenna type considered was the parabolic V-antenna. By modifying the standard V-antenna to a parabolic shape, a good impedance match is obtained over an octave range. The pattern of the parabolic V is very similar to that of a horn but the side lobe is higher. By introducing an artificial dielectric lens, the side lobe level is reduced.

The second antenna type considered was the back scatter array. This antenna utilizes an array of dipole scatterers or shaped reflectors to obtain a beam in the backward direction.

(Continued on page 15)



Joseph R. Sherman and Thomas A. Combellick of Lenkurt's government marketing group demonstrate a new high-speed digital data-transmission system developed for USAF to Richard C. Benoit, Jr., chief of the telecommunications branch at Rome air-development center; Col. Jean Long; and Maj. Robert Fraysse both of the French Air Force

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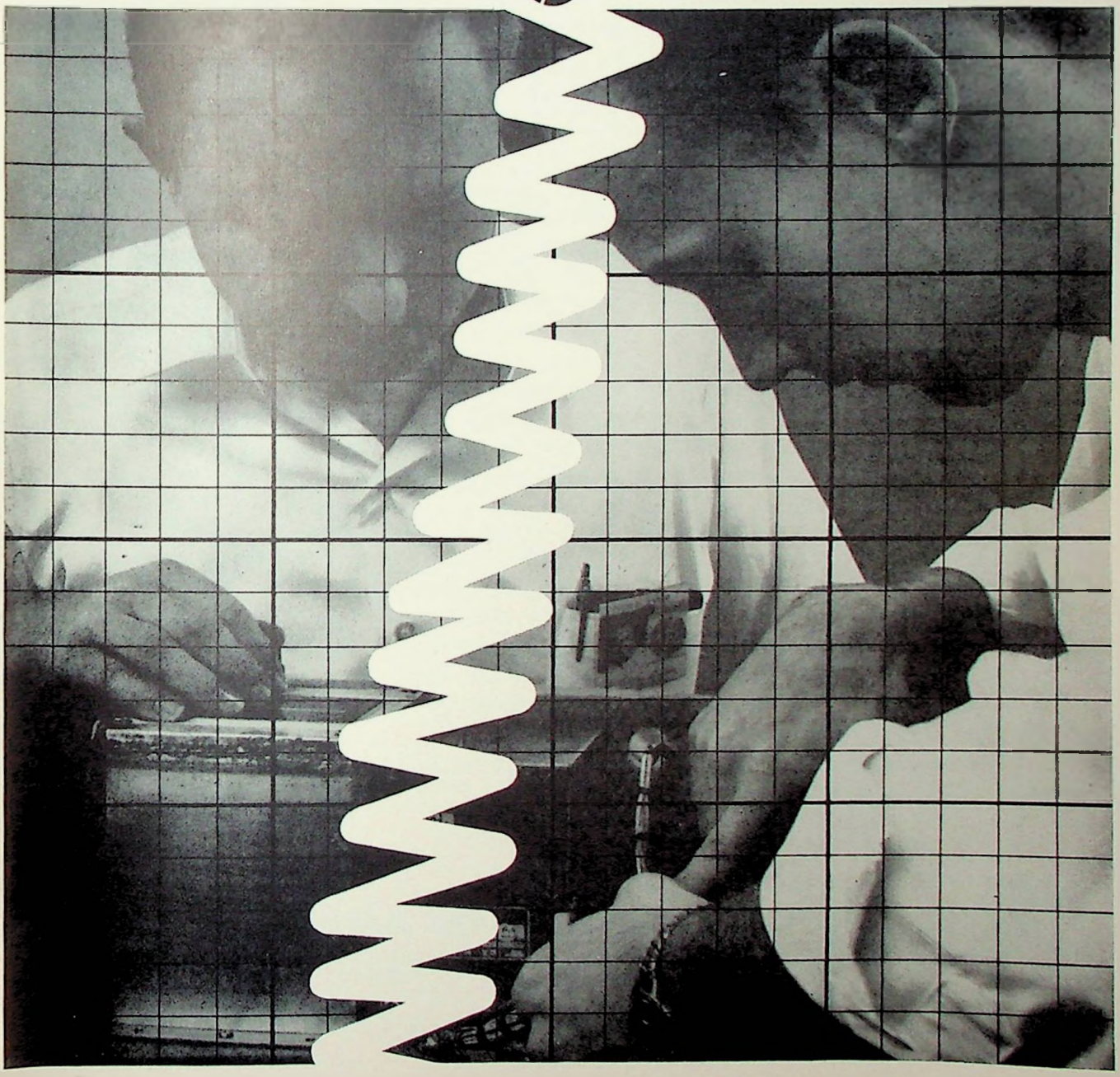

Individuality

alone is not a true measure of an engineer's creativeness

Of course, it helps a bit.

But we're not asking you to jog around the neighborhood in Bermuda shorts or a souped up Model A to prove you can think for yourself. If, however, this somehow stimulates your thinking process, be our guest.

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MORE ANTENNAS

The third antenna type considered was modifications to the log-periodic structure. A tapered zig-zag log-periodic antenna operating over an image plane whose vswr was less than 2.5 to 1 from 250 to 2000 mc was described. Another modification was a balanced planar zig-zag log-periodic antenna. Finally a flush-mounted slot antenna fed below by a log-periodic feed was described.

After six years in the U. S. Navy as a radio operator and electronics technician, Carr attended the University of California at Berkeley where he received the BS degree in electrical engineering in 1949. He was employed at Wright Field, Dayton, Ohio, from 1949 to 1951, during which time he attended Ohio State University from which he received the MS degree in electrical engineering in 1951. From 1951 until 1958 he was employed by Gilfillan Bros., Los Angeles, where he was engaged in microwave-component and antenna development. During part of this period he continued his graduate studies on a part-time basis, mostly at the University of Southern California.

In 1958, Carr came to Lockheed missiles and space division at Sunnyvale where he has been primarily engaged in antenna research and related work in the LMSD electromagnetics division.

—TETSU MORITA

meeting review

GETTING A BUZZ FROM HELIUM

Members and guests of the Professional Group on Product Engineering and Production, at the January meeting, had the opportunity to see another of the Peninsula's phenomenal growth plants. The host for the occasion was Melabs in Palo Alto. Melabs is a research and development and also production facility for masers.

Lloyd Addleman, president, revealed to participants that the company is only five years old and started on a shoestring like some other successful electronic organizations in the country. Melabs' success is unusually successful, however, and this has largely contributed to the fact that the company is about 80 per cent employee-owned. It was originally started by four energetic men, and stock has been offered to all employees joining the corporation, which at present has 175 employees.

It is engaged in the ferrite and solid state fields and primarily supplies research and development to government contracts.

Speaker for the evening was Roy Roberts, head of the magnetic devices branch. Roberts graduated, in 1951, with a BSEE from the University of Ar-

(Continued on page 16)

MORE MELABS

kansas. In 1954, he received his master's degree in mathematics and physics from Northeastern University in Boston. After a few years with the Air Force, in both active and civil-service duty at Cambridge Research Center, he came to Melabs in April of 1959.

Roberts explained the theory of the maser and discussed the energy levels at various temperatures. From this, it became apparent that masers have to operate at extremely low temperatures, between 3 and 5 degrees Kelvin. The first experimental units operated within the field of a 12-in. Varian electromagnet and had a bandwidth of a mere 50 kilocycles and a gain of 25 db. Since then, masers have been vastly improved by using a magnetic field within the refrigeration chamber and the bandwidth is now 50 megacycles at a gain of 25 to 35 db. These masers have been made extremely stable by slow-wave structure rather than cavity structure.

After Roberts' description of functions and construction of masers, an interesting question-and-answer period revealed that there are many manufacturing and production problems encountered. For example, it is not so easy to transfer liquid helium from one container to another because one cannot see the liquid. Melabs has developed a unique method for checking the level of liquid helium by lowering a tube toward the surface of the helium. The upper end of the tube is covered by the thumb of the operator. As the tube approaches the surface of the liquid, a vibration is felt. As the tube enters the helium, the frequency of this vibration doubles. In other words, the human body functions as a frequency detector to determine the level.

During the following plant tour, the progressive aspects of management were acknowledged by one of the participants who commented that the plant gave the impression of being a smaller division of a large, well-organized, and well-planned concern. The equipment in the plant is very modern and the atmosphere is very pleasing.

—OLOF LANDECK

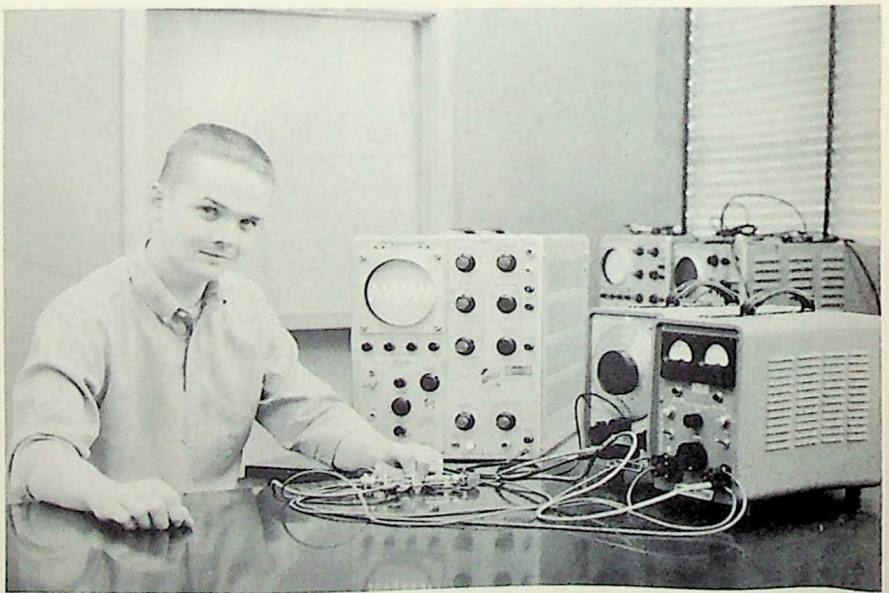
meeting review

SEVENTEENTH GROUP GETS UNDER WAY

The San Francisco Section Professional Group chapter on Radio Frequency Interference held its organization meeting in January. Following installation of officers, there was a discussion of by-laws and operating procedures. Subsequently, the meeting was devoted to planning of activities for the coming year. It was agreed that six meetings per year should be held and tentative plans call for these meetings to occur on the second Tuesday of every other month; details to be worked out prior to the next meeting.

As the first technical presentation, Fred Rowe of the Northern California Electrical Bureau and Richard Lake of Pacific Gas and Electric Company will speak March 14 on the subject of "Interference in Power Systems." See the Calendar for other information.

—R. G. DAVIS



Dave Bell demonstrates the testing of a capacitor-microphone impedance-matching amplifier in the division of engineering at San Jose State College. This will be one of numerous student displays during the open house at the college, March 2, 3, and 4. Hours and other details are listed on page 32

INERTIAL ENGINEERING INGENUITY

Litton's LN-3 Inertial Navigation System for the NATO F-104, now in production, owes its excellent performance to Litton-designed technical features such as:

Integrators with linearity of better than 1 part in 10,000.

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The next generation of inertial systems will require engineers with experience applicable to the improvement of computer performance and the performance of other system units such as miniature inertial platforms. If you have experience in fire control, analog, servo, or gyro systems, you may find unusual satisfaction in applying your talents to the development of fresh concepts in inertial systems.

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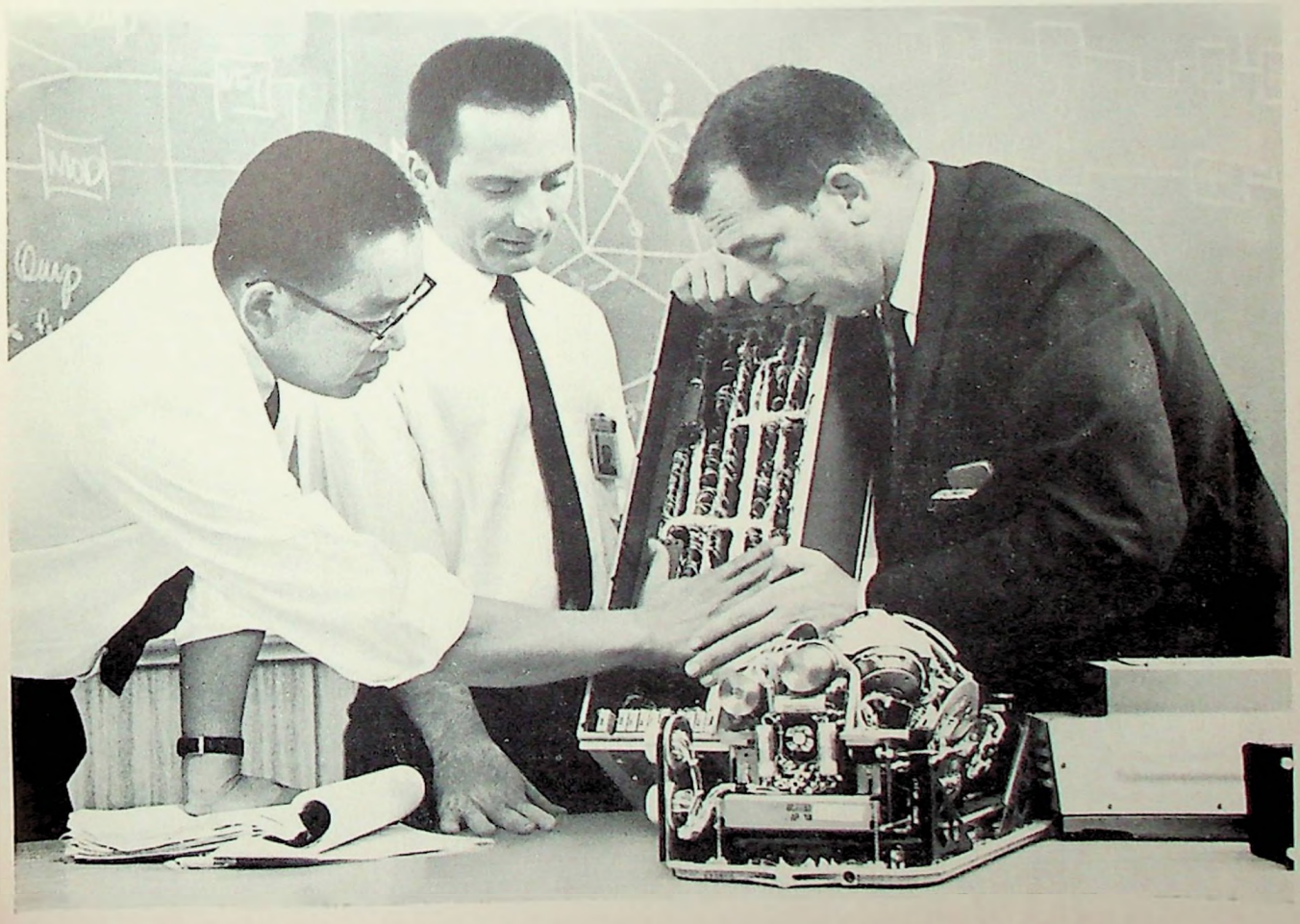
John Tamura and Robert Ebner discuss the optimization of the LN-3 Computer Integrator design with Dr. Harold Bell, assistant director of the Guidance Systems Laboratory



IT IS REPORTED

Porter *Lee*

Hewlett-Packard Company has announced two vice-presidential appointments within the company. **Noel E. Porter,** former vice-president of manufacturing for the Palo Alto electronics firm will occupy the new post of vice-president of operations. **Ralph E. Lee,** formerly chief manufacturing engineer for Hewlett-Packard, will succeed Porter as vice-president of manufacturing for the company.

Porter's new responsibilities will include the coordination of Hewlett-Packard divisions and subsidiaries: Palo Alto Engineering Co. (PAECO); F. L. Moseley Co. of Pasadena, California; Dymec Division; Microwave Division; Precision Components Division; Loveland Division, Loveland, Colorado; as well as unit plants in Palo Alto manufacturing specific types of electronic instruments. Lee's new duties will include responsibility for manufacturing engineering, plant engineering, quality assurance, tool engineering, and various engineering support activities.

Appointment of **James M. Tierney** as district manager of sales in the Northern California area for **Transitron Electronic Sales Corp.,** 535 Middlefield Road, Palo Alto, has been announced. Tierney received his BS degree in electrical engineering at the University of Santa Clara. Prior to joining Transitron he was associated with the I-T-E Circuit Breaker Co. in San Francisco.

C. E. Orchard has been appointed field engineer. Prior to joining Transitron, Orchard was vice president and sales manager for Fortune Electronics of San Francisco.

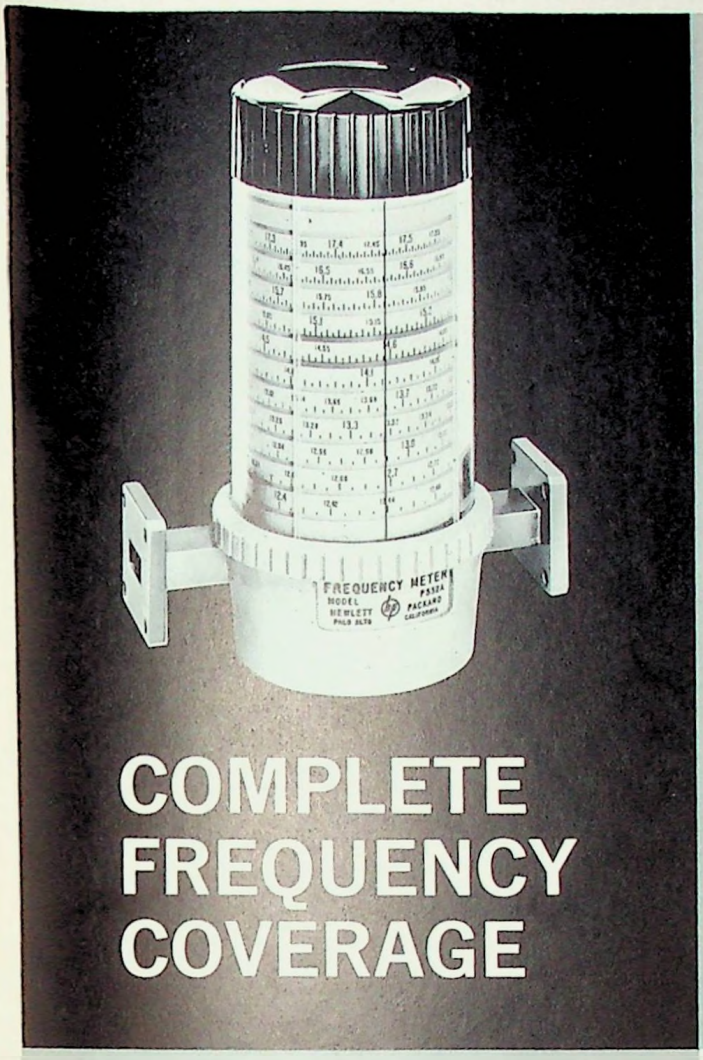
O. Hank Brown has been named manager of the newly formed San Carlos regional sales office of **Eitel-McCullough, Inc.,** San Carlos. Brown will direct sales activities in the northern California and northern Nevada region for Eimac electron tubes. Brown joined Eimac in 1941, as purchasing agent and was later appointed marketing director. Prior to his new appointment, Brown was assistant to the president on corporate relations.

Brown *Peter*

Dr. **Rolf W. Peter** has resigned the position of director at the physical and chemical research laboratory, RCA Laboratories, Princeton, N. J., to become manager of the electron devices division of **Watkins-Johnson Co.** A native of Zurich, Switzerland, Peter had his academic training at the Swiss Federal Institute of Technology. While completing work there for a PhD degree in the field of microwave network synthesis, he was for two years assistant professor of radio engineering and physics.

Dr. **H. Michael Klein** has joined the advanced research staff of **Arthur D.**

(Continued on page 22)



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Frequency is read directly in KMC on the large, precisely calibrated spiral scale. No charts or interpolation are required. Accuracy is high—up to 0.06% including 0 to 100% relative humidity change, 20° C temperature variation and dial accuracy (See Specifications).

Model 532 Frequency Meters comprise a special waveguide section mounting a high Q resonant cavity tuned by a choke plunger. A 1 db or greater dip in output indicates resonance. There are no spurious modes or resonances. Tuning is by a precision lead screw, spring loaded to eliminate backlash. Minimum calibration spacing is 1/32" to provide good resolution.

SPECIFICATIONS

Model No.	Overall Accuracy (%)	Frequency Range KMC	Dial Calib Accuracy (%)	Calibration Increment (MC)	Max. Temp. Coefficient % per ° C	Price
G532A	0.065	3.95 - 5.85	0.033	1	0.0012	$325.00
J532A	0.065	5.30 - 8.20*	0.033	2	0.0012	300.00
H532A	0.075	7.00 - 10.0	0.040	2	0.0015	195.00
X532B	0.080	8.20 - 12.4	0.050	5	0.0010	150.00
M532A	0.085	10.0 - 15.0	0.053	5	0.0012	275.00
P532A	0.100	12.4 - 18.0	0.068	5	0.0012	210.00
K532A	0.110	18.0 - 26.5	0.077	10	0.0013	230.00
R532A	0.120	26.5 - 40.0	0.083	10	0.0017	250.00

K and R band models available with circular flange adapters; specify K532AC and R532AC respectively.

*When used between 5.3 to 7.5 KMC, or 5.7 to 8.2 KMC, single mode resonance is achieved.

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invite you to join their proud company.

MORE SWINGS

Little, Inc., San Francisco. Klein, a former member of the Stanford Research Institute staff, received his bachelor of science degree from Penn State in 1952, and his doctorate from the University of Pennsylvania in 1957.

New president of the **Western Electronic Manufacturers Association (WEMA)** is **Phillip L. Gundy**, senior vice president of Ampex Corp., Redwood City, Calif. Gundy, who also is chairman of the San Francisco council of WEMA, was elected to head the trade association in 1961 by its board of directors at a two-day meeting in Los Angeles.

Newly elected treasurer is **Emmet C. Cameron**, executive vice president of Varian Associates, Palo Alto.

C. R. Dalton Associates, 1037 Laurel St., San Carlos, Calif., will represent **Temptron Inc.** for the Northern California area.

Appointment of **Norbert J. Gamara** to manager of the antenna research and development department at the electronic defense laboratories of **Sylvania Electric Products Inc.,** has been made. Formerly head of the laboratories' antenna section, Gamara has been with Sylvania since 1954 when he joined the company as an engineering specialist. Gamara received the BS degree in electrical engineering in 1941 from Tri-State College. His graduate studies were taken at the Universities of Minnesota, Pennsylvania, and New Mexico.

Gamara

Reiche

Ludwig P. Reiche has been appointed manager of the newly established microwave communications branch of **Melabs,** Palo Alto. Reiche has been active for over ten years in the research and development area of radar, communications, and telemetry systems. Prior to joining Melabs, he was a senior research engineer with Stanford Research Institute.

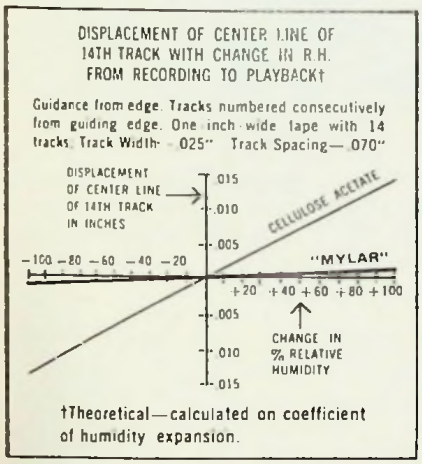
Lenkurt Electric has created a new project group in microwave products development. **Maurice H. Kebby,** formerly commercial products chief engineer, has been named project manager

(Continued on page 24)

Magnetic tapes of "Mylar"® insure reliability of recording and playback

The difficulty of duplicating test conditions means that much of the information on your magnetic tapes could not be replaced at any price. Tapes of "Mylar"* polyester film protect your investment in valuable recorded data. Their small additional cost is negligible compared with the cost of the data they contain. Here's why they provide higher reliability than any other tapes.

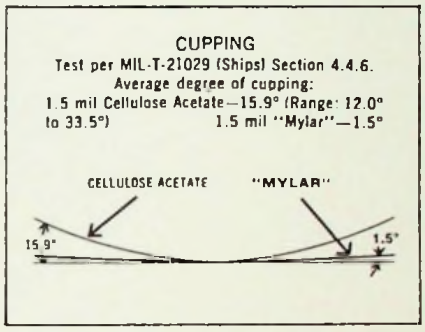
CHART NO. 1



Less track displacement.

Because "Mylar" is virtually unaffected by changes in temperature or humidity, tapes do not shrink or swell to cause shifting of tracks. Chart 1 compares lateral shifting of track due to dimensional change of "Mylar" and cellulose acetate. Tapes of "Mylar" minimize possibility of garbled or weak signals caused by track displacement.

CHART NO. 2



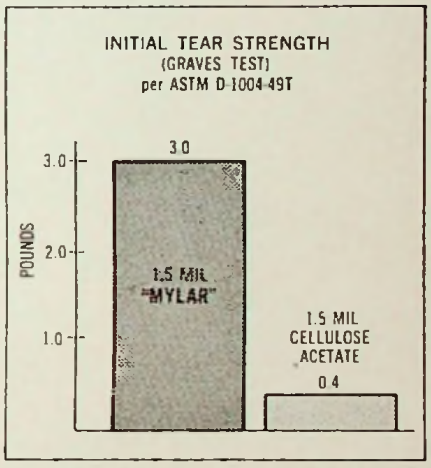
Fewer signal dropouts.

Chart 2 compares "Mylar" with cellulose acetate in cupping due to temperature and humidity change. Insignificant change in "Mylar" minimizes possibility of signal dropout caused by loss of total contact with the recording or playback head.

Less tape breakage.

Since most breaks start as edge nicks, the high initial tear strength of "Mylar" reduces chance of breakage and subsequent failure to record critical information. Chart 3 compares initial tear strength of "Mylar" and acetate. In addition, "Mylar" polyester film has the highest tensile strength of any instrumentation-tape base. And "Mylar" does not lose its toughness with age, repeated playbacks or storage because it has no plasticizer to dry out.

CHART NO. 3



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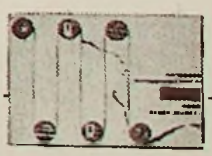

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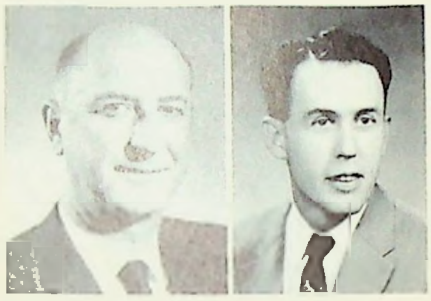
MORE SWINGS

of the new group. He has been succeeded as chief engineer by **L. Bruce Johnson,** who moves up from the position of equipment and components engineering manager. Also assigned to the group as project leaders representing the company's three major functions were **John Coffin,** production engineering manager; **Myron E. Ferguson,** development project engineer; and **Robert F. White,** product manager from the marketing group.

Louis J. DuFresne, formerly general sales manager for Schlage Lock Company, has joined **Varian Associates** in the newly created position of marketing manager for the tube group.

Working directly with Executive Vice President Emmet Cameron, DuFresne will be responsible for coordinating marketing efforts of the tube division at Palo Alto and Varian's subsidiary plants.



DuFresne *Grigsby*

The appointment of Dr. **John L. Grigsby** to the board of directors of **Applied Technology, Inc.,** has been announced. Grigsby will continue in his present position of chief engineer.

Shareholders have approved the merger of **Ampex** and **Telemeter Magnetics, Inc.** The agreement will result in the issuance of approximately 430,172 shares of Ampex to existing Telemeter Magnetics shareholders, in addition to the 7,277,570 shares currently outstanding.

William Seip has joined **Long & Associates** as sales and operations manager. He recently completed 21 years in military service with principal areas of responsibility in radar and electronic equipments.

Nine California firms have been added to the **WEMA** (Western Electronic Manufacturers Association) membership roster—five of these being Northern California organizations: **Chemprint Corporation,** Menlo Park, G. M. Howard, president; **Component Technology Corporation,** Redwood City, Robert S. Paul,

(Continued on page 26)

There are times, not many, in every man's life when he quails. And this holds true for the men strongest and stoutest of heart. Personally, we at Rantec never fire until we see the whites of their eyes, we damn the torpedoes and we have but one life to give for our country. This is all very well and good and we usually don't go about bragging about our unlimited bravery. Actually, what we are doing is rationalizing, since one thing, just one, turns our knees to jelly, our hearts to ice, our warm blood cold. Buy-off day.

The day normally begins gently warm, softly breezed and with the sun at its most friendly. The first call is from a satisfied customer who says he likes our microwave sub-system so much he is going to buy a gross. We thank him profusely and wish him and his lovely wife a good day. The second call is from the Air Force. The Buy-off man is coming. Hail begins to fall, soft breezes turn to gales and the sun vanishes forever. We have spent thirteen weeks (did it have to be that number?) designing and developing, producing and testing this particular inverse frequency modulator. It has been working perfectly now for a week under every conceivable type of environmental and physical torture. But do you think it will work today in the comfort and coziness of its own little living room. You guess. We're afraid to.

On this particular day, we ushered the Buy-off man into the laboratory. We were laughing nervously and we knew it, but who can face a situation such as this. There the modulator was sitting, effulgent in its simplicity, yet we knew it was conjuring up unthinkable evil. We turned on the current. The damn device played the Star Spangled Banner and then did Polka Dot Bikini as an encore. It surprised us only slightly. We were expecting Danse Macabre.

What we at Rantec need is comfort in these trying times. If you are an engineer with insuperable knowledge and experience in ferrite devices, microwave components and antennas, call us quick. Dlamond 7-5446 or Dlamond 7-5446 collect. You can have our job. We're going to be a Buy-off man.

MORE SWINGS

vice president and director of manufacturing; **Shockley Transistor Corporation,** Palo Alto, R. E. Caron, personnel manager; **Systron-Donner Corp.,** Concord, Norman Perlmutter, vice president; and **Ultek Corp.,** Palo Alto, C. A. Piercey, sales manager.

James I. Stultz has just been named sales manager for audio products of **Vega Electronics Corp.,** Cupertino, manufacturers of the Vega-Mike wireless microphone system. This is a new post in which Stultz will report to **C. Arthur Foy,** Vega marketing manager. In electronics since 1930, Stultz has most recently spent nine years with Ampex Corp., in various phases of technical marketing. He studied engineering at Stanford University, and in 1951 graduated from San Jose State College, with the degree of bachelor of arts in commerce. While at San Jose he was elected to Eta Mu Pi, national honorary marketing fraternity.

Stultz

Foncell

The promotion of **Robert Foncell** to production manager has taken place in the Sierra Electronic division of **Philco Corporation**. A native of New York City, Foncell attended Pratt Institute in Brooklyn, as well as the Stewart Technical School in New York City. Prior to joining Sierra in 1952, he was associated with Kay Electric Co., New Jersey, as superintendent from 1947 to 1950.

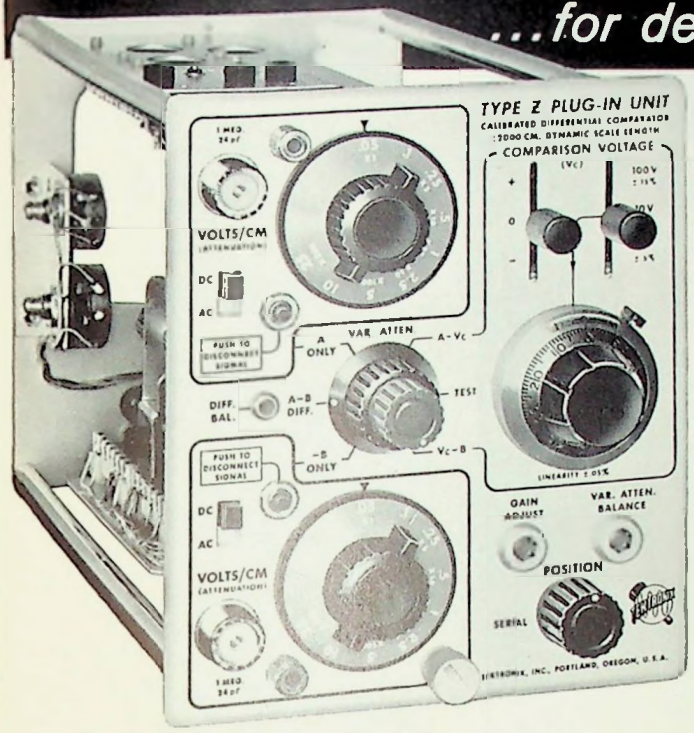
Glenn Livingston has been advanced to the position of section head of quality-assurance inspection at **Fairchild Semiconductor Corporation**. Livingston, who has been a senior quality-assurance engineer since joining the company in January of 1960, replaces **George Cone**. Cone has moved to Fairchild's marketing department as a product manager.

San Francisco architect John S. Bolles has been retained by **Lenkurt Electric Co.** to submit plans for addition of approximately 94,000 sq ft to its manufacturing building at Howard Avenue and Industrial Road in San Carlos. Approximately 82,000 sq ft of the pro-

(Continued on page 28)

500-TIMES MAGNIFICATION—VERTICALLY

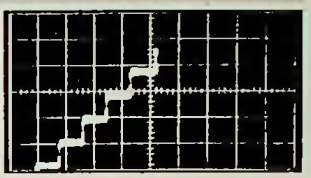
...for detailed waveform analysis



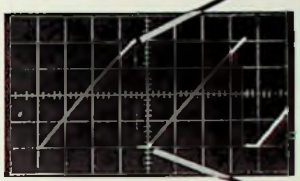
Waveform Details of a 100-v Staircase

Vertical Expansion
500 Times

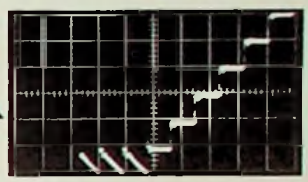
Horizontal Expansion
500 Times



Vertical	Horizontal
50 mv/cm	10 μsec/cm
V_C = +92.5	



Vertical	Horizontal
25 v/cm	5 ms/cm
V_C = 0	



Vertical	Horizontal
50 mv/cm	10 μsec/cm
V_C = −5.5	

TYPICAL APPLICATIONS

FAST-RECOVERY AMPLIFIER—observe small signals riding with large gates.

MODULATION MONITOR—measure amplitude modulation on a digital train pulse.

HIGH-AMPLITUDE HUM REJECTION—reject up to 200 volts peak-to-peak common-mode hum.

SEMICONDUCTOR CHARACTERISTICS—measure Zener diode ac impedance and Zener voltage together, measure transistor output impedance.

PULSE-HEIGHT ANALYSIS—select any pulse above a preset dc level.

COMPONENT MATCHING—check components to easily-interpreted tolerances.

MAIN CHARACTERISTICS

3 Modes of Operation—as a conventional preamplifier, as a differential-input preamplifier, or as a calibrated differential comparator.

50-mv/cm Sensitivity—nine calibrated attenuation steps to 25 v/cm.

Wide Passband—dc to 13 mc with Tektronix fast-rise scopes.

±100-volt Dynamic Range—permits common-mode signals up to 100 volts to be applied to the unit without attenuation.

40,000 to 1 Common-mode Rejection Ratio—allows measurement of differential signals less than 50 millivolts.

Comparison Voltage Accuracy—within 0.25% on the ±1-volt scale; within 0.20% on the ±10-volt scale; within 0.15% on the ±100-volt scale.

Safety Feature—the Type Z eliminates "floating oscilloscope" operation.

AC and DC VTVM—extends oscilloscope accuracy in both ac and dc voltage measurements to 0.2%.

Price, Type Z Plug-in Unit, f.o.b. factory **$525**

New differential plug-in preamplifier rejects up to 100 v of an input signal . . . accepts 100-v waveforms for oscilloscope display at 50-mv/cm sensitivity . . . provides an equivalent vertical scale length of ±2000 centimeters.

You can now display small segments of large waveforms at maximum oscilloscope sensitivity, with vertical expansion equivalent to as much as 500 times. You can select magnified "window" displays of all portions of a waveform, and make amplitude measurements with a degree of accuracy that closely approaches the possibilities of digital techniques. The flexibility and simplicity of the analog (oscilloscope) presentation is retained for accurate analyses of complex waveforms.

The new Type Z Plug-In Unit is a triple-purpose device, acting also as a conventional preamplifier and a differential-input preamplifier. It can be used in all Tektronix Type 530, 540, 550, and *580 Series Oscilloscopes. Ask your Tektronix Field Engineer to demonstrate the dynamic range, waveform resolution, and amplitude accuracy of the Type Z in your application.

**with Type 81 Adapter.*

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TEKTRONIX ENGINEERING REPRESENTATIVES: Hawthorne Electronics, Portland, Oregon • Seattle, Washington. Tektronix is represented in twenty overseas countries by qualified engineering organizations. In Europe please write Tektronix Inc., Victoria Ave., St. Sampsons, Guernsey C.I., for the address of the Tektronix Representative in your country.

posed new building will be designed for development engineering offices and laboratories. Most of the remaining 12,000 sq ft will house a new company cafeteria.

Current construction costs would indicate that the project under study would cost approximately $1.25 million.

International Business Machines Corp. has announced transfer of the process-control systems program from Peekskill, N.Y., to San Jose. Dr. **C. C. Hurd,** who has headed the program, continues as systems manager in San Jose.

Also, **F. S. Wiedmer** has been promoted to the position of senior engineer in the advanced system development division laboratory. He joined IBM in 1956 at the Zurich, Switzerland, research laboratory. Until he was transferred to San Jose in 1958, Wiedmer was in charge of circuit design and electronic automatic typist studies, and of systems and circuit design and evaluation.

Lewis and Kaufman Electronics Corp., Los Gatos, through a direct cash transaction, has acquired **Cascade Research,** which was a division of **Monogram Precision Industries, Inc.**

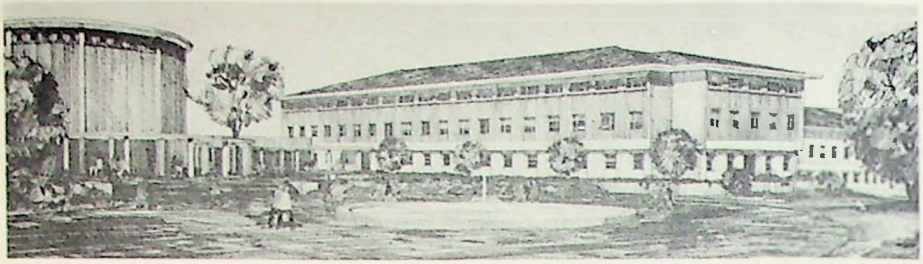
Cascade Research becomes the microwave components division of Lewis and Kaufman, and will remain in its present location in Los Angeles. **Jerome S. Jaffe,** co-founder of the original Cascade Research Corporation, continues as division manager. **Herman Chait,** formerly with the Naval Research Laboratory, remains as chief scientist. **Clay Agadoni,** formerly assistant chief engineer, will become production manager.

Lew Britton of Ampex has transferred to **Lockheed Aircraft Corporation,** where he is currently engaged on the Polaris reliability program.

Final details for the first traveling exhibit ever held by the instrument division of the Northern California Chapter of the **Electronic Representatives Association** have been completed. The five-day itinerary will include: Monday, February 27 in Oakland-Berkeley; the 28th in Sacramento; March 1 and 2, Palo Alto; Friday, March 3, in San Mateo. Facilities to be utilized are the Claremont Hotel in Berkeley, the Sacramento Inn in Sacramento, the Elks Club in Palo Alto, and the Villa Hotel in San Mateo.

Companies participating, representing more than 50 manufacturers, are the following: **Ault Associates** of Menlo Park, **Cerruti and Associates** of Redwood City, **C. W. Mauldin Company** of Palo Alto, **R. L. Pflieger Company** of

(Continued on page 30)



Architect's conception of new Stanford Russell H. Varian laboratory of physics

San Carlos, **Jay Stone and Associates** of Sunnyvale, and **White and Company** of Palo Alto.

Soon to rise on the **Stanford** campus is the two-and-a-half-million-dollar **Russell H. Varian** laboratory of physics. The new building will contain over 60 offices and more than 50 individual laboratories—six of these will be large teaching labs. The building will be connected to the present Physics Lecture Hall by an arcade.

John E. Yocom, director of technical services and No. 2 man in the Bay Area Air Pollution Control District, has resigned to accept a position as senior staff member with **Arthur D. Little, Inc.**

The appointment of **Wayne H. Robinson** as applications engineer for **Watkins-Johnson Co.** has been announced. Robinson came from Eitel-McCullough, Inc., San Carlos, where he was a tube engineer and responsible for marketing microwave tube products for four years. Earlier he was with Sun Electric Co., Chicago, specializing in automotive electronics.

Dr. **Victor Twersky,** head of research at the electronic defense laboratories of **Sylvania Electric Products Inc.,** has been promoted to senior scientist, it has been announced. Twersky is the first person on the west coast and one of three in the nation to achieve this posi-

Robinson *Twersky*

tion within GT&E. The appointment was made in recognition of Twersky's outstanding scientific contributions.

Twersky is internationally known for his work in the fields of electromagnetic wave scattering and propagation. He joined Sylvania in 1953 as EDL's first engineering specialist; since then he has been senior engineering specialist and laboratory consultant. He will continue as head of research at the electronic defense laboratories.

Dr. **George Caryotakis** has been appointed manager of the newly formed high-power laboratory of **Eitel-McCullough, Inc.**, in Belmont, California. He will direct Eimac's research and development activities for amplifier klystrons and other high-power microwave tubes.

events of interest

IRE MEETINGS SUMMARY

March 9-10 — **Symposium on Engineering Aspects of Magneto-hydrodynamics.** University of Pennsylvania, Philadelphia, Penna. Norman W. Mather, Project Matterhorn, P. O. Box 451, Princeton, N. J.

March 20-23—**1961 IRE International Convention.** Waldorf-Astoria Hotel and New York Coliseum, New York City. E. K. Gannett, IRE Headquarters, 1 East 79 Street, New York 21, N. Y.

April 4-6—**International Symposium on Electromagnetics & Fluid Dynamics of Gaseous Plasma.** Engineering Society Building Auditorium, 33 West 39 Street, New York City. Jerome Fox, Microwave Research Institute, Brooklyn 1, N. Y.

April 12-13—**Symposium on Information & Decision Processes.** Purdue University, Lafayette, Indiana. Prof. Robert E. Machol, Purdue University, School of Electrical Engineering, Lafayette, Ind.

April 12-13 — **Fifteenth Annual Spring Technical Conference. Electronic Data Processing and Space Technology.** (Cincinnati Section IRE and American Rocket Society) Hotel Alms, Cincinnati, Ohio. C. Farrell Winder, Baldwin Piano Co., Cincinnati 2, Ohio.

April 26-28—**1961 Seventh Region Technical Conference.** Hotel Westward Ho, Phoenix, Arizona. Everett Eberhard, Motorola Military Electronics Division, 8201 East McDowell Road, Scottsdale, Arizona.

NON-IRE LOCAL EVENTS

February 16 — Peninsula Chapter **California Society of Professional Engineers** "Why I Have Chosen Engineering as a Career," by finalists from San Mateo County high schools in the annual competition for three scholarships to be awarded at the annual Bay Area Engineers' Week Banquet in San Francisco. Sequoia High School, Redwood City (Little Theater Building, Room 42, near Brewster and Broadway), 8:00 p.m.

February 20—**Women's Association of the Electronic Industry,** "Bosses' Night," Villa Hotel, San Mateo, California.

February 23—**Engineers' Week** Banquet, with Dr. Donald H. McLaughlin, famous mining engineer and regent of the University of California, as guest speaker. Guests of honor: ten outstanding high school senior science and mathematics students selected by a committee of prominent Bay Area engineers and educators. Sheraton-Palace Hotel.

February 23 — Santa Clara Valley Subsection joint meeting with Santa Clara Valley Engineers Council, **American Institute of Electrical Engineers:** Engineers Week Banquet; talk by Dr. Wernher von Braun, director, National Aeronautics and Space Administration, at the George C. Marshall Space Flight Center, Huntsville, Alabama; question period moderated by Dr. Earl Herald of television's "Science in Action" programs. 7:00 P.M., Santa Clara County Fair Grounds on Tulley Road, San Jose, California. Reservations required.

March 2-4—**San Jose State College** Annual Engineering Open House with displays using principles of magnetic fields, eddy currents, and infrared detectors included among numerous student exhibits. Engineering Department: Thursday, March 2, 6:00 to 10:00 p.m.; Friday, March 3, 10:00 a.m. to 10:00 p.m.; Saturday, March 4, 10:00 a.m. to 3:00 p.m. (See photo, p. 16.)

March 6—Santa Clara Valley Chapter, **Instrument Society of America:** General subject, "Physiological Measurements Under Acceleration." "The Physiological Problems of 'G' Stress" by Dr. Terence A. Rogers, Physiology Dept.,

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MORE EVENTS

Stanford University; and "Instrumentation for Physiological Measurement on a Human Centrifuge" by George R. Holden, NASA Ames Research Center. Rudolfo's, 4020 El Camino Real, Palo Alto, California. Social Hour 6:15 P.M., Dinner 7:00 P.M. (for reservations call Russ Palmer, Consolidated Electrodynamics Corp., Los Altos, WHitecliff 8-8294).

March 20-22—**American Physical Society:** meeting at U. S. Naval Post-graduate School, Monterey, California.

April 13-14—**Society of Technical Writers and Publishers:** Eighth Annual Convention, Mark Hopkins Hotel, San Francisco, California. Headquarters, P.O. Box 3706, Beechwold Station, Columbus 14, Ohio.

IRE PAPER CALLS

April 1—300-word abstracts and 50-word summaries for the 4th Internation Conference on Medical Electronics combined with the 14th Annual Conference on Electrical Techniques in Medicine and Biology (New York City, July 16-21, 1961). Send to: Dr. Herman P. Schwan, Program Chairman, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia 4, Pennsylvania.

May 1—100- to 200-word abstracts and 500- to 1000-word detailed summaries of papers for 1961 Western Electronic Show and Convention (San Francisco, August 22-25, 1961). Send to: E. W. Herold, c/o WESCON's Northern California Office, 701 Welch Road, Palo Alto, California.

letter to the editor

GRID RETURN

Palo Alto, California

Editor, The Grid
Dear Frank:

The otherwise excellent **Grid** coverage of the presentation to the Professional Group on Communications Systems of ionosphere sounder techniques ("Stepping Through the Ionosphere," p. 12, January, 1961), contains an error. Dr. Raymond Egan, co-author with Leonard Seader, is a staff member of the Radio Sciences Laboratory at Stanford University, where he has been engaged for some time in ionosphere research employing sounder techniques. He serves as a consultant to Granger Associates.

Mr. Seader's affiliation is correctly listed as Granger Associates, where he is supervisor of special systems development.

Best regards.
J. V. N. Granger

Not watching our stepping, obviously—Ed.

the section

MEMBERSHIP STATUS

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

Henry T. Abstein, Jr.
Robert A. Anderson
Giorgio Borgiotti
I. H. Buckminster
C. C. Buttschardt, Jr.
Steven S. Cerwin
William F. Chambers
Lowell E. Clark
Francis L. Cobb
James W. Dorsett, Jr.
Maxwell C. Gilliland
James W. Gillis
Charles E. Goodell
Richard A. Hackborn
Stephen E. Harris
Arthur H. Hausman
George A. Hirota
Eugene E. Jones
J. Edward Kelch
Kenneth O. Kelly
Otto Kornei
Peter Lazarus
Andis Lepnis
James M. McEnroe
Bruce T. McKeever
Don K. Miller
Arthur R. Moss
Robert D. Moyer
George F. Moynahan, Jr.
Donald R. Noel
James R. Pepper
Norman J. Peterson
James S. Picken
Gerold E. Pokorny
James W. Quottleboum
John C. Reinhardt
William C. Ridgway
Seymour N. Rubin
Paul W. Sokoloff
Roderic E. Steele
Terence J. R. Tracy
Harry A. Turner
William J. Utterback
Hugh A. Voris, Jr.
Kent R. Willson
Dennis L. Wilson
Merrill D. Wittman
Aaron Wolgin
Ben E. Youngberg

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

David R. Christensen
Gerold L. Cobb
Frederick W. Egli
John F. Fishek
Mahlon B. Fisher
Robert M. Madvig
Norman R. Overacker
John W. Strohbehn
George C. Stump, Jr.
George D. Vedelin
Peter W. Wallace

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

SENIOR MEMBER

Eugene W. Kinamon

MEMBER

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Charles J. See
James Sutherland
Miroslav Swyryd
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American Optical Co., Instrument Div.	J. T. Hill Co.
Analab Instrument Corp.	V. T. Rupp Co.
Antenna Systems	T. Louis Snitzer Co.
Antlab, Inc.	Jay Stone & Assoc.
Baldwin-Lima-Hamilton Corp.	Neely Ent.
Beckman/Berkeley Division	V. T. Rupp Co.
Behlman Engineering Co.	T. Louis Snitzer Co.
Bogart Microwave	Jay Stone & Assoc.
Bomac Laboratories, Inc.	Neely Ent.
Boonton Electronic Products, Inc.	O'Halloran Assoc.
Communications Control Corp.	T. Louis Snitzer Co.
Consolidated Electrodynamics Corp.	Jack Kaufman
Datafilter Corp.	Jay Stone & Assoc.
Daytronic Corp.	McCarthy Associates
Di-Tran Corp.	McCarthy Associates
DuMont Labs, Tubes & Instruments	J. T. Hill Co.
Dynamics Instrumentation Co.	J. T. Hill Co.
Dymec, Div. Hewlett-Packard Co.	Neely Ent.
E-H Research Laboratories, Inc.	V. T. Rupp Co.
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ERA Engineering, Inc.	Premmco, Inc.
John Fluke Mfg. Co.	McCarthy Assoc.
Franklin Electronics, Inc.	T. Louis Snitzer Co.
General Communication	T. Louis Snitzer Co.
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Goodrich, B. F., Sponge Prod. Div.	Jay Stone & Assoc.
Guardian Electric Mfg. Co.	Jack Kaufman
Hamner Electronics	McCarthy Associates
Hewlett-Packard Company	Neely Enterprises
Heli-Coil Corp.	Premmco, Inc.
Huggins Labs., Inc.	O'Halloran Assoc.
Hughes Aircraft Co.	McCarthy Associates
Irvan Engineering Co., Inc.	Jay Stone & Assoc.
Jerrold Electronics	Instruments for Measurements
Kauke and Co., Inc.	Jay Stone & Assoc.
Keithley Instruments	T. Louis Snitzer Co.
Kepco, Inc.	V. T. Rupp Co.
Kin Tel	Neely Enterprises
Laboratory for Electronics	O'Halloran Assoc.
Lawrence Manufacturing Corp.	Premmco, Inc.
Lindsay Structures	Premmco, Inc.
Massa Div., Cohu Electronics	McCarthy Assoc.
Menlo Park Engineering	O'Halloran Assoc.
Microwave Associates	T. Louis Snitzer Co.
Microwave Electronics Corp.	Jay Stone & Assoc.
Millivac Instrument Div., Cohu	McCarthy Assoc.
F. L. Moseley Co.	Neely Enterprises
Narda Microwave Corp.	O'Halloran Assoc.
Norwood Unit-American Standard	J. T. Hill Co.
Optimized Devices	O'Halloran Associates
Pacific Electro Magnetics Co.	T. Louis Snitzer Co.
Peerless Elec. Prod. (Altec Lansing)	Jack Kaufman
Polarad Electronics	T. Louis Snitzer Co.
Radiation at Stanford	O'Halloran Assoc.
Sanborn Company	Neely Enterprises
Scientific-Atlanta, Inc.	J. T. Hill Co.
Sensitive Research Instrument	McCarthy Assoc.
Sierra Electronic Corp.	T. Louis Snitzer Co.
Sorensen & Co., Inc.	McCarthy Assoc.
Sperry Microwave Electronics Co.	J. T. Hill Co.
Statham Development Corp.	O'Halloran Assoc.
Technibilt Corp.	J. T. Hill Co.
Telonic Industries	T. Louis Snitzer Co.
Ultrasonic Corp. of America	Premmco, Inc.
Varian Associates	Neely Enterprises
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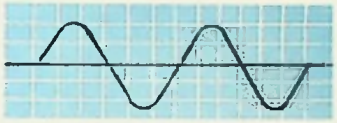

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10 μv sensitivity—excellent resolution for bridge circuit operation. Sensitivity ranges: 10 μv, 100 μv, 1000 μv.

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Zero-center meter gives a "sense" as to above or below null. Frequency range: 50-10,000 cps. Unit can be used as an amplifier.

Available in two models: NI-2, battery operated, portable carrying case—NI-3, a 3½" high rack mounted version, with built in AC power supply. Request Bulletin NI.

companion instrument:

GERTSCH RATIOBRIDGE

—offers high accuracy and high input impedance at 10 kc and up

Combined in the one instrument is a precision ratio transformer and an electrostatically shielded bridge transformer. Either can be used independently. This instrument when teamed with the NI-2 or NI-3, forms a complete AC ratio bridge.

Accuracy of the RatioBridge is as good as .0025%. Input impedance is 300K ohms at 10 kc. Ratios up to 1.1111. Unit provides switching transient suppression, plus in-line switching and readout. *Bulletin RB-105.*

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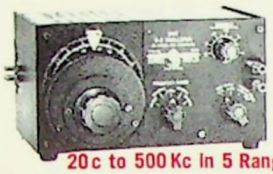
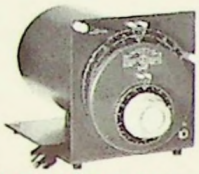


20c to 500 Kc in 5 Ranges

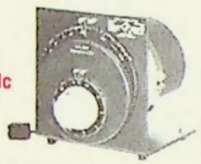
Type 1210-C Unit R-C Oscillator
$180...±3% accuracy — low-Z sine wave (80-mw/7v); high-Z sine wave (40-mw/45v); square wave (0-30 v p-p).



0.5 to 50 Mc in 2 Ranges

Type 1211-B Unit Oscillator...$295
±2% accuracy — 1500 mw (0.5 to 5 Mc), and 500 mw (5-50 Mc) into 50-ohm load.

50 to 250 Mc

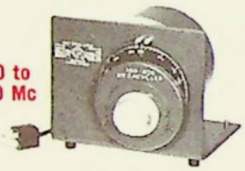


Type 1215-B Unit Oscillator...$210
±1% accuracy — 100-mw minimum output into 50-ohm load; 200 mw over most of range.

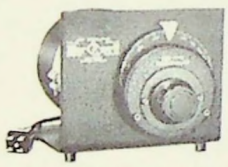
65 to 500 Mc

Type 1208-B Unit Oscillator...$230
±2% accuracy — 200-mw output into 50-ohms; 400 mw over most of range.

180 to 600 Mc



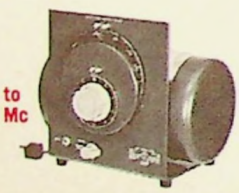
Type 1209-BL Unit Oscillator . . . $260 ±1% accuracy—300-mw output into 50-ohms; 400 mw over most of range.



250 to 920 Mc

Type 1209-B Unit Oscillator...$260
±1% accuracy — 200-mw output into 50-ohms; 300 mw over most of range.

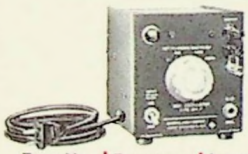
900 to 2000 Mc



Type 1218-A Unit Oscillator...$465
±1% accuracy — 200-mw output into 50-ohms.

2700 to 7425 Mc
Depending on Klystron used

Type 1220-A Unit Klystron Oscillator...$235 (less Klystron) 40-mw output into 50-ohms.



1214 SERIES FIXED-FREQUENCY OSCILLATORS

Type No.	Frequency	Accuracy	Output	Price
1214-A	1000 c 400 c	±2%	200 mw/60 v	$75
1214-D	120 c	±2%	400 mw/60 v	$100
1214-E	1000 c 270 c	±2%	300 mw/28 v	$75
1214-M	1 Mc	±1%	300 mw/7 v	$75

(All 1214 Oscillators have built-in power supplies)

UNIT POWER SUPPLIES
for use with Unit Oscillators

Type 1201-B . . . $85
Regulated Power Supply
300 v dc, regulated to ±0.25%, 70 ma; 6.3 v ac at 4 a, unregulated

Type 1203-B . . . $45
Power Supply
6.3 v ac at 3 amp; 300 v dc at 50 ma.

Write For Complete Information

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WEST CONCORD, MASSACHUSETTS

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