

EDITOR'S PROFILE of this issue

from a historical perspective ...

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

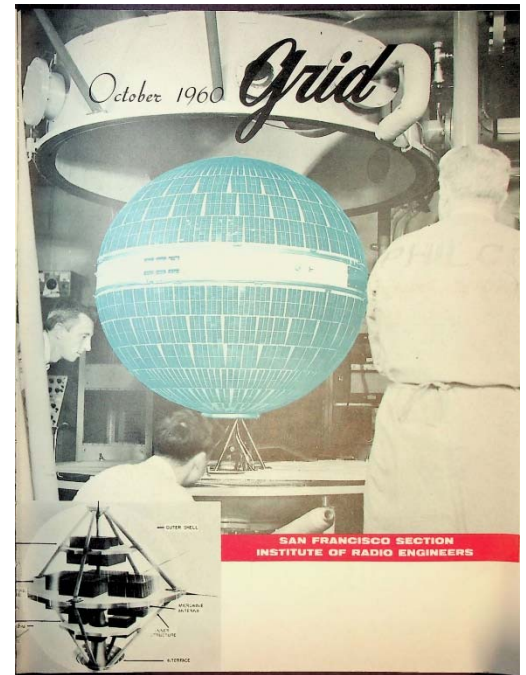
OCTOBER, 1960:

Cover: Courier Satellite 1-B as it undergoes final testing at Philco Western Development Labs. Photo/story on p. 14.

p. 8: Section has panel on "Experiences of Recent Visitors to the Soviet Union", chaired by David Packard, president, HP (photo and article, p. 9). Stanford professor Joshua Lederberg speaks on "Exobiology – experimental Approaches to Life Beyond the Earth". Dean Watkins of Watkins-Johnson speaks on "Low-Noise Traveling Wave Tubes".

p. 12: Gene Amdahl of IBM Research talked on "A New Kind of Program Control Element", using a human-like language as opposed to machine language. C.E. Harthun of Lockheed talked on a reliable high-density welding packaging technique for space applications (photo of Harthun and Charles "Bud" Eldon, future IEEE president, on p. 14; Eldon photo/bio on p. 22). Stanford's George Pake talked on paramagnetic resonance and its application to a maser (the auditorium at PARC is named for him).

p.24: Frederick Terman, provost of Stanford, to be a principal speaker at the National Electronics Conference in Chicago.



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

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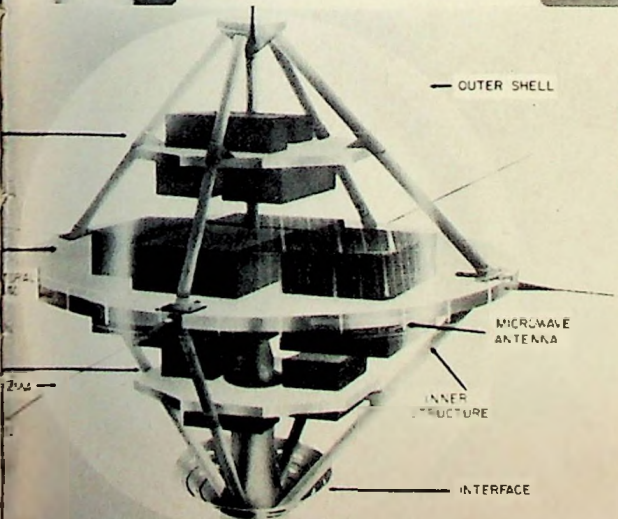
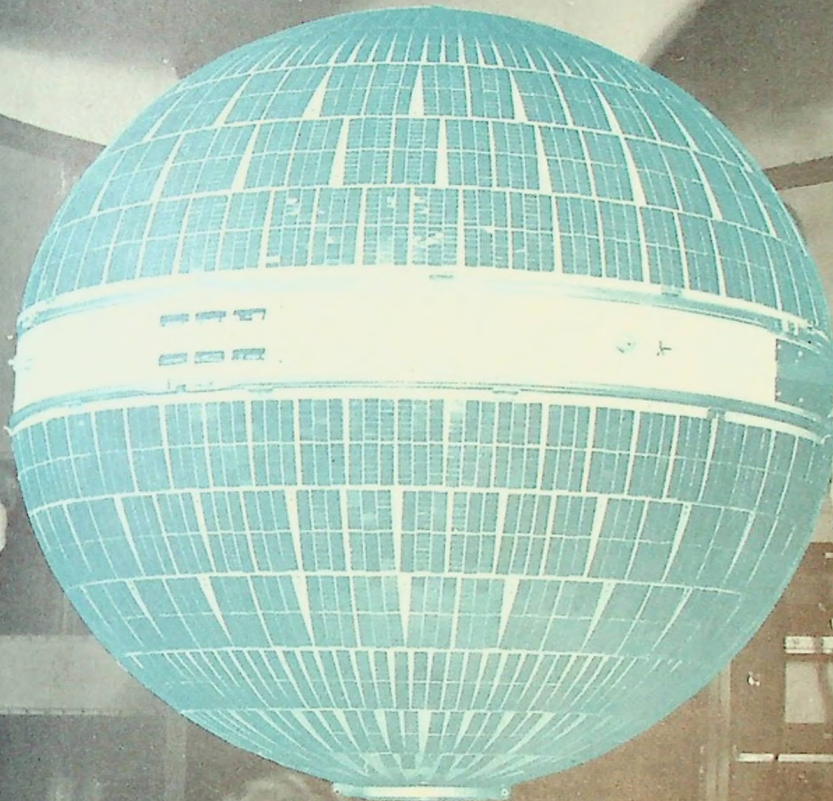
At time of scanning, the bound volumes are held by Paul Wesling.

January, 2021

Contact p.wesling@ieee.org

October 1960

Grid



**SAN FRANCISCO SECTION
INSTITUTE OF RADIO ENGINEERS**

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VA-1299 Stalo Cavity shown with VA-201B Klystron

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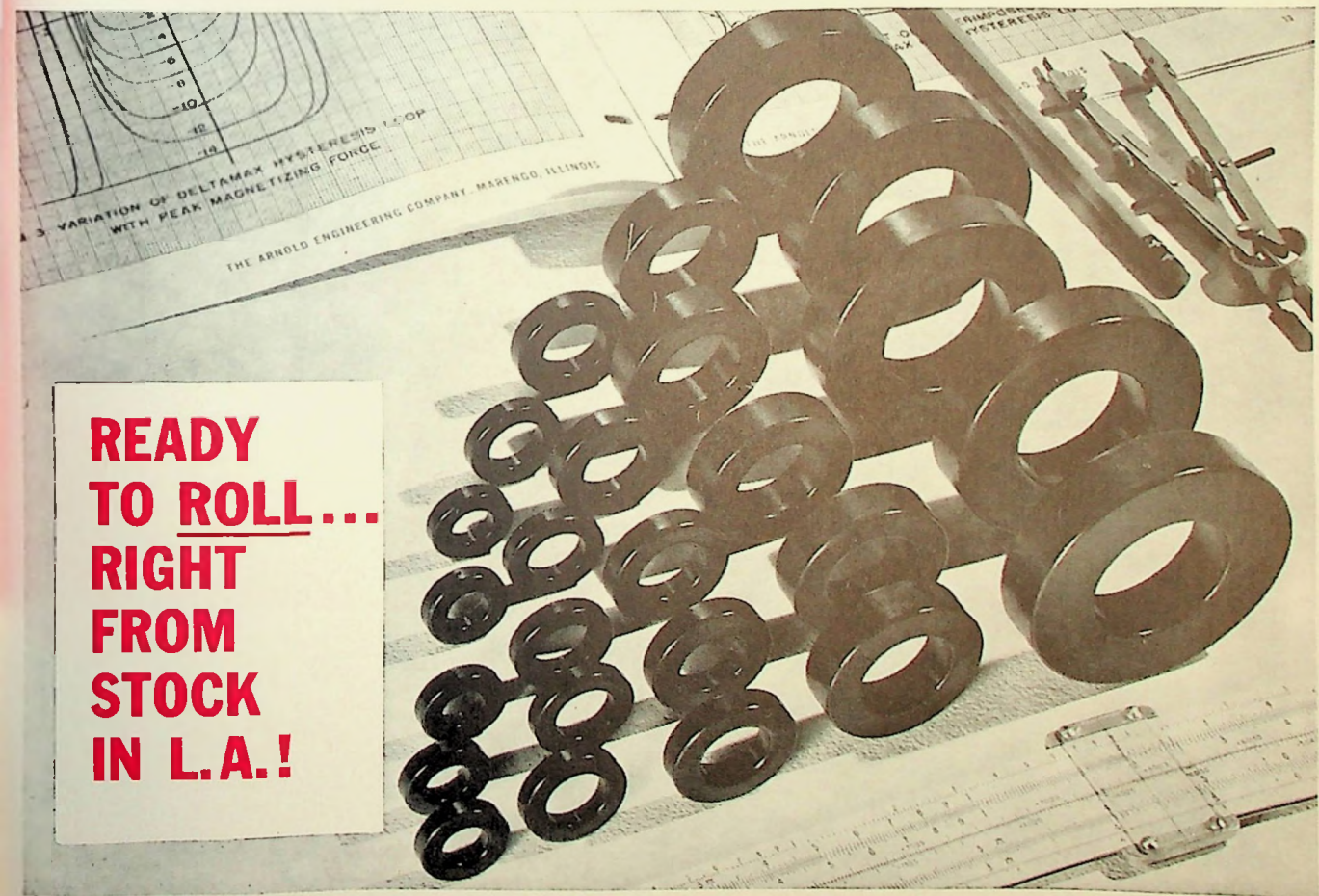
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Grid

October 1960

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cover

Iridescent blue with solar shingles, Courier Satellite 1-B undergoes final checkout procedures at Philco WDL. The 500-lb sphere, which provides the capability for handling 513 newspaper pages full of words per day, was worked on by nearly 200 engineers and technicians in Palo Alto in a crash program starting 12 months ago.

Phantom view on cover shows general disposition of the inner black boxes. Three decks (indicated by black arrows) suspended about the vertical Z axis contain respectively from top, 1) code tape reader, baseband combiner, tlm generator, tlm transmitter, acq transmitter, vhf duplexer, and vhf receiver; 2) batteries, microwave trans-

mitter, power center, microwave duplexers, command decoder, and microwave receivers; 3) command decoder and data-storage units.

Included in the happy group whose product is now orbiting loud and clear are IRE members Barry, Benware, Gullick, Kelley, Moore, Nawrocki, Rosenberg, Simpson, and Wert. See picture, page 14.

It would be reasonable to assume that more details of this project will appear in the program of the joint PGRQC/PGET meeting on October 18 when the principal speaker will be Gerry Moore, Courier program manager.

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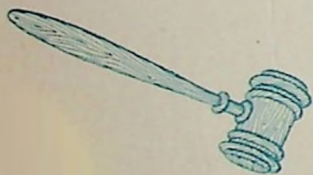
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Stanley F. Kaisel

from
the
chairs



**THE IRE LOOKS
TO COMMUNITY
SERVICE**

During the year now waning the San Francisco Section of the IRE has gone through an administrative reorganization aimed at better serving the needs of its membership. Internal operating changes have been necessitated by the rapid growth of the Section, resulting from the greatly increased level of electronic activity on the Peninsula. Local growth, in turn, is a reflection of the development and maturity of the whole body of our profession. And this new dominance carries with it rather serious responsibilities, even obligations!

Now that we have begun to get our organizational household in better working order, perhaps some thought should be given to other directions that might profit from the Section's capabilities and membership strength. One of the best views is outward, toward the general community in which we work and in which the Section operates as a significant force.

Representing as we do a concentration of talented, capable manpower in one of the nation's most important technologies, it seems we should enlist the total membership to think and act on what remains a challenge to every man in science and engineering—our succession, through the interesting, stimulating, and training of young minds.

Hereabouts the Bay Area, the IRE and other professional and trade organizations have given support and executive talent to graduate-level training on an out-of-hours basis. There is a mechanism within the IRE to provide sponsorship and encouragement to undergraduates through the Student Branch program. The student papers competitions have upgraded individual effort and given direction to individual ambitions. Cooperation with the WESCON Future Engineers Show, through choosing participants and underwriting a portion of the expenses of the students and their teachers, has registered many immediate and abstract satisfactions. Numerous of our Section members have given cheerful and enthusiastic service to "enrichment" programs in local high schools. Many of these things we have done, but are they enough?

Some strong feeling is shared that the IRE can and should make further significant contributions at every educational level it can reach. Observations resulting from detailed contacts with the WESCON Future Engineers Shows and the Bay Area Science Fairs indicate that behind every outstanding student exhibit there is either an inspirational teacher or parent or both. Unfortunately there are just not enough teachers and parents who have the understanding of science and the gifts to transmit the excitement of exploration and accomplishment to the many chil-

dren who could profit from knowing and ebullient guidance.

Undeniably one of our most important resources is the potential represented by the awakening minds of youth. In our own experiences, some long past, we find memorable moments of stimulation when we were "touched" by adult wisdom and skill and moved forward in our development.

It seems likely that there are many students who are not being "touched" in our current explosion of mass education. There are many wandering and wondering, with the potential to make significant contributions to our progress in science and engineering in the future. Seeking a means of "touching," then, is a greater part of the challenge to which IRE can apply telling effort.

There is little contact between students at the junior high and high school levels with professional engineers or representatives of the various technical disciplines. Understandable difficulties exist through patent curriculums and overburdened faculties. It is far easier for the distorted pictures popularly portrayed in the press and on TV to reach and impress these young minds than it is for us to present the true view of the exciting environment in which we work and want them to work one day.

With a better picture of the realities, some of the semantic difficulties of understanding the differences between research, development, product engineering, sales engineering, production and so forth might be resolved in students' minds, so that they can direct their education and ambitions in proper channels. Here is a role for the professional engineer: "touching," in the inspirational sense, through guidance that may give a youngster direction and, ultimately, a rewarding lifetime career.

It seems that we have a problem in "coupling." On the one hand we have a large, technically sophisticated group of engineers who would make a substantial contribution in time and effort, on the other hand we have local school systems which might respond to serious offers of assistance to students with unanswered questions about the true nature of our professional arenas and the probability of their fitting in.

How can these two groups be brought together, effectively?

I would appreciate any suggestions or comments from the membership. Your thoughts can be forwarded to Earl Shelton, chairman of the Section's Education Committee, or to me directly.

Stanley F. Kaisel

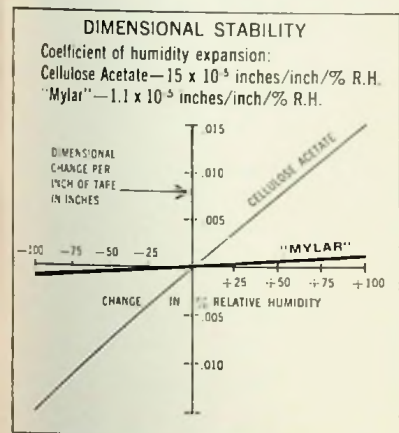
—Stanley F. Kaisel, vice chairman, SFS

October 1960

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

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CHART NO. 1

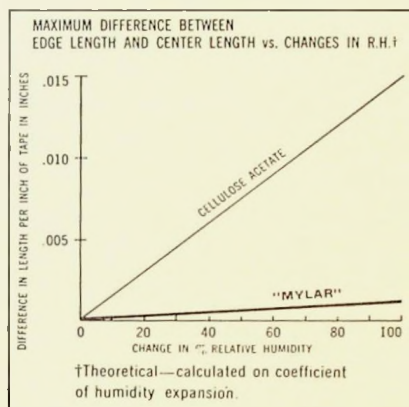


Less signal dropout.

Chart 1 shows that dimensional change in "Mylar" with humidity change is negligible compared to acetate. This exceptional stability prevents tape shrinking, swelling or cupping that could result in shifting of

tracks or loss of contact with the recording or playback head. Possibility of signal dropout or garbled or weak signals are minimized and reliability of recorded data is assured.

CHART NO. 2



Fewer garbled signals.

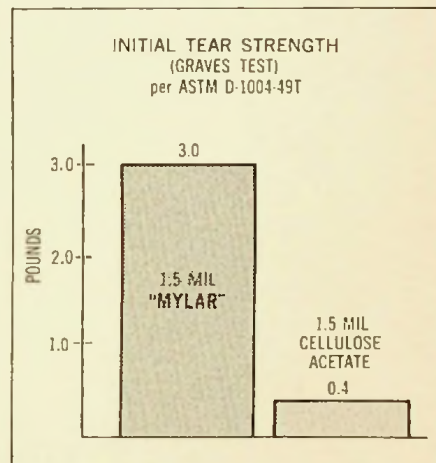
If magnetic tape picks up or loses moisture unequally across the tape width there will be a difference in length between the edges and center. Chart 2 compares this effect for "Mylar" and cellulose acetate tapes. Because "Mylar" is virtually non-hygroscopic there is no dimensional difference between edges and center to cause poor registration of timing across adjacent tracks on the tape.

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" 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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MEETING CALENDAR

SAN FRANCISCO SECTION

8:00 P.M. • Monday, Oct. 24

"Experiences of Recent Visitors to the Soviet Union"—panel discussion
Moderator: David Packard, president, Hewlett-Packard Co.
Panelists: Irmgard Flügge-Lotz, Gerald L. Pearson, and Bernard Widrow, Stanford University; Roy Amara, Stanford Research Institute; and Fred Kurzweil, Jr., IBM, San Jose
Place: Room 100, Physics Lecture Hall, Stanford University

PROFESSIONAL GROUPS

Antennas & Propagation

8:00 P.M. • Wednesday, Nov. 9

"The Trapping of Electrons From a Nuclear Detonation in the Earth's Magnetic Field"

Speaker: Dr. Rolf B. Dyce, assistant head of propagation group, SRI

Place: Stanford University, Physics Lecture Hall, Room 101

Dinner: 6:30 P.M. (Happy Hour 6:00 P.M.), Red Shack, 4085 El Camino Way, Palo Alto

Reservations: Odette Moore, DAvenport 6-6200, Ext. 2414, by Nov. 9

Bio-Medical Electronics

8:00 P.M. • Monday, Oct. 24

"Exobiology—Experimental Approaches to Life Beyond the Earth"

Speaker: Joshua Lederberg, professor of genetics at Stanford Medical School

Place: Room M-112, Medical School Building of 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 Avenue, Palo Alto

Dinner: 6:00 P.M., Red Cottage Restaurant, 1706 El Camino Real, Menlo Park

Reservations: Ken Gardiner, DAvenport 6-6200, Ext. 3106

Electron Devices

8:00 P.M. • Wednesday, Nov. 9

(Joint meeting with PGMTT)

"Getting Close to the Ultimate Noise Limit"

Speaker: A. E. Siegman, associate professor of electrical engineering, Stanford University

Place: Room 100, Physics Lecture Hall, Stanford University

Electron Devices

8:00 P.M. • Wednesday, Nov. 30

(Joint meeting with PGMTT)

"Low-Noise Traveling-Wave Tubes"

Speaker: Dean Watkins, Watkins-Johnson Co.

"Low-Noise Parametric Amplifiers"

Speaker: Glen Wade

Place: To be announced

Electronic Computers

8:00 P.M. • Tuesday, Oct. 25

"Self-Adaptive Systems"

Speaker: Hans J. Bremmerman, assistant professor, math department, University of California

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

Dinner: 6:00 P.M., The Red Shack, 4085 El Camino Way, Palo Alto

Reservations: None required

Engineering Management

Computer Executive-Decision Game

Hosts: Ben Lefkowitz and Dr. Clay Perry, Stanford Research Institute

Place: Stanford Research Institute, Engineering Division, Bldg. 410

Reservations: Mrs. Crist, DAvenport 6-6200, Ext. 2403

Participation limited

MEETING CALENDAR

Engineering Writing & Speech 8:15 P.M. • Tuesday, Oct. 18

"Motion Pictures as Another Tool for the Engineering Writer"

Speaker: Terry Brickley, audio-visual consultant, W. A. Palmer Films, Inc.
"How the 'Writer-Producer' Can Take Advantage of Professional Motion Picture Technical Services"

Speaker: Bill Palmer, president, W. A. Palmer Films, Inc.

Place: W. A. Palmer Films, Inc., 611 Howard Street, San Francisco

Dinner: 6:00 P.M., Red Shack, 4085 El Camino Way, Palo Alto

Reservations: Bonnie Williams, DAvenport 6-7000, Ext. 870

Engineering Writing & Speech 8:00 P.M. • Tuesday, Nov. 15

"Patent Disclosures and Claims"

Speaker: John F. Lawler, patent attorney, Sylvania Mountain View

Place: To be announced

Instrumentation 8:00 P.M. • Tuesday, Nov. 1

"Missile Range Instrumentation"

Speaker: Alan Smolen, laboratory director, ITT Lab, Nutley, New Jersey

Place: Room 320, Geology Building, Stanford University

Microwave Theory & Techniques 8:00 P.M. • Wednesday, Nov. 9

(Joint meeting with PGED, see above)

Microwave Theory & Techniques 8:00 P.M. • Wednesday, Nov. 30

(Joint meeting with PGED, see above)

Product Engineering & Production 8:00 P.M. • Tuesday, Oct. 25

Plant tour and technical presentation

"Theory and Practice of Impurity Concentration and Control in Silicon Monocrystals"

Speaker: Horst Kramer, chief of materials preparation, Knaptic Electrophysics

Place: Knaptic Electrophysics, Inc., 940 Industrial Ave., Palo Alto

Reliability & Quality Control 7:45 P.M. • Tuesday, Oct. 18

(Joint meeting with PGSET)

"Reliable Communications via Satellite"

Speaker: G. O. Moore, program manager, Courier communications satellite, Philco WDL, Palo Alto

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

Space Electronics & Telemetry 7:45 P.M. • Tuesday, Oct. 18

(Joint meeting with PRGQC, see above)

CHRONOLOGICAL RECAP

October 18—Engineering Writing & Speech, Reliability & Quality Control/Space Electronics & Telemetry

October 24—San Francisco Section, Bio-Medical Electronics

October 25—Electronic Computers, Product Engineering & Production

November 1—Instrumentation

November 9—Antennas & Propagation, Electron Devices/Microwave Theory & Techniques

November 15—Engineering Writing & Speech

November 17—Engineering Management

November 30—Electron Devices/Microwave Theory & Techniques



David Packard

meeting ahead

RUSSIAN ROUNDTABLE

October features a San Francisco Section meeting. Detailed in the Calendar, it consists of a group of five recent voyagers to Russia telling about their experiences in that country. Their remarks will be moderated by David Packard whose own experiences on a recent trip there constituted an illuminating highlight of WESCON just past, when he appeared as principal speaker at the WEMA Luncheon.

meeting ahead

WHO'S THAT OUT THERE?

When PGBME, the recently-re-named Professional Group on Bio-Medical Electronics, meets October 24, it will consider Exobiology — Experimental Approaches to Life Beyond the Earth. See the Calendar on page 8 for detailed information.

The speaker, Dr. Joshua Lederberg, is professor of genetics at Stanford Medical School. A 1958 Nobel Laureate in medicine, Lederberg was educated in New York City schools, received a BA from Columbia College, studied medicine at Columbia University, and received his PhD from Yale.

He has been a research assistant at Columbia University, a research fellow at Yale, professor of genetics and chairman of the department of medical genetics at the University of Wisconsin, and professor of genetics and biology at Stanford since 1959. In 1950 he was visiting professor of bacteriology at the University of California, Berkeley; and in 1957 a Fulbright visiting professor of bacteriology at Melbourne University, Australia.

His special field of genetics is the chemistry and evolution of unicellular organisms, and his Nobel prize was received for studies on the organization of genetic material in bacteria.

Lederberg's organization memberships include Phi Beta Kappa, Sigma Xi,

(Continued on page 10)



G. O. Moore

MORE EXO BIOLOGY

American Geophysical Union, and the National Academy of Sciences where he is chairman of the subcommittee on exobiology of the space-science board.

In his presentation, the possibilities of unmanned instruments serving to detect the presence of life on bodies beyond the earth will be considered in general.

In addition to problems of defining what constitutes living matter, the talk will present aspects of making the required cytochemical analyses in remote places and telemetering the information back to earth.

meeting ahead

BOUNCE BETTERMENT

Reliable communications by way of satellites will be considered when PGRQC gathers for the October meeting listed in the Calendar—a joint session with PGSET. G. O. Moore of Philco will present the illustrated discussion covering real-time and delayed read-out communications. Refreshments are scheduled.

Moore is manager of the satellite programs department of Philco Corporation's western development laboratories in Palo Alto. He has been program manager for the Courier Communications Satellite, a joint Army and ARPA Project. In this capacity, he has been system and equipment coordinator between the customer and the various equipment design laboratories.

Moore received a BS in electrical engineering from Purdue University in

1936 and has taken various short courses in electronics and space technology. He previously served as equipment development coordinator for a classified space-instrumentation project for the U.S. Air Force and as technical consultant for Philco International Corporation, in charge of radio and television production at all Philco overseas facilities. He also was manager of the Philco electronics division subsidiary in Mexico. He has 20 years experience in design and development of consumer radio and television for Philco Corp.

He is a senior member of the IRE and an active member of PGSET, PGMIL, and PGEM.

meeting ahead

ON THE MISSILE RANGE

For its November meeting, on the first day of the month, the San Francisco Chapter of PGI will bring together a color film, slides, and an unclassified technical presentation covering such topics as missile and drone tracking systems, drone guidance, telemetry, data handling, radar synchronization, beacon encoders, and support systems and instrumentation. For details, see the Meeting Calendar, page 9.

meeting ahead

GAME NIGHT

An unusual kind of meeting can be expected from the Professional Group on Engineering Management in November. As detailed in the Calendar, hosts Lefkowitz and Perry of Stanford Research Institute will organize those present into teams to play the Computer Executive-Decision Game on a UCLA Model 3 Computer.

Because of the special organizing required for this meeting, reservations must be made.

meeting ahead

CLOSING IN ON NOISE

In the current series of joint meetings between PGED and PGMTT, the gathering on November 9 will hear Professor A. E. Siegman addressing himself to the topic, "Getting Close to the Ultimate Noise Limit." Additional facts about the meeting are in the Calendar.

Professor Siegman is widely known for research and publications on masers, noise problems, and electron devices. He will discuss what many workers in the field believe to be an absolute lower limit to the noise figure of a coherent amplifier, set by spontaneous emission, for zero-point energy, or the uncertainty principle, depending on your point of view. The limit is of more than academic interest: practical maser amplifiers presently come very

close to this limiting noise figure. The same noise limit also applies, although in a different fashion, even to "noiseless" amplifiers, such as quantum counters or photon detectors.

Professor Siegman has reviewed some of these topics during the preparation of a manuscript on "Solid-State Masers" for McGraw-Hill. He will summarize the ideas on ultimate noise-figure limitations and discuss practical maser noise figures which come close to the theoretical limit.

The concluding talk of the low-noise series, on November 30, will feature Dr. Dean Watkins and Dr. Glen Wade. Dean Watkins will discuss low-noise traveling-wave tubes and Glen Wade will cover low-noise parametric amplifiers.

meeting review

IMPERFECTIONS & EMISSION

The Professional Group on Electron Devices held its first meeting of the season on September 8 in the Stanford physics lecture hall. Joseph F. Hull, PGED chairman, introduced the newly elected officers of the Group.

The meeting was attended by 112 members who were rewarded with a very interesting talk on "New Ideas on Thermionic Emission" by Professor Edward H. Coomes of the University of Notre Dame. Coomes described work being done by him and his students in investigating basic mechanisms of thermionic emission. He presented ideas (to be distinguished from theories) based on possible interpretation of his results which challenge the monolayer theories.

Starting with pure single-crystal tungsten points, emission patterns and work functions were determined using a field electron microscope. Tungsten alone is found to vary in emission over its surface, with the greatest emission coming from the junctions of the crystal faces, that is, at surface imperfections. Tests were then conducted with high-activity materials such as strontium oxide evaporated onto the tungsten tip. The field electron microscope was used to observe the resultant patterns.

While specific patterns were dependent on temperature and amount of material deposited, it was generally observed that diffusion and migration of the active substance occurred along the crystal-plane edges or imperfections. Furthermore, the deposited material will not cover the plane surfaces but forms unstable clusters ("like water on a hot griddle") on the crystal faces.

This behavior might be explained by the absence of exchange electrons on the crystal surface suitable for forming a bond. When sufficient material is deposited to give work functions corresponding to those of the monolayer

(Continued on page 12)



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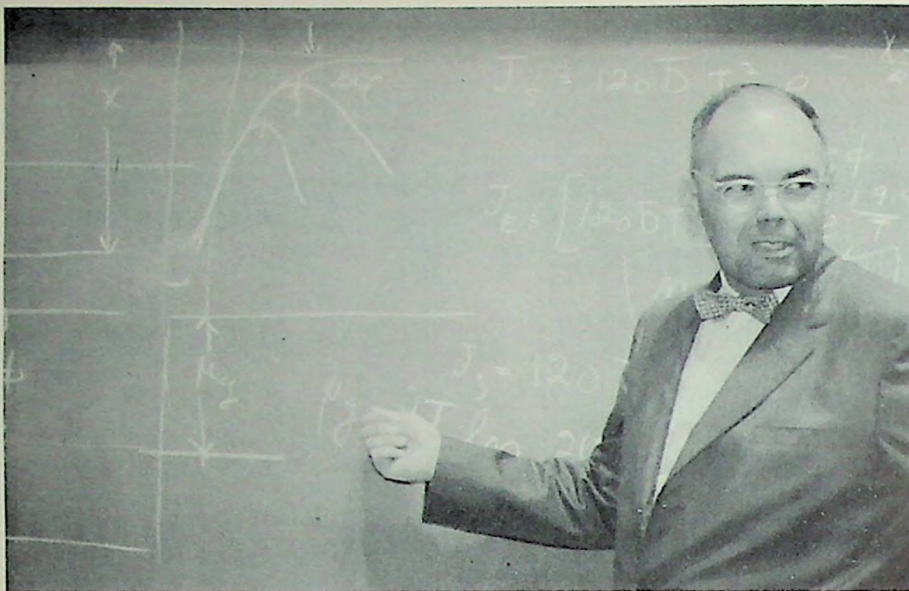
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Professor Coomes illustrates a point on thermionic emission during the September PGED meeting

MORE IMPERFECTIONS

theory an emission pattern is obtained which does not correspond to that of tungsten. There appears to be a greater number of crystal planes giving rise to more boundary imperfections capable of concentrated emission.

The question is whether this emission arises from a monolayer. If it does not, then the deposited material must build on the tungsten substructure. It is possible to match the face-centered strontium-oxide lattice to the body-centered tungsten crystal. The resulting structure has an increased number of imperfections. Highest emission is known to be obtained from mixtures such as barium and strontium oxides.

These ideas afford an explanation here too, since a mixed crystal system of the two oxides would be expected to have a still higher number of surface imperfections and consequently lower work functions. Coomes pointed out that if emission does occur in a manner corresponding to these ideas then a new area is opened for the discovery of emission surfaces.

—Richard P. Borghi

meeting review

INSTRUMENTING THE FUTURE

The San Francisco Chapter of PGI held its September meeting in the Little Theatre at Stanford. The speaker was Harvey Lance, chief of the Boulder, Colorado, NBS electronic calibration center. Lance prefaced his main talk with some remarks on the general direction of PGI.

PGI has 28 chapters which presented 106 papers on different subjects last year. These were generally divided into two groups: (A) included subjects on nuclear science to microwave theory and development of new methods of

precise measurement, and (B) included general circuit theory and general instrumentation. Lance went on to say that a subcommittee has been appointed to make recommendations concerning the future scope and functions of the Group.

The subject of Lance's main talk was: "Whither Instrumentation." As he pictures the situation, we are challenged by the Soviets to an economic war. In order to win this war, we must show the uncommitted countries a better way of life than the Soviets do in order to swing them to our side. Instrumentation may well be the deciding factor.

Lance spent 14 weeks last year touring Europe to find out how we compare with others. He gave the following observations: Instrumentation for the d-c and low-frequency areas is adequate and well supplied. Instrumentation from there through the i-f frequencies needs to move from the laboratories into production. Instrumentation and methods need study and action from the i-f frequencies through the top microwave frequencies. Required accuracy has increased one order per decade and is increasing at a more rapid rate now.

NBS is increasing liaison with both the armed forces and industry to determine requirements and increase accuracy. In this connection, Lance would like to see an association of standards laboratories.

Lance made these further observations: To keep our feet on the ground, it is necessary to distinguish between accuracy claims that are sales ballyhoo and those that are really required. The problem is acute and requires continuing loyalty to the code of engineering ethics which refuses to consider anything except what is fact. Reliability is

of paramount importance. He suggested use of the solid-state physics concept wherever possible and said that the Soviets lead us in this field.

—Leslie Burlingame

meeting review

CAN YOU READ ME?

The September meeting of the Professional Group on Electronic Computers was held in the LMSD Auditorium at Palo Alto. Dr. G. M. Amdahl, member of the IBM research staff at San Jose, spoke on "A New Kind of Program Control Element."

Amdahl received his PhD in 1952 and has been employed at IBM, Aeronautics, and Ramo-Wooldridge. He has presently returned to IBM working in special research.

The talk was on a concept for a machine that could evaluate formulas by manipulating in sequence the symbols and operators appearing in the formula. The formula would be written in language that is very near that of a human as opposed to a machine language.

This concept is somewhat related to use of compilers that translate human language to machine language. The difference with Amdahl's machine is that his machine is organized to accept a language closer to the human language and solve the formula directly.

The question-and-answer session following the talk was stimulated by the presence of H. D. Huskey of the University of California, Berkeley; and Mort Astrahan of IBM, San Jose; who are also well versed in this field.

—J. A. Boysen

meeting review

THE SQUEEZE GOES ON

If you had the requirement of getting 100,000 standard proved electronic components into a space of 1 cu ft to produce a non-resonant reliable package, would it surprise you to learn that this is not only possible but requires no particular skill? That was the word from C. E. Harthun, staff assistant in the electronic manufacturing division of Lockheed MSD and chairman of a welded-electronics packaging committee in that organization, who spoke on the subject before the September meeting of PGPEP.

Harthun, who was previously in the reliability section of satellite systems at LMSD, is a graduate of the University of Washington. His BS degree is in mechanical engineering. He spent 11 years at Boeing Airplane Co., including electronic test-equipment design and manufacturing engineering on Bomarc, and two years at Sandia.

(Continued on page 14)

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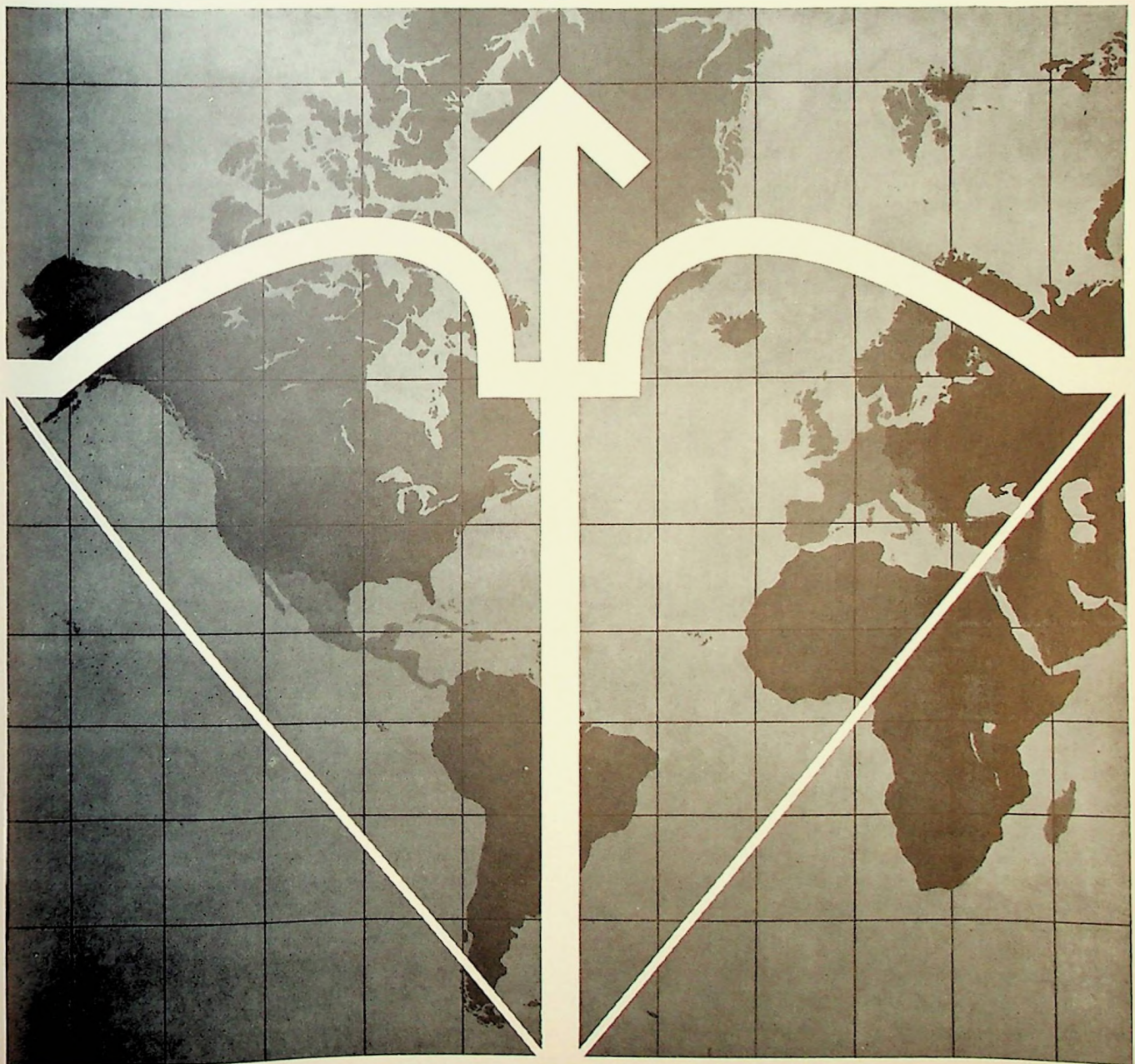
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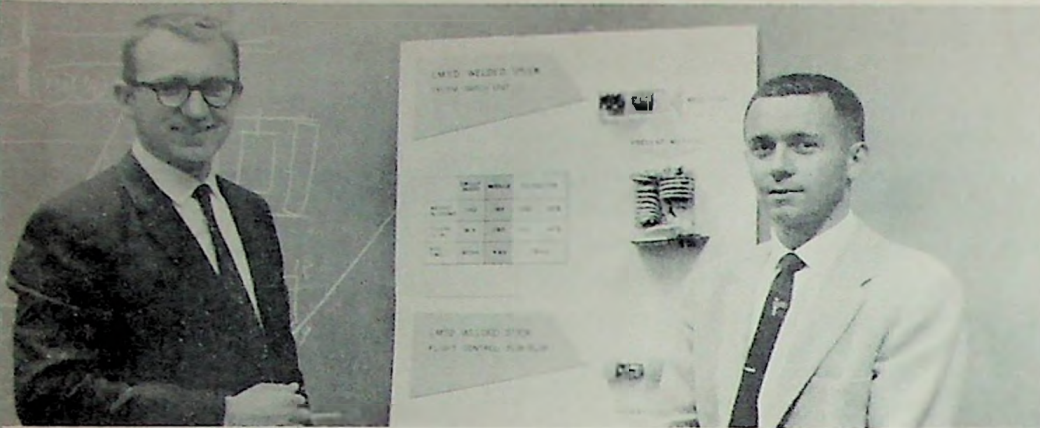
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Speaker Harthun and PGPEP Chairman Eldon with a display of electronic weldments during the September meeting

MORE SQUEEZE

The meeting, which was held in the Sunnyvale plant cafeteria of Lockheed, was attended by about 50. Chairman Eldon opened the meeting by making a pitch for membership and outlining the coming year's program.

Harthun pointed out that an engineer who designs a certain package expecting it to function in a specific way cannot necessarily expect it to come off the production line exactly like the prototype. It may furthermore completely fail to function in its final usage due to some such minor failure as a faulty connection.

One answer to the problem seems to be the use of welded rather than soldered connections, and Harthun compared failure rates for soldered connections, printed circuits, and welded connections.

A Lockheed film, included in the program, showed the actual manufacture of high-density electronic packages. Some of the figures quoted showed volume reduction of 62 per cent and weight reduction of 29 per cent by the way of welded rather than soldered electronics. The weld pack (or weld stick) is plastic encapsulated and color

coded. Manufacture of these packages reminds one very much of watchmaking, where all three dimensions are fully utilized in order to save space.

Harthun's presentation was primarily a report on a survey of welded electronics. Work is continuing on technical production problems and it is expected that in the next three months practical solutions will have been found. Progress to date promises a revolution in electronic production and a follow-up report is planned for a later PGPEP meeting.

After the formal talk, a question-and-answer period ensued. The meeting was concluded with serving of refreshments.

—Olof Landeck

meeting review

PARAMAGNETIC RESONANCE

George E. Pake of Stanford University addressed a joint meeting of the PGMIT and PGED on September 21 in the physics lecture hall at Stanford. His subject was paramagnetic resonance, a field in which he has done extensive research. He first reviewed the basic physical theory of this phenomenon and then discussed recent applica-

tions of it in chemical analysis and other fields.

Paramagnetic resonance arises from the fact that an electron possesses both a magnetic moment and a spin angular momentum, i.e., it behaves like a body with both charge and mass rotating about an axis. When such a body is placed in a magnetic field with its axis making a finite angle to the direction of the field, classical mechanics predicts that its axis will precess about the direction of the field (Larmor precession). The angular precession frequency is $2\pi \nu = \gamma H$ where H is the field strength and γ is the gyromagnetic ratio of the electron. For an electron in free space, $\gamma/\pi = 2.80$ mc/sec oersted.

An electron in bulk matter is coupled to other electrons and to atomic nuclei, resulting in a shift of the precession frequency and also in damping out of the precessional motion. When a sample is placed in a d-c magnetic field, the precessional motion can be excited by an r-f magnetic field in a plane perpendicular to the d-c field. The frequency of the r-f field required for gyromagnetic resonance is given approximately by the above relation. This resonance may be observed both in paramagnetic and ferromagnetic materials, but the latter are excluded from consideration here.

In paramagnetic materials each atom or molecule has a magnetic moment, resulting from one or more unpaired electrons. The atoms of some of the transition elements and rare earths have this property. In another class of paramagnetic compounds there are free radicals, i.e., molecules in which one of the electrons of the pair, normally present in a chemical bond, is missing. A great deal can be learned about chemical structure from studies of the hyperfine components of the resonance line, i.e., the several components into which the line is split due to the magnetic moments of the nuclei.

Pake concluded his talk with a brief description of the paramagnetic maser. Here a system of paramagnetic ions is dissolved in a crystal of another material. When a magnetic field is applied a number of paramagnetic resonance lines can be observed. From the point of view of quantum mechanics these correspond to transitions between energy states of the spin system.

When the spin system is pumped at a suitable frequency, the normal populations of these energy states can be so altered that amplification is possible at frequencies corresponding to certain transitions. Successful operation depends on extremely weak coupling of the spins to the crystal lattice, and this in turn usually requires operation at very low temperatures.

—E. P. Barrett

Part of the Philco technical cadre for Courier 1-B crowds around ground-receiver equipment monitoring transmission



Much has been said recently about the dissolution of our language by youngsters in their teens, members of the beat generation, angry young men, ardent followers of Method theater and other imbibers of espresso. Admittedly, conversation among members of these groups is difficult, if not impossible, to follow. Eg:

"Like let's split."

"You putting me on, man."

"Like nevermore, dad. Let's fall up to my pad. You got any bread?"

"Cool it. Like not even the butter."

"Some scene."

Without question, the culture that contributed to the above is a somewhat confused one. Yet, we at Rantec cannot be too disturbed. Frankly, it would be a "pot calling the kettle black" type of situation if we did. Engineers too, we have noticed, participate in a language of their own. Now this is relatively excusable within the confines of the plant, at the coffee machine or around the ping-pong table out in back of manufacturing. For it to occur at times of more social definition is occurring, it seems to us, more and more. Eg.:

"How do you feel? You realize, of course, I do not mean tactilely, but in a functional sense."

"You conducting a reliability study?"

"Merely friendly research."

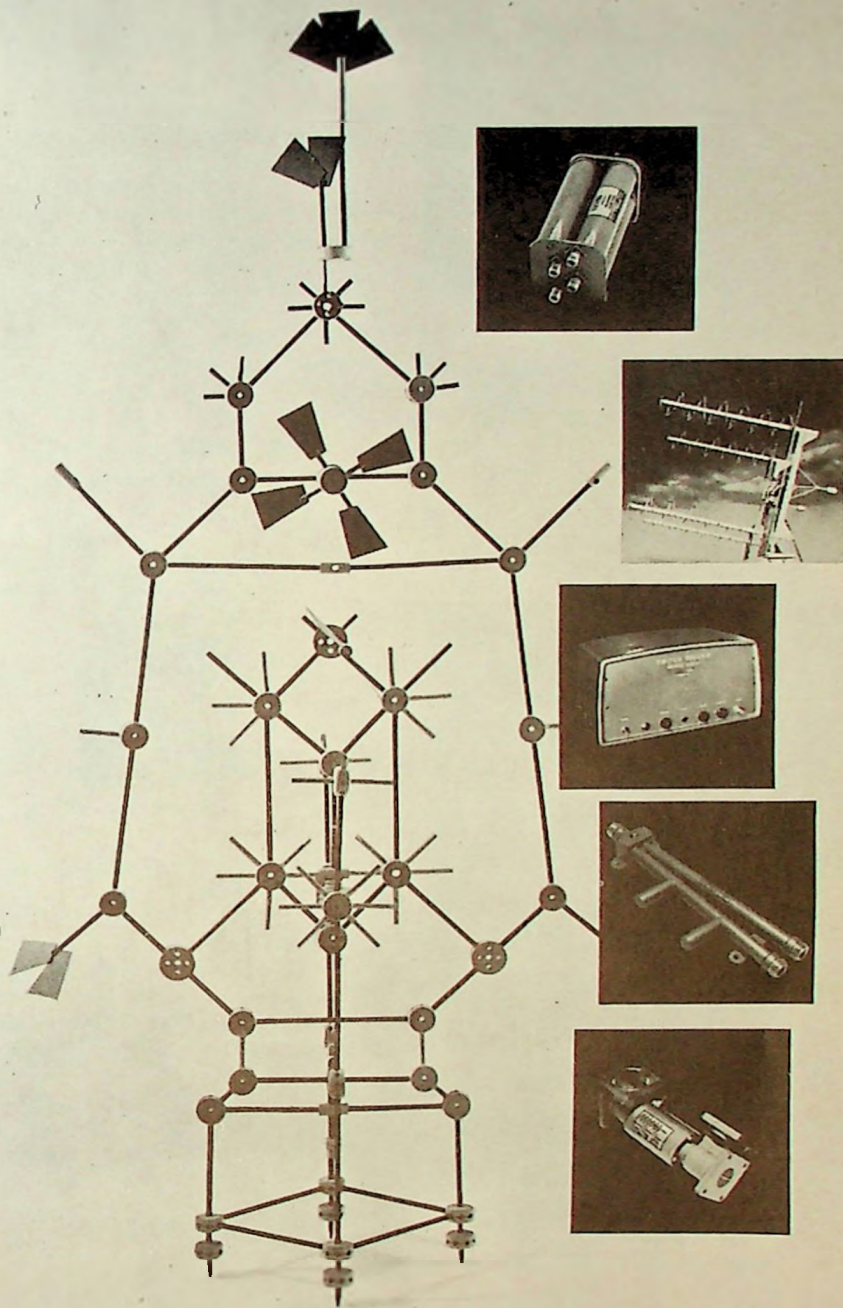
"Non-tactilely, you understand, I'm about 25 db down with an absolutely minimum power level."

"Shame, I'm right at band center. What happened?"

"Little too much input last night. And, believe me, fellow scientist, the output rating isn't worth it."

This, in itself, is not too confusing (except, of course, to the poor, poor layman who might be present). However, we ran across an example the other day that drove us immediately back to the comforting lap of the King's English. Somehow, in the course of conversation, the name of the great firm Daniel, Mann, Johnson and Mendenhall came up. Three seconds later, this industrial giant was referred to as DMJM which caused us to pause for thought, but we eventually caught on. When a third individual, not to be outdone, called this austere titan of business DimJim, we shuddered and returned to our tiny office with a momentary vow of silence on our lips.

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Morris

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Tanaka

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(Continued on page 18)



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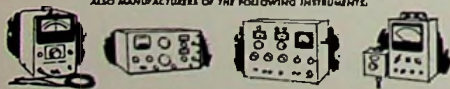
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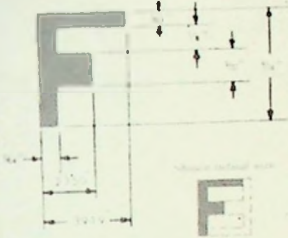
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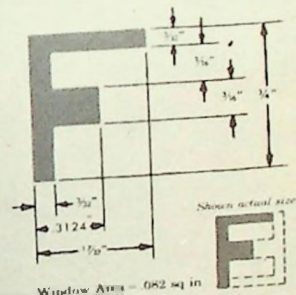
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21	.014"	359	2783.2	.014"	385	2598.4	.014"	399	2506.7
24	.0185"			.010"	275	3657.5	.010"	385	3509.1
40	.025"			.006"	165	6052.4	.006"	171	5818.5

RF-167



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 100% Interleaved = .88

SETS PER INCH	HIGH SILICON WEIGHT			LOW NICKEL WEIGHT			HIGH NICKEL WEIGHT		
	Ga	Lb/M Pcs	Pcs/Lb	Ga	Lb/M Pcs	Pcs/Lb	Ga	Lb/M Pcs	Pcs/Lb
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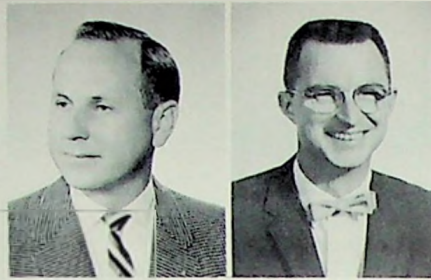
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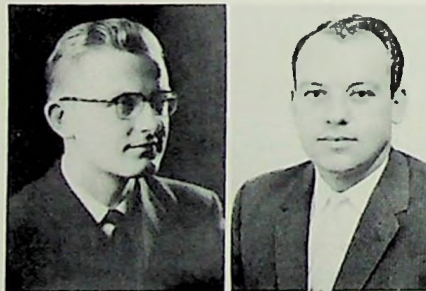
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Vice Chairman: **James M. Weldon**, member engineering publications staff, Sylvania EDL. University of Nebraska, BSEE 1953. Sylvania, 1959; Continental Electronics Mfg. Co., in charge of instruction book preparation, 1957-1959; Collins Radio Co., technical writer, 1953-1957; U. S. Army radio repairman. Contributing editor, Dallas Section magazine, "dIREction"; publicity chairman, Southwestern IRE Conference and Radio Show, 1959.



Dupen

Kern

Secretary: **Douglas W. Dupen**, chief writer, Associated Techdata Inc. University of California, AB physics; Humboldt State College, AB English. U. S. Navy, electronics maintenance officer and electronic countermeasures officer.

Treasurer: **John P. Kern**, technical publications manager, Lenkurt Electric Co. U. S. Marine Corps, instructor in electronics; Lenkurt, 1954. Society of Technical Writers and Editors.

PROFESSIONAL GROUP ON INSTRUMENTATION

Chairman: **Nicholas L. Pappas**, Iconix Incorporated. Lehigh University; Stan-

ford, MSEE 1950, PhD 1958. Sperry Gyroscope Co., engineering section head, 1956; consultant, 1955-1956; Hewlett-Packard Co., instrument design, 1951-1955; Federal Telecommunication Laboratories, communications systems studies, 1950-1951. Tau Beta Pi, Sigma Xi, Pi Mu Epsilon.

Vice Chairman, **H. A. Kazanjian**, owner and founder, Peninsula Associates. Babson Institute, BS; Tufts, Harvard, Stanford, graduate work. Ford Motor Co., business-management analyst. PGCP, PGEC, PGIE, organizer San Francisco Chapter PGI.



Pappas

Kazanjian

Secretary: **Leslie G. Burlingame**, manager of capacitor-engineering department, Lenkurt. Rhode Island State College, BSEE 1925; GE general course, 1926; Temple University, quantitative analysis, 1937. Lenkurt, 1952; Sangamo Electric Co., paper capacitor engineer, 1947-1949; Solar Manufacturing Co., project engineer, 1943-1945; General Electric Co., capacitor engineer, 1937-1943; RCA, capacitor section engineer, 1934-1937, capacitor engineer, 1930-1934; GE, capacitor engineer, 1929-1930, testing, 1925-1929. Phi Kappa Phi, Tau Beta Pi.

Treasurer: **James G. Hussey**, district office manager, General Radio Co. UCLA bachelor's degree in physics. RCA, test engineer; U.S. Navy; RCA, audio quality control; GR, 1949. ASA, AIEE.



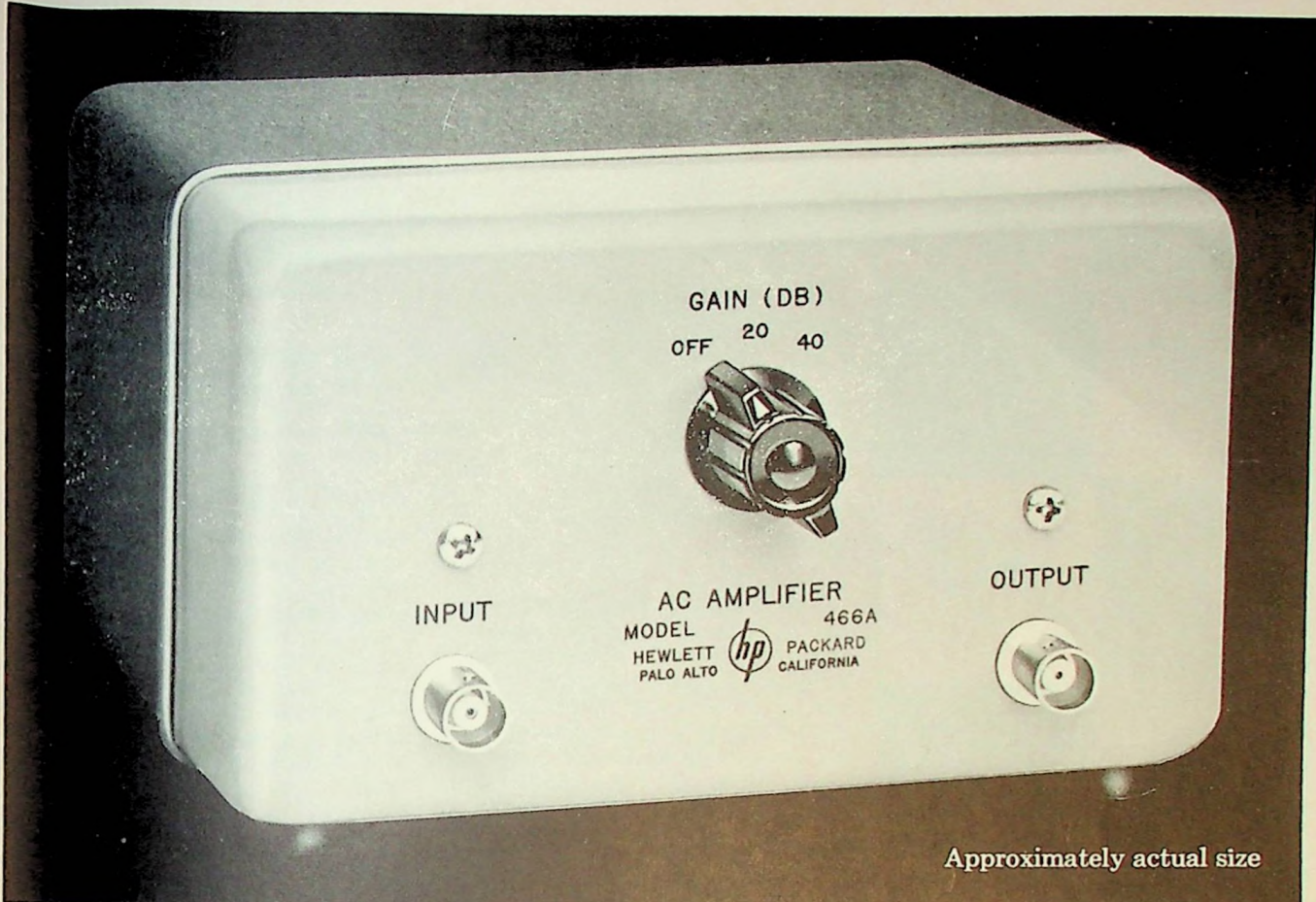
Burlingame

Hussey

PROFESSIONAL GROUP ON MICROWAVE THEORY & TECHNIQUES


Chairman: **Edward M. T. Jones**, head of microwave group, electromagnetics

(Continued on page 20)




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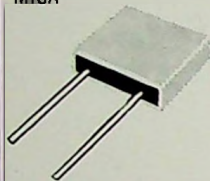
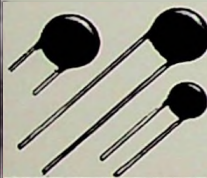
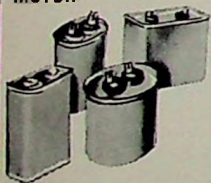
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laboratory Stanford Research Institute. Swarthmore College, BSEE; Stanford University, MS and PhDEE. U.S. Navy, radar maintenance officer 1944-1946; Stanford University, research associate. Stanford Research Institute, 1950. Senior member IRE, PGAP, RESA, Sigma Tau, Sigma Xi.

*Vartanian*

Vice Chairman: **Perry H. Vartanian**, vice president and head of component department Melabs. California Institute of Technology, BSEE 1953; Stanford University, MS 1954 and PhDEE 1956. Melabs, 1956, founding member; Sylvania EDL, senior staff member in ferrite research 1954; U.S. Naval Radiological Defense Laboratory, radiation detection 1951-1952; Stanford, Tau Beta Pi Fellow and research assistant, ERL. Tau Beta Pi, RESA.

*Strum**Gado*

Secretary-Treasurer: **Peter D. Strum**, vice president and co-founder, Applied Technology, Inc. North Carolina State College, BEE with honors 1945; Stanford University, MS 1947. Applied Technology, Inc. 1959; Granger Associates, supervisory engineer 1958-1959; Ewen-Knight Corp., director radio astronomy division and vice president engineering 1955-1958; Airborne Instruments Laboratory, engineer 1947-1955. Senior member IRE, Sigma Xi, Tau Beta Pi, Eta Kappa Nu, PGMAT administrative committee, NEC Annual Paper Award 1957.

**PROFESSIONAL GROUP ON
MILITARY ELECTRONICS**

Chairman: **Louis Gado**, manager, northern California field office, Wiancko Engineering Co. San Jose State College, AB physical sciences 1950. Signal Corps Laboratories, Ft. Monmouth, New

*Prise**Dover*

Jersey, engineering aide; U.S. Marine Corps, radar technician; U.S. Naval Ordnance Test Station, China Lake, 1949-1957. Vice chairman China Lake Section.

Vice Chairman: **Walter J. Prise**, production design specialist, Lockheed missiles and space division, Sunnyvale. University of California, BSEE. Moore Drydock Company, assistant chief electrical engineer; Raytheon Mfg. Co., radar development; Consolidated Copper & Steel Industries, radar design and installation; Maintenance Co., chief engineer; Kaiser Engineers, consultant; McGraw-Hill Publishing Co., consulting editor. AIEE.

Secretary: **Jerome J. Dover**, operations manager, Ampex Military Products Co. Grinnell College, graduate with physics major. Ampex Corp., southwest district manager 1958; Air Force Flight Test Center, Edwards AFB, chief of telemetering section, chief of the office of research and development in the technical facilities division, and assistant chief of the technical facilities division; National Bureau of Standards, research physicist in guided missile development section. Senior member IRE, IAS, PGSET past vice chairman national administrative committee.

Treasurer: **C. Boyd Norris**, manager of parts application, Lockheed missiles and space division. University of Texas, BSEE 1929 and MSEE 1934; MIT, graduate study 1946-1948. Lockheed, 1958. Bendix Aviation Corp., Mishawaka, Indiana, chief test equipment engineer 1955-1958; New London Instrument Co., contract administrator and project engineer 1952-1955; Transducer Corp.,

(Continued on page 22)*Norris**Gado*

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contract engineer and project engineer 1950-1952; Raytheon Mfg. Co., technical consultant 1949-1950; Submarine Signal Co., systems design coordinator 1945-1949 and electrical engineer 1943; Tufts College, associate professor of electrical engineering 1943-1945; MIT, radar instructor 1942-1943; Tulane University of Louisiana, assistant professor of electrical engineering 1930-1942. Tau Beta Pi, Eta Kappa Nu, AIEE, Acoustical Society of America, National Management Association, American Ordnance Association.

**PROFESSIONAL GROUP ON
PRODUCT ENGINEERING
AND PRODUCTION**



Eldon

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Chairman: **Charles A. Eldon**, production manager, signal generator division,



Landeck

Fuller

Hewlett-Packard Co. Stanford University, BS physics and MBA. Hewlett-Packard Co., 1951. U.S. Naval Reserve, electronics technician 1945-1946. WEMA, chairman, education committee, 1954-1956; AIEE.

Vice Chairman: **George F. Reyling**, manager of quality assurance and engineering services, Varian Associates. Polytechnic Institute of Brooklyn, BSCE. Foster D. Snell, Inc.; RCA Mfg. Co.; Sperry Gyroscope Co., Lake Success.

Secretary-Treasurer: **Olof Landeck**, production manager, Electro Engineering Works. State Electrotechnical Institute at Vasteras, BSEE. ASEA Electric, Inc., research and production engineer. AIEE, ASQC.

Program Chairman: **W. Dale Fuller**,

manager, microsystems electronics, Lockheed missiles and space division, Sunnyvale. Iowa State College, MSEE 1948; Michigan College of Mining & Technology, BSEE 1943; Southern Methodist University, graduate study 1957; Oklahoma State College, 1954-1956; General Electric advanced engineering course, 1943-1946. Lockheed, 1959. Varo Mfg. Co., director of research 1956-1959; consulting engineer (Tulsa, Okla.) 1954-1956; Varo Mfg. Co., research engineer, 1953-1954; Engineering Laboratories, Inc., chief engineer 1948-1953; Iowa State College, instructor, electrical engineering 1946-1948; General Electric Co., engineer 1943-1946. American Society for Engineering Education, American Astronautical Society, Acoustical Society of America, Pi Mu Epsilon.

**PROFESSIONAL GROUP ON
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Chairman: **Robert A. Davis**, manager of reliability assurance, Philco western development laboratory. Friends University, AB physics; Iowa State University, graduate work. Lockheed, Jet Propulsion Laboratory, Western Electric Co. Operations Research Society of America.



Davis

Hilman

Vice Chairman: **Julian Hilman**, manager, reliability-evaluation division, Fairchild Semiconductor Corp. Pennsylvania State University, BSEE; San Jose State College, MSEE and graduate work. Fairchild, 1958. Taylor Model Basin, Johnsville Naval Air Development Center, Remington-Rand, American Bosch Arma. AIEE, ASQC.

Secretary-Treasurer: **John W. Hall**, staff engineer, reliability group, International Business Machines Corp. University of California, BSEE. IBM, 1960.



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Program Chairman: **R. S. Cazanjan**, quality assurance supervisor, Sylvania reconnaissance-systems laboratory, Mountain View. City College of New York, BSE 1952; Hofstra College, MS business administration 1960. Sylvania, 1959. Sperry Gyroscope Co., engineering group leader; Grumman Aircraft Corp.; Polytechnic Institute of Brooklyn, instructor. ASQC, vice chairman of national speakers committee.

PROFESSIONAL GROUP ON SPACE ELECTRONICS & TELEMETRY

Chairman: **Boyd C. Roberts**, supervisor of the electrical-mechanical design and test instrumentation sections, Lockheed missiles and space division, Sunnyvale. Brigham Young University; University of Utah, BSEE 1950. LMSD, 1954. Lockheed (Burbank), 1953; Otis Elevator Co., 1950-1953; U.S. Navy, electronic technician 1944-1946.



Roberts



Morgan

Baker

Vice Chairman: **Robert B. Morgan**, staff scientist, Lockheed missiles and space division. Jefferson College, BS in general engineering; University of Buffalo and University of Minnesota, graduate studies; Chicago Radar School of Illinois Institute of Technology, radar electronics course. LMSD, 1956. Hughes Aircraft Co., Bell Aircraft Corp., University of California at Sandia. AIEE.

Secretary-Treasurer: **Robert D. Baker**, project engineer, Granger Associates. Purdue University, BSEE 1948. Granger, 1960. Philco WDL, group engineer, 1958-1959; P. R. Mallory Co., senior engineer and chief engineer, 1950-1954 and 1956-1958; Lear, Inc., project engineer, 1954-1956; Philco Corp., Philadelphia, 1948-1950.



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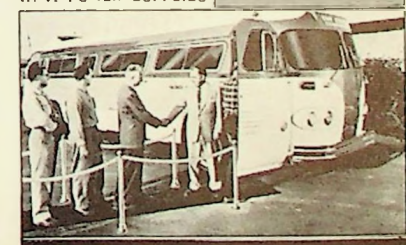
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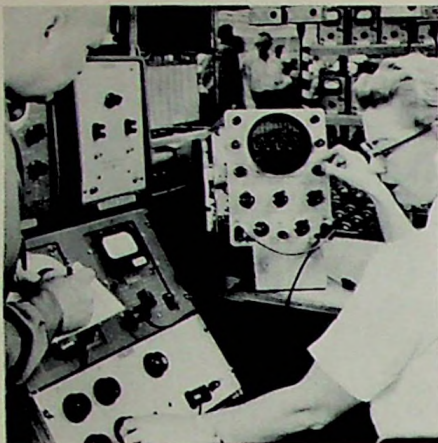
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IT IS REPORTED:

San Francisco Section members scheduled to appear on the program of the National Electronics Conference in Chicago this October included: Dr. **Frederick E. Terman**, provost, Stanford University, as one of the principal speakers; **C. M. Melas** and **Emil Hopner**, IBM; **P. S. Castro**, **W. D. Fuller**, and **W. W. Happ**, Lockheed missiles and space division; **Lawrence P. Huelsman**, **A. S. Fraenkel**, and **Harold Weaver**, University of California; **D. Farina** and **J. Nall**, Fairchild Semiconductor Corp.; **John M. Hunt**, General Precision, Inc.; and **E. LeRoy Younker**, SRI; as technical program participants.



Ewing

Weiner

General Telephone & Electronics Corp. has announced the following personnel shifts: **A. George Ewing**, manufacturing manager, has been named vice president of manufacturing and a director at Lenkurt Electric Co. He has been with Lenkurt since 1951. **E. Kenneth Peterson**, formerly chief engineer of the microwave products section of Motorola Inc., has joined the Lenkurt staff in product planning. **Richard A. Stonesifer** has become product sales manager in the Sylvania special tube operations. He has been a special representative for government sales in Washington, D.C. **Arthur Weiner**, formerly an advanced development engineer, has become an engineering specialist in Sylvania EDL.

Donald R. E. Barnaby recently joined **Eitel-McCullough, Inc.**, San Carlos, as manager of the newly formed parts division. Prior to joining Eimac, Barnaby was plant manager for Line Material Industries of South Milwaukee, Wisconsin.

Earl J. Shelton has been appointed manager of the newly formed high-power-tube division. Shelton joined Eimac in 1960 as director of development and held that position until his recent advancement.

Dr. **George Caryotakis** has joined the company as senior project engineer in the power klystron laboratory. He is responsible for high-power broadband



Shelton

Caryotakis

klystron development in the company's power klystron division at San Bruno. Caryotakis goes to Eimac from the post of senior engineer in the tube research department at Varian Associates.

Dr. **Richard Lagerstrom** has also joined Eimac as a senior scientist in the research division. As a research assistant and associate with Stanford University's electronics research laboratories since 1951, and with Hughes Aircraft Co. from 1946 to 1951, Lagerstrom has worked on the development of various new techniques and methods in the field of traveling-wave tubes and microwave devices.

William R. Luebke has also joined the research division as a senior scientist. Luebke was a research associate at the electronics research laboratories of Stanford University from 1950 to 1960. He was a consultant to the General Electric microwave laboratory at Palo Alto from 1957 to 1960.

George R. Chambers III, has been named manager, research and development marketing. Chambers, assistant manager, R & D marketing prior to his present appointment, received the BS in electrical engineering from Stanford University in 1951 and later joined Eimac as a project engineer.



Lagerstrom

Luebke

In a move designed to augment its instrumentation magnetic-tape-recorder production with the manufacture of related electronic components, **Precision Instrument Co.** of San Carlos has recently purchased **Magnetic Industries, Inc.**, of 931 Commercial Street, Palo Alto. The new facility comprises some

MORE SWINGS

2500 sq ft devoted to the production of toroids, cores, coils, and transformers. The company will retain its present name, and will function as a wholly owned subsidiary of Precision Instrument Company.

Five California manufacturers' representatives will exhibit the latest electronic instruments, of over 50 leading manufacturers, throughout California, from November 7 to 11.

Instruments and sophisticated components will be displayed ranging from d-c power supplies to microwave test equipment. Exhibits will be staffed by sales engineers ready to demonstrate units, and answer questions on their operation.

Termed "The Representatives' Caravan," the traveling exhibit will be shown twice a year in a program aimed at keeping interested engineers and technicians up to date on recent developments. The exhibits will reach Palo Alto November 11 and be shown at Elks Hall, 4249 El Camino Real. Show hours will be from 12 noon to 7 p.m.

The exhibit is sponsored by J. T. Hill Co., Instruments for Measurement, McCarthy Associates, Inc., John Francis O'Halloran & Associates, and T. Louis Snitzer Co.

(Continued on page 26)

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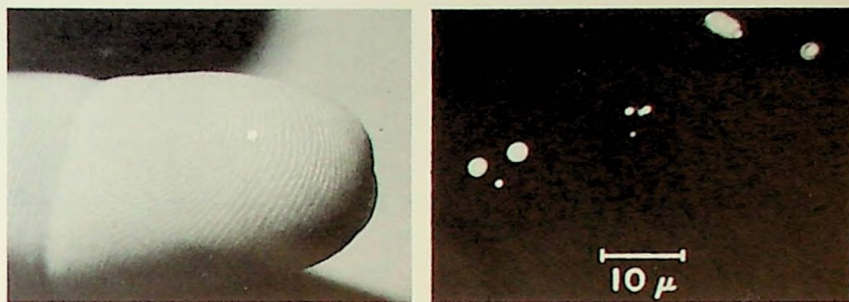
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The reason such high power can be switched on so fast is that the 4-layer diode can be turned on over its whole area by bringing the middle junction abruptly to avalanche. Base resistance and junction capacitance do not slow down the turn-on as they do in a transistor.

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Although many customers are pleased with our 4-layer diodes for switching magnetrons, klystrons and traveling wave tubes in fast pulse applications, we are not satisfied. We want to cut faster and deeper into the problems. We have an unfinished project on the theory of turn-on delay for a string of n diodes in series. The delay seems to vary as $\tau(1/n)/1_n(V_B/\delta V)$ where τ is a turn-on time constant and V_B is the breakdown voltage and the diodes wait at $V_B - \delta V$. Obviously this problem is important in design for high voltage applications.

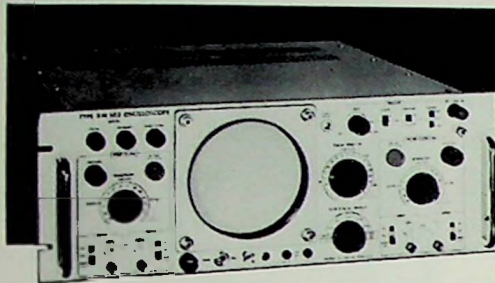
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If our technical problems interest you—study of behavior of 4-layer diodes, customer circuit problems, new diode design theory and development—contact William Shockley, R. L. Biesele, or J. S. Woollett. All at:

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1. W. Shockley, *Bull. Am. Phys. Soc.*, vol. 5, p. 161, (1960) and *Proceedings International Conference on Semiconductor Physics*, Prague, Czechoslovakia, September, 1960.
2. B. McDonald, A. Goetzberger and C. Stephens, *Bull. Am. Phys. Soc.* 4, 455 (1959).
3. A. Goetzberger, *J. Appl. Phys.*, in press, and *Proceedings International Conference on Semiconductor Physics*, Prague, Czechoslovakia, September, 1960.

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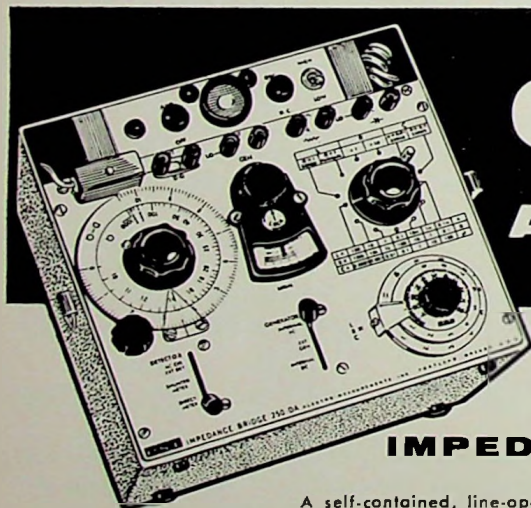
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MORE SWINGS

A new company to produce transformers, coils, and electronic components has been formed at Mountain View. Called **Magnetronics Co.**, the firm has begun production at 1080 Alma Street. It has about 3000 sq ft of factory space. **Al Krueger** and **Gene Daniels**, partners in the new firm, were formerly employed by Palo Alto Engineering Co.

Fairchild Semiconductor Corporation has appointed **Schad Electronic Supply, Inc.**, in San Jose to act as distributor for Fairchild transistors and diodes.

Within **Hewlett-Packard Company**, several shifts in personnel have been made. **Corlandt Van Rensselaer**, former sales manager, has been advanced to the position of general manager of Dymec, a division. **Harry B. Schulteis**, formerly a member of Hewlett-Packard's manufacturing engineering department, will also move to Dymec as head of the digital data section. **Robert E. Rawlins**, who was general manager of the Dymec Division, will occupy the newly created post of assistant to the president for technical planning. To fill the post formerly occupied by Van Rensselaer, **Richard J. Reynolds** has been made domestic sales manager. Since 1957 he has been in the marketing department as a regional sales manager.



Van Rensselaer

Willard

At **Ampex Corporation**, **Thomas E. Davis** has been appointed manager of the newly created data parts and service division of Ampex Data Products Co. Davis joined Ampex in 1956, and has been most recently manager of the video products division; **Neil K. McNaughten** has been appointed staff vice president of the corporation and marketing activities consultant for Ampex Professional Products Co., Ampex Audio Co., and Ampex International; McNaughten will be succeeded as manager of Ampex Professional Products Co. by **Leonard E. Good**, formerly corporate staff director of operations services for the corporation; **Harold S. Salzman** has been made marketing manager of Ampex Professional Products Co., coming from AT&T where he was general sales manager of the long lines

(Continued on page 28)

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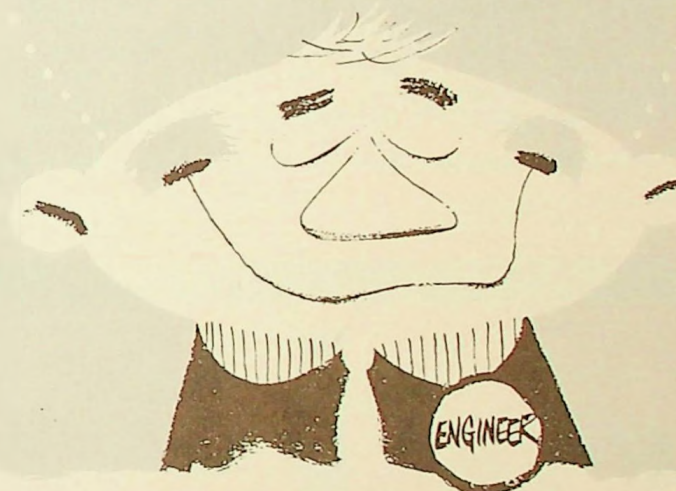


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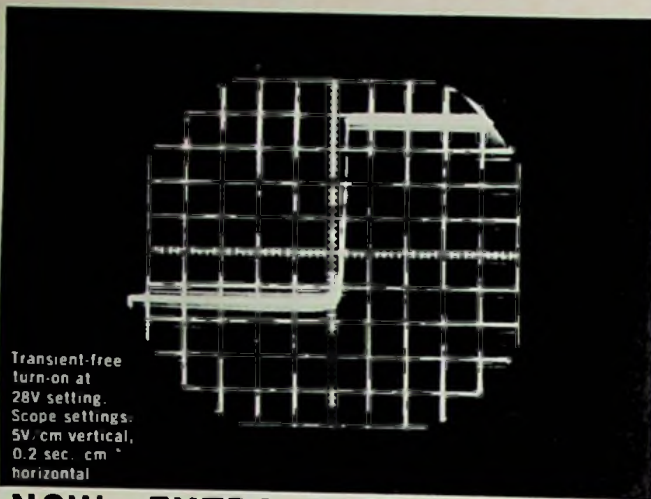
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MORE SWINGS

division; **Dennis D. Willard**, formerly manager of advanced technical planning in the advanced systems development division at IBM San Jose, becomes manager of the advanced computer laboratory for Ampex Data Products Co.



Scal

Parks

Robert Scal has been elected president of **RS Electronics Corporation**, Palo Alto, a subsidiary of Regan Industries, Inc., Burlingame, Calif. Scal was formerly executive vice president. At the same time it was announced that **Robert B. Parks**, who previously served as vice president of the company, has been named executive vice president, and **Clinton O. Lindseth**, formerly chief engineer, has been appointed vice president for engineering.



Lindseth

Potter

Paul L. Potter has been appointed branch manager of the Palo Alto office of **Carl A. Stone Associates, Inc.** Prior to his recent appointment Potter was affiliated with Ampex Corp., Philco Corp., and Sperry Rand Corp.

Insul-8-Corp. of San Carlos has acquired the physical assets of Engineered Instruments, Inc., Hayward. Engineered Instruments will become a part of Vicon Corp., a wholly owned subsidiary. **George C. Riser**, former manager and chief engineer, and **George C. Lydixsen**, former sales manager, will occupy equivalent posts in the new division.

Stanford Research Institute has announced plans to sponsor an international symposium on chemical reactions in the lower and upper atmosphere. The meeting is scheduled for April 18-20, 1961 at the Hotel Mark Hopkins in San Francisco.

According to Dr. **Richard D. Cadle**, manager of SRI's atmospheric chemistry

MORE SWINGS

section and chairman of the forthcoming symposium, "Fundamental research on these chemical reactions is important in missile and satellite programs, in weather analysis, in smog control problems, and in long-range radio-communication studies.

Acquisition of a manufacturing plant in Forestville for miniature encapsulated and resin-potted transformers, has been announced by **Electro Engineering Works**. This new plant doubles the space owned by Electro Engineering Works. **Robert D. Burnham** is manager of the new small-transformer division housed in this facility. Burnham was formerly a senior engineer with the company.

The appointment of **Theodore R. Broida** as director of planning for **Broadview Research Corp.** has been announced. Broida will be in charge of development and expansion of the organization's programs of research service to government and industry.

For three years before joining BRC he was senior operations analyst in the economic research division of Stanford Research Institute.

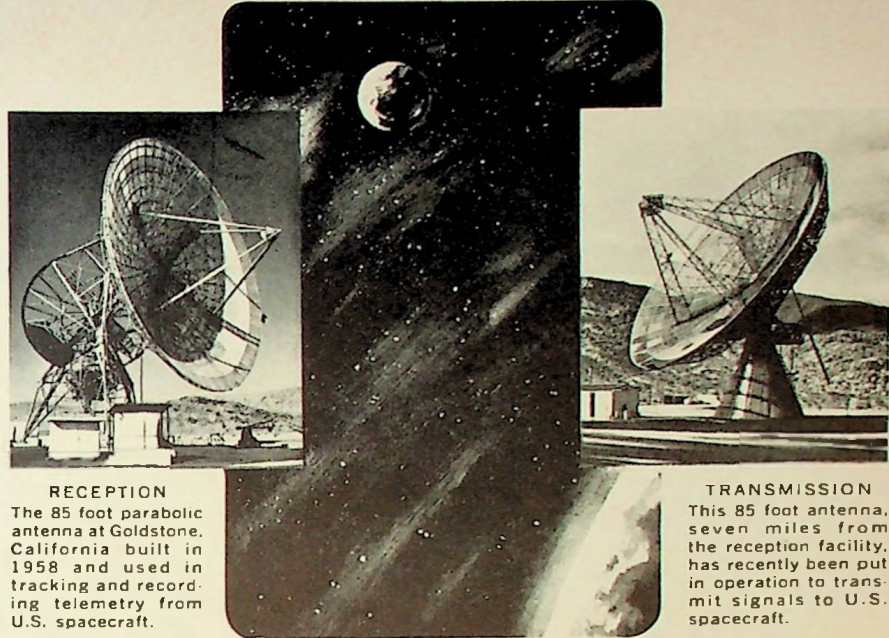
At the **University of California, Berkeley**, Professor **Donald O. Pederson** has been appointed director of the electronics research laboratory, replacing Professor Sam Silver, now director of the new space sciences laboratory. **V. R. Learned**, 1938 graduate of the University, has been named chief engineer of the electronic-tube division of **Sperry Gyroscope Co.**

Two southern California electronics executives have been appointed to four-year terms as directors of the **Western Electronic Show and Convention**. They are **S. H. Bellue**, president of the **Western Electronic Manufacturers Association** and vice president of **Osborne Electronics Corp.**, and **Edward C. Bertolet**, vice president of **Behlman Engineering Co.**

A new 150,000 sq ft laboratory facility will be built by the general products division development laboratory of the **International Business Machines Corp.** The laboratory now occupies two H-shaped buildings at the San Jose plant site, and several leased buildings in the San Jose area. The new two-story rectangular structure will be located between the two existing buildings, and will bring the total development laboratory floor space to 230,000 sq ft.

october 1960

LUNAR and PLANETARY COMMUNICATION



RECEPTION

The 85 foot parabolic antenna at Goldstone, California built in 1958 and used in tracking and recording telemetry from U.S. spacecraft.

TRANSMISSION

This 85 foot antenna, seven miles from the reception facility, has recently been put in operation to transmit signals to U.S. spacecraft.

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Research Scientists

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Several openings also exist for supervisors of Research and Advanced Development Projects performed by industry for JPL.



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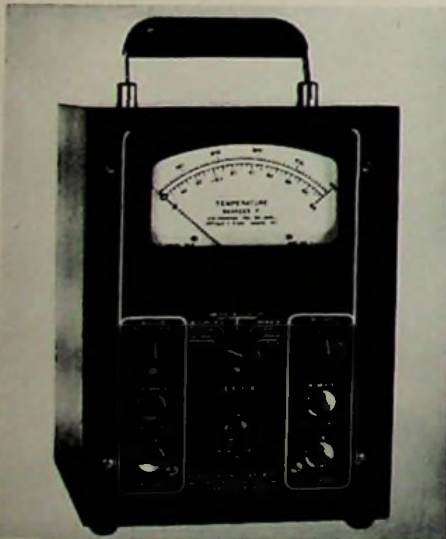
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events of interest

IRE MEETINGS SUMMARY

October 19-21—**Symposium on Space Navigation.** Columbus, Ohio. Prof. J. D. Kraus, Ohio State University Radio Observatory, 2024 Neil Avenue, Columbus 10, Ohio.

October 24-26—**East Coast Conference on Aeronautical & Navigational Electronics.** Lord Baltimore Hotel, Baltimore, Maryland. S. Hershfield, Mail #G-3143, Martin Company, Baltimore 3, Maryland. (Local participant: Glenn H. Keitel, Philco Corp.)

October 26-28—**Conference on Non-Linear Magnetics & Magnetic Amplifiers.** Bellvue-Stratford Hotel, Philadelphia, Penna. D. Katz, Bell Telephone Labs, Whippany, New Jersey.

October 27-28—**1960 Electron Devices Meeting.** Shoreham Hotel, Washington, D.C. D. H. W. Welch, Motorola, Inc., 8201 E. McDowell Road, Phoenix, Arizona. (Local participants R. S. Johnson and L. A. Roberts, Watkins-Johnson Company; John Moll, Stanford University; L. K. Brodersen and M. P. Forrer, GE Microwave Lab; M. A. Allen, G. S. Kino, T. A. Midford, and C. B. Williams, Hansen Laboratories, Stanford University; C. Biechler, T. Maltzer, J. Pavkovich, D. Robinson, J. Ruetz, A. Staprans, R. Symons, and L. Zitelli, Varian Associates; Gene Hoerni, Fairchild Semiconductor Corp.; D. H. Priest, Eitel-McCullough, Inc.; F. A. Olson, A. Sevarin, and S. J. Tetenbaum, Sylvania Corp. and Joe E. Hull, Litton Industries.)

October 31, November 1-2 — **1960 Radio Fall Meeting.** Syracuse Hotel, Syracuse, N. Y. Virgil M. Graham, EIA, 11 W. 42 St., New York 36, N. Y.

October 31, November 1-2—**13th Annual Conference on Electrical Techniques in Medicine and Biology.** Sheraton-Park Hotel, Washington, D.C. G. N. Webb, Room 547, CSB, Johns Hopkins Hospital, Baltimore 5, Maryland. (Local participants: R. Pasternak and L. E. Hiam, SRI; Harry C. Ehrmantraut, Bruce D. Marshall, and W. Walker, Mechrolab.)

November 4-5 — **Communications Symposium.** Queen Ellis Hotel, Montreal, Canada. C. F. Ripp, Box 802, Station B, Montreal PQ, Canada.

November 14-16 — **MAECON (Mid-America Electronics Convention).** Hotel Muehlebach, Kansas City, Mo. J. E. Austin, Bendix Aviation Corp., 95th & Troost, Kansas City, Mo. (Local participants: Dr. William Shockley, Shockley Transistor Corp. as principal speaker for the annual banquet; Hyman Olken, University of California, Livermore.)

November 14-17—**6th Annual Conference on Magnetism & Magnetic Materials.** New Yorker Hotel, New York City. A. M. Clogston, Bell Telephone Labs, Murray Hill, New Jersey.

November 15-16—**4th Annual Conference on Product Engineering & Production.** Boston, Mass. C. W. Watt, Raytheon Co., Waltham 54, Mass. (Local participant: Arthur P. Kromer, Ampex.)

November 15-16—**Symposium on Engineering Applications of Probability and Random Function Theory.** Purdue University, Lafayette, Indiana. Professor J. L. Bogdonoff or F. Kozin, Purdue University, Lafayette, Indiana.

NON-IRE EVENTS

On October 20 to 22 the **Acoustical Society of America** will hold its Sixtieth meeting at the Sheraton-Palace Hotel in San Francisco. Acoustical scientists from the United States and several foreign countries will present some 192 technical papers in 21 sessions at the three-day meeting. Several authors will discuss computer means for synthesizing music and speech, and for recognizing spoken words.

Speech privacy in buildings and efficacy of various sound isolating constructions will be explored in other sessions. Discussions on the workaday uses of sound for industrial purposes will include such topics as how to measure stresses locked up in metals, improved means of picking up heart sounds, how to assist turbine designers by measuring

the velocity of sound in steam at 4500 pounds per square inch, and the use of sonar for navigation under an ice cap.

A panel will discuss rocket noise and there will be a report on sound from earthquake waves. Means for improving speech reinforcement in reverberant halls will be discussed; a wide range electrostatic loudspeaker will be described; and experimental results on optimum conditions for stereophonic listening will be presented. The meeting will also include an exhibit of professional acoustical laboratory equipment.

At the Society's banquet on Friday evening, October 21, Rex Rathbun of the Audio-Visual Research Foundation, Sausalito, will discuss non-objective motion pictures and electronic music.

(Continued on page 32)

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General Chairman of the meeting is Dr. Vincent Salmon, Stanford Research Institute, Menlo Park, California.

Listed on the program schedule of Station **KPFA-FM**, 94.1 mc, on Saturday, October 29, is a commentary program on new audio equipment by Robert S. MacCollister. Equipment to be considered on this date includes the new Fisher Spacexpander, a new component reverberation unit. Broadcast time may be obtained from the station, TH 8-6767.

IRE PAPERS CALLS

October 21—100-word abstracts and 500-word summary, both in triplicate, for 1961 IRE International Convention (New York, March 20-23, 1961). Send to: Dr. Gordon K. Teal, chairman, 1961 Technical Program Committee, The Institute of Radio Engineers, Inc., 1 East 79 Street, New York 21, N. Y.

November 1—500-word abstracts, including an original and four copies, for the 1961 7th Regional IRE Technical Conference & Electronic Exhibit (Phoenix, Ariz., April 26-28, 1961). Send to: H. W. Welch, Jr., Motorola, Inc., P.O. Box 1417, Scottsdale, Arizona.

November 15—100-word abstracts and 500-word summaries for the Winter Convention on Military Electronics (Los Angeles, Calif., Feb. 1-3, 1961). Send to: Dr. John J. Myers, Hoffman Electronics Corp., Military Products Div., 3717 S. Grand Ave., Los Angeles, Calif.

November 15—Abstracts submitted to the appropriate session chairman for Second Symposium on Engineering Aspects of Magneto-hydrodynamics (University of Pennsylvania, March 9-10, 1961). Communications and Diagnostics: C. B. Wharton, Lawrence Radiation Laboratory, Livermore, Calif.; Flight Applications: Dr. G. S. Janes, Avco Research Laboratories, Everett, Mass.; Fusion: Dr. C. W. Little, Atomic Energy Division, Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.; Power Conversion: Dr. G. W. Sutton, General Electric Co., Missile and Space Vehicle Dept., Philadelphia 24, Penna.

November 30—Abstracts of approximately 250 words with brief professional record of author, in duplicate, for Fifth National Symposium on Global Communications (GLOBECOM V), Chicago, May 22-24, 1961. Send to: Donald C. Campbell, ITT-Kellogg, 5959 So. Harlem Avenue, Chicago 38, Illinois.

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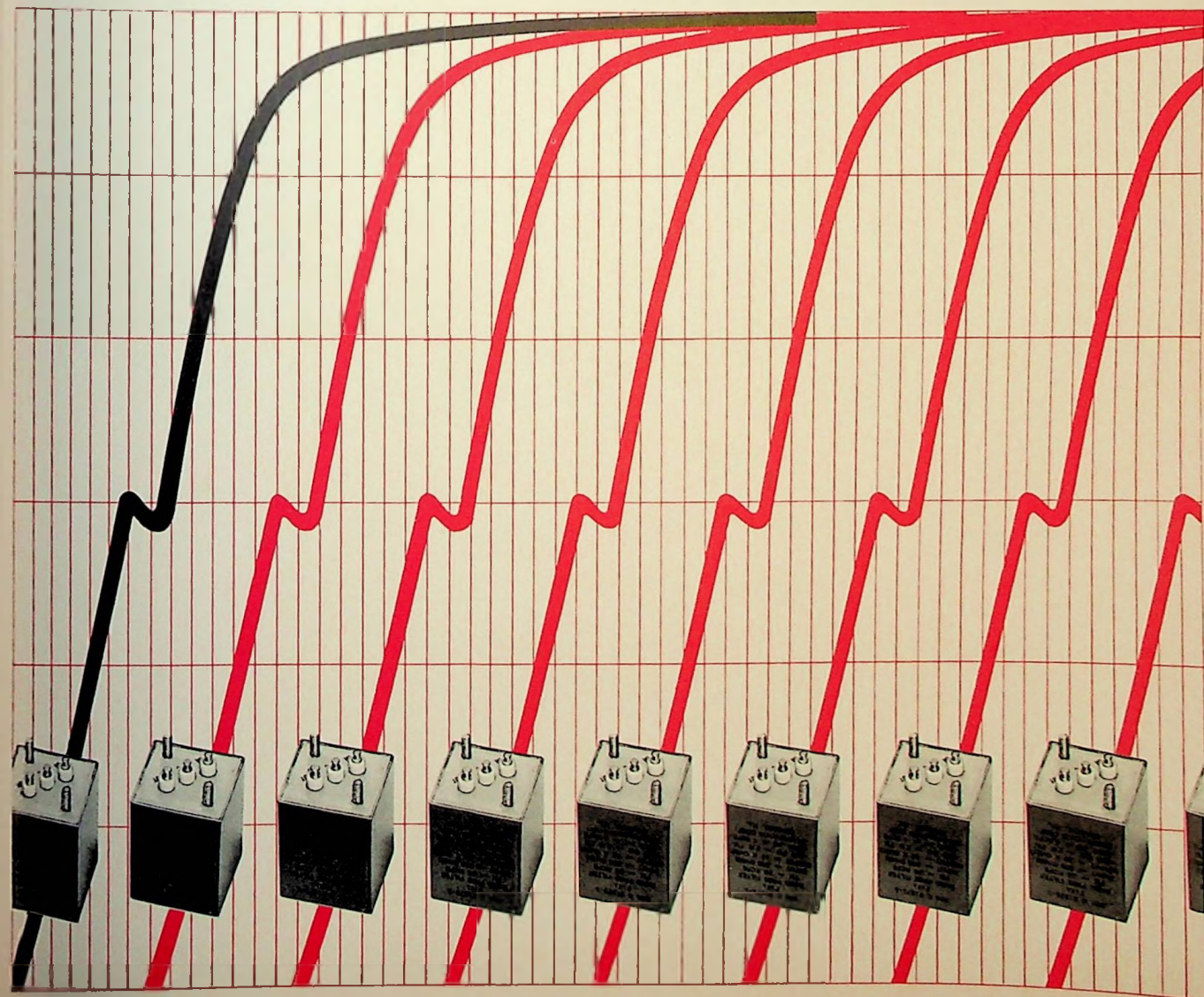


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Gertsch Products, Inc.	35	WHITEcliff 8-1483	34
Hewlett-Packard Co.	19	Shockley Transistor, Unit of Clevite Transistor	25
Hill Company, J. T., 1682 Laurel St., San Carlos;		Snitzer Co., T. L., 510 So. Mathilda Ave.,	
LYtell 3-7693	34	Sunnyvale; REgent 6-6733	25, 34
Jet Propulsion Laboratory	29	Space Technology Laboratories	13
Kaufman, Jack, 126 - 25th Avenue, San Mateo;		Stone & Associates, Jay, Box 583, Sunnyvale;	
Fleside 1-4942	32, 34	YORkshire 8-2770	34
Kay Electric Co.	18	Tech-Ser, Inc.	30
Litton Industries, Electronic Equipments Div.	28	Tektronix, Inc.	26
Luscombe Engineering Co.	32	Tung-Sol Electric Inc.	24
McCarthy Assoc., 635 Oak Grove, Menlo Park;		Van Groos Co.	23
DAvenport 6-7937	27, 34	Varian Associates	2
Measurements Corp.	22	White & Company, 788 Mayview, Palo Alto;	
		DAvenport 1-3350	34

New Gertsch Freq Meter

MEASURES AND GENERATES: 20 mc to 1000 mc

ACCURACY: 0.0001%, exceeding FCC requirements 5 times

MODULATION: AM, 30% at 1000 cps; FM, 1 kc at 30 mc
5 kc at 150 mc, or 15 kc at 450 mc max.



This portable instrument in one complete package enables you to measure both frequency and frequency deviations in the maintenance of mobile communications systems.

As optional equipment the FM-7 Frequency Meter can be combined with the new DM-3 Deviation Meter as illustrated. The DM-3 is a dual-range deviation meter with 15 kc and 7.5 kc full scales.

By combining the FM-7 and the DM-3 you get a single instrument capable of measuring and generating carrier frequencies *plus* reading peak modulation deviation.

Write for complete literature.

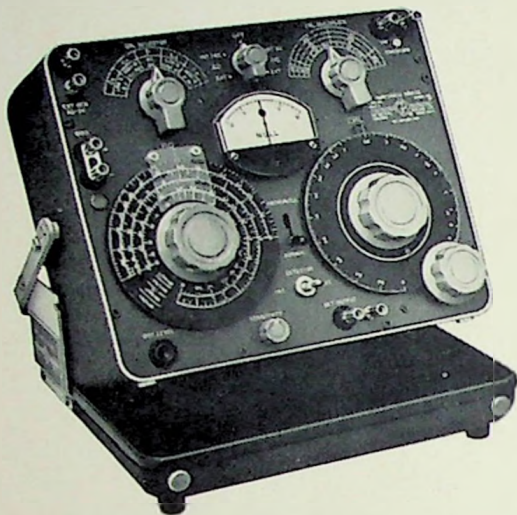
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GERTSCH PRODUCTS, Inc.

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4

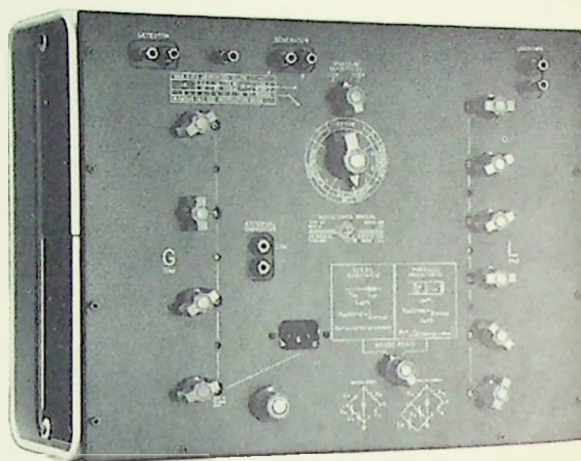
OUTSTANDING BRIDGES



Type 1650-A Impedance Bridge . . . \$450

Ranges: R: 1 mΩ to 10 MΩ
 L: 1 μh to 1000 h
 C: 1 pf to 1000 μf
 D: 0.01 to 50 (at 1kc)
 Q: 0.02 to 1000 (at 1kc)

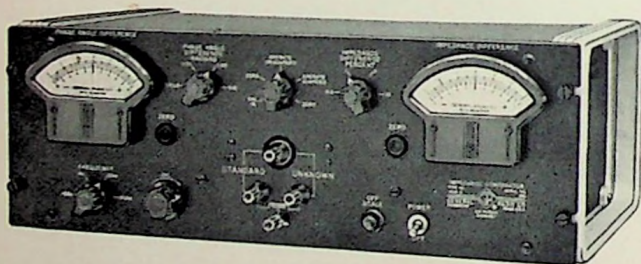
Basic ±1% accuracy
 Built-in null detector
 Built-in 1-kc oscillator; bridge useful to 20kc with external sources



Type 1632-A Inductance Bridge . . . \$950

Full-Scale Ranges: L: 111 μh to 1111 h
 (minimum indication is 0.0001 μh)
 G: 111 μmhos to 1111 mhos

Basic ±0.1% accuracy. Inductors having nearly equal values can be compared to an accuracy of 1 part in 10³
 Designed for 1-kc measurements. Can be used to at least 10kc with slight decrease in accuracy.



Type 1605-A Impedance Comparator . . . \$800

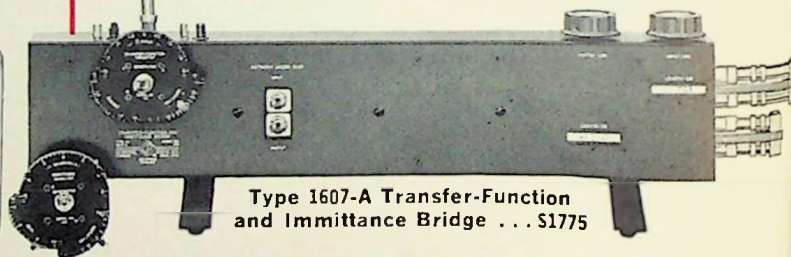
For rapid measurements of impedance and phase angle without manual balancing

Panel meters indicate percent difference in impedance magnitude and phase angle between unknown and external standard

Ranges: Z: 2Ω to 20MΩ
 ΔZ: ±0.01% to ±10%
 Δθ: ±0.0001 to ±0.1 radian

Accuracy: ±0.01%
 Built-in 100c, 1kc, 10kc, and 100kc frequency sources.

Write For Complete Information



Type 1607-A Transfer-Function and Impedance Bridge . . . \$1775

For VHF-UHF measurements of transistors, tubes, networks and components

Frequency Range: 25 to 1500 Mc

Blasing Provisions: Built in for use with external d-c sources. Maximum current, 250 ma; maximum voltage, 400 volts.

Measurement	Range	Accuracy (from 150-1000 Mc)
Voltage and current ratios (R)	0-30	2.5 (1 + √R)% ± 0.025
Transimpedance (Z ₂₁)	0-1500 ohms	2.5 (1 + √ $\frac{Z_{21}}{50}$)% ± 1.25 ohms
Transadmittance (Y ₂₁)	0-600 mmhos	2.5 (1 + √ $\frac{Y_{21}}{20}$)% ± 0.5 mmho
Impedance (Z ₁₁)	0-1000 ohms	2.0 (1 + √ $\frac{Z_{11}}{50}$)% ± 1.0 ohm
Admittance (Y ₁₁)	0-400 mmhos	2.0 (1 + √ $\frac{Y_{11}}{50}$)% ± 0.4 mmho

GENERAL RADIO COMPANY

WEST CONCORD, MASSACHUSETTS

Branch Engineering Office in SAN FRANCISCO
 1186 Los Altos Avenue, Los Altos, California
 James G. Hussey • Donald M. Vogelaar
 Tel: Whitecliff 8-8233