EDITOR'S PROFILE of this issue

from a historical perspective …

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

January, 1960:

Cover: Kurt Appert is pictured (see page 5). He is the "kurt" in "Lenkurt", one of the two founders of this electronics company in San Carlos. It is a part of General Telephone and Electronics. I worked at Lenkurt for two years (1968-1970) as a components evaluation engineer. Appert had accumulated many shares of GT&E stock, which he donated to employees.

Page 6: The continuation of the East Bay Subsection is questioned. It is moving its footprint to Livermore, to be nearer that tech hub. I worked one summer as an intern at the Lawrence Livermore Radiation Labs; it was very hot as rode my bicycle back to town every afternoon.

Archive of available SF Bay Area GRID Magazines is at this location:
https://ethw.org/IEEE_San_Francisco_Bay_Area_Council_History

At time of scanning, the bound volumes are held by Paul Wesling. July, 2021 Contact p.wesling@ieee.org

Grid

JANUARY 1960

San Francisco Section Institute of Radio Engineers

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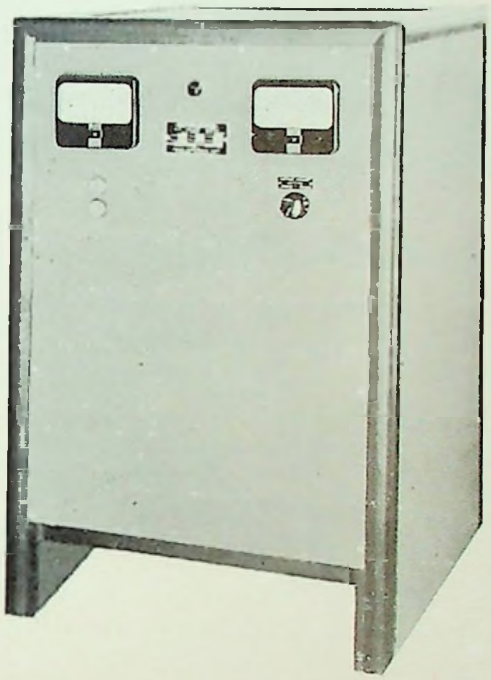
VANGUARD AND LA CROSSE

MISSILE PROGRAMS



SPECIFICATIONS

A.C. INPUT: 208/230/460 volt ±10%, 3 phase, 60 cycle.

RIPPLE: Less than 1% RMS.

RESPONSE TIME: A special control internally mounted in the Power Supplies handles adjustment of response time. The "load on" response time is adjustable from 20 to 200 milliseconds, and the "load off" from 40 to 400 milliseconds. An important advantage of this adjustable response is when used with inductive loads, such as inverters; recovery can be adjusted to avoid interaction between inductive load and power supply.

RATINGS AVAILABLE:

Model Number	D.C. Output		Regulation		Dimensions W" x H" x D"	Weight Lbs.
	Volts	Amps	Static-Line or Load	Dynamic Load*		
MRST28-100	24-32	100	±0.1%	±6V	22"x36"x22"	430
MRST28-200	24-32	200	±0.1%	±6V	22"x36"x22"	550
MRST28-300	24-32	300	±0.1%	±6V	22"x46"x22"	700
MRST28-400	24-32	400	±0.1%	±6V	28"x58"x24"	1250
MRST28-500	24-32	500	±0.1%	±6V	26"x68 ½ x32"	1650
MRST28-600	24-32	600	±0.1%	±6V	26"x68 ½ x32"	1650
MRST2440-250	24-40†	250	±0.1%	±2V	26"x68 ½ x32"	1650

* For Full Load Charge

† In 2 Ranges

TECHNICAL DESCRIPTION

These units use silicon power rectifiers for increased reliability and efficiency. Silicon rectifiers provide constant efficiency and exhibit no aging characteristics as is more common in other type rectifiers. Magnetic components utilize grain oriented silicon steel and Class B insulation for compact design and efficient operation. The power section consists of a 3 phase magnetic amplifier with extremely high gain. Preamplifier is fully transistorized and utilizes silicon zener diodes as a reference element.

ADDITIONAL FEATURES

Output of units can be shorted without damage to the silicon rectifiers.

Units can withstand 400% overload for periods up to 1 second without damage to Power Supply components.

Remote sensing
low output impedance

Militarized versions of above units are also available.

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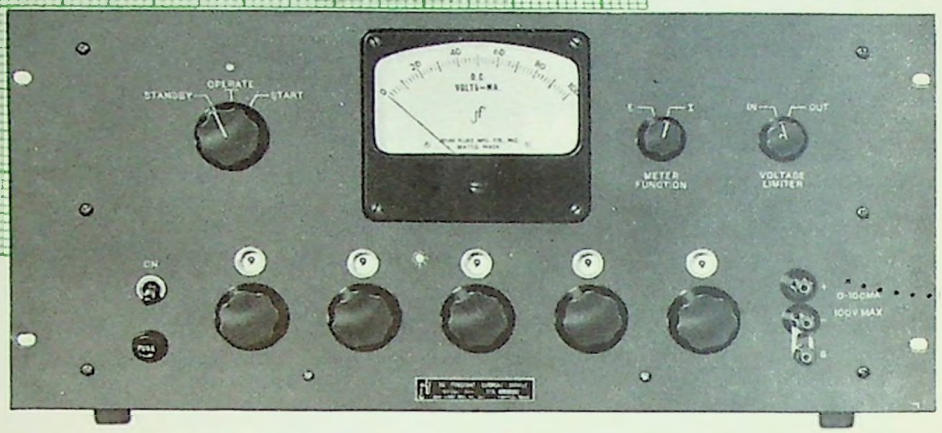

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Output Voltage:	100 volts maximum
Voltage Limiter: (Panel Switch Selected)	Provides maximum protection for meter calibration. Limiter in: output voltage will not rise above 600 mv. Limiter out: over voltage protection places instrument in standby condition when output voltage attempts to rise above 120 v.
Output Polarity:	Floating or negative grounded
Regulation vs. Line:	0.01% or 0.1u amp., whichever is greater, for 10% line voltage change
Regulation vs. Load:	0.01% or 0.1u amp., whichever is greater, for load change from zero to maximum
Calibration Accuracy:	0.05% or 0.5 unmp., whichever is greater
Current Resolution:	1 microampere
Stability:	0.005% per hour after short warm-up, 0.01% per day
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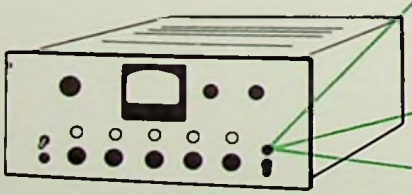

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SAN FRANCISCO SECTION

Grid

VOLUME 6 JANUARY 1960 NUMBER 5

(Continued on page 8)

IN THIS ISSUE

ABOUT THE COVER

K. E. Appert, who appears on the cover, was the supplier of syllable number two in the first name of Lenkurt Electric Co. He retired from active part in company affairs late last year with sale of his interest to General Telephone & Electronics.

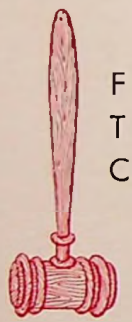
Finding himself with substantial quantities of GT&E stock, he wrote to each of about 300 of his former colleagues in management and engineering at the San Carlos plant and others in the company's various outposts, making stock gifts which totalled somewhere between 1.5 and 2 million dollars. He said, "This is a Christmas gift to you. It is an expression of my pleasure in our association . . . I would like you to have a part of the GT&E stock I received as my share in the success story of Lenkurt."

Seeking a suitable means to acknowledge a gesture of such magnitude, the group decided on a return gift of a Rolls Royce Silver Cloud II, also seen on the cover with the inscribed greeting card to Mr. and Mrs. Appert which accompanied it.

We salute these examples of industrial goodwill in our midst and hope that the engine noise stays 3 db below the panel clock for many happy years.

The GRID is published by the San Francisco Section of the Institute of Radio Engineers monthly except for July and August.

Please send Form 3579 to:
Editorial and circulation office: P.O. Box 966, San Mateo, California
Subscription: $1.00 (members); $2.00 (non-members) per annum.
Office of publication: 394 Pacific Ave., Fifth Floor, San Francisco, Calif.
Second-class postage paid at San Francisco, California.



FROM THE CHAIRS

East-West Co-existence

The East Bay Subsection was organized shortly after World War II and its operations have oscillated from very active to very inactive. The existence of a subsection is justified when there exists within a section more than one center of "radio activity." The by-laws of the IRE indicate that one way to promote electronic activity in a geographical subcenter is with the existence of a subgroup of this kind. For the first few years of the East Bay Subsection operation, interesting, well-attended meetings indicated that the Subsection was indeed serving the desired function for its members.

With the advent of meetings of professional group chapters several years ago, it became evident that there was a decreased need for the Subsection. There was and is ample literature available of both purely technical and semi-technical activities outside a member's specialty to keep him informed. In addition, the professional group meetings within a specialty are sufficiently valuable to overcome transportation difficulties from the East Bay (at any rate, from the relatively nearby Oakland-Berkeley-Richmond area) to meetings, usually on the Peninsula.

With these developments in mind, previous officers of the East Bay Subsection had come to the tentative conclusion that the need for the East Bay Subsection was no longer present. However, during the past year it has been evident that the geographical reason for a subsection in the East Bay still exists because of the growth of electronic activity in the Livermore and Concord/Walnut Creek areas. These two areas, and particularly the former, are far enough removed from the majority of the professional group meetings to require a Subsection to promote technical meetings and other IRE activities.

At the time for nominations and election of officers last year this was taken into consideration. Elected officers included a vice chairman and secretary-treasurer from the Livermore area. In addition, in making up the meeting agenda, it was planned that the majority of the meetings of the East Bay Subsection would be held in the Livermore area. There is close coordination with those professional groups of greatest interest to the members in the Livermore and Concord areas. During the remainder of the year it is planned that at least two events to be held in the East Bay area will be joint meetings with certain professional groups.

The membership is now aware of changes within the executive committee of the San Francisco Section. At the present time the chairman of the East Bay Subsection is a member of the executive committee. Representation on the operating committee of the executive committee is maintained through direct liaison with the chairman of the Section. It will be seen after this year and next whether we do in fact have a need for the East Bay Subsection because of the distance between different geographical areas of electronic activity.

If the Subsection is abandoned, it is expected that the various professional groups will take into consideration the membership in the East Bay in planning their activities.

Donald O Pederson

—Donald O. Pederson, chairman, EBSS

Donald O. Pederson

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MEETING CALENDAR

Antennas & Propagation
8:00 P.M. • Wednesday, Feb. 24

(Joint meeting with PGCS, see below)

Communications Systems
8:15 P.M. • Wednesday, Jan. 27

"Propagation Factors in the Design of Scatter Circuits"
Speaker: Dr. W. H. Kummer, Hughes Aircraft Company
Place: Room 101, Physics Lecture Hall, Stanford University
Dinner: 6:00 P.M., Hal's Restaurant, 4085 El Camino Way, Palo Alto
Reservations: Mrs. Wada, DAvenport 1-3300, Ext. 318

Communications Systems
8:00 P.M. • Wednesday, Feb. 24

(Joint meeting with PGAP)
"Department of Defense: Problems, Policies, and Objectives in Worldwide Communications"
Speaker: Ralph Clark, assistant director for communications office of the Department of Defense Research and Engineering
Place: Physics Lecture Hall, Stanford University
Dinner: Details to be announced

Electron Devices
8:00 P.M. • Wednesday, Jan. 27

"Thermionic Cathodes: State of the Art"
Speaker: L. J. Cronin, president, Semicon of California, Inc.
Place: Room 100, Physics Lecture Hall, Stanford University

Electron Devices
8:00 P.M. • Monday, Feb. 29

"The Crossed Field vs the Linear Beam in Microwave Super-Power Generation"
Speakers: W. C. Brown, assistant vice president, Raytheon; and Dr. M. Chodorow, professor of applied physics, Stanford University
Place: Room 100, Physics Lecture Hall, Stanford University

Electronic Computers
8:00 P.M. • Tuesday, Jan. 26

"ERMA Computing System—Principles and Operating Experience"
Speakers: Jay G. Levinthal, manager, systems engineering; and Claude H. Tucker, engineer, General Electric Computer Lab, Palo Alto
Place: Bank of America Conference Room, First and Santa Clara, San Jose
Dinner: To be announced
(A tour is also scheduled at the Bank of America computer center, Fourth and St. John St., San Jose)

Engineering Writing & Speech
8:00 P.M. • Tuesday, Jan. 19

"A New Approach to the News"
Speaker: Norman Tipton of "Electronic News" magazine
Place: WESCON office, 60 West 41st Avenue, San Mateo
Dinner: Villa Chartier, 4060 South El Camino Real, San Mateo
(No reservation necessary; ask for PGEWS table)

Medical Electronics
8:00 P.M. • Tuesday, Jan. 19

"Micro-Instrumentation of Nerve Cells"
Speakers: Dr. Ronald Grant, professor of physiology, Stanford University; James J. Patterson, physical chemist, Palo Alto Medical Research Foundation; and Kenneth W. Gardiner, research engineer, control systems laboratory, Stanford Research Institute
Place: Room M112, Stanford Medical Center, Palo Alto
Dinner: 6:00 P.M., Red Cottage, Menlo Park
Reservation: George Turner, DAvenport 5-8332

Military Electronics
8:00 P.M. • Tuesday, Feb. 2, 9, 16, 23

(Joint series with PGPT and PGRQC—see Production Techniques)

MEETING CALENDAR

Production Techniques 8:00 P.M. • Tuesday, Feb. 2, 9, 16, 23

(Joint series with PGMIL/PGRQC)
"Microminiaturization"
Speakers: Charles Reise, Hewlett-Packard Co., photocell construction; Samuel A. Francis, Francis Associates, Marion, Mass., welded assemblies; Jack Jennings, Spectracoat Inc., Belmont, thin metal films; and W. D. Fuller, Lockheed, Sunnyvale, LMSD work
Place: All Room 100, Physics Lecture Hall, Stanford University, except Feb. 9, Room 300, Engineering Corner
Further details and additional meetings to be announced

Reliability & Quality Control 8:00 P.M. • Tuesday, Feb. 2, 9, 16, 23

(Joint series with PGMIL and PGPT—see Production Techniques)

Space Electronics & Telemetry 8:00 P.M. • Tuesday, Jan. 19

"The Explorer VI Experiment"
Speaker: Dr. Charles Sonnet, head of space physics section, guidance research laboratory, Space Technology Laboratory, El Segundo
Place: Lockheed Missiles and Space Division, 3251 Hanover Street, Palo Alto, Calif.
Dinner: 6:30 P.M., Hal's Restaurant, 4085 El Camino Way, Palo Alto
Reservations: Lois Reed, REgent 4-4321, Ext. 2-8150

Space Electronics & Telemetry 8:00 P.M. • Tuesday, Feb. 16

"Design Considerations for a PAM-FM Telemetry System"
Speaker: Thomas D. Lusk, associate research scientist, communications & control dept., Lockheed MSD, Palo Alto
Place: Auditorium, Bldg. 202, Lockheed Missiles and Space Division, 3251 Hanover Street, Palo Alto, Calif.
Dinner: "Meet-the-Speaker" dinner, 6:30 P.M., Hal's Restaurant, 4085 El Camino Way, Palo Alto
Reservations: Lois Reed, REgent 9-4321, Ext. 2-8150, before 12:00 noon February 16

Space Electronics & Telemetry 8:00 P.M. • Tuesday, Mar. 15

"The Courier Satellite Communications System"
Speaker: Donald Marx, project manager, U. S. Army Signal Research & Development Laboratories, Ft. Monmouth, N. J.
Place: Auditorium, Bldg. 202, Lockheed Missiles and Space Division, 3251 Hanover Street, Palo Alto, Calif.
Dinner: "Meet-the-Speaker" dinner, 6:30 P.M., Hal's Restaurant, 4085 El Camino Way, Palo Alto, Calif.
Reservations: Lois Reed, REgent 9-4321, Ext. 2-8150 before noon, Mar. 15

CHRONOLOGICAL RECAP

January 19—Engineering Writing & Speech, Medical Electronics, Space Electronics & Telemetry
January 26—Electronic Computers
January 27—Communications Systems, Electron Devices
February 2—Military Electronics/Production Techniques/Reliability & Quality Control
February 9—Military Electronics/Production Techniques/Reliability & Quality Control
February 16—Space Electronics & Telemetry, Military Electronics/Production Techniques/Reliability & Quality Control
February 23—Military Electronics/Production Techniques/Reliability & Quality Control
February 24—Antennas & Propagation/Communications Systems
February 29—Electron Devices
March 15—Space Electronics & Telemetry

MEETING AHEAD

Super Power

A discussion of prime importance in the microwave super-power tube field is scheduled by PGED as a joint meeting with the Section for February. See the Meeting Calendar, page 8. Two eminent authorities will debate the relative merits of the crossed-field and linear-beam approach for super-power generation. W. C. Brown, assistant vice president at Raytheon, will come out of the crossed-field corner, and Dr. M. Chodorow, professor of applied physics at Stanford University, will defend the linear-beam approach.

MEETING AHEAD

Thermionic Cathodes

Who in the tube business doesn't need to know more about thermionic cathodes? Undoubtedly we all will welcome this state of the art discussion by L. J. Cronin, president of Semicon of California. The talk will be sponsored by the PGED. For details, see Meeting Calendar, page 8.

Cronin will outline new applications such as the thermionic converter, linear accelerators, ion propulsion, plasma studies, magnetrons, traveling-wave tubes, backward-wave oscillators, klystrons, special-purpose tubes and ruggedized receiving tubes. His discussion will feature physical and electrical properties such as work functions, perveance, life, operating temperatures, ion resistance, poisoning, and new size requirements. Associated topics such as activators, heaters, and electron leakage will also be mentioned.

Since graduating with a BS degree in chemical engineering from Worcester

(Continued on page 10)

L. J. Cronin, speaker for the January PGED meeting

MORE CATHODES

Polytechnic Institute in 1938, Cronin has spent five years with RCA in vacuum-tube engineering and twelve years with Raytheon where he was head of the techniques department in charge of ceramic development, ceramic-to-metal seals, physical metallurgy, chemical electronics, and physical electronics. Cronin is author of numerous publications, talks and patents in these fields. He has had graduate studies in statistics, ceramics, solid state physics, sales, and business management. Since July, 1957, he has been a partner and president of Semicon of California, Inc., a firm engaged in research, development and production of components for the electronic and aircraft industries. He is a member of the American Physical Society, American Ceramic Society, and IRE.

MEETING AHEAD

Scatter Propagation

The propagation medium is one of the factors which must be taken into account in the design of scatter circuits. In the January PGCS meeting, two aspects of propagation will be discussed: twin-feed diversity reception and bandwidth of the medium. These studies were conducted at Bell Telephone Laboratories using a 171-mile experimental circuit between Pharsalia, New York, and Crawford Hill, New Jersey. See page 8 for Meeting Calendar.

The diversity systems to be described by Dr. Kummer use one receiving antenna with two feeds. Two types of feed positions are used: horizontal feeds placed side by side and vertically stacked feeds. Uncorrelated signals should be obtained for the two feeds because they are oriented to illuminate different parts of the atmosphere. Results of the experiments show that the received signals were uncorrelated for vertically disposed horns at 460 and 4110 mc while for the horizontal position only the 4110-mc signals were uncorrelated at all times; at 460 mc the correlation was a function of the short-term fading rate.

These results will be interpreted in terms of the theory of layers. This theory is based on the simple assumption that tropospheric propagation beyond the horizon is due to reflections from a large number of randomly disposed layers in the volume of the atmosphere common to the beams of the transmitting and receiving antennas.

Delays introduced by multipath propagation, limit the useful bandwidth of scatter systems. The bandwidth experiments were performed at 4110 mc; the transmitter was sawtooth-modulated at a 1000-cps rate over a 20-mc band. The receiver was swept non-synchronously over the same band at a 30-cps rate and the resultant pulses were displayed on an oscilloscope. Samples of sequences of photographs for various propagation conditions and antenna combinations will be shown. Statistical analyses of the photographs will be presented and explained in terms of the mechanism of propagation.

W. H. Kummer received the BS (1946), MS (1947), and PhD (1954) degrees, all in electrical engineering, from the University of California, Berkeley.

From 1950 until 1953 he was lecturer in electrical engineering and research engineer in the electronics research laboratory at the University of California. Subsequently he joined the radio research department of Bell Telephone Laboratories at Holmdel, N. J.

Recently he became associated with Hughes Aircraft Company, Culver City, as staff engineer in the antenna research department of the microwave laboratory.

He has done research in the fields of slot radiators, multimode waveguide, and tropospheric propagation beyond-the-horizon.

He is a member of Sigma Xi and Phi Beta Kappa and a senior member of the IRE.

MEETING REVIEW

Americans in Moscow

The Professional Group on Broadcasting held a joint meeting with the SMPTE December 8 at the KGO-TV studios in San Francisco.

Joseph Roizen of the Ampex Corporation entertained the mixed audience with a vivid description of his "Experiences in Russia with the American National Exhibition."

The Ampex group spent over two months in Russia with the color Videotape Recorder display at Sokolinski Park in Moscow.

Motion pictures and slides of the Exhibition, Moscow, and Leningrad were presented, showing the Russian people in many walks of life.

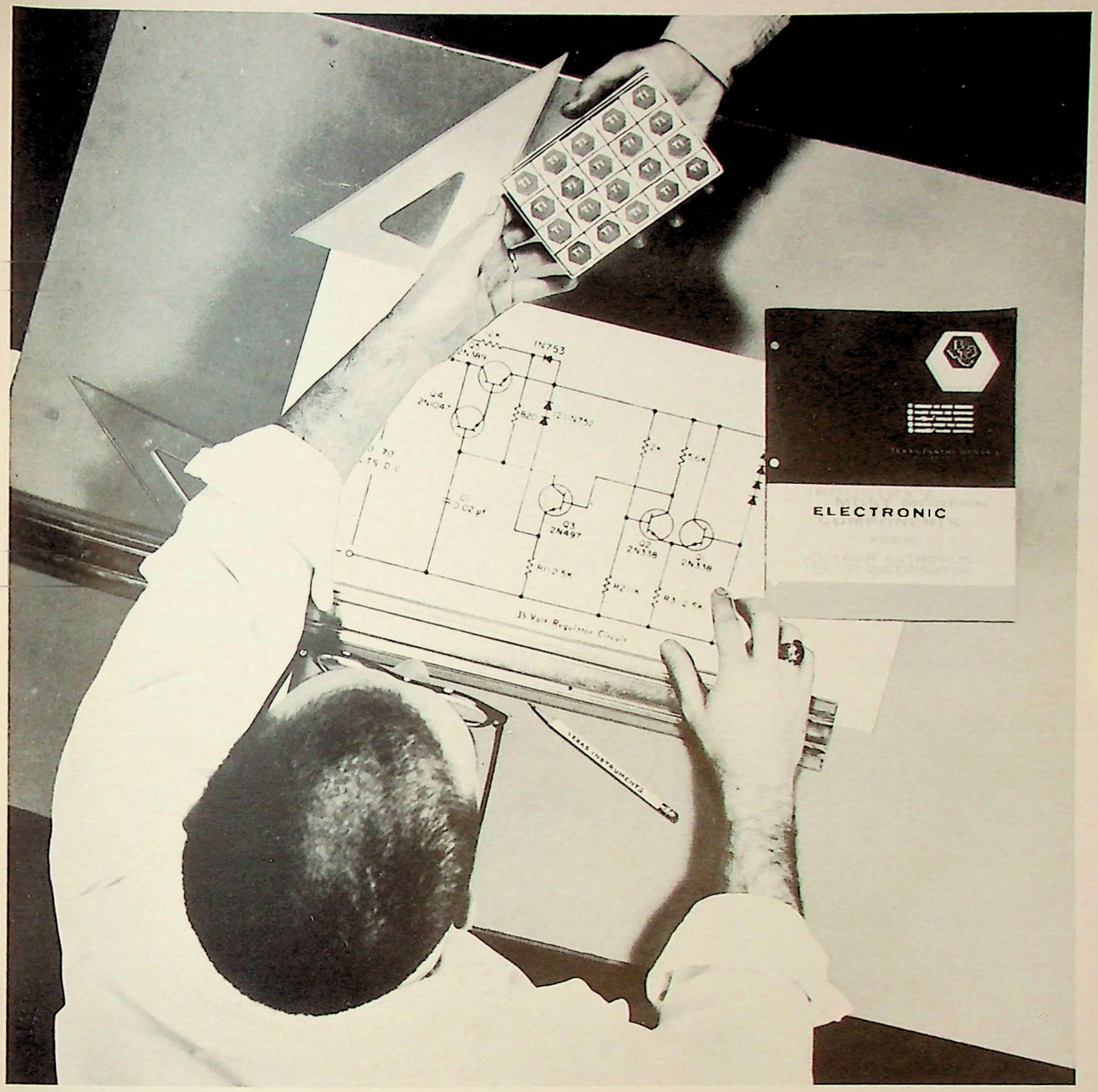
An unusual stereotape recording of a Russian religious ceremony was played. A Videotape recording of the famous Nixon-Khrushchev debate was also shown and Roizen told the story of how the tape was taken out of Russia.

A display of various Russian goods, technical magazines, photo magazines, newspapers, and postage stamps was on display after the meeting.

Attendance totaled 133 members and guests, an indication of great interest in the topic.

—Harry N. Jacobs

Joseph Roizen of Ampex Corporation, speaking at left before the December joint meeting of PGB and SMPTE, told the audience, right, about the Ampex adventures at the American National Exhibition in Moscow



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MEETING REVIEW

Quick Nic

The December 15 meeting of the PGEC was held in the Stanford Village Auditorium, Menlo Park. Chairman Douglas Englebart presided.

The group was fortunate to have Dr. Wolfgang J. Poppelbaum of the University of Illinois as a speaker. His topic was "The Circuit Philosophy and Design for the New Illiac Computer."

This computer is being designed and built at the University of Illinois and is financed under contract with the AEC. The name of this computer is Illiac II or Nic (New Illiac Computer). The University of Illinois is noted for work in asynchronous type computers; asynchronous meaning no basic timing clock. Illiac II is basically of this type, although there is some synchronization performed by the data in the data circuits and other ingenious methods in the control circuits. It may be more proper to call this system psuedo-synchronous.

Fantastically high operating speeds are achieved by this type of system in conjunction with ingenious circuitry. It is claimed that this will be the fastest operating machine, even faster than IBM's Stretch. Typical operating times are one-quarter microsecond for addition and 4.5 microseconds for multiplication on 52-bit words.

Other methods employed for achieving high speeds are the use of a flip-flop buffer memory, a separate carry storage in the parallel adder, and a recoding of the binary words to a base-4 for multiplication. Many of the circuits used were explained.

The system when completed will use approximately 15,000 mesa transistors and 30,000 diodes.

Poppelbaum was born in Franco, Germany, and had his basic education in Basel, Switzerland. He received his PhD in solid-state physics from the University of Luzanne, Switzerland, in 1953. From there he went to the University of Illinois where he taught courses in transistors and circuit theory. He is presently a research associate professor in charge of the basic circuits group on the Illiac II computer.

—J. A. Boysen

MEETING REVIEW

Untranquil Yttrium

The joint meeting of the PGMTT and PGED on December 2 was held at the Physics Lecture Hall at Stanford University. Dr. John Shaw of Stanford gave a review of the basic theory and the state of the art in the generation of microwaves using ferrites as well as describing his own recent results in this field.[1]

Wolfgang Poppelbaum, speaker at a December meeting of PGEC
—Henry Herold photo

For the purposes of his talk, Shaw considered a ferrite as a very dense collection of electrons with spins in which energy can be stored by means of a pulsed magnetic field. Under suitable circumstances this stored energy can be extracted in the form of microwave radiation. The effective density of electron spins in a ferrite is of the order of 10^{22} per cm^3. A dense electron beam, on the other hand, has a maximum density of 10^{10} electrons per cm^3.

For a fair comparison between the two cases it is necessary to take into account the fact that the energy is stored in different ways: the energy of the spins in a magnetic field in one case and the kinetic energy of the moving electrons in the other. In practical devices the energy stored per electron in a beam is typically 10^8 times greater than that associated with each spin in the ferrite. Nevertheless, the greater density of the spins in the ferrite would more than compensate for this difference if a way could be found to use them with high efficiency.

Consider a ferrite sphere in a magnetic field large enough to saturate it. In equilibrium the internal field is uniform and the electrons are lined up parallel to it. If the direction of the applied field is now changed suddenly, the spins will then precess about the new field direction with an angular frequency given by $\omega = \gamma H$, where γ is the gyromagnetic ratio $\gamma/2\pi = 2.78$ mc/oersted and H is the field intensity. As long as the spins continue to move in phase, the sphere as a whole will have a precessing magnetic dipole moment, and this dipole can be coupled to an external radiation field, resulting in the generation of microwave power at the precession frequency.

(Continued on page 14)

MORE YTTRIUM

However, the precessional motion of the spins is rapidly damped by internal loss mechanisms in the ferrite. In order to generate microwave radiation with appreciable efficiency it is necessary that the applied field be changed in a time short in comparison with this natural relaxation time. Ordinary ferrites have relaxation times which are too short for this application. However, single-crystal spheres of yttrium iron garnet have recently become available with internal relaxation times of the order of 10^{-7} second, and these make generation of microwave power practicable.

The first scheme suggested for this type of microwave generator involved placing the ferrite in a d-c field just sufficient to saturate it and then applying a large pulsed field at an angle of either 90 or 180 deg to the initial field. Detailed theoretical analyses of these schemes by Morgenthaler[2] and Schaug-Petersen[3] have, however, shown them to be impractical. In one case the difficulty is the requirement that the rise time of the pulse be short in comparison to a single cycle of the precessional motion. In the second case, spin waves (non-uniform modes of motion of the electron spins) compete with and build up more rapidly than the desired uniform precession, which alone can be coupled efficiently to the radiation field.

To overcome these difficulties, Shaw has devised a scheme in which the spins in the ferrite are driven into precession by means of a microwave field at a frequency corresponding to gyromagnetic resonance in the initial, relatively weak field. The pulsed field is then applied in the same direction as the initial field. If the rise time of the pulse is short in comparison to the relaxation time, the angle Θ which the precessing spins make with the field direction will remain nearly constant until the field reaches its peak value. The energy of the spin system is given by $W = MVH\Theta^2/2$, where M is the magnetization, V the volume of sample and H the applied field.

Thus the energy available for radiation at the higher frequency exceeds the initial energy by a factor equal to the ratio of the peak field to the initial field. The angle Θ must be made as large as possible in order to maximize the energy in each output pulse. Suhl[1] has shown that Θ increases with the amplitude of the driving field until a certain critical value Θ_c is reached. Any further increase in the amplitude of the driving field is coupled by non-linear effects into spin-wave modes without any further increase in the amplitude of the desired uniform precession. Typically, Θ_c is a few degrees so that (expressing Θ_c in radians) Θ_c^2 is of the order of 10^{-3}. Although it is possible to exceed Θ_c somewhat on a transient basis by use of pulsed r-f pumping, this factor limits the output power to a few tenths of a per cent of that which could be obtained if large precession angles could be achieved.

An experimental arrangement built to test this theory is shown in Figure 1. The power from the pump source at 2.4 kmc passes through a circular polarizer in round waveguide followed by a transition to a section of 3-conductor strip line. This line is closely coupled to the sample, an yttrium-iron garnet sphere 0.120 in. in diameter with an internal relaxation time of the order of 100 mμsec. A pulsed field of 150-gauss intensity and 5-mμsec rise time is applied to the sample. This raises its reso-

(Continued on page 16)

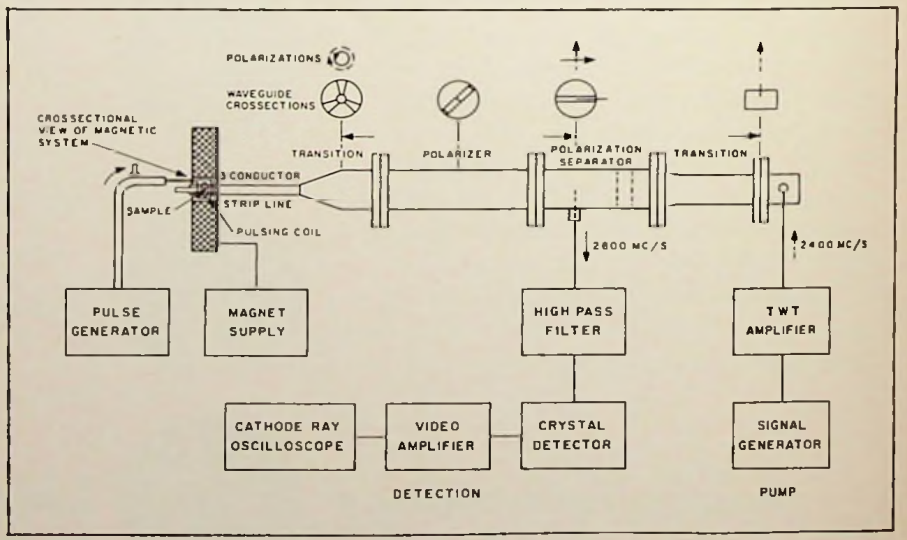

Fig. 1. Experimental 1-watt 2.8-kmc ferrite generator described at the December PGMTT/PGED meeting. See text

MORE YTTRIUM

nant frequency to 2.8 kmc, where the electron spins precess freely and re-radiate their stored energy. This output power passes back through the circular polarizer, a polarization separator and a high-pass filter to a detector. The maximum peak power obtained with this system was about one watt.

With presently available techniques it is estimated that a pulsed field of 6000 gauss with a 2-mμsec rise time could be obtained. This would make possible an output frequency of 20 kmc with a pump frequency of 3 kmc. Ultimately operation into the millimeter wavelength range should be possible.

Another approach to the generation of millimeter waves involves the use of non-linear effects in ferrites at high power levels for harmonic generation[5]. High conversion efficiencies are possible with this method, but the output frequency can only be varied by tuning the driving oscillator, not by merely varying the magnetic field applied to the ferrite as in the method described above.

Still another approach is the pulsed-field paramagnetic maser[6]. This device is superficially very similar to the pulsed ferromagnetic generator described above. The density of spins is much lower than that in the ferromagnetic case, however, which reduces the power obtainable from a sample of given volume. Furthermore, the maser requires cooling to liquid-helium temperatures.

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—E. F. Barnett

MEETING REVIEW

Managing Communication

"Is communication as good as management thinks it is?," was the question of the night when the Professional Group on Engineering Management held its December meeting at Hal's Restaurant in Palo Alto. The speaker was Mr. John L. Church of Booz, Allen & Hamilton, management consultants. Church's talk on the management of research and development was given following an informal dinner attended by 54 members and guests. He uncovered some very interesting contradictions in the problem of communication and understanding between management and the research and development people with whom management works.

Church reported the results of an evaluation of management methods,

(Continued on page 18)

John Church, speaker at the December PGEM meeting, poses with Allan Dunbar, Lockheed, chairman of the group, and Oscar T. Simpson, Philco, vice chairman

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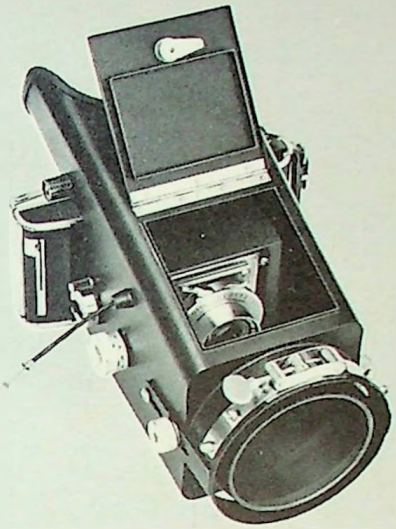

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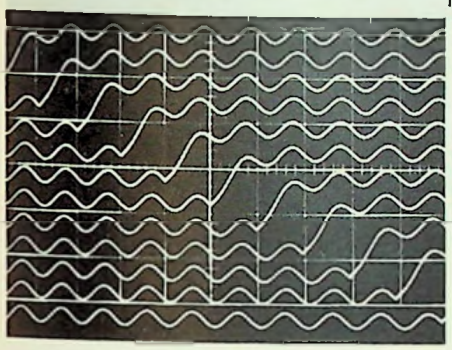

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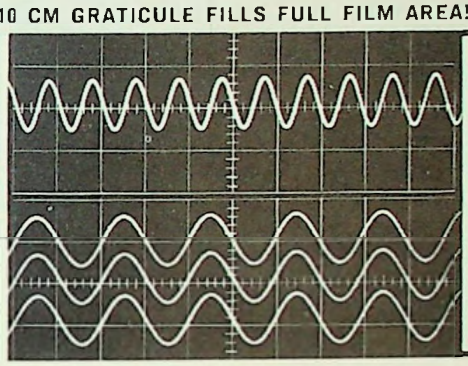

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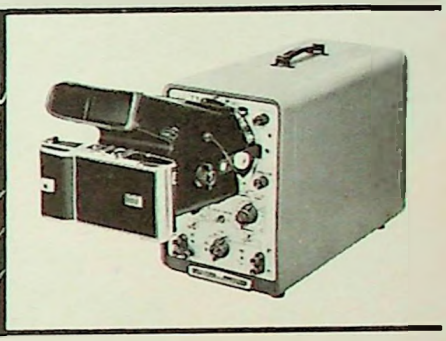

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GRID RETURNS

Letters to the Editor

Mountain View

Dear Editor:

(Please refer to page 18 of the December issue of the Grid)

"Christofilos, while he was born in Boston, Mass., spent his youth in Athens, Greece."

This sounds to me like a quite unusual achievement in locomotion.

Yours very truly,
Mark M. Siera

Probably what got him started on accelerators.—Ed.

Princeton, N. J.

Dear Editor:

I read with interest the October 1959 **Grid,** as I do every issue. I was pleased to see the cover picture and associated story on the triumph of electronics at Moscow.

Ampex and RCA enjoy a friendly rivalry to the point of cross licensing agreements, yet your writer almost completely ignored the fifteen RCA and NBC personnel who worked for four weeks prior to the arrival of the Ampex engineers, preparing the studio.

This studio was built from the ground up under extremely trying circumstances, and was completely equipped by RCA for "live" and film color TV

(Continued on page 24)

MORE COMMUNICATION

based upon surveys at 100 corporations. Some interesting figures were produced to show that the engineers and scientists in a company may be quite unhappy with the degree of communication between top management and engineering-scientific personnel, while at the same time top management is patting itself on the back for having achieved satisfactory communications.

Six practical ways to improve R&D are suggested: 1. Improve your selection of research projects; 2. Improve your utilization of technical personnel; 3. Improve your selection of research supervisors; 4. Improve the organization of your research program; 5. Improve the control of your research; and 6. Improve your methods of evaluating research methods.

Church's talk was given to an audience of 65. His presentation was very well illustrated with excellent slides and stimulated many interesting questions and discussions with the audience. His material was a portion of a complete two-hour presentation which is available to management groups at no charge.

—*C. F. Meyer*

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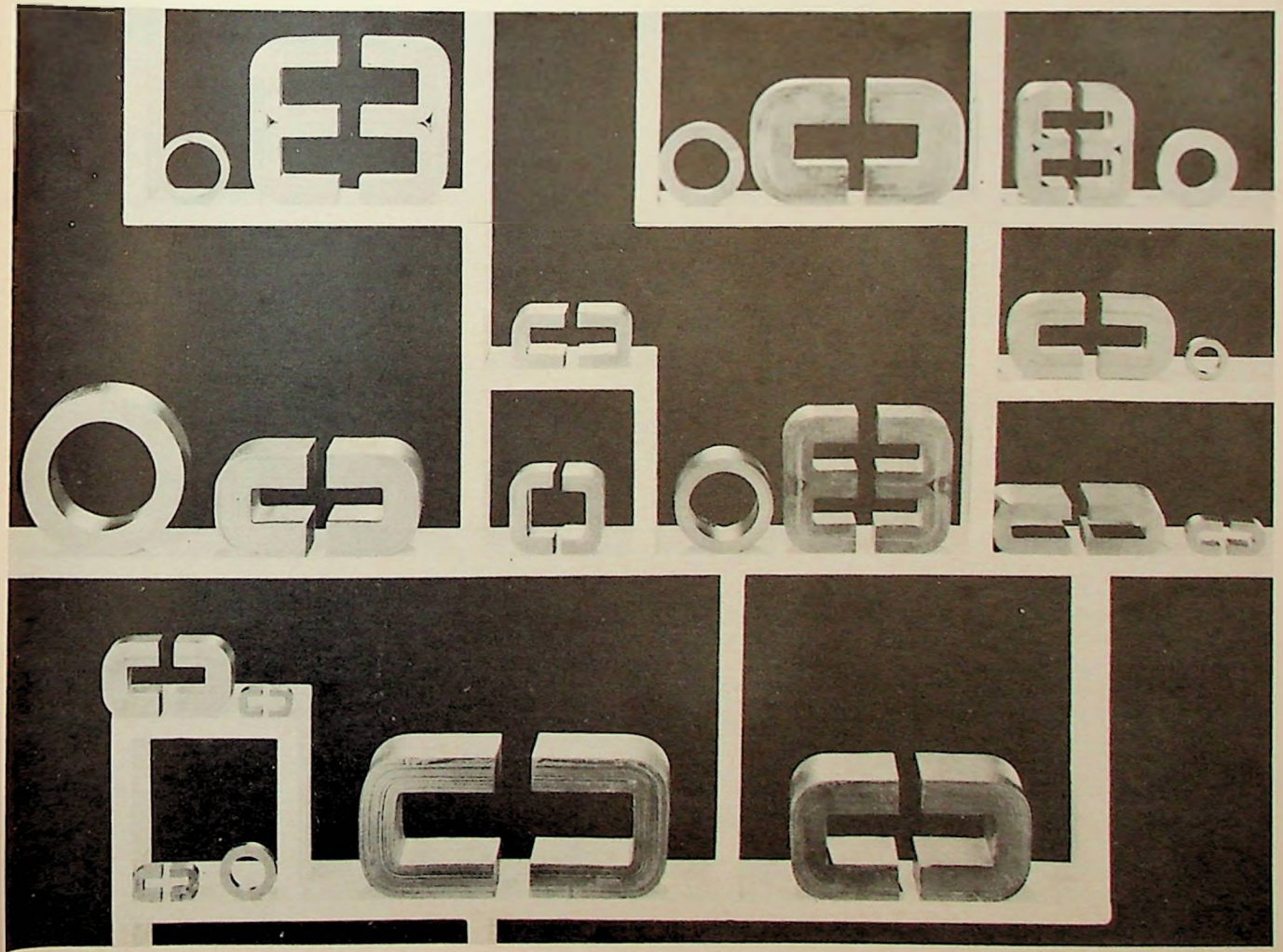

GRID SWINGS

It Is Reported:

A new industry-university cooperative program, involving 17 organizations in the transistor field, has been launched by **Stanford University**. The cooperative program is aimed at enlarging Stanford's solid-state electronics program and increasing liaison with the industry.

Each affiliate contributes $5,000 a year for five years. These funds are used primarily to enlarge the electrical-engineering faculty engaged in the new program. A yearly "annual review" conference is scheduled to be held on the campus, when affiliates and faculty will discuss new developments in this field.

The 17 affiliates are: **Ampex Corp., Fairchild Semiconductor Corp., Hewlett-Packard Co., Hughes Aircraft Co., International Business Machines Corp., Lenkurt Electric Co., Lockheed Aircraft Corp., Marquardt Aircraft Co., Motorola Inc., Pacific Semiconductor Co., Radio Corporation of America, Rheem Semiconductor Co., Stanford Research Institute, Sylvania Electric Products Inc., Tektronix Inc., Texas Instrument Co.,** and **Varian Associates.**

Four other organizations are contributing to the program in various

(Continued on page 26)

MORE LETTERS

operations. In fact the monitor which Gundy and "friends" are watching was part of the RCA equipment. It might have been courteous too to mention that Gundy's "friend" on the far right of the cover picture is J. L. Burns, president of RCA. Your inside picture shows Khrushchev, Nixon, Voroshilov, Mikoyan, and Kozlov. But it also shows George Malko, a Russian speaking member of the NBC staff. It was this NBC staff that arranged the talent shown on television.

We are all proud of the job that Ampex and RCA did in exhibiting some of the most complex forms of technology shown in Moscow, but I feel that Ampex might have been just a little more generous in giving credit to the "television men" who supplied program, sync, color bars, subcarrier, monitors, soup, and nuts.

Robert E. Flory
Radio Corporation of America

To colleague Flory (Editor of the Princeton Section publication), apologies for any apparent slight. It is not Ampex's lack of generosity but rather the strong provincialism of the Grid which makes it extremely difficult for any outlander to get mentioned.—Ed.

MORE SWINGS

ways, but are not affiliates.

One, the **Bell Telephone Laboratories,** lent a top scientist for six months teaching and now is permitting him to retire early to spend full time on the Stanford program. He is Dr. **Gerald L. Pearson,** co-inventor of the solar battery.

Another, the **Shockley Transistor Corp.,** lends its president for occasional teaching and consultation. He is Dr. **William B. Shockley,** co-winner of the 1956 Nobel Prize for discovering the transistor, and a lecturer in Stanford's department of electrical engineering.

A third, the **General Electric Foundation,** is providing financial support for the program.

Funds from the fourth donor, **Gilfillan Brothers Inc.** of Los Angeles, gave Stanford's solid-state electronics program its start in 1954. One of the firm's founders, **Sennett W. Gilfillan,** is an alumnus who captained Stanford's 1912 baseball team.

Student interest is keen, according to Professor **John G. Linvill,** director of the program. About 40 electrical engineering graduate students now are working on solid-state projects. Most are PhD condidates.

Besides Professor Linvill, four others are engaged full time in the program: Professors **James F. Gibbons, Malcolm M. McWhorter, John L. Moll,** and **Robert M. Scarlett.** Additional participating faculty include Professors **Hubert Heffner, Anthony E. Siegman,** and **Glen Wade.**

Appointed as sales representatives by **Balco Research Laboratories, Inc.,** (high temperature plastic film capacitors) is **Electrosources, Inc.,** Palo Alto.

Howard Cary, president of Applied Physics Corporation, Monrovia, has been elected to **Varian Associates'** board of directors.

Wellesley Dodds, manager of **Varian Associates'** traveling-wave-tube and backward-wave-oscillator development department, has been made vice president of engineering and a member of the board of directors for **Bomac Lab-**

(Continued on page 28)

Cary *Dodds*

MORE SWINGS

oratories, Inc. Dodds will head up all research and development on present and future product lines, including radar switching tubes, magnetrons, silicone diodes, and duplexers.

The **Varian Associates** board of directors has elected **Merle Zinser** vice president for finance to fill one of the two vacancies on the board created by the death of Russell Varian and the resignation of David Packard. Zinser joined Varian Associates in 1951 after several years with Marchant Calculating Company as assistant to the president.

The late **Russell Varian** will receive a living memorial, according to plans of the Sierra Club of which he was an active member. The project involves development of a favorite hiking area of his, Castle Rock Park, on the summit of a 3100-ft ridge three miles south of the intersection of Skyline Boulevard and the Saratoga/Big Basin Road. Contributions for the development can be sent to Castle Rock Memorial Park, Conservation and Memorial Fund, Sierra Club, 1050 Mills Tower, San Francisco.

Finances of two concerns with either local roots or local branches have been announced as follows: **Varian Associates** has experienced a 67-per-cent increase in earnings and a 32-per-cent increase in sales volume for the year ending September 30. Consolidated sales: $38 million plus. Net income: 81 cents per share on 3,125,650 shares. **Radiation Incorporated** showed 38.9 per cent sales increase, and 20.5 per cent earnings increase to August 28. Sales equalled $14 million plus (including **Levinthal Electronic Products**) and earnings, $588,993 or 66 cents per share.

Charles Miller, Varian Associates, has been elected president of the **American Society for Calibration and Standardization.** Other officers include **Phil Hand,** Hewlett-Packard, vice president; **Tom Wilson,** Lockheed MSD, Sunnyvale, treasurer; and **Dale Kastle,** McCarthy Associates, secretary. Elected to the Board were **Carroll Frankfort,** Stanford University; **A. E. Shales,** Eitel-McCullough; **Paul Hubbs,** Hewlett-Packard; and **R. Fosdick** of IBM.

Hewlett-Packard Company announced plans to establish a manufacturing, research, and development facility in Loveland, Colorado. The company expects construction of the first building in Loveland to begin in 1960, and at least 300 people to be employed there by 1961.

(Continued on page 29)

Dubois

Bowles

Ampex Data Products Company has appointed **Russell Dubois** head of the marketing activities in the computer products division under **James Bowles,** division manager. The instrumentation products division, managed by **Paul Weber,** will have **Gene Rogers** in charge of marketing.

Weber

Rogers

Harvey G. Lowhurst has been recently appointed patent counsel at **Ampex Corporation,** it was announced. Lowhurst, who will be responsible for all patent and licensing matters at the company's Redwood City headquarters, was formerly patent counsel at Link Aviation, Inc., in Palo Alto. He was also affiliated with Hughes Aircraft Company for a number of years as patent attorney.

In addition to his law degree, received at the University of Southern California, Lowhurst holds degrees in physics from both Columbia University and McGill University. He subsequently lectured at the Newark College of Engineering and was an assistant research physicist with the radiological research laboratory of Columbia University.

Lowhurst

Stahl

Robert J. Stahl is now in the newly created position of manager of commercial planning for the Mountain View operations of **Sylvania Electric Products**

(Continued on page 30)

MORE SWINGS

Inc. In this position, Stahl will be responsible for creating and guiding a commercial-product program.

Formerly with Dalmo Victor Division of Textron Inc., Stahl has had over 16 years' experience in electronic engineering and general management. His last position with Dalmo Victor was as manager of the hydraulics division.

Harper

Goldsborough

In **Sylvania Electric Products,** the promotion of **John W. Harper** to the position of engineering specialist at the electronic defense laboratories has been announced. Formerly an advanced development engineer in the analyzer section, Harper will now be responsible for supervising engineers engaged in design and development of electronic circuits and sub-systems used in automatic analysis equipment.

Robert R. Goldsborough has become program manager for a specialized airborne system in Sylvania electronic systems, a major division of the company, which is part of an eight-company team engaged in the design and development program. **Robert L. Amelang, Rudolph Cazanjian,** and **Melbourne J. Myers** have been appointed to the administrative staff of the same program.

John S. McCullough, formerly of Eitel-McCullough, Inc., has joined the tube division of **Litton Industries** as assistant to the vice president in charge of new product planning.

McCullough

Littman

Webster Manufacturing Co., Inc., Mill Valley, manufacturers of mobile antennas, announces the appointment of **Ed-**

(Continued on page 32)

MORE SWINGS

ward Littman as general manager.

Littman was employed previously by Lynch Carrier Telephone Systems and by Applied Electronics Co., Inc.

Dr. **Wayland C. Griffith** has been elevated to assistant director of research and **Robert H. Gibson** has been appointed to the newly created post of production and services manager of the Navy's Polaris fleet ballistic missile in the Lockheed missiles and space division.

Other major changes in Lockheed research move **Maurice Tucker** up to associate director of research for spacecraft and missiles and **J. R. Weiner** to associate director of information processing and computers. He formerly was a member of the research director's staff.

Dr. Griffith, who had been associate director of research with responsibility for spacecraft and missiles, fills a vacancy created when Dr. **John P. Nash** moved up to director of research earlier this year.

Dr. **Herbert N. Leifer,** head of solid-state-physics research, has been assigned to the University of Paris for an indeterminate period to engage in advanced research in his specialty. Leifer was invited to participate in the University's research program after members of its physics department became acquainted with his work during visits to U. S. scientific meetings. Replacing him as head of solid-state-physics research will be Dr. **Michael E. Browne.**

William C. Holmes has been appointed vice president and manager of the space communications division, **Radiation Incorporated** of Mountain View. Holmes, who recently joined Radiation's new West Coast division, was formerly at Lockheed. Prior to joining Lockheed, he was with Northrop Aircraft for eleven years.

Holmes

Quinn

A newly created marketing position, manager of marketing operations, has been assumed by **John R. Quinn** at Eitel-

(Continued on page 34)

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MORE SWINGS

McCullough, Inc., San Carlos. Prior to this promotion, Quinn was manager of the customer services department at Eimac. He joined the company in April 1958 as a member of the commercial marketing department.

Eitel-McCullough, Inc., has reached an agreement that will make **National Electronics, Inc.**, and **Industrial Tubes, Inc.**, of Geneva, Illinois, wholly owned subsidiaries. All of the stock of National Electronics and Industrial Tubes will be acquired by Eimac in return for 175,450 shares of Eitel-McCullough, Inc., which represents about 9 per cent of the stock. No cash will be involved. National Electronics and Industrial Tubes will be operated as separate subsidiaries.

Lenkurt Electric Company has named **Herbert K. Krengel** to the newly created position of assistant marketing manager in its commercial products division.

Krengel formerly was manager of the engineer, furnish and install project group. Succeeding Krengel as EF&I manager is **Rodman C. Romayne**, who has been with Lenkurt since 1955 as project engineer and EF&I project-engineering manager.

Pedersen Electronics of Lafayette has broken ground for a new plant to be built in the shape of a hyperbolic paraboloid. The new building, one of four planned for Pedersen's suburban acreage, will provide 10,000 sq ft of flexible space for research and development, conference, manufacturing and office space.

Concurrent with the announcement of the new plant, the company announced the appointment of **W. T. Wilkinson** as vice president and new applications engineer.

The semiconductor division of **Hoffman Electronics Corporation** has relocated its San Francisco area sales office to 1575 Laurel Avenue, San Carlos.

Merrill M. (Tod) Holt is Northern California branch manager at **Richard A. Strassner Co.**. Holt is replacing **Jim Hill**.

Holt is a retired naval officer, having spent 30 years in the service as an instructor and executive officer in electronic training commands.

Granger Associates has occupied an additional 8000 sq ft of office and laboratory facility at 974 Commercial St., Palo Alto, doubling existing floor space. Starting with two employees in the fall

(Continued on page 36)

MORE SWINGS

of 1956, the staff now totals 75. Sales for the year ending August 31 were $954,000. The firm anticipates $2 million sales in the coming year, based on the present volume and backlog.

Hoover

Appointment of Dr. **William G. Hoover,** professor of electrical engineering at Stanford University, as technical director of **Granger Associates** has been announced. Hoover has been director of Stanford's Ryan High Voltage Laboratory since 1957. He will retain an association with the University's academic and research activities. With Granger Associates, Hoover will supervise the company's expanding technical programs with particular emphasis on pulse systems, microwave-tube applications, and advanced-circuit techniques.

Dr. **J. R. McCaughna** has been appointed to direct electronics research and development at **Broadview Research Corporation,** Burlingame. The new research executive comes to Broadview after ten years of consulting in electronics. A native of San Francisco, McCaughna attended the University of California at Berkeley, where he received BS, MS, and PhD degrees in chemistry. Upon completion of his graduate work he studied electrical engineering, worked in Mexico for Mexican Industries, Lt., and was chief engineer for Pacific Electronics Corporation.

Bauer Electronics Corporation has been established in Burlingame to enter the broadcast-equipment field. Plans include the introduction of 1- and 5-kw a-m broadcast transmitters early in 1960. **Fritz Bauer,** active in this industry since 1926, is president and principal stockholder. **Paul Gregg,** sales manager, was formerly West Coast sales engineer for Gates Radio.

Bauer

Gregg

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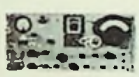

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Gertsch

MICROWAVE FREQUENCY MULTIPLIER

MODEL FM-4A

-measures 100 to 30,000mc
-generates 500 to 30,000mc
with high accuracy and stability

This instrument transfers the accuracy and stability of a VHF driver into the microwave region. The unique Gertsch circuitry – a phase-locked UHF oscillator coupled to a buffer amplifier and harmonic generator-mixer – gives continuous and complete coverage throughout the region.

You can drive the unit with Gertsch frequency meters FM-3, FM-6, or FM-7. Accuracy and stability remain the same as that of the driving source. Fundamental frequency range is 500 to 1000 Mcs, with output to at least 30,000 Mcs available from external harmonic generator-mixer.

Instrument is ideal for calibration of cavity wavemeters... for precise measurements, or as an ultra-stable frequency source for microwave spectroscopy. Unitized construction simplifies servicing. Unit is adaptable for rack mounting.

Complete data in Bulletin FM-4A.

Gertsch

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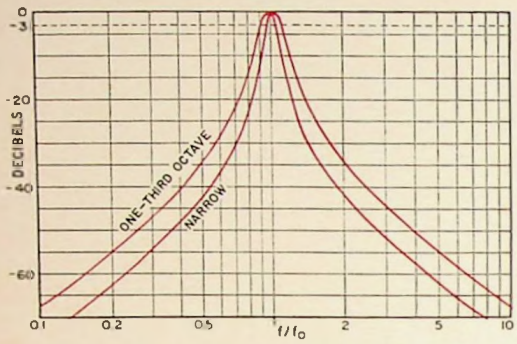
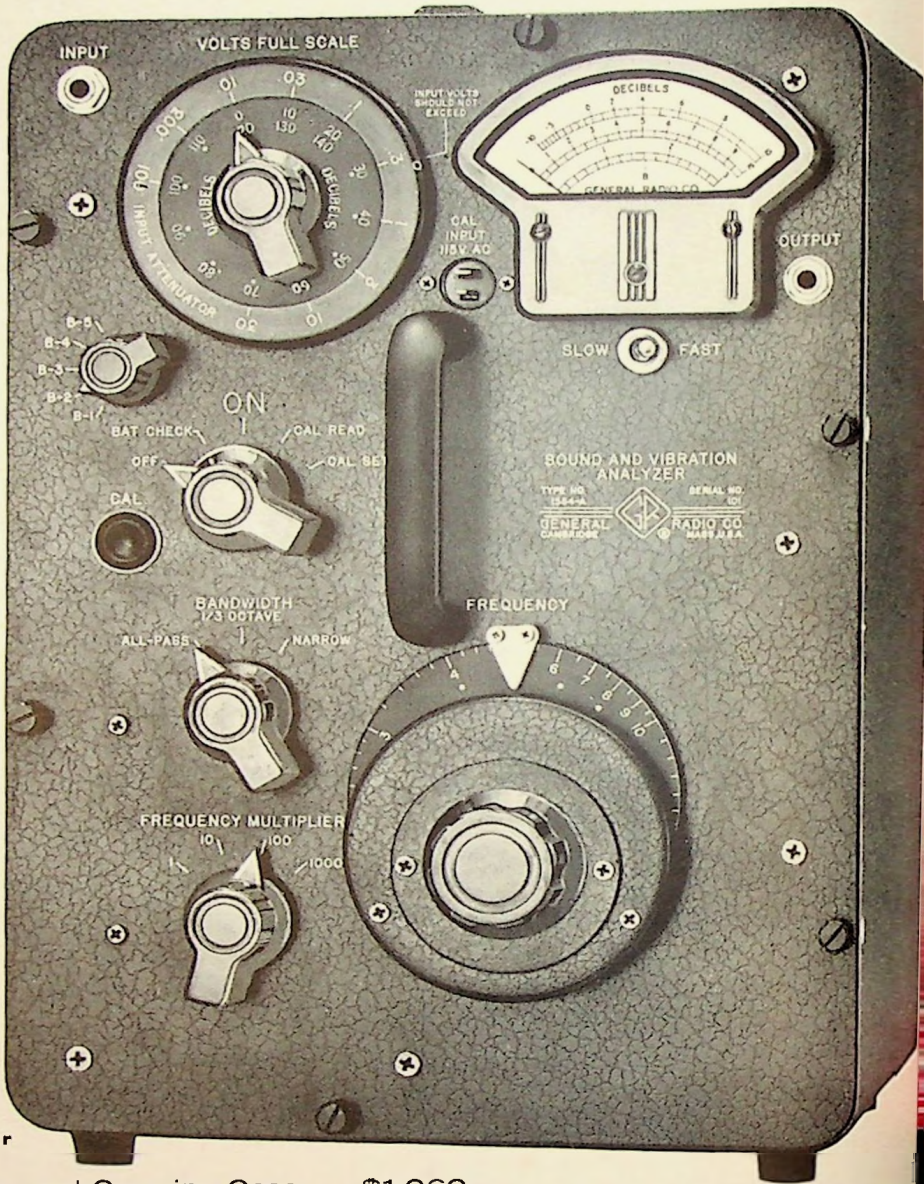
NEW— ONE ANALYZER . . .
FOR SOUND, NOISE, AND VIBRATION



- ★ THREE BANDWIDTHS:
  "Narrow" for measurement of single-frequency components of spectrum — bandwidth is 8% of center frequency at 3-db points.
  "One-Third Octave" for analysis of noise — bandwidth is 1.26 times center frequency.
  "All-Pass" for convenient adjustment of overall level — flat from 2.5c to 25 kc ±2 db.
- ★ Wide Range: Continuously tunable from 2.5 to 25,000 cps.
- ★ Both Analyzer characteristics fall off at 12-db per octave far from center frequency.
- ★ Adjustable decibel dial may be set so Analyzer is direct reading in sound-pressure level, one-third octave-band level, or any other desired level — may be calibrated using 115v line to make Analyzer direct reading in input volts.
- ★ Portable and battery-operated for field use.
- ★ New G-R Type 1521-A Recorder can be linked to the Analyzer to provide a graphic record of the frequency spectrum under study.



Type 1564-A
Sound and Vibration Analyzer

Complete with Accessory Cables and Carrying Case . . . $1,060

This Analyzer is a tunable voltmeter whose bandwidth is a constant percentage of the frequency to which the instrument is tuned. It will measure amplitudes and frequencies of the individual components of sounds and vibrations. Frequency-selective amplifiers employing RC feedback networks can be either synchronously or stagger tuned to give "Narrow" or "One-Third Octave" bandwidth respectively. The amplifiers can also be switched to "All-Pass" operation to measure the entire input signal. Transistors have been used extensively throughout this instrument.

The instrument is designed for use with a Sound-Level or Vibration Meter. When component levels exceed 50 db, measurements may be made directly with accessory microphones.

Write For Complete Information

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WEST CONCORD, MASSACHUSETTS

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