

EDITOR'S PROFILE of this issue

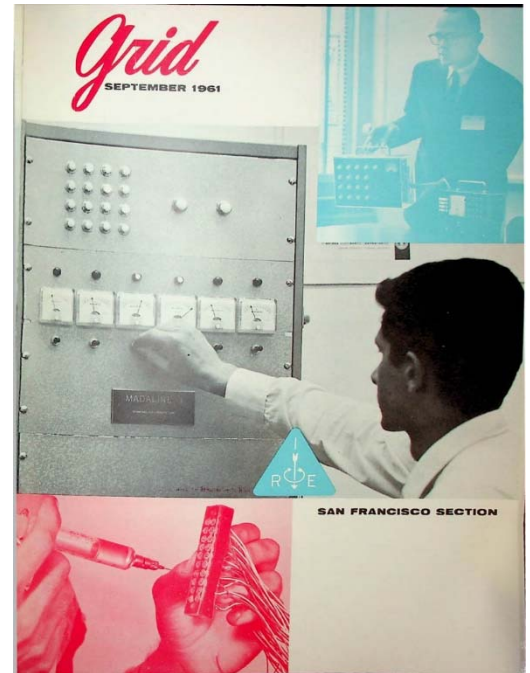
from a historical perspective ...

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

September, 1961:

Cover: Dr. Bernie Widrow demonstrates the ADAptive LINEar machine (ADALINE), mimicking the brain's neuron and synapse system, based on the memistor (now known as the memristor). This "device" was then postulated mathematically in a paper in 1971 by Prof. Leon Chua of UC-Berkeley and Steve Kang (later a Prof/Dean at UC-Santa Cruz, then president of KAIST, and an IEEE Fellow) -- as a result of symmetry, there should be a fourth basic device (in addition to R, L, and C). The instantiation shown here is slow -- based on using a liquid electrolyte (lower photo) and electroplating to create a variable resistor with memory. When we finally achieved nanometer-level plating, control and metrology in the 2000's, Stan Peters of H-P made practical memristors; I was an endorser for Stan's IEEE Fellow nomination. Stan's practical discovery answered a number of puzzling phenomena that had been seen for years but remained unexplained. Now memristors are showing up experimentally in computer architectures and other applications.

p. 14: Bill Hewlett gets an Award of Excellence in the Industrial Design competition; Arnold Beckman was the luncheon speaker; Lloyd Berkner of the National Academy of Sciences says that the best window for landing men on the moon is 1975; before that, the issue is sunspots and the resulting radiation exposure.



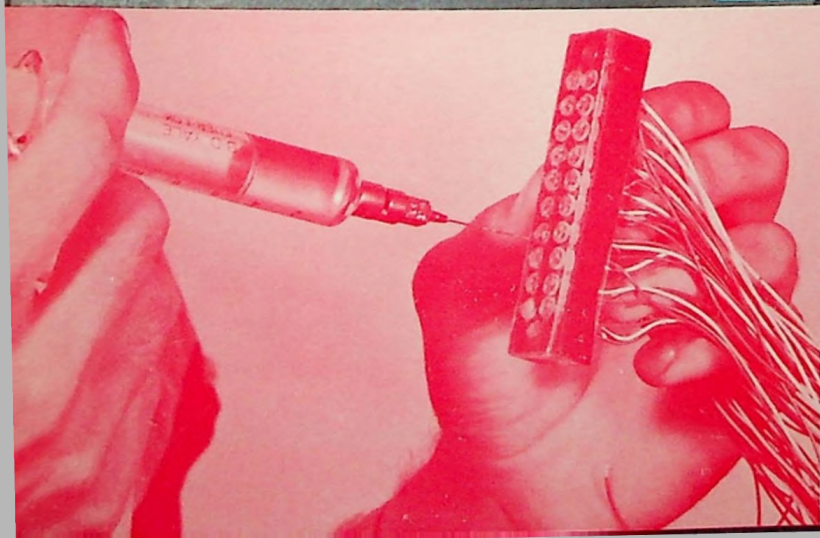
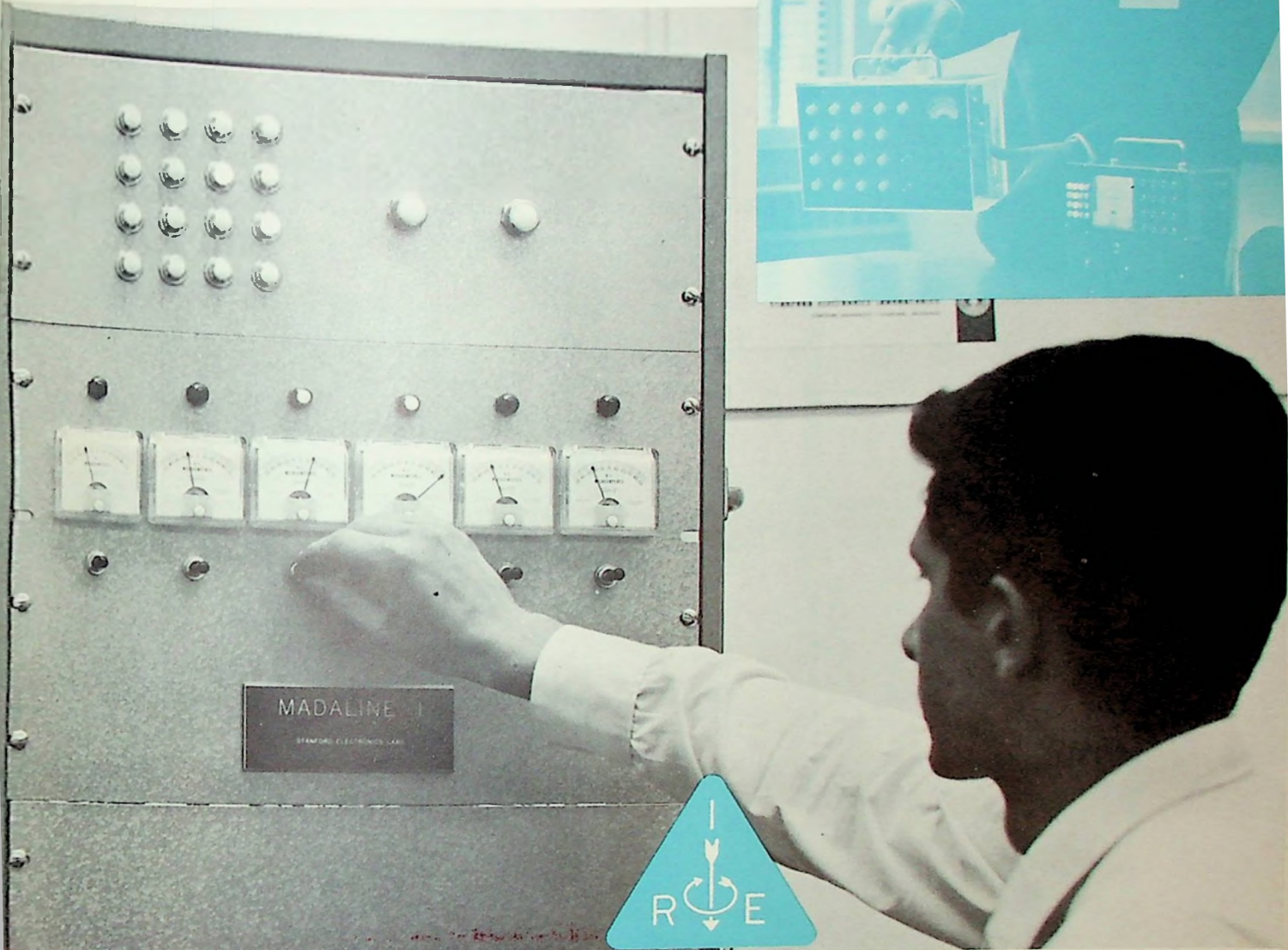
Archive of available SF Bay Area GRID Magazines is at this location:

[https://ethw.org/IEEE San Francisco Bay Area Council History](https://ethw.org/IEEE_San_Francisco_Bay_Area_Council_History)

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

Grid

SEPTEMBER 1961



SAN FRANCISCO SECTION

HIGH-POWER LOW-FREQUENCY DUPLEXERS

1 Mw to 25 Mw

Bomac presents a state-of-the-art advancement in high-power, low-frequency duplexers. Applications include a wide variety of radar services and systems.

These duplexers are available in both waveguide and coaxial line configurations. Peak power ratings: 1 Mw to 25 Mw. Frequency range: 450 to 9600 Mc. Life expectancy: greater than 2000 hours.

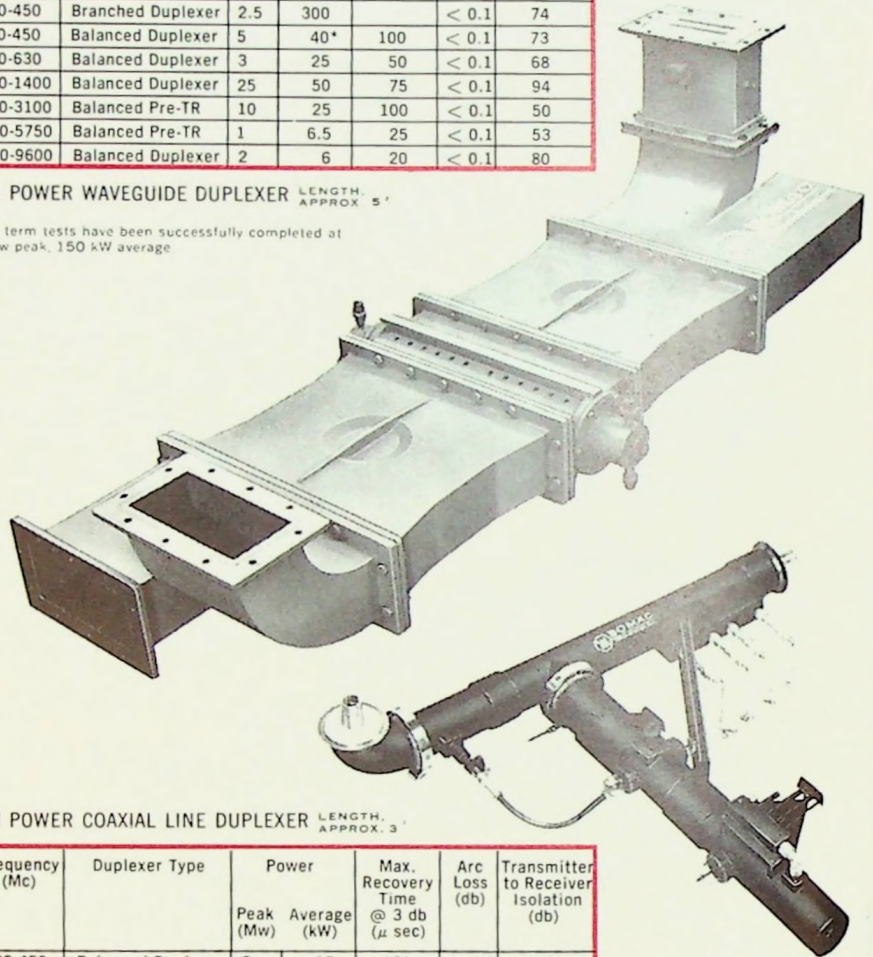
Improved window design provides increased radar capability. Arc loss: much less than 0.1 db. Recovery time at high power is the fastest of any gas switching duplexer on the market. With increased power, recovery time increase is negligible.

Write for additional information, including power level and frequency desired.

Frequency (Mc)	Duplexer Type	Power		Max. Recovery Time @ 3 db (μ sec)	Arc Loss (db)	Transmitter to Receiver Isolation (db)
		Peak (Mw)	Average (kW)			
400-450	Branched Duplexer	2.5	300		< 0.1	74
400-450	Balanced Duplexer	5	40*	100	< 0.1	73
570-630	Balanced Duplexer	3	25	50	< 0.1	68
1250-1400	Balanced Duplexer	25	50	75	< 0.1	94
2700-3100	Balanced Pre-TR	10	25	100	< 0.1	50
5250-5750	Balanced Pre-TR	1	6.5	25	< 0.1	53
8400-9600	Balanced Duplexer	2	6	20	< 0.1	80

HIGH POWER WAVEGUIDE DUPLEXER LENGTH APPROX. 5'

*Short term tests have been successfully completed at 95 Mw peak, 150 kW average



HIGH POWER COAXIAL LINE DUPLEXER LENGTH APPROX. 3'

Frequency (Mc)	Duplexer Type	Power		Max. Recovery Time @ 3 db (μ sec)	Arc Loss (db)	Transmitter to Receiver Isolation (db)
		Peak (Mw)	Average (kW)			
400-450	Balanced Duplexer	3	15	120	< 0.1	70
400-450	Branched Duplexer	3	5	100	< 0.1	60
850-950	Balanced Duplexer	2	15	100	< 0.1	70



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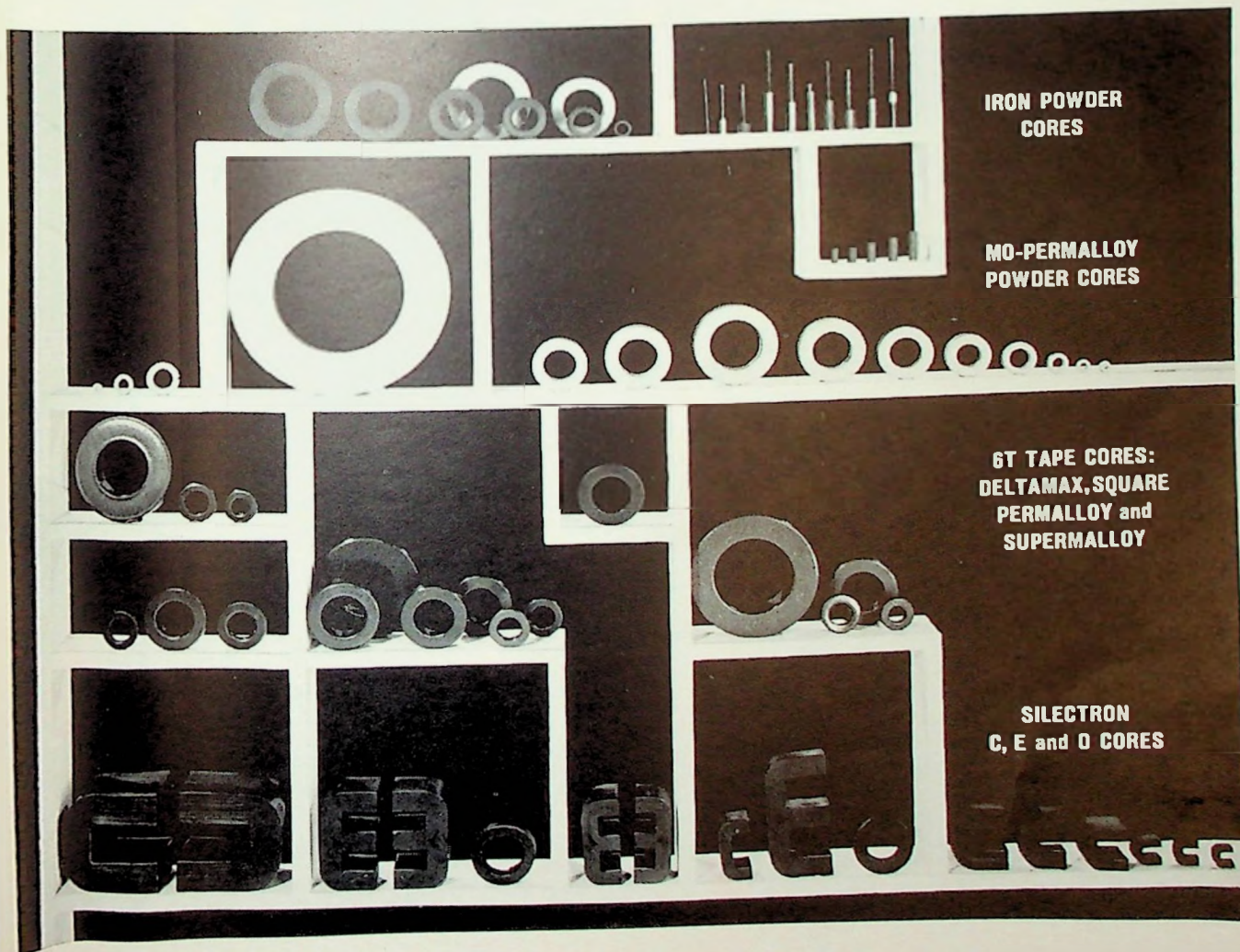
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Grid

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cover

Dr. Bernard Widrow, Stanford Electronics Laboratory staff member, shows Adaline I while Adaline II stands by on the table. Based on newly developed memistors, seen getting a hypo of electrolyte below, the Adalines are building blocks for an intelligent computer, capable, like the human nervous system, of learning to adapt to changing requirements. Adaline is an acronym for ADAPtive LINEar classification machine.

Adalines can be taught to respond reliably with positive or negative out-

puts to the identity of letters of the alphabet and other geometric shapes. Teaching is done by manipulating resistances—potentiometers in the case of Adaline I, memistors in Adaline II. These three-terminal liquid-state devices have internal resistances that are variable by the application of a reversible electroplating current.

Madaline, shown in the center, comprises six Adalines and is a Multiple ADAPtive LINEar classification machine, whose outputs are the result of majority decisions among individual Adalines.

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MEETING CALENDAR

SAN FRANCISCO SECTION

● Wednesday, Nov. 29

(Joint meeting with PGEM) (Tentative)

Speaker: Sir Robert Watson-Watt, governing director, Sir Robert Watson-Watt & Partners, Ltd.; chairman, advisory board, Axe Science & Electronics Corp., London, England

EAST BAY SUBSECTION

2:00 P.M. ○ Sunday, Sept. 24

"The Ratchet Effect in Research"

Speaker: Dr. Herbert Bandes, Arthur D. Little Co., Inc.

Place: Marsh Creek Springs Park

Picnic Lunch: Noon

Reservations: Winopher Veeder, Thornwall 3-2740, Ext. 5451; or Chris Widger, Hilltop 7-5100, Ext. 2470

PROFESSIONAL GROUPS

Audio

8:00 P.M. ● Tuesday, Oct. 17

(Joint meeting with Society of Motion Picture and Television Engineers)

"A Very Directional Condenser Microphone" and "Acoustical Considerations in the Design of a Sound Studio"

Speaker: Michael Rettinger, RCA

Place: Studio "A," KGO-TV

Dinner: 6:30 P.M., Rathskeller Restaurant, 602 Turk Street, San Francisco

Reservations: Stan Oleson, DA 6-6200

Circuit Theory

8:00 P.M. ● Wednesday, Oct. 4

"Quantized Probability Design"

Speaker: R. B. Hurlley, advisory engineer, IBM, San Jose

Place: Main Conference Room, Stanford Research Institute

Communications Systems

8:00 P.M. ● Wednesday, Sept. 20

"The Videograph Process—A New Approach to High-Speed Printout and Display"

Speaker: W. E. Evans, A. B. Dick Research & Development Lab

Place: A. B. Dick Research & Development Lab, 3950 Fabian, Palo Alto

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

Electronic Computers

8:00 P.M. ● Tuesday, Sept. 26

"Computers in Operations Research"

Speaker: Ernest Koenigsberg, CEIR, San Francisco

Place: Lockheed Auditorium, 3251 Hanover Street, Palo Alto

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

Reservations: None required

Engineering Management

● Wednesday, Nov. 29

(Joint meeting with San Francisco Section, see above)

Space Electronics & Telemetry

8:00 P.M. ● Tuesday, Sept. 19

"Multiple Frequency Antenna System for Satellite Tracking and Communication"

Speaker: L. G. Ettling, Philco

Place: Lockheed Auditorium, 3251 Hanover Street, Palo Alto

Dinner: 6:30 P.M., Old Plantation, 1030 N. San Antonio Road, Los Altos

Reservations: Cynthia Chaney, DA 6-4350, Ext. 2266 by Sept. 18

CHRONOLOGICAL RECAP

September 19—Space Electronics & Telemetry

September 20—Communications Systems

September 24—East Bay Subsection

September 26—Electronic Computers

October 4—Circuit Theory

October 17—Audio/SMPTE

November 29—San Francisco Section/Engineering Management

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PGAP: RAYMOND D. EGAN, RADIO-SCIENCE LABORATORY, STANFORD UNIVERSITY

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MEETING SCHEDULE 1961-1962

	Monday	Tuesday	Wednesday	Thursday
1st		PGI PGB PGMIL	PGCT PGA	
2nd		PGRFI	PGEM PGAP	
3rd		PGSET PGBME	PGMTT PGED PGRQC	
4th	EBSS	PGPEP PGEC PGEWS	PGCS	PGIT

September 1961

12	PGIT, PGRFI
13	PGA, PGEM
19	PGSET
20	PGCS, PGED/PGMTT
24	EBSS
26	PGEC, PGPEP
27	PGCS

October 1961

3	PGI, PGB, PGMIL
4	PGCT
11	PGAP
17	PGA, PGBME, PGSET
18	PGRQC, PGMTT
24	PGEC, PGEWS, PGPEP
25	PGCS, PGED
26	PGIT
30	EBSS

November 1961

1	PGA, PGCT
7	PGI, PGMIL
8	PGAP, PGEM, PGED
14	PGRFI
15	PGMTT, PGRQC
21	PGBME, PGEWS, PGSET
22	PGCS
28	PGEC, PGPEP

December 1961

5	PGMIL
6	PGA, PGED
13	PGAP, PGMTT
19	PGEC
20	PGRQC

January 1962

2	PGI, PGMIL
3	PGA
9	PGRFI, PGB
10	PGAP, PGEM
16	PGBME, PGSET
17	PGED
23	PGEC, PGEWS, PGPEP
24	PGCS, PGMTT
25	PGIT
29	EBSS

February 1962

6	PGI, PGMIL
7	PGA
14	*PGAP, PGED
20	PGBME, PGSET
21	*PGAP, PGRQC
26	EBSS, PGIT
27	PGEC, PGPEP
28	*PGAP, PGCS, PGMTT

March 1962

6	PGI, PGB, PGMIL
7	PGAP, PGA, PGED
13	PGRFI
14	PGEM, PGEWS
20	PGBME, PGSET
21	PGMTT, PGRQC
22	PGIT
26	EBSS
27	PGEC
28	PGCS

April 1962

3	PGI, PGMIL
4	PGA
11	PGAP
17	PGBME, PGSET
18	PGED
24	PGEC, PGPEP
25	PGCS, PGMTT
30	EBSS

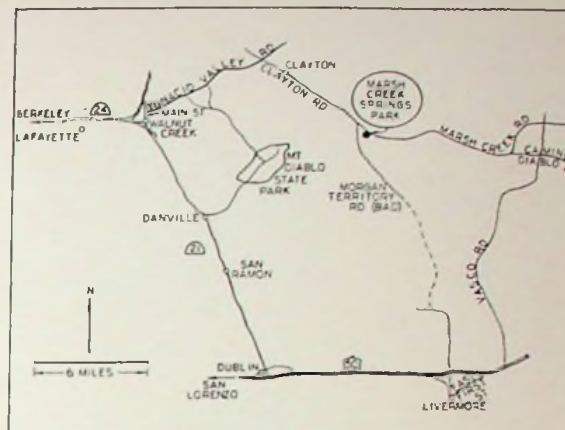
May 1962

1	PGI, PGB, PGMIL
2	PGA
8	PGRFI
9	PGAP, PGEM
15	PGEWS, PGSET
16	PGED
22	PGEC, PGPEP
23	PGMTT
24	PGIT
25	PGRQC—Seminar

June 1962

5	PGMIL
6	PGA
13	PGAP
19	PGSET
26	PGEC

* Tutorial Series on recent antenna developments



meeting ahead

TECHNOLOGY AL FRESCO

On Sunday, September 24, members of the East Bay Subsection with their friends and families will take to the open country for a combination picnic and technical session in the Marsh Creek Springs Park (see map). Other details including reservation information are included in the Calendar.

Attendees are to take their own lunches and assemble at noon. Beverages will be provided. The park does, however, have a cafe in addition to facilities for swimming, games, and short hikes.

New officers of the Subsection will be in charge of the proceedings. They are as follows:

Chairman: E. A. Aas, Sandia Corporation, Livermore.

Vice Chairman: John Lavrischeff, LRL, Livermore.

Secretary-Treasurer: Ted Hamm, LRL, Livermore.

Arrangements: Bert Kortegaard, LRL, Berkeley; and Gordon Longerbeam, LRL, Livermore.

Publicity: Sid Yakowitz, LRL, Berkeley. Program: Robert Roulette, LRL, Livermore; and Carl Furnberg, Sandia Corporation, Livermore.

Membership: Tom Nugent, LRL, Livermore.

Reporter: Jim Wright, Sandia Corporation, Livermore.

(Continued on page 8)



Eugene A. Aas, chairman, EBSS

CAL EXTENSION LECTURES

Lecture series in plasma physics, environmental engineering, and space sciences will be offered this fall by University of California Extension.

"Plasma Physics in Theory and Application" is a series of 16 lectures to be presented at Moffett Field beginning the week of September 25. The series is designed as a comprehensive introduction to the new field for research workers and others desiring a general knowledge of plasma physics.

"Environmental Engineering," a series of 16 lectures, will begin the week

of September 4 in Palo Alto. Enrollment is open to research workers, designers, engineers, technicians, and management concerned with reliability and product assurance.

"Space Sciences" is another 16-lecture series which begins the week of September 18 in Palo Alto.

Further information about the lecture series and application for enrollment may be obtained from the Department of Engineering and Sciences, University Extension, University of California, Berkeley 4, California.



John Lavrischeff, vice chairman, EBSS



Ted Hamm, secretary-treasurer, EBSS

MORE EBSS PICNIC

The speaker, Dr. Herbert Bandes did his undergraduate and graduate work in physical chemistry at the University of Michigan. After about a year of chemical research and process control in the chemical industry, he worked early in the war as a civilian physicist for the Navy and for several years was responsible for the design and installation of degaussing equipment on merchant vessels.

From there he joined the Manhattan Project as a chemistr group leader. Following that, he was employed by Sylvania Electric Products, Inc., in the central research laboratories. For a period of almost three years he was chief engineer of the Sylvania semiconductor division. Bandes has been with Arthur D. Little, Inc., for three years and has been a senior staff member of the western laboratories for the last two years.

In addition to semiconductors, he has worked on corrosion, electro-deposition, luminescence, cathode-ray-tube screens

(monochrome and color), ferrites, and emissive carbonates.

He is a member of the American Chemical Society, the Institute of Radio Engineers and the Electrochemical Society, having served as chairman both of the New York metropolitan section and of the electronics division.

meeting ahead

GOODBYE GUTENBERG

New methods for transmission and reproduction of data will take the spotlight at the September PGCS meeting listed in this month's Calendar, page 6.

W. E. Evans, A. B. Dick Company, Palo Alto, will be the speaker. Increasing need for and interest in the dissemination of information for science and business is obsoleting many old communication techniques. The A. B. Dick Company's proposed solution operates through high-speed electrostatic printing. Principles will be demonstrated and discussed, together with means for displaying information on cathode-ray tubes and television screens.

New officers of the Professional Group Chapter on Communications Systems for the season 1961-1962 are as follows:

Chairman: R. A. Isberg, University of California.

Vice Chairman: W. R. Vincent, Stanford Research Institute.

Secretary-Treasurer: Owen E. Thompson, Secode Corporation.

meeting ahead

OCTOBER SOUND

For the October joint meeting between PGA and SMPTE listed in the Calendar, the speaker will be Michael Rettinger, RCA. He will speak on two subjects: a directional microphone, and the acoustics of a sound studio.

Rettinger has been with the RCA engineering department in Hollywood for 25 years. He is a well known consultant in acoustics, particularly studio acoustics, and has an extensive background in development engineering on microphones, loudspeakers, headphones, and magnetic heads. He has an MS in physics from UCLA (1933), and is a Fellow of the SMPTE, a Member of the Acoustical Society of America, and a Member of the AES. He is the author of two books and many papers in the audio engineering field, and has been granted 20 patents.

new publication

SECTION DIRECTORY

Because of a shortage of space in the Grid, the usual Directory of Section Officers is not being printed in this issue. Instead, a separate Directory will be distributed during the month of September by the Section Office. If you have need for this information and do not receive a copy, you may request it from the IRE Office, 701 Welch Road, Palo Alto; DA 3-1332.



R. A. Isberg, chairman, PGCS



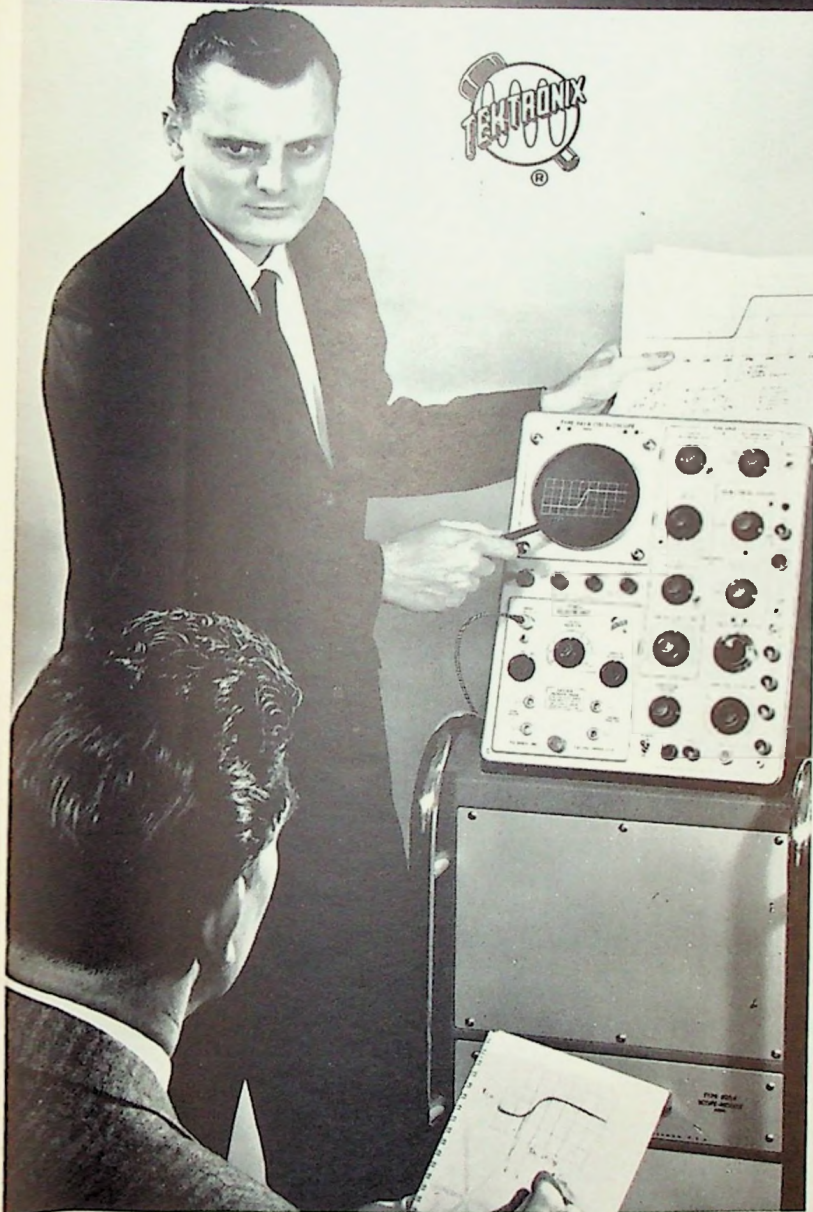
W. R. Vincent, vice chairman, PGCS



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Or, perhaps your own instrument-maintenance technicians handle test and calibration of your Tektronix equipment. For them your Field Engineer will willingly conduct classes in preventive-maintenance procedures. These informal classes covering time-saving trouble-shooting techniques can be held at your convenience—at a Tektronix Field Office when feasible or at your own company location.

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Moderated by Tom Boyd, Lenkurt, technical session participants R. R. Segel, Arnold Addison, R. W. Boom, and A. E. Lilley meet the press

wescon report

BULL RUN

As anticipated, not a single real cow was to be found on the premises of Wescon 1961—though the San Francisco Cow Palace abounded with salesmen of various kinds touting electronic materials, components, systems, and services from the record-breaking 1180 booth spaces and elsewhere. There were 31,349 listeners. Competition seemed more apparent and sales efforts generated perhaps a new high in novelties like recordings of space signals, balloons with internally orbiting poker chips, blinking plastic eyes, and the like.

Technical Program

Papers-sessions participants gathered in convenient groups for the benefit of the press and sketched in the outlines of their individual presentations.

Arthur E. Lilley, associate professor of astronomy at Harvard, spoke about the instrumentation dilemma on Venus which seems to impale investigators with the question of whether the planet has at its surface the optically measured temperature of 300 K or the radio-astronomically measured 600 K. If the former, then the 600 K reading comes from ionospheric activity, and probes have either the problem of developing instrumentation capable of operating in a broiling 600-K ambient, or being able to work in a reasonable 300 K, transmitting intelligence through the 600-K ionosphere.

R. W. Boom, Oak Ridge National Laboratory, described work conducted at 1.5 K toward the reduction of size in magnet solenoids using wire of niobium compounds. Arnold Addison, associate professor of engineering research and personnel director at Pennsylvania State University, discussed a program under study at that institution for the systematic evaluation of engineering and scientific personnel and based on the idea of the employee and

his supervisor both completing evaluation forms prior to a series of interviews between the two, and between the supervisor and the assistant director—the upshot of the latter being fed back to the employee. Ronald R. Segel of Daniel, Mann, Johnson & Mendenhall, expressed the user's viewpoint of the encoding, abstracting, storage, and retrieval problems in the handling of data by anyone engaged in activities involving original concepts.

Lester C. Van Atta, former special assistant for arms control in the Office of the Director of Defense Research and Engineering and now technical director of the Hughes Research Laboratories, moderated a special evening session covering the technical aspects of arms control, and featuring Dr. W. H. K. Panofsky, professor of physics at Stanford and deputy director of Project M; Rear Admiral P. L. Dudley, special assistant to the joint Chiefs of Staff for disarmament affairs; Morton Halperin, Harvard Center for International Affairs and Rand Corporation; Dr. Donald G. Brennan, Lincoln Laboratories, MIT; and Dr. Charles E. Osgood, director of the Institute of Communications Research, University of Illinois.

This meeting produced a broad-spectrum outline of the technical aspects of the problems and one proposed solution—a plan called GRIT (Graduated Reduction of International Tension) proposed by Dr. Osgood. Under this scheme, the United States would launch and follow through on a program of specific moves calculated and pre-announced as aimed at the objective of diminishing world tension. As an experimental psychologist, he expressed conviction that this would both generate corresponding counter-moves by Russian strategists and produce an enhanced international image for the United States.

administration

PROPOSED CHANGE IN BYLAWS

At the meeting of May 22, 1961, the executive committee adopted a recommendation that the following change in the Section bylaws be made:

"Delete sentence two of Article X. Substitute following sentence:

"Any amendments to these Bylaws shall require a two-thirds vote of the voting members present at a regular executive committee meeting; provided that notice has been given to all voting members of the Section at least three weeks prior to such meeting."

In accordance with the present bylaws, notice is hereby given to the voting members of the Section. A vote on this proposed change will be taken at the next Section meeting.



Gart Westerhout, Donald Bitzer, Lester C. Van Atta, and E. O. Stone during a press conference

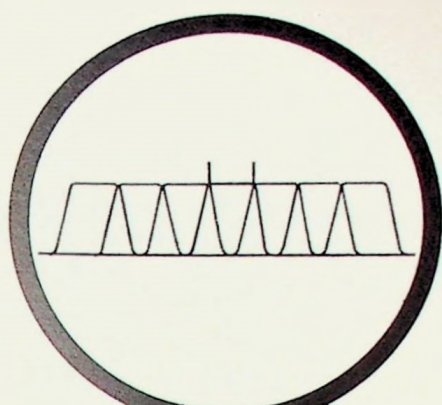
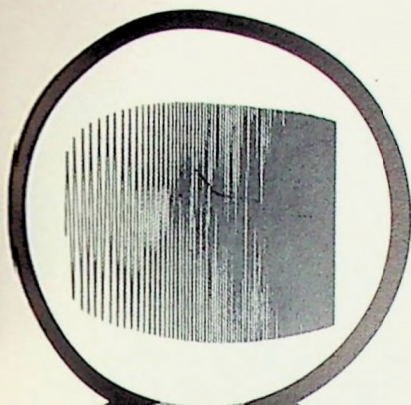
Donald Bitzer, research assistant professor in the coordinated science laboratory of the University of Illinois, spoke about the work being done there on the teaching machine PLATO (Program Logic for Automatic Teaching Operations) which has been used to present subject matter ranging from mathematics to French grammar. E. O. Stone, Sylvania Electric Products, described some of the new second-generation display devices possible through electro-luminescence, providing large-area displays the size of a wall. Gart Westerhout, head of the radio astronomy department at the University Observatory, Leiden, Netherlands, covered various aspects of radio astronomy including a description of the Benelux Cross Antenna, with which he is concerned, and which will be the largest radio telescope in the world—three miles in diameter.

Jacob Haimson of Varian Associates provided a description of the 12-mev radiographic Linac typified by the installation at the U. S. Navy ammunition depot in Concord featured as a cover illustration of the March 1961 **Grid**. Harold L. Kassens of the Federal Communications Division discussed multiplex stereo f-m, estimated that transmitter modification costs might range from \$1,000 to \$5,000, and pointed out that among the stations on the air

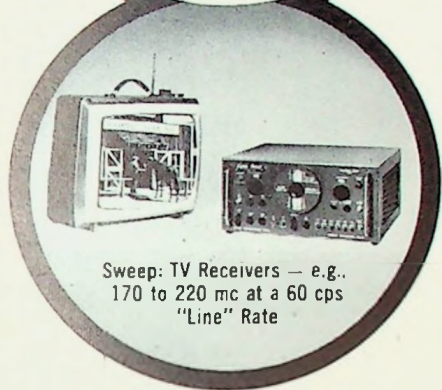
(Continued on page 12)



Press conference appearance of James E. Hacke, Jr., E. S. Guttman, Jacob Haimson, and H. L. Kassens



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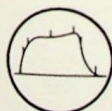
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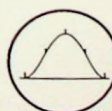
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with the new signal is included one San Francisco transmitter—that of KPEN. James E. Hacke, Jr. talked about the best arrangements for microwave satellite communication which could provide under-developed countries with appropriate facilities at reasonable cost and concluded that ten or so active equatorial satellites offer the best solution. Eric S. Guttman of Gilfillan Bros., Inc., gave details on a new airborne display for a computer-controlled map



M. L. Stich, Hughes Aircraft Co., Bernard M. Oliver, Hewlett-Packard Co., and Paul P. Kisliuk hold forth on maser/laser technology

which furnishes a pilot with continuous all-weather information on his present position and heading. Equipment, weighing approximately 28 pounds and costing \$5,000 to \$8,000, has a three-mile accuracy.

Samuel G. Lutz, senior scientist at the Hughes Research Laboratories, discussed the relative advantages of a stationary-satellite system for point-to-point communications. Lutz concluded that this system offered the best possibilities through better communications and wider use of the spectrum by frequency sharing. Transmission delays encountered by the distance involved in this type of orbit present a serious problem.

Bernard M. Oliver, director of research at Hewlett-Packard, in a discussion of the potentialities of the optical maser, listed many uses for the high-density beam available, but feels that the most profound uses are yet to be imagined.

Paul P. Kisliuk, Bell Telephone Labs., described experiments using a pulsed-ruby maser as a light amplifier. Gain factors of two were observed using a ruby maser oscillator as a source.

M. L. Stich, manager of the radar and missile electronics laboratory of

Hughes Aircraft Co., spoke about a research program under way at the laboratory concerning the use of a ruby laser as a ranging device. With an experimental model, accurate measurements of ranges up to about seven miles were obtained.

Future Engineers

One young scientist carried away both the Frederick Emmons Terman Award of \$250 and the Lee de Forest Award of a \$1,000 scholarship to a college of choice. This clean sweep was accomplished by Douglas B. Bingham from Castle Rock, Washington, who showed a sequence-controlled-relay digital computer and presented a paper on the same general topic. Second place was won by Dennis M. Taylor of San Jose, and third place by Robert Burke of Whittier.

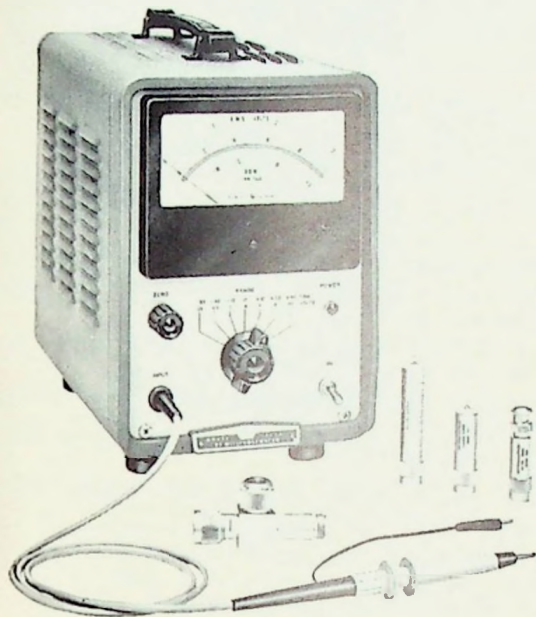
Industrial Design

Five awards of excellence were presented to designers and their organizations selected from among the 23 awards of merit previously announced. These included Hewlett-Packard Company for an instrumentation packaging system, Tektronix Inc. for an oscilloscope cart, Precision Instruments Co. for a recorder/reproducer, Collins Ra-

(Continued on page 14)

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Bill Hewlett, Hewlett-Packard Co., comes away with one of the Awards of Excellence in the Industrial Design Competition. Hank Brown, Wescon executive committee chairman, prepares to present the next award while J. W. Stringer, committee vice chairman, looks on

MORE WESCON

dio for an f-m transmitter, and Kaar Engineering Corp. for a portable transceiver.

Social Events

Social events included the bigger and better cocktail party held this year for the first time in the new Grand Ballroom of the Fairmont Hotel. As the computations worked out, the space of 17,856 square feet was enough less than the 19,500 utilized in 1959 that the share for each vertical person of the 3000 expected was reduced from 8.12 to 7.44 sq ft, a drop of 0.68 sq ft which required each party-goer to stand approximately four inches closer to his neighbor than heretofore. Nobody seemed to mind.

WEMA held its traditional luncheon with Dr. Arnold O. Beckman of Beckman Instruments Inc. as principal speaker and also recipient of the Western Electronic Medal of Achievement for significant contributions to the ad-

vancement of electronics in the West. Beckman entered a plea for better management, higher profits, abandonment of the luxury of mediocrity, and a return to the philosophy of "first placemanship."

This year the traditional Wescon luncheon yielded to a new all-industry banquet and dance. Principal speaker was Lloyd V. Berkner, president of the Institute, chairman of the space-science board of the National Academy of Science, and president of the Graduate Research Center of the Southwest in Dallas.

Speaking on "IRE and the Universe," he looked at space from the three aspects of science, application, and exploration, and regarding application he felt that economically, through commercial and meteorological applications, our program will pay for itself in 50 years. In the communications aspect of the program, he attempted to set the minds of apprehensive astronomers at rest by pointing out that the U.S. is taking great care to be sure that Project West Fort will result in no damage to astronomy or any other scientific activity.

As to putting a man on the moon, he felt that we will not be ready in 1964, a year of minimum sun spots, and doubts that Russia will be ready either. Maximum sun spots make 1970 an unfavorable year from the viewpoint of required shielding, but by 1975 he expects excursions of many men to have reached the moon.



Lloyd V. Berkner



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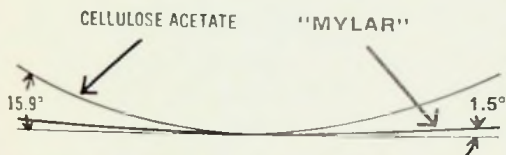
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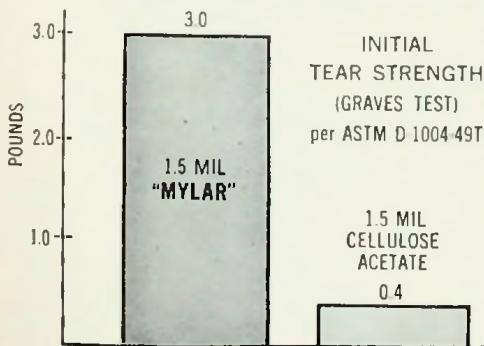


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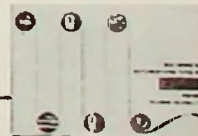
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Retiring PGMIL Chairman Louis Gado, center, passes the word on operations to C. Boyd Norris and Walter J. Prise

meeting review

THIN, TOUGH, AND FILMY

The regular and the last meeting of the season of PGMIL took place in June at the Lockheed auditorium, Palo Alto. The speaker was W. D. Fuller, manager of microsystems department of the R&D division of Lockheed. His subject was "Use of Refractory Materials in an Electronic Circuit." The members gathered for dinner at the Red Shack preceding this meeting. The result of the election of new officers was announced as follows:

- Walter J. Prise, chairman—Lockheed Missiles & Space Co.
- Jerome J. Dover, vice chairman—Amplex Military Products Co.

- C. Boyd Norris, secretary—Lockheed Missiles & Space Co.
 - General Victor Conrad, treasurer—Varian Associates.
- Fuller's talk was directed toward use of refractory materials such as titanium



Jerome J. Dover, vice chairman, PGMIL



General Victor Conrad, treasurer, PGMIL

in the thin-film concept of electronic packaging. These materials have unusual characteristics that make their application in the electronic circuit very beneficial. The thin films have larger resistance than bulk materials. By oxidation and anodizing they can be converted into resistive and dielectric layers. Thin films with passive elements are readily available. Thin films are inert as far as radiation is concerned and can withstand severe environmental conditions. They will find an area of application in space, missile, and electronic technology. —WALTER PRISE

meeting review

MICROSCOPIC MACHINING

The last PGPEP meeting for the winter season was held at the Physics Hall on the Stanford University campus on May 23. The meeting was preceded by a speaker's dinner at the Red Cottage.

Program Chairman Dale Fuller introduced the speaker, Dave Vance. Vance received his BS degree in mechanical engineering at the University of California in 1944. Over the years, Vance has been associated with the University of California Radiation Lab, Temescal Metallurgical Corp., and Hughes Aircraft. He is now a design specialist for Lockheed.

(Continued on page 18)

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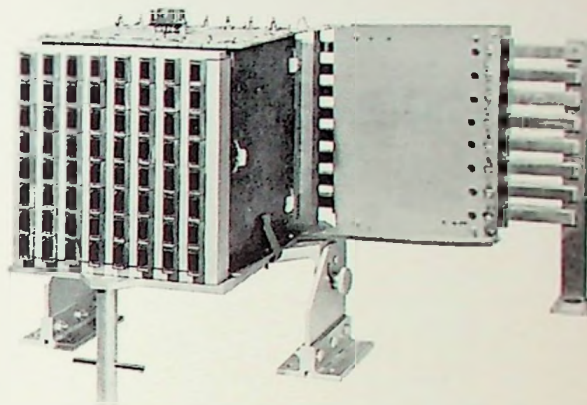
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The topic for the evening was "Application of Electron Beams in Electronic Fabrication Processes." This field, which has been under development for many years, is an offspring of the electron microscope. Though the principles have been known and applied for a long period of time, the method is now moving into the production stage. The cost of the operation still prevents widespread use since a basic electron-beam machine costs as much as \$75,000 and by the time accessories and installation have been added, figures are in the six digit area.

An electron-beam machine operates at high voltage and low current ranging from 30,000 to 150,000 volts and 50 to 250 ma. With the aid of charts, Vance demonstrated the influence of electronic characteristics on successful welding and machining. After the foundation for the continued presentation was laid, Vance described different types of electron-beam guns and machines. These operate under high vacuum which necessitates the use of mechanical vacuum pumps as well as oil booster pumps. The material to process rests on a remote controlled turntable inside a vacuum chamber that also houses the gun. The material may be welded, cut, or machined with the high-

est precision. As an example, Vance mentioned drilling of sapphire jewels for watches. Such precise drilling is done in seconds and large quantities of small parts may be on the turntable simultaneously.

The presentation was followed by an interesting discussion.

—OLOF LANDECK

meeting review

COOL COMMUNICATIONS

Mr. Robert W. DeGrasse of Microwave Electronic Corporation gave an interesting description of the receiving equipment for Bell Telephone Laboratories' Project Echo to the May 24th meeting of the PGMTT at Stanford. In this satellite communication experiment, contact was successfully established between stations in California and New Jersey, using different carrier frequencies (960 mc and 2390 mc) for transmission in the two directions. These carriers were frequency modulated with a 5-kc audio band-width and up to 200-kc frequency deviation. DeGrasse's group developed the receiving equipment for the higher frequency, consisting of two maser amplifiers (one for each direction of polarization) and an S-band horn antenna.

Amplification in the masers takes place in suitably doped ruby material,

cooled to liquid-helium temperatures and magnetized with a field of 2530 oersteds, which produces resonance of the electron spins at the carrier frequency (2390 mc). The ruby is in the form of a number of rods placed in a comb-type slow-wave structure. This structure is also loaded with alumina and with yttrium iron garnet. The alumina loading makes possible a very narrow bandwidth. The garnet material is placed in the same magnetic field as the ruby, so that its ferromagnetic resonance occurs at the same carrier frequency. It can thus be used to produce strong non-reciprocal attenuation, which greatly enhances the stability of the amplifier. Gain of 35 db was obtained over a 17-mc bandwidth. Pump power of 70 mw per channel was supplied at a frequency of 13 kmc. The maser noise temperature was 8 K.

The horn antenna used in conjunction with the masers has a gain of 40 db and sidelobes more than 60 db below the isotropic level. When the antenna is pointed in the vertical direction the overall system temperature is 17½ K. This includes 8 deg from the maser, 2½ deg from the sky and the remainder sidelobe pickup from surrounding objects. When the antenna is pointed near the horizon, the noise figure rises to 150 K.

—E. F. BARNETT

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Eitel-McCullough, Inc., San Carlos, Calif.

IT IS REPORTED:



Hansen


Britt


Major personnel changes for Tech-Ser, Inc., have been announced by Jack C. Guy, president. Howard M. Hansen, formerly manager of the Palo Alto office, has been appointed vice-president and general manager; Cecil W. Britt, Jr., has been promoted to manager of the Palo Alto office, 640 Donohoe Street. Jack R. Penwell, formerly with Philco Corp., replaces Britt as instrument engineer in Palo Alto.

William H. Heflin has been appointed to the newly created position of vice-president and general manager of Fisher Research Laboratory, Inc., Palo Alto; Herbert K. Krengel has been elected vice-president of marketing and director of Lenkurt Electric Co.; Louis Martin has been appointed director of marketing at Eitel-McCullough, Inc.; David A. McGibbon has joined Lenkurt Electric Co. as an engineer in the company's microwave project group; Arthur Vassiliadis has joined Kane Engineering Laboratories as senior electrical engineer; Royal Weller has been named to the newly created position of director of engineering for the space systems division of Lockheed Missiles and Space Co.; Charles A. M. Prior and Robert E. Wolfe have been appointed manager of engineering services and manager of production at Melabs; Rudolph Furrer has joined Lockheed Missiles and Space Co. as special assistant—reliability. At the radiation division of Varian Associates the following applications managerial appointments have been made—Ray Kent, microwave systems; John Moore, microwave equipment; Gary Logan, microwave components; and James Halcomb, military magnetics; William D. Collins, Jr. has been appointed manager of the San Francisco district office of Radiation Incorporated located at the company's subsidiary Radiation at Stanford; Gordon L. Ness has been named instrumentation marketing manager for Fairchild Semiconductor; Nathan W. Snyder has joined Royal Research Corp. of Hayward as vice-president and director of research and engineering.

(Continued on page 20)


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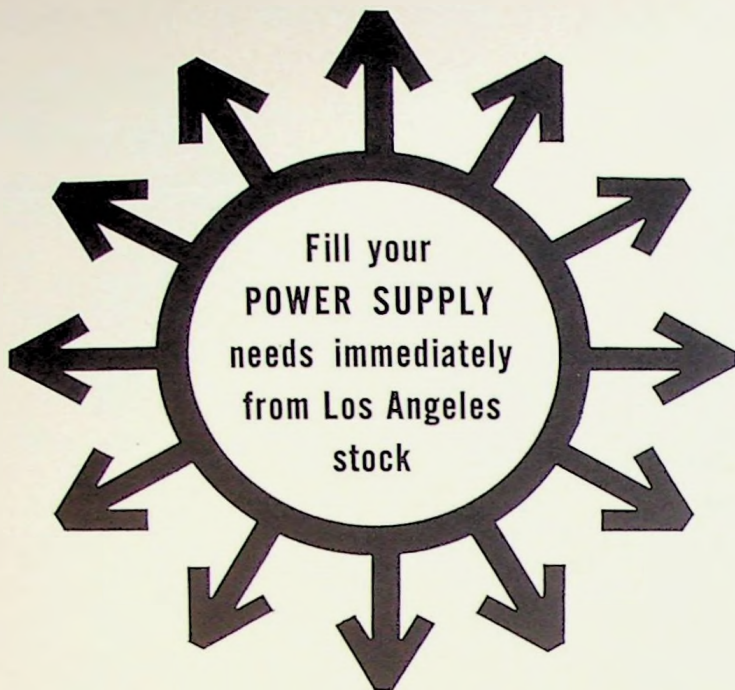
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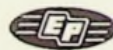
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MORE SWINGS

Beckman & Whitley, has named John W. Bodnar as sales manager, and has also directed several other organizational responsibilities into a vertical rather than horizontal pattern. Myron B. Baldwin becomes vice president of marketing, Joseph R. Greer, becomes vice-president of operations, and Thomas E. Holland becomes vice president of research and engineering.



Gottfried



Hennings

Two new managers, William C. Hennings and Hugh L. Gottfried, have been appointed to head recently established branches of Melabs. Hennings has been appointed manager of the company's new space systems branch. Gottfried is named manager of the new reconnaissance systems branch.



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 Fellow IRE, 1953;
 president,
 Eitel-McCullough Inc.
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SAN FRANCISCO SECTION IRE

MORE SWINGS

At Fairchild Semiconductor Corporation, Donald B. Rogers, formerly sales manager for Fairchild's diode facility in San Rafael, has been named to the position of field sales manager. Succeeding Rogers as diode sales manager is John F. Ready. Ready moves to this position from central regional sales manager, Chicago. Robert F. Graham has been appointed to the new position of special products and Micrologic sales manager. Graham comes to this position from that of western regional sales manager, Los Angeles. He will be succeeded in that position by Alan J. Bayley, former district sales manager in Palo Alto. Robert W. Dugan comes to the position of transistor sales manager from eastern regional sales manager, Garden City, L.I., New York.

Dr. J. Richard Hechtel has joined the staff of the research laboratory of Litton Industries' electron tube division as a senior scientist. For the last three years Hechtel has been head of the Naval microwave tube branch of the Naval Ordnance Test Station, China Lake. Previously, he was employed for seven years as research scientist and head of the microwave tube department for Telefunken, GmbH, at Ulm, Germany.

(Continued on page 22)

NEW

- Direct Reading In Degrees.
- Accuracy 0.05° or 1%.



Type 405 Series:

1 cps to 500 kc. Accuracy 0.25° relative, 1° absolute. No amplitude adjustment from 0.1v to 70v. Suitable for plotting phase curve.

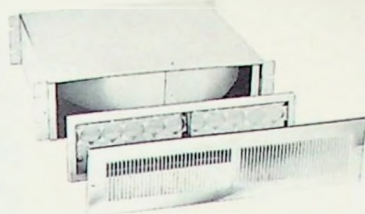
Type 202: 20 cps to 500 kc. Accuracy 0.02° or 2%. 1° full scale sensitivity. Phase range 0-1, 0-2, 0-4, 0-12, 0-120 and 0-180 degrees.

Type 205A1-A2: 100 kc to 15 mc. Accuracy 0.05° or 1%. Sensitivity 0.04v.

Type 205B1-B2-B3: 15 mc to 1500 mc. Accuracy 0.05° or 1%. Sensitivity down to 20 microvolts with receiver.

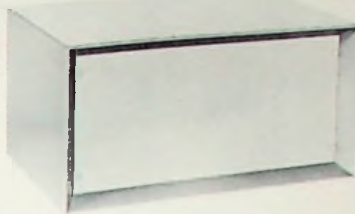
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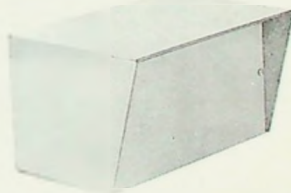
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An extremely versatile housing since both front and rear panels as well as bottom may be removed for installation or servicing purposes. Unusually attractive appearance is created by recessing the front panel one inch as well as by beveling the front. The two piece body is made of 18 gauge steel and the panels of 16 gauge steel. Four sizes available. Finished in light gray hammertone.

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Bud Cowl-Type Miniboxes have a projecting cover which reduces glare from overhead lighting. It also provides protection for controls and dials. Cover has two box braces to which the bottom is attached by means of sheet metal screws. When assembled, this type of construction results in a sturdy, rigid housing. The unit may be table mounted or hung from a wall. Fabricated of .040 aluminum and furnished natural or with light gray hammertone finish. Four sizes available.



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A very practical housing with symmetry and strength. Rounded contour corners as well as the flanged panels combine to preserve the eye-catching design. Fabricated from 20 gauge steel to provide strength and rigidity. Front and rear panels are removable, the front panel being solid while the rear panel is louvred to provide ventilation. Body is finished in smooth dark gray enamel and the panels in light gray enamel. Six sizes available.



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MORE SWINGS

Louis D. Stevens has been given a new assignment as manager of information storage and retrieval for **International Business Machines Corp.**'s advanced systems development division. He joined IBM in August 1949 after receiving his MS degree in electrical engineering from the University of California.

Appointment of **Lawrence Nadel** as director of the system program office for the western development laboratories of **Philco Corporation** has been announced. Prior to joining Philco, Nadel was assistant division manager of Aerojet-General Corporation, Azusa, Calif.

Four promotions in the data processing systems division of **Smith-Corona Marchant Inc.**, Oakland, have been announced. **Harry R. Kattelmann** and **Stanley R. Olson** have been named senior project engineers. Both were formerly project engineers. **Herbert P. Stickel** has been moved up from senior engineer to project engineer and **Ronald N. Borrelli** has been promoted to senior engineer. All four were with the SCM data processing systems division prior to its formation in October 1959, when it was the research unit of Marchant Calculators, Inc., which itself is now a division of Smith-Corona Marchant Inc.

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MORE SWINGS

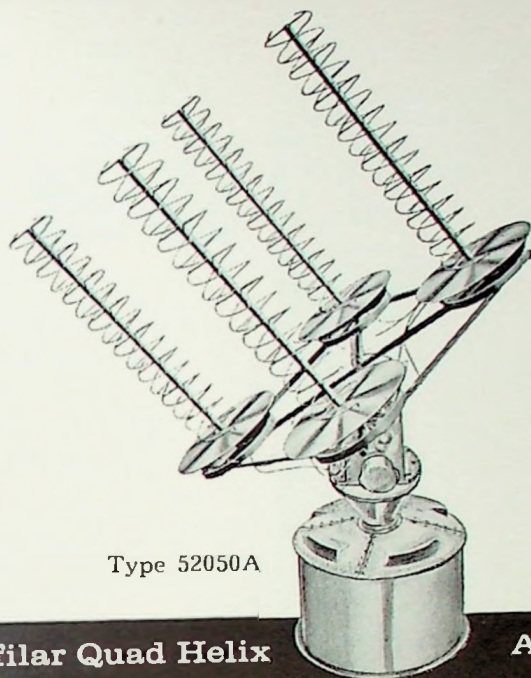
Three Bay Area firms have been approved for membership in the San Francisco Council of the **Western Electronic Manufacturers Association (WEMA)**: **E-H Research Laboratories, Inc.**, 163 Adeline Street, Oakland, **Hill Magnetic Products**, 1055 O'Brien Dr., Menlo Park, **Wiltron Co.**, 717 Loma Verde Ave., Palo Alto.

Lee M. Hester has joined the engineering staff at **Lynch Communication Systems Inc.** Before going to Lynch, Hester was with the Lockheed missiles and space division, and prior to that was with the Bechtel Corporation.

Representatives

Among recent manufacturers representative appointments are the following: **Neely Enterprises** to distribute Dage Division closed-circuit television equipment for **Thompson Ramo Wooldrige**; **O'Halloran Associates** will service the **Erie Pacific** line of digital counting, timing, and control systems; **J. T. Hill** will represent **Power Sources, Inc.** solid-state power-conversion devices; **R. W. Thompson and Associates**, of Palo Alto will handle **Stoddart Aircraft Radio Co.** for northern California; **White and Company** will represent **The Eckel Corp**; **Ault Associates** of Menlo Park, **Solartron**; and **McCarthy Associates**, the **Carad Corporation**, high-voltage equipment and instruments.

SPACE COMMUNICATION ANTENNAS



Type 52050A

Bifilar Quad Helix

Antenna



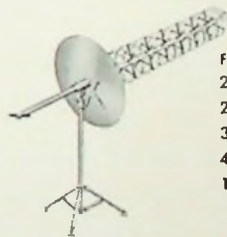
ANDREW Type 52050A telemetry antenna system is a step forward in the design approach of antennas used for maintaining reliable contact between missile (or satellite) and ground installations. The **BIFILAR*** quad helix array consists of 4 BIFILAR helices on individual ground screens, oriented to provide optimum radiation patterns for the 215-265 mc telemetry band.

*Patent Pending

Gain is 19.3 db and beam width 16.5 degrees at 240 mc. VSWR is less than 1.8:1 across the 215-265 mc band. Polarization is right hand circular.

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PARABOLIC ANTENNAS		
FREQUENCY	GAIN	TYPE NUMBER
1400-1600 mc	26 db	51855
2200-2300 mc	29 db	51860



HELICAL ANTENNAS		
FREQUENCY	GAIN	TYPE NUMBER
215-265 mc	14 db	52000-2
260-320 mc	12 db	H19110A-3
320-400 mc	13 db	H19110A-4
400-550 mc	11.5 db	H19110B-5
1300-1600 mc	13 db	H19110A-11



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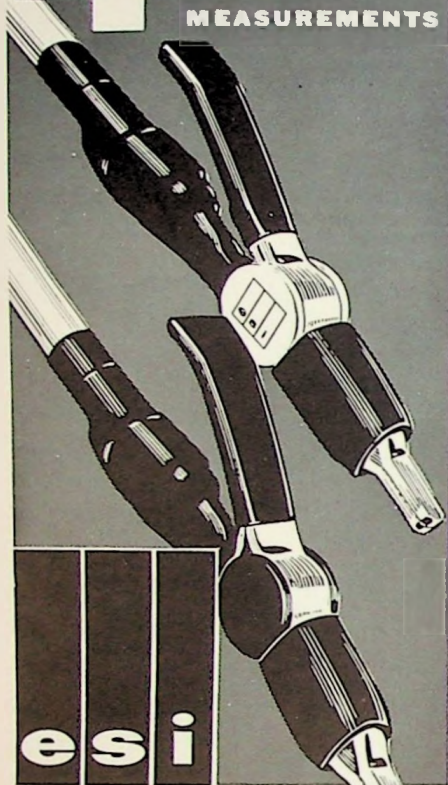
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Paul H. Robbins, speaker at the CSPE joint meeting. Section members will find Robbins' talk on Engineering Unity a natural sequel to the Siegman Report

Sept. 21—Joint meeting of the Northern California Chapters of the **California Society of Professional Engineers.**

Meeting will commence at 7:00 p.m. (social hour 6:00-7:00) in the Skyline Suite of the Hilton Inn at the San Francisco International Airport. The guest speaker will be Paul H. Robbins, executive director of the National Society of Professional Engineers, who will discuss "A Step Toward Engineering Unity." The Peninsula Chapter is serving as host and extends an invitation for members of the San Francisco Section to attend the meeting and participate in the discussion. For reservations (including dinner) contact: K. W. Henderson, 1914 Cooley Ave., Apt. 5, E. Palo Alto, DA 6-2440.

events of interest

IRE MEETINGS SUMMARY

Sept. 20-21—**Industrial Electronics Symposium.** Bradford Hotel, Boston, Mass. Ronald K. Jurgen, Sutton Publishing Co. 172 So. Broadway, White Plains, New York.

Oct. 1-6—**CISPR Meeting.** University of Pennsylvania, Philadelphia, Penna. Brooks Short, Delco-Remy, Andersonville, Ill.

Oct. 2-4—**Seventh National Communications Symposium.** Utica, N.Y. Exhibits: R. E. Gaffney, General Electric Co., Utica, N.Y. Program: R. K. Walker, 34 Bolton Road, New Hartford, N.Y.

Oct. 2-4—**IRE Canadian Electronics Conference.** Automotive Bldg., Exhibition Park, Toronto, Canada. Exhibits: IRE, 1819 Yonge Street, Toronto 7, Ontario, Canada. Program: A. R. Low, same address.

Oct. 6-7—**Eleventh Annual Broadcast Symposium.** Willard Hotel, Washington, D.C.

Oct. 1—Title of paper and author's name for 1962 Southwestern IRE Conference (Houston, Texas; April 11-13). Send to: Prof. Martin Graham, Rice University, Computer Project, Houston 1, Texas.

Oct. 9—15 copies of 500-word summary for the 1962 Electronic Components Conference (Washington, D.C.; May 8-10). Send to: Henry A. Stone, chairman, Technical Program Committee, Bell Telephone Labs., Murray Hill, New Jersey.

Oct. 15—Abstracts for the 1962 Joint Automatic Control Conference (New York City; June 27-29). Paper text deadline is Nov. 15. Send to: Anthony J. Hornfeck, director of research, Bailey

Oct. 9-11—**National Electronics Conference.** International Amphitheatre, Chicago, Ill. Exhibits: John S. Powers, Bell & Howell, Chicago 45, Ill. Program: Dr. William L. Firestone, Motorola, Inc. Chicago, Ill.

Oct. 16-17—**National Symposium on Engineering Writing and Speech.** Michigan State University, E. Lansing, Mich. J. D. Chapline, Philco Corp., 3900 Welsh Road, Willow Grove, Penna.

Oct. 19-20—**Symposium on Electronic Engineering & Education.** Greensboro Coliseum, Greensboro, North Carolina. Exhibits: H. G. Eidson, Jr., Dept. 8760, Charham Road Plant, Westinghouse Co., Winston-Salem, N.C. Program: Henry A. Voorhees, 1015 Wendover Circle, Winston-Salem, N.C.

Oct. 20—**Second N.Y. Conference on Electronic Reliability.** NYU College of Engineering, University Heights, New York, N.Y. Registration: M. A. Benanti, Molecular Electronics Co., New Rochelle, New York.

IRE PAPERS CALLS

Meter Co., 1050 Ivanhoe Road, Cleveland 10, Ohio.

Oct. 20—100-word abstract and 500-word summary with title of paper and author's name and address, all in triplicate for the 1962 IRE International Convention (New York, N.Y.; March 26-29). Send to: Dr. Donald B. Sinclair, chairman, 1962 Technical Program Committee, The Institute of Radio Engineers, Inc., 1 East 79th Street, New York 21, New York.

Nov. 10—Three copies of complete preliminary draft for the Spring Joint Computer Conference (San Francisco; May 1-3, 1962). Send to: Richard I. Tanaka, Lockheed Missiles and Space Co. research branch, 3251 Hanover St., Palo Alto.



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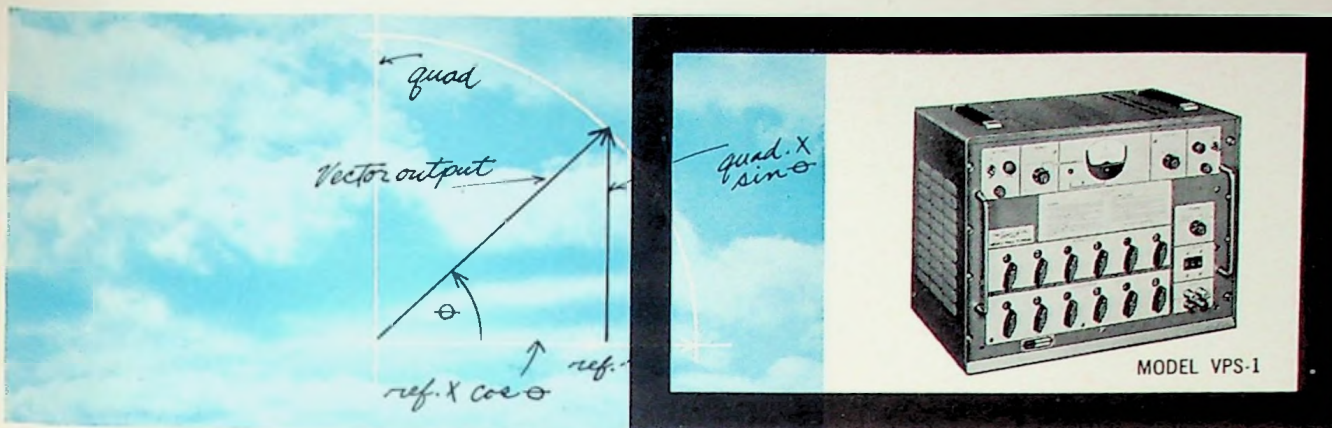
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Accurate Instrument Co.....	Jay Stone & Assoc.	Hewlett-Packard Company.....	Neely Enterprises
Aircom, Inc.....	Components Sales California, Inc.	Huggins Labs., Inc.....	O'Halloran Assoc.
Airflow Company.....	Premmco, Inc.	Hughes Aircraft Co., Indus. Systems.....	McCarthy Assoc.
Allen Electronic Corp.....	Straube Associates	Jerrold Electronics.....	Instruments for Measurements
American Optical Co., Instrument Div.....	J. T. Hill Co.	Keithley Instruments.....	T. Louis Snitzer Co.
American Standard, Norwood Unit.....	J. T. Hill Co.	Kepeco, Inc.....	V. T. Rupp Co.
Analab Instrument Corp.....	V. T. Rupp Co.	L.E.E. Incorporated.....	J. T. Hill Co.
Antenna Systems.....	T. Louis Snitzer Co.	Laboratory for Electronics.....	O'Halloran Assoc.
Antlab, Inc.....	Jay Stone & Assoc.	Lavoie Laboratories, Inc.....	McCarthy Associates
Arnoux Corporation.....	Straube Associates	Lindsay Structures.....	Premmco, Inc.
Astra Technical Instrument Corp.....	Straube Associates	Magnetic Amplifiers (Sieglar).....	O'Halloran Assoc.
Baldwin-Lima-Hamilton Corp.....	Neely Enterprises	Massa Div., Cohu Electronics.....	McCarthy Assoc.
Beckman/Berkeley Division.....	V. T. Rupp Co.	Melcor Electronics Corp.....	Components Sales Calif.
Behlman Engineering Co.....	T. Louis Snitzer Co.	Menlo Park Engineering.....	O'Halloran Assoc.
Bogart Microwave.....	Jay Stone & Assoc.	Metron Instrument Co.....	Components Sales California
Bomac Laboratories, Inc.....	Neely Enterprises	Microwave Associates.....	T. Louis Snitzer Co.
Boonton Electronics Corp.....	O'Halloran Assoc.	Microwave Dynamics Corp.....	Jay Stone & Assoc.
Boonton Radio Corp.....	Neely Enterprises	Microwave Electronics Corp.....	Jay Stone & Assoc.
Carad Corporation.....	McCarthy Associates	Millitest Corp.....	Components Sales California, Inc.
Communications Control Corp.....	T. Louis Snitzer Co.	Millivac Instruments, Inc.....	McCarthy Associates
Components Corp.....	Straube Associates	Monitor Products Company Inc.....	Straube Associates
Components Engineering & Mfg. Co.....	Premmco	F. L. Moseley Co.....	Neely Enterprises
Computer Instruments Corp.....	Components Sales Calif.	Narda Microwave Corp.....	O'Halloran Assoc.
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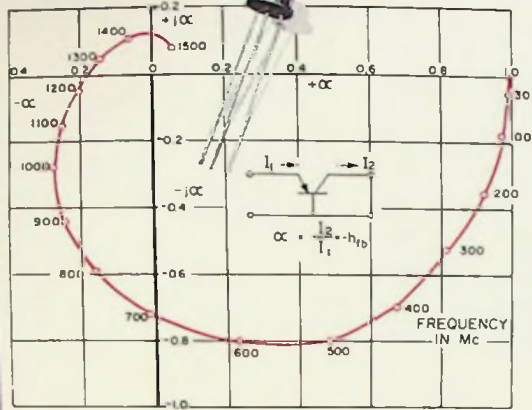
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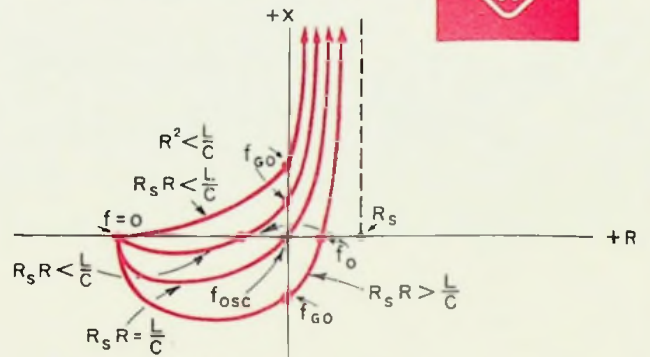
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