

EDITOR'S PROFILE of this issue

from a historical perspective ...

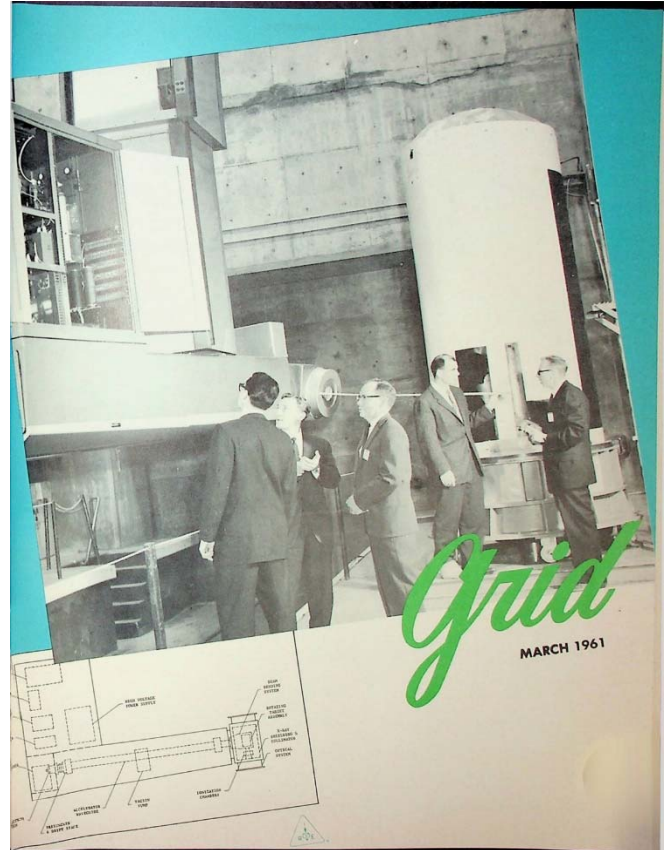
with Paul Wesling, SF Bay Area Council GRID editor (2004-2014)

MARCH, 1961:

Cover: Litton engineers demonstrate a 12-mev linear accelerator developed for inspection of rocket motors – through 15 inches of steel or 78 inches of propellant. This is used for inspection of the Polaris first stage (shown).

Off the left of the screen (missing because of binding) are the labels for the diagram – from the top: Beam Forming Network; Switch Tube; Auxiliary Supplies; RF Generator; and Pulse Transformer.

pp. 8-9: Prof. John Linvill of Stanford talks about Crane's Neuristor – basically today's neuron -- which can generate a spike or impulse of activity when some threshold is exceeded. This two-port element needs to be modeled and simulated in order to understand how it could be used to build computing systems.



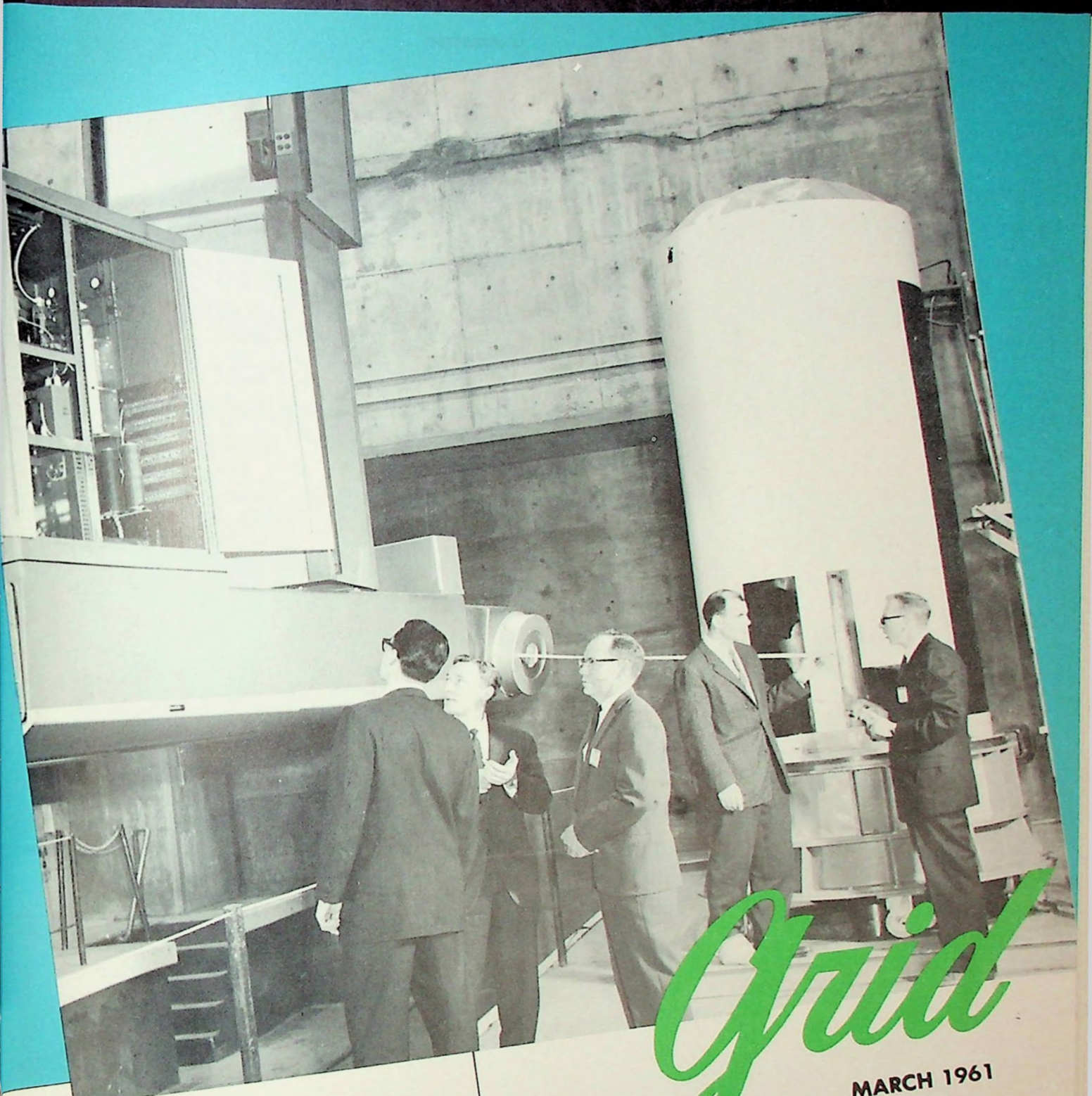
Archive of available SF Bay Area GRID Magazines is at this location:

https://ethw.org/IEEE_San_Francisco_Bay_Area_Council_History

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

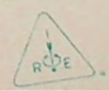
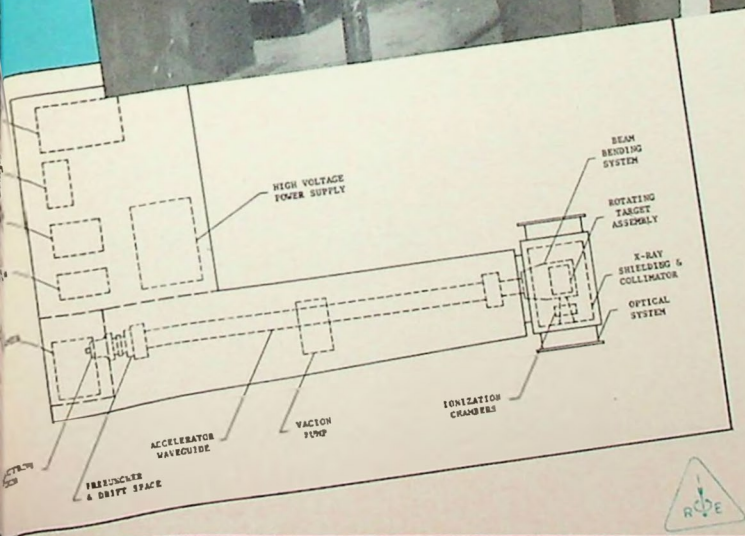
January, 2021

Contact p.wesling@ieee.org



Grid

MARCH 1961



In Quantity Production

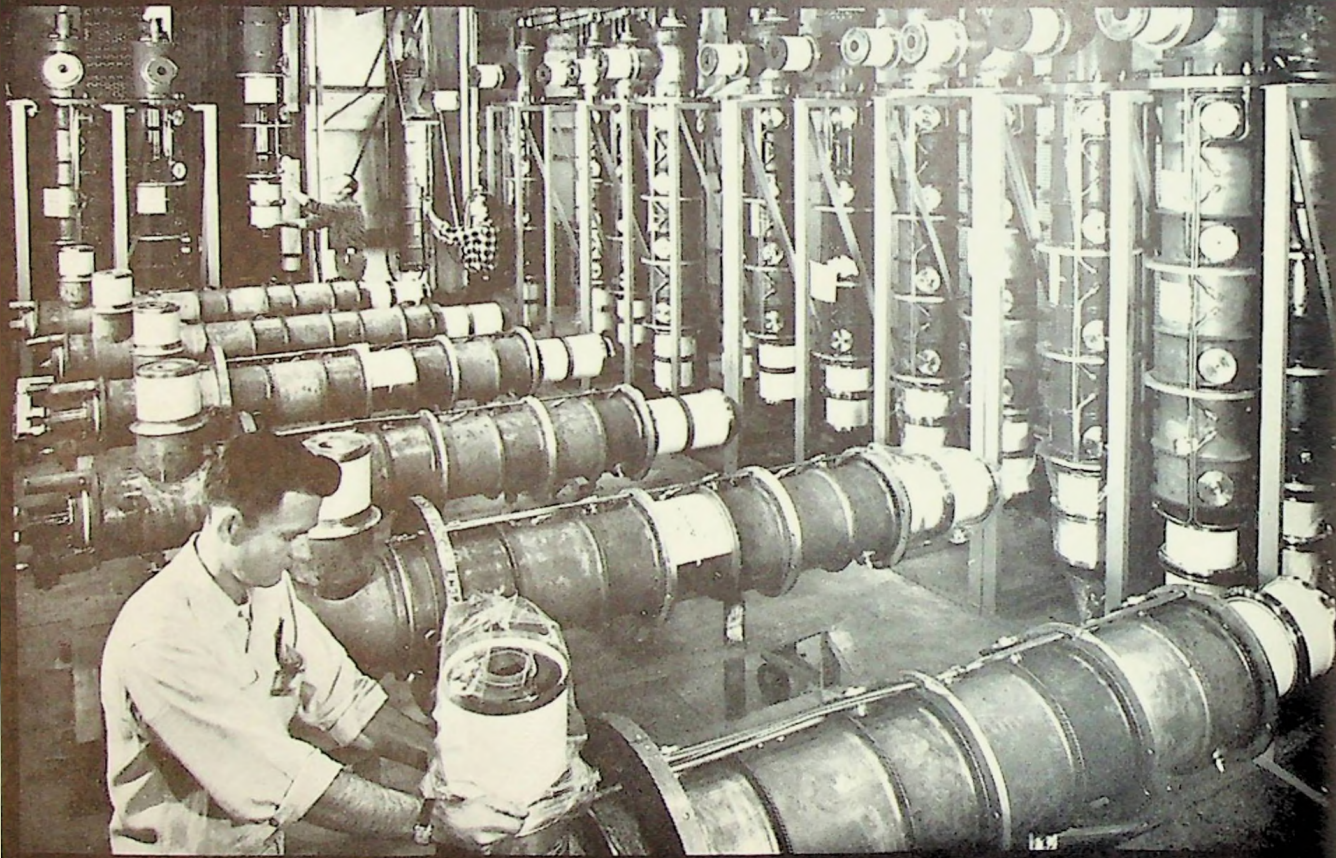
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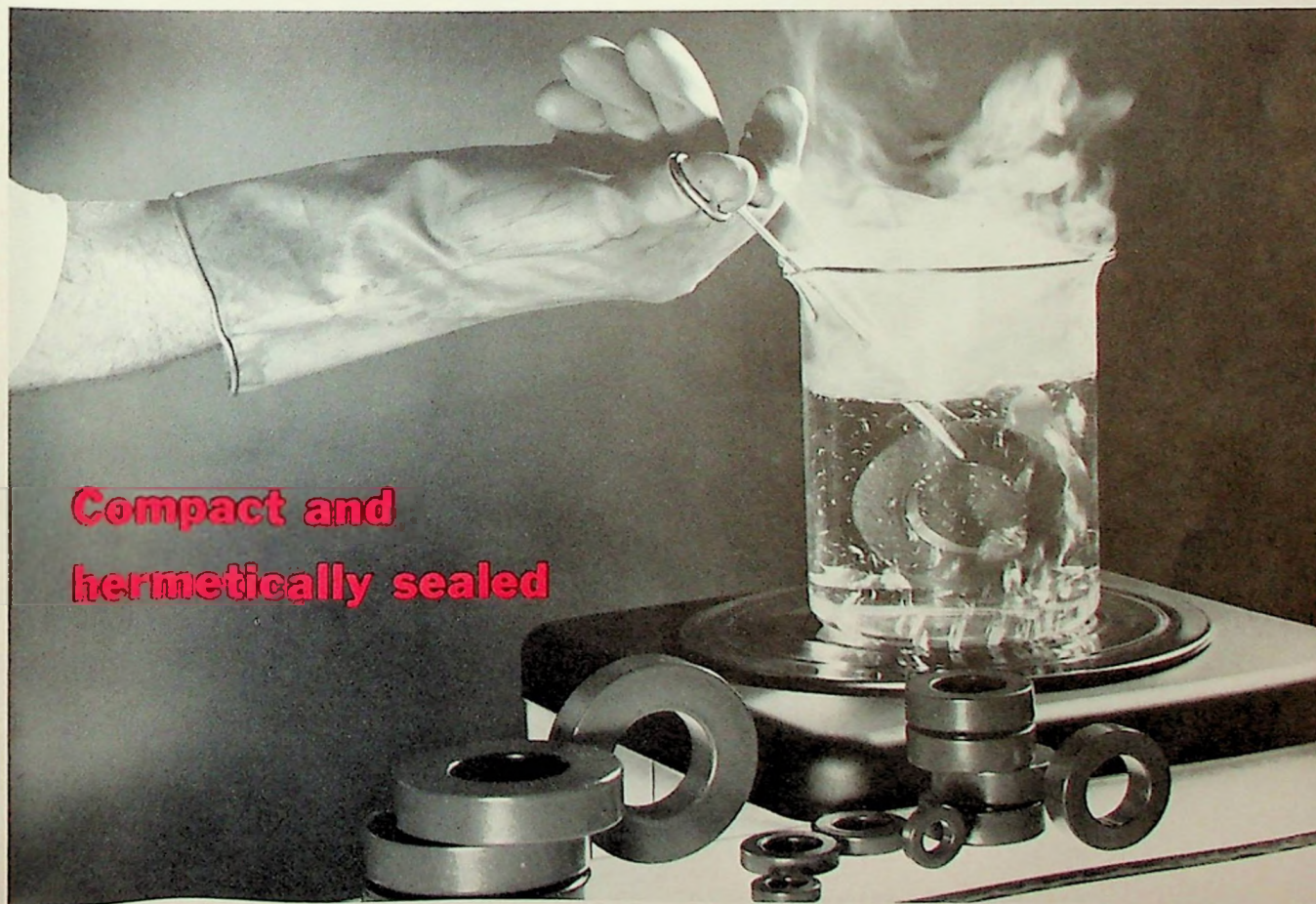
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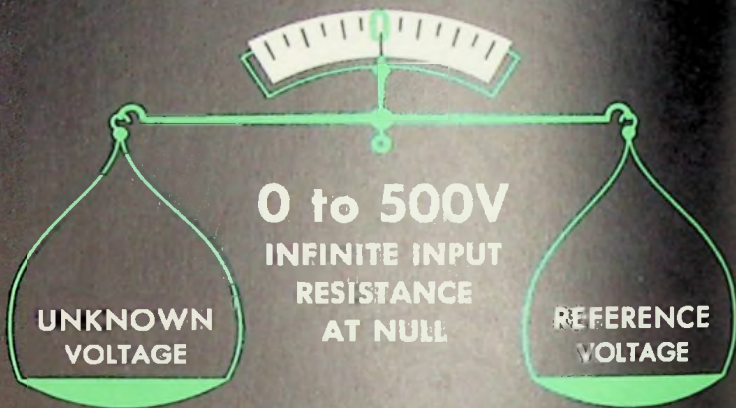


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volume 7
number 7

Grid

March 1961

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cover

Scene: the quality-evaluation laboratory at the U. S. Naval Ammunition Depot, Concord, deep in the inscrutable East Bay. Cast: W. J. McBride, Jr., manager, radiation division; Jacob Haimson, project physicist, accelerator department, radiation division; Howard R. Patterson, vice president, instrument & equipment group; Craig S. Nunan, manager, accelerator department, radiation division; and Sam Wenk, manager, accelerator applications, radiation division; all of Varian Associates, Palo Alto. Action: inspection of new Varian 12-mev

radiographic linac capable of x-ray penetration through 15 in. of steel or 78 in. of solid propellant. At lower left is a block diagram of the newly developed unit. The 3-in. diameter accelerator waveguide is 98 in. long. It operates in S-band at 3000 mc with a pulse repetition rate variable from 50 to 500 pps. X-rays are emitted from the rotatable head in line with the extended measuring tape, rear, thereby making scrutable the interior of the Polaris first stage seen in the background.

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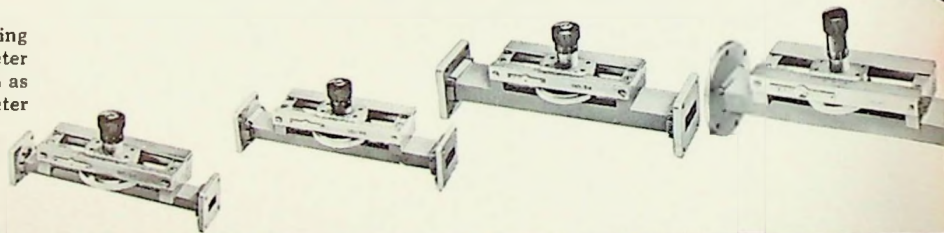
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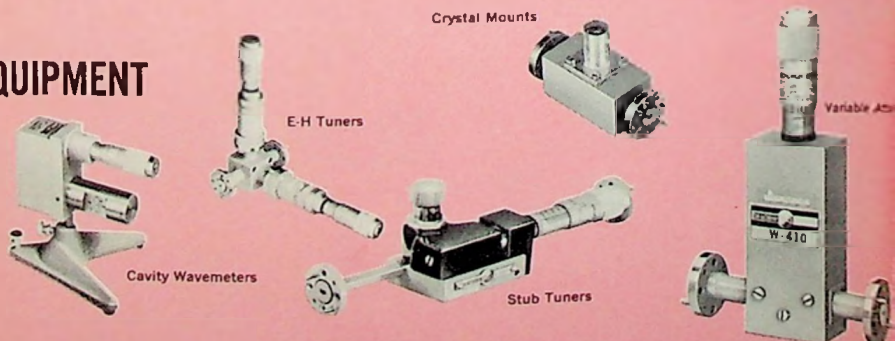
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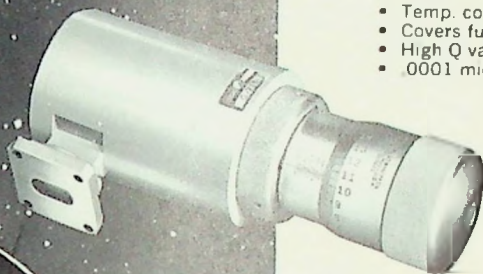
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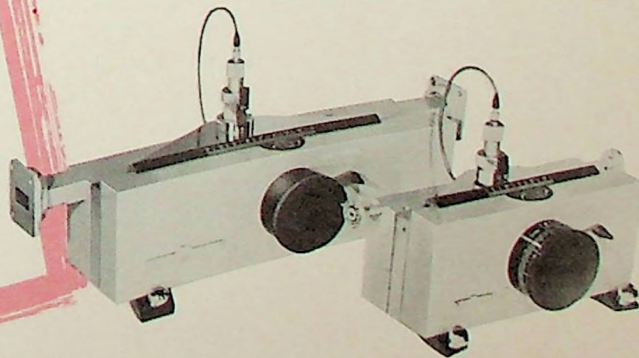


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MEETING CALENDAR

SAN FRANCISCO SECTION

● Friday, April 21

Student Chapter meeting. (Details to be announced)

EAST BAY SUBSECTION

7:30 P.M. ● Wednesday, April 5

(Joint meeting with PGED)

"The Plasma Diode"

Speaker: Dr. Raymond Fox, Lawrence Radiation Lab, Livermore

Place: Room 277, Cory Hall, University of California, Berkeley

Dinner: 6:30 P.M., Faculty Club, University of California

Reservations: June Edwards, HI 7-1100, Ext. 84203; or Virginia Cherniak,

TH 3-2740, Ext. 5434, by noon, April 3

EAST BAY SUBSECTION

● Monday, April 24

Talks and tour of Air Route Traffic Control Center, Fremont

(Details to be announced)

PROFESSIONAL GROUPS

Antennas & Propagation

8:00 P.M. ● Wednesday, April 12

(Details to be announced)

Bio-Medical Electronics

8:00 P.M. ● Wednesday, March 22

"Information Handling Processes in Brain Systems in Computer Analysis
of Brain Wave Data"

Speaker: Dr. W. Ross Adey, professor of Anatomy & Physiology, Univer-
sity of California Medical Center, Los Angeles

Place: Room M-112, Medical School Building, Palo Alto Stanford Univer-
sity Medical Center. Room M-112 is located in the courtyard of the wing

in the Center nearest Hoover Tower. Approach from Palm Drive on
Stanford Campus, which is the extension of University Ave., Palo Alto

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

Reservations: Ken Gardiner, DA 6-6200, Ext. 2659

Circuit Theory

8:00 P.M. ● Wednesday, April 5

"Relationship of Devices, Models, and Circuits"

Speaker: Dr. John G. Linvill, associate professor of electrical engineering,
Stanford University

Place: Room 277, Cory Hall, University of California, Berkeley

conventions

BOOK OF DETAILS

June, April, and October are the months with the greatest number of technical meetings scheduled, and New York City is the leading locale with Chicago, Los Angeles, and Washington, D. C., following in that order, according to the 1961 issue of "Engineering and Technical Conventions."

This is a publication of Deutsch & Shea, Inc., manpower communications consultants, and lists details on almost 700 state, regional, and national meetings on technical subjects sponsored by

over 170 technical societies, universi-
ties, and other groups. The booklet,
which comes out annually, lists at \$4.00
and can be obtained from Juanita Lutz,
Deutsch & Shea, Inc., 230 West 41
Street, New York 36, N. Y.

professional groups

INFORMATION THEORY ORGANIZING

Work has begun on the formation of
a San Francisco Bay Area Chapter of
PGIT (Professional Group on Informa-
tion Theory). Group members in the San
Francisco Section will receive a ques-
tionnaire concerning meeting locations
and meeting programs with a first meet-

MEETING CALENDAR

Electron Devices

7:30 P.M. • Wednesday, April 5

(Joint meeting with East Bay Subsection, see above)

Electronic Computers

8:00 P.M. • Tuesday, March 28

"Teaching Machines"

Speaker: Richard S. Hirsch, IBM, San Jose

Place: Building 202, Lockheed Auditorium, 3251 Hanover Street, Palo Alto

Engineering Writing & Speech

8:00 P.M. • Tuesday, March 21

Discussion on adoption of bylaws and future meeting topics

Place: The Red Shack, 4085 El Camino Way, Palo Alto

Dinner: 7:00 P.M. (Social Hour, 6:30 P.M.), The Red Shack

Reservations: Jim Weldon, YO 8-6211, Ext. 2361

Reliability & Quality Control

8:00 P.M. • Wednesday, March 29

"The Optimum Use of Redundant Information to Improve Reliability"

Speaker: W. H. Pierce, Stanford University

Place: Room 101, Physics Lecture Hall, Stanford University

Dinner: 6:00 P.M., L'Omelette, 4170 El Camino Real, Palo Alto

Reservations: M. Muca, YO 8-6211, Ext. 2282

Reliability & Quality Control

• Wednesday, April 19

Space Electronics & Telemetry

• Tuesday, March 21

CHRONOLOGICAL RECAP

March 21—Engineering Writing & Speech, Space Electronics & Telemetry

March 22—Bio-Medical Electronics

March 28—Electronic Computers

March 29—Reliability & Quality Control

April 5—East Bay Subsection/Electron Devices, Circuit Theory

April 12—Antennas & Propagation

April 19—Reliability & Quality Control

April 21—San Francisco Section Student Chapter

April 24—East Bay Subsection

ing anticipated some time this spring.

Information can be obtained from D. Braverman, Stanford Electronics Laboratories, Stanford, California.

election news

BROADCASTING

New officers for PGB were elected on January 10. They are: Hugh W. Granberry, General Electric Company, Redwood City, chairman; Paul Gregg, Bauer Electronics, San Carlos, vice chairman; and James Gabbert, KPEN, San Francisco, secretary-treasurer.

march 1961

meeting ahead

DEVICES, MODELS, AND CIRCUITS

Crane's neuristor will be described by John G. Linvill, at an April 5 meeting, as an example of an element derived from a network theory. The neuristor is a hypothesized single device sufficient in itself for the construction of a computer. The meeting will be that of the Professional Group on Circuit Theory, details for which can be found in the Calendar on page 8.

Circuit theory for any new field centers around the identification of illuminating and convenient models of its



J. G. Linvill

new devices. Around these models is developed a theory useful both in analysis of given systems and ultimately synthesis of systems to provide prescribed characteristics. Solid-state devices have induced the development of an active network theory applicable to the new technology but sometimes using suggestions from the established theory.

The consideration of two ports provides a number of interesting examples to illustrate the role of active network theory. The case of active filters will be examined to illustrate both the capability and limitation of a theory built upon idealized models.

J. G. Linvill, who was born in Missouri in 1919, received an AB in mathematics from William Jewell College in 1941, SB, SM, and ScD in electrical engineering from MIT in 1943, 1945, and 1949.

From 1949 until 1951 Linvill was assistant professor of electrical engineering at MIT. From 1951 until 1955 he was a member of the technical staff at the Bell Telephone Laboratory where he did research in transistor circuits. Since 1955 Linvill has been at Stanford University where he is now professor of electrical engineering and director of the solid-state electronics laboratory at Stanford.

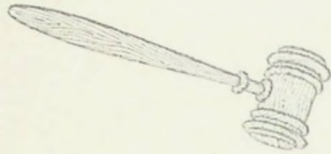
He is a Fellow of the IRE and a member of Sigma Xi and Eta Kappa Nu.

meeting ahead

DECISIONS, DECISIONS

Redundant information introduced to provide improved reliability in a digital system can be used most efficiently by a decision element, according to W. H. Pierce of Stanford University who will speak later in the month for the Professional Group on Reliability & Quality Control. For details, see the Calendar on page 9. He will present substantiation of the concept that if errors in the inputs to a decision element are independent, a decision element which takes a weighted vote is optimum. When the votes are weighted adaptively, very reliable systems may be obtained with low redundancy.

grid—9



from the chairs

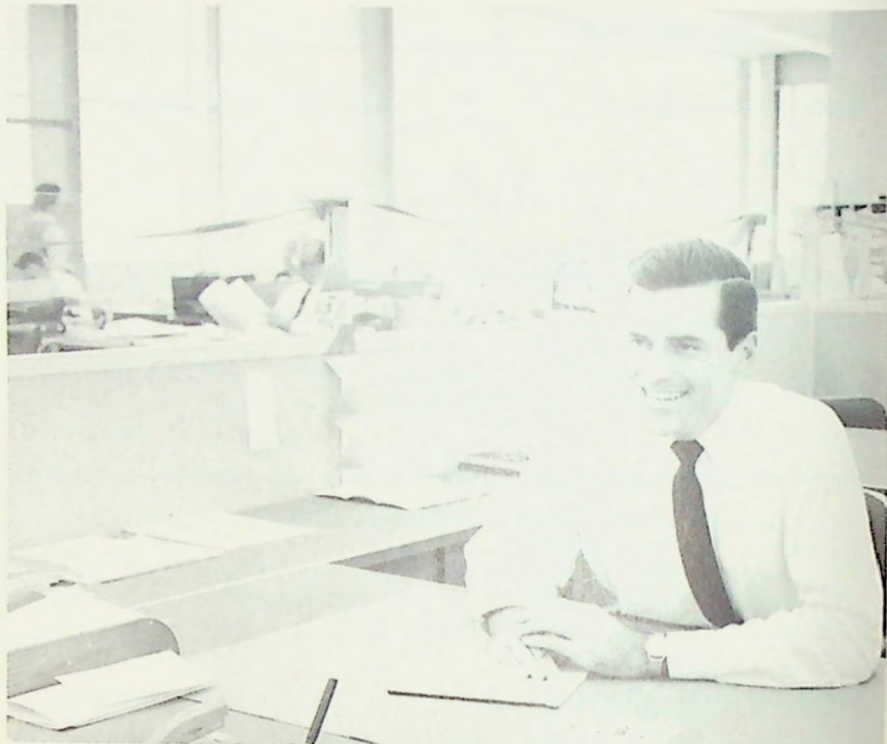
THE LITERARY CHAIRS



Seymour—off to the big city



Zeidler—back to the ranks



Sherrill—on to fame and riches

Instead of the simple, straightforward progression of responsibilities on the Publications Board provided for in the Section bylaws, the beginning of 1961 found this august group in the midst of a fast shuffle. As A. M. Seymour prepared to grasp the reins as chairman for the forthcoming year, word came from his employer, Lenkurt Electric Co., transferring him to New York City.

He was able to preside over a single meeting before his departure, and at this time the board was required to make a speed shift into the next lower gear, bringing Corvette-aficionado Peter Sherrill of Hewlett-Packard Co. into the chairmanship.

More than the normal number of openings on the board thus existing, ex-chairman Howard Zeidler of SRI was persuaded to carry on through the next year as a plain member. The group was augmented by two new members, William R. Luebke of Eitel-McCullough, Inc., and William E. Waters of Microwave Electronics Corp., the former of whom immediately acceded to the vice chairmanship. All of these details appear on the masthead page, but are reviewed here in case this apparent game of musical chairs may have you bemused.

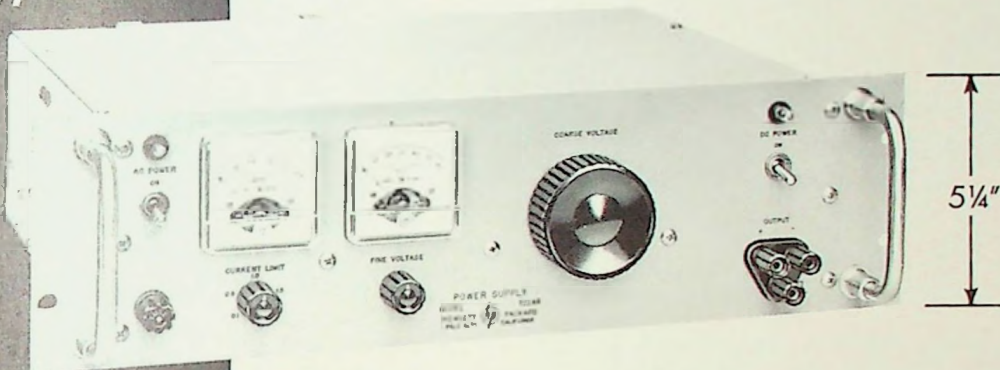
As things now stand, therefore, the board will continue to have the benefit of Zeidler's experience supporting the capable leadership Sherrill has been developing during his particularly active tenure in subordinate posts on the board. At the same time, all hands regret the severance of an extremely pleasant relationship with Milt Seymour and look forward to another turn of fortune's wheel that may return him to the group.

The forthcoming year, or what is left of it at this point, is expected to be one of continued growth for the **Grid** in service to the Section and its slate of professional groups, now expanded to 17; with still another, PGIT, making preliminary movements just off-stage.

That this growth in service will involve a growth in size is, of course, obvious and an expansion in advertising lineage is necessarily a pre-condition for this. This seventh year of the **Grid's** life will therefore include at least one historic event. Within the next few months the **Grid** will, for the first time, take advertising space in an advertising publication to advertise its own advertising space.

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requirements—
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Meets all specs from 0 to 55°C!

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

SPECIFICATIONS, $\frac{1}{2}$ 722AR

Rated Output:	0 to 60 v dc 0 to 2 amps dc
Line Regulation:	Less than 2.5 mv for \pm 10% line voltage change; any output between 0 and 60 v.
Load Regulation:	Less than 5 mv for 0 to 2 amps change; any output between 0 and 60 v.
Noise and Ripple:	Less than 250 μ v rms
Output Vernier:	Range, 1.3 v; resolution, 5 mv.
Temperature Stability:	Better than 0.02%/°C or 5 mv/°C, whichever is larger
Temperature Range:	0 to 55°C for operation within specifications
Output Impedance:	Dc: Less than 2.5 milliohms Ac: Less than 5 milliohms in series with 4 μ h
Output Meters:	Voltage: 0 to 60 v, one range Current: 0 to 2.5 amps, one range
Protection:	Output current limiter continuously adjustable from less than 100 ma to 2.2 amps
Cooling:	Forced air
Size:	19" wide, 5 1/4" high, 12" deep
Weight:	Net 34 lbs.
Price:	\$525.00

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CONTACT OUR ENGINEERING REPRESENTATIVES, NEELY ENTERPRISES, FOR INFORMATION—Los Angeles, 3939 Lankershim Blvd., North Hollywood, CA 91604; San Carlos, 501 Laurel St., LY 1-2424; Sacramento, 1317 Fifteenth St., GI 2-8901; San Diego, 1055 Shafter St., AC 3-8104; Phoenix, 641 E. Missouri Ave., CR 4-5431; Tucson, 232 So. Tucson Blvd., MA 3-2564; Albuquerque, 6501 Lomas Blvd., N.E., AL 5-5586; Las Cruces, 114 S. Water St., JA 6-2486.

PLUG-IN PATIENTS

About the middle of January the PGBME met to consider "Hospital Automation—Progress and Prospects." Presentation was by Mark S. Blumberg, M.D., senior health economist, Stanford Research Institute.

As he put it, hospitals need automation to improve services without prohibitive increases in labor costs. They have the capacity for substantial capital investments. They are a likely market for electronic equipment.

Already, as a by-product of the man-in-space program, patient-monitoring instruments record pulse, blood pressure, temperature, respiratory rate, ecg, and heart sounds and signal when they are out of established limits. In the future are new analytical instruments for the medical laboratory, automated prescription filling and medical records keeping systems—and a new breed of nurse, keen on gadgets and trained in mathematics.

Hospital automation as a market, however, won't be attractive to all electronics firms, even those equipped to meet the need. One reason is increasing competition. Historically, the typical medical supply house has been a family enterprise, part business and part a tradition of service. However, with superbly equipped and well-heeled electronics giants entering the field, the competitive element is increased. There also are peculiar risks. To replace an existing practice a "quantum jump" in superiority may be necessary because of institutional unwillingness to change to something just a little better. On the other hand, the current pace of discovery in the chemical and electronics fields poses risks of obsolescence.

Decisions by electronics manufacturers, based on balancing opportunity in the hospital automation market against risk, will rest upon knowledge of medi-

cine and of hospital economics as well as of electronics. For example, medical records might seem to present an opportunity for data processing equipment use. However, the records keeping budget is but 0.5 to 2 per cent of a hospital's total. Moreover, records-keeping for the purpose of deriving medical statistics probably will be contracted by the hospital to a regional agency.

The nursing budget, 26 per cent of the total, is a challenge to management and technology. So is medication paper work, 5 per cent; and laboratory, 5 per cent.

"Idleness" accounts for 10-15 per cent of nursing time, being principally attributed to the necessity of standby nurses to handle peak patient loads—"a concomitant of hospitals' very erratic case loads." Suggestions for reduction of standby time include establishment of a community-wide mobile nursing pool.

Patient monitoring instruments for critically ill patients requiring constant care, also may reduce nursing time. However, it is emphasized that the principal goal of automation is not so much straight cost reduction as it is "better patient care without exaggerated increases in labor cost.

If someone could develop a time-saving handwashing device—"not just a better soap"—another cut in nursing time could be made. Nurses in pediatrics would spend up to one-eighth of their time washing their hands if they followed rules to the letter.

Obstetrics eventually will be the most heavily instrumented ward in the hospital, because the first day of life is by far the most hazardous.

Some laboratory instruments might become almost universally used if they could reduce lab time. If, for example, the analysis of female smears, male sputum, and urine sediment of both sexes could be largely automated, preventive medicine would have a power-

(Continued on page 14)



—George Reyling photo

Don Smith and Roy Roberts of Melabs; Olof Landeck, Electro Engineering Works; and Lloyd Addleman, Melabs, enjoy the coffee period following the PGPEP meeting reviewed in the February issue. Roberts was speaker

ABOUT THE PROFESSION

Culminating an extensive research project performed by a special committee of the San Francisco Section, the following information is provided for the general illumination of the membership. It is basically a report on engineering registration. The committee, appointed by Chairman Dunn in August 1960, consisted of John S. McCullough, Litton Industries; and A. E. Siegman, Stanford University.

Originally rendered at an Operating Committee meeting of December 8, the report is printed in small type and continued to the back of the issue not through a lack of appreciation for its importance, but simply because of the limitations of space in the *Grid* and the desire to print the material in full. It will be found both informative and interesting and its absorption by all members concerned about the future of engineering with respect to registration and other organizational movements is recommended.

(1) The following is a collection of facts gathered during an informal study of the topics named above. The original intent was to study only the question of registration of engineers. However, this question seems to be at least partly tied in with the broader question of "engineering unity," and so the latter topic was added. The information presented here is not guaranteed to be complete or definitive or necessarily absolutely accurate; it is only the results of an initial survey over conveniently available sources.

(2) Various references are cited in the following. Copies of many of these references may be found in the files of the IRE, San Francisco Section.

(3) A suggested policy for the San Francisco Section is attached at the end of this report.

The Concept of Engineering Unity

(1) There exist, at present, a wide variety of technical societies and institutes, such as the IRE, devoted to various specific branches or fields of engineering. Some of these groups limit their activities strictly to serving the technical needs of their members. Others also carry out in varying degrees nontechnical activities having to do with such things as education, economic matters, legislative matters, questions of national policy, labor relations, employment matters, and the like.

(2) Besides the activities of the indi-

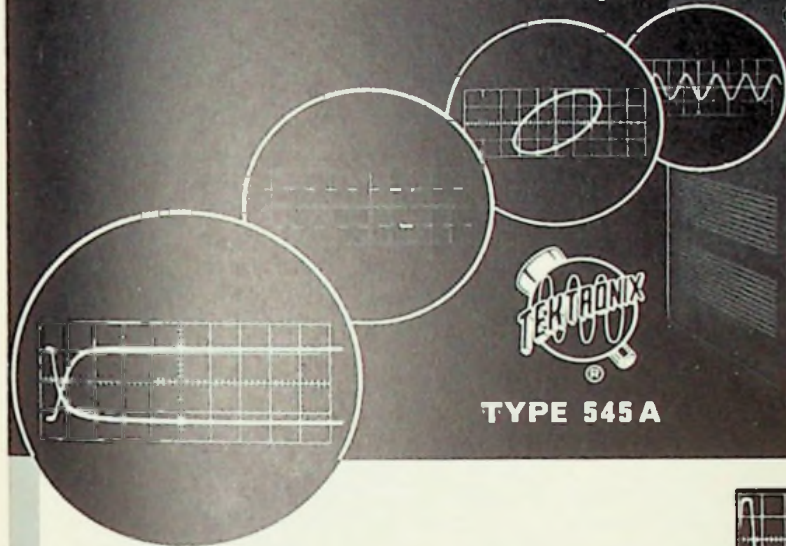
(Continued on page 25)

RADIO FREQUENCY INTERFERENCE

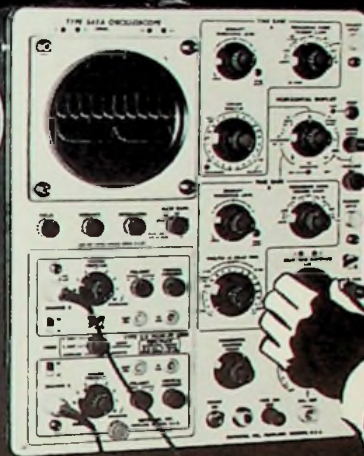
A first set of officers for the newly formed PGRFI are as follows: Peter Spencer, Filtron Co., Palo Alto, chairman; Robert J. Lathrop, Cooke Engineering Co., San Mateo, vice chairman; and Richard G. Davis, Lockheed Aircraft, Sunnyvale, secretary-treasurer.

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—ROBERT HARDGROVE

meeting review

STRAIGHT AND NARROW PATH

The joint meeting of the PGED and PGMTT at Stanford on February 15 heard an interesting talk on the proposed two-mile-long linear electron accelerator known as Project M. The speaker was Dr. Kenneth Mallory, research associate at Stanford and a member of the team doing design studies for the project. He substituted for Dr. Gregory Loew, who was unable to speak as originally scheduled.

A series of progressively more powerful linear accelerators has been built at Stanford since World War II, the latest of which is capable of accelerating a pulsed electron beam to 700 mev. Theoretical studies based on experience with these machines showed that there is no fundamental obstacle to building a very much more powerful accelerator with the same basic design. Furthermore, loss of beam power due to radiation makes circular-orbit electron accelerators impractical for energies above 10 bev, so that the linear accelerator becomes the only practical design approach.

These considerations led to the Project M proposal which is currently awaiting authorization by Congress. It is envisioned that the project will pass through two stages in which different performance goals will be reached. In the first stage a beam voltage of 20 bev will be attained with an average current of 30 microamperes. In the second stage the corresponding figures will be 40 bev and 60 microamperes. By way of comparison, existing and proposed proton synchrotrons having beam energies of the same order of magnitude have average currents less than 0.003 microamperes. Hence it may be expected that high-energy nuclear particles will be produced by the Project M beam in quantities of the order of 10^4 times larger than is now possible.

Of the many challenging engineering problems connected with the project only a few can be mentioned briefly. The electrons will be accelerated inside a two-mile-long, $\frac{7}{8}$ -in.-diameter disc-loaded waveguide, the dimensions of each section of which must be held to tolerances of a few ten-thousandths of an inch. The requirement on the straightness of the guide over this distance is

(Continued on page 16)

Samuel A. Ferguson, vice president and general manager, Mountain View operations of Sylvania Electronic Systems, a division of Sylvania Electric Products Inc., died February 5 at Palo Alto-Stanford Hospital of a malignant head tumor. He was 44 years old.



I first met Sam when he joined what was then a handful of people organizing the Sylvania electronic defense laboratory (EDL). He had been in the Los Angeles area as assistant technical director of the Dumont Laboratories for a short period after service with the Signal Corps during the Korean period. Sam possessed the needed combination of technical background and knowledge of Signal Corps programs and Army requirements which was invaluable in establishing the working philosophy of the EDL and as a means for effective utilization of the output of the laboratory by the Signal Corps. As manager of technical liaison for the two critical first years, he formed a sound basis for the future effectiveness of this military-industry innovation by the Signal Corps. His stable nature and basic good humor, and his effectiveness in negotiation and administration, carried him and the enterprise through many critical periods.

Some incidents or periods stand out sharply against the hazy background of years gone past. In the formative days of EDL, I accompanied Sam on an extended investigation of the field problems and needs of the Signal Corps in what was then occupied Germany and Austria. It was an exciting period with long hours, sometimes under arduous conditions, and at other times relaxing in the adult playground of the civilian admitted to PX privileges. Despite all the wonders of the scenery and the fascination of learning about a foreign coun-

try and people, I most vividly remember our serious, stable Sam Ferguson as the only member of the group who tried and managed to get through a "schuhplattler" or shoe-slapping dance in a beer garden on one Saturday evening in Salzburg. He was always good company, and a comfortable fellow to have around.

After several years, he was promoted to director of the electronic defense laboratories, and with the continued growth of Sylvania, in 1957 he became manager of the Mountain View operations, with an elevation to vice president in 1959. Sam exhibited excellent organizational and administrative abilities and a continuing growth in this career could have been easily predicted.

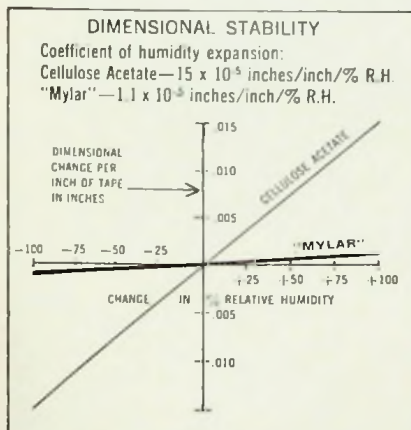
The first indication of the disease which caused his death occurred at the end of 1959 and this was diagnosed and operated upon very early in 1960. He was then presented with the situation that is often discussed or written about—given a short time left to live, how shall you order the last few months of your life. The answer depends so much on how happy an individual is with his work, his family, and his daily routine. Sam chose to continue his work when he was able to return, and without any concessions to his health or short future, right up to the inevitable relapse and final return to the hospital. He was cheerful and good-natured to the last. He was a good man to have known and a good friend.

—M. L.

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

Much information recorded on magnetic tapes can never be replaced because of the tremendous cost of duplicating test conditions. You can protect your investment in such valuable data with tapes of "Mylar"[®] polyester film. Their small additional cost is negligible compared to the cost of the data they contain. Here's why they provide higher reliability than any other tapes:

CHART NO. 1

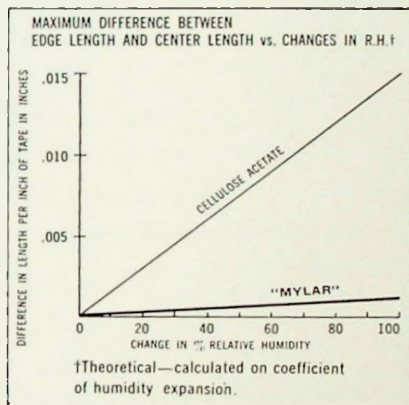


Less signal dropout.

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

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

CHART NO. 2



Fewer garbled signals.

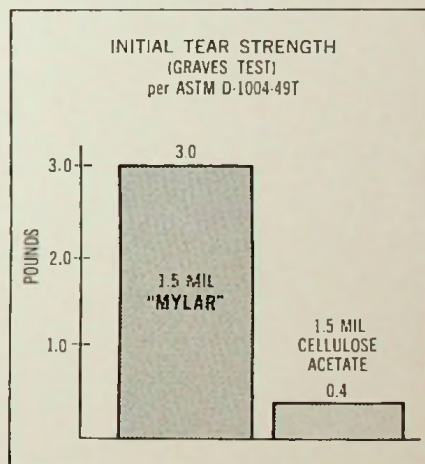
If magnetic tape picks up or loses moisture unequally across the tape width there will be a difference in length between the edges and center. Chart 2 compares this effect for "Mylar" and cellulose acetate tapes. Because "Mylar" is virtually non-hygroscopic there is no dimensional difference between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

Less tape breakage.

Since most breaks start as edge nicks,

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

CHART NO. 3



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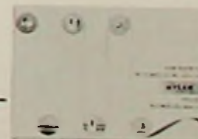
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MORE PROJECT M

so stringent that distortions due to small earth movements may make frequent realignment of the guide necessary unless some compensating device is used, such as strong focusing of the beam.

Radio-frequency power will be fed to the accelerator from a large number (250 to 1000) of klystron amplifiers distributed at equal intervals along the length of the accelerator. Each of these klystrons will be rated at over 20 kw of average power, in the form of 360 pulses per second of 2.5 microseconds duration.

The accelerator will ultimately consume 130 megawatts of power. The beam power will reach 2.4 megawatts, presenting some interesting heat-dissipation problems in addition to the radiation-shielding problems at the target end.

—E. F. BARNETT

meeting review

NEW ANGLES ON PHASE

Different methods are required to perform phase measurements in different regions of the overall range from 1 cps to 2000 mc, according to Dr. Paul Yu, who spoke before the Professional Group on Instrumentation early in February. This effect comes about because of the appearance of new parameters.

Speaking to approximately 50, Dr. Yu, president of Ad-Yu Electronics Laboratories, Passaic, New Jersey, announced his subject as, "State of the Art in Precise Phase Measurement from Very Low to High Frequencies."

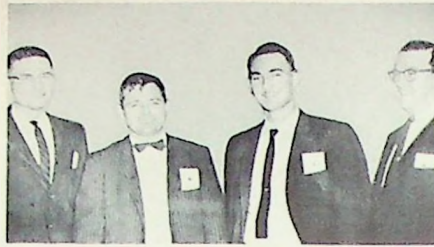
Yu described: cathode-coupled limiters with stabilization by negative feedback which give 0.25-degree accuracy in the frequency range 1 to 500,000 cps; an instrument based on the vector differences of two input voltages, available to measure phase angles in the 20 to 100,000 cps region; another instrument which compares an incoming signal with a standard precision time-delay network capable of being adjusted continuously for measurements in the 100 kc to 15 mc region; and a continuously variable delay line, constructed coaxially, used as a standard for signal comparisons in the region from 15 to 2000 mc. Slides and other visual aids were used to augment the presentation.

—L. G. BURLINGAME

meeting review

NO ROOM FOR WISE GUYS

Urgent need for electronic systems and instrumentation often tends to push equipment into the hardware stage prematurely. There it may not perform as intended, nor perform for as long a period of time as required, according to J. T. Lavrischeff, reliability engineer at the University of California Lawrence Radiation Laboratory. He spoke on the



Reliability considerations at the EBSS/PGEM/PGRQC meeting brought together Alexander J. Stripeika, Lawrence Radiation Lab and PGRQC chairman; Robert A. Davis, Philco Corporation; Speaker John T. Lavrischeff, Lawrence Radiation Lab and EBSS chairman; and PGEM chairman Oscar Simpson, Philco

subject, "The Component Approach to Reliability" at a late January meeting in Oakland. Sponsors were the East Bay Subsection jointly with the PGEM and the PGRQC.

As Lavrischeff stated his objective in the presentation, it was to stress the results and worth of the least costly effort in reliability programs and the use of engineering know-how to evalu-

seventh region

THE PHOENIX CONFERENCE

The technical program has been set for the 1961 conference of the Seventh Region of the Institute of Radio Engineers in Phoenix April 26-28, according to information released by George Royden, conference chairman. All sessions and industrial exhibits will be at the Hotel Westward Ho, located in the central business district.

Opening remarks Wednesday morning, April 26, will be made by C. Wesley Carnahan, director of the Seventh Region and director of central research planning for Varian Associates.

Sessions, subjects and speakers will be as follows:

New Problems for Electronic Engineers (morning of April 26)—"Problems Associated with Crowding of Frequency Spectrum," Dr. D. E. Nable, executive vice president, Motorola, Inc.; "Problems Associated with Electronic Control in Industrial Operations," Clair C. Lasher, general manager, General Electric Co., computer department.

Panel discussion—Spectrum Management, Marshall Davie, Jr., of Rand Corp., moderator (Wednesday afternoon, April 26)—"Land Management Problems of the U. S. Forest Service on Mountain-top Sites for Electronic Installations," William B. Morton of U. S. Forest Service; "Status of the Defense Mutual Interference Problem," Col. Emmett R. Reynolds, U. S. Army, and Henry Randall, Office of the Director of Defense Research and Engineering; "Frequency Management in Army Electromagnetic Compatibility Program," Charles Gregory, and "Data Display Requirements for Interference Prediction and Control," D. R. J. White, Frederick Research Corp.

Control Theory and Practice (Wednesday afternoon, April 26)—"A-C Instrument Servo with Error-

ate the capability of a part, sub-assembly, or assembly in relation to an entire system. His warning to reliability personnel was that they must not become known by their "I told you so" attitude, but must exhibit their prowess in determining how a part will perform its task as it passes through all the various steps leading up to final operation.

After showing a couple of specific examples of how the component approach to reliability works—one on the prediction of failure rates by use; and a second on the application of accelerated life testing of parts to the determination of life expectancy—Lavrischeff concluded by restating his conclusion: that a reliable device must be designed that way, that the engineer or systems coordinator who originates it is in the best position to make it reliable, and that it is not really designed until it is reliable. He finished by emphasizing the urgency for all engineers who design electronic equipment to become familiar with the problems of reliability, the techniques for solving them, and the means of applying this knowledge to all their work.

—GEORGE SPELVIN

Controlled Damping Coefficient," P. B. Krishnaswamy, Roy Schmoock and Donald L. Hom of Fisher & Porter Co.; "A Special Purpose Cross Correlator with Application to Servo Analysis," Robert C. Howard of Giannini Controls Corp.; "Signal Filtering in Digital Control Computer Systems," W. M. Gaines of General Electric Computer Department; "Adaptive Filtering in Digital Control Computer Systems," R. C. Dorf, M. C. Farnen, and C. A. Phillips of U. S. Navy Postgraduate School; and "Synthesis of Double-Terminated Active Networks Using Negative Impedance Converter," King-sun Fu of Purdue University.

Student Prize Paper Contest (Wednesday evening, April 26), organized by Dr. C. L. Hagan of Motorola Semiconductor Products Division.

New Problems in Frequency Interference (Thursday morning, April 27)—"Survey of Electromagnetic Effects Associated with the Thermonuclear Devices Teak and Orange," R. Sanders of Hughes Communications Division; "Control of Interference Between Satellite Communication Terminals and Surface Services," Dr. W. L. Firestone of Motorola, Inc.; "Control of Surface-Service Interference with Communication Satellites," S. G. Lutz of Hughes Research Laboratories; and "Adaptive Communication Techniques as they Apply to Radio Control Systems," Jana Cohn of Motorola, Inc.

Magnetic Logic in Computer Circuits (Thursday morning, April 27)—"Principles of Multiaperture Magnetic Logic," Leslie Norde of Motorola Inc.; "The Use of Multiaperture Magnetic Logic in Digital Computers," Dr. Edwin K. Van de Riet of Stanford Research Institute; "Implementation of Boolean Algebra with Integrated Magnetic Logic," L. R. Smith of Motorola Inc.; and "Field Computer Using Pulsed Magnetics," J. W. Heermans of IBM.

Panel discussion—The User Looks at Computer Control (Thursday afternoon, April 27)—Dr. Thomas L. Martin, dean of engineering, University of Arizona, moderator.

Microwave Tubes and Antennas (Thursday afternoon, April 27)—"Generating High Power Gaussian Pulses in a Klystron Amplifier for Tacan Service," Harold R. Jones of Eitel-McCullough, Inc.; "PPM Focusing of Low-Noise and Serradine TWT's," William J. Fleig of Microwave Electronics

(Continued on page 18)

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MORE CONFERENCE

Corp.; "Some New Crossed-Field Tubes for High Resolution Radars," Joseph A. Saloom of S.F.D. Laboratories, Inc.; "Waveguide-Fed Biconical Horn," Anthony Maestri, Jr., of Melpar, Inc.; and "Performance Characteristics of a Horn-Reflector Antenna," L. E. Hunt, D. C. Hogg, and A. B. Crawford of Bell Telephone Laboratories.

Analysis Techniques for Radio Interference Problems (Friday morning, April 28)—"Close-Channel Operation of SSB Receivers and Transmitters," Charles E. Blakely of Georgia Institute of Technology; "A Model for Prediction of Radar Interference," Russell A. Rollins, Jr., G. Minty, W. DeHart, J. Dute, R. Legault, Y. Morita, J. Riordan, and N. Smith of the University of Michigan; and "Radio Frequency Interference Predictions for Quick Fix Decisions," J. E. McShulskis, J. H. Mills, and D. R. J. White of Frederick Research Corp.

Process Control Instrumentation (Friday morning, April 28)—"Automatic Electronic Quadrature Rejection in Electromagnetic Flowmeter Systems," Roy Schmoack and Donald Ham of Fisher & Porter Co.; "Transformers, Transformer-type Transducers and their Application in Process and Industrial Control Systems," Raymond E. Claflin, Jr., of Claflin Associates; "A Novel Electropneumatic Temperature Controller," Leslie R. Axelrod of Powers Regulator Co.; and "Some New Techniques for Record and Processing Vibration Test Data," Roy M. Tidwell of Sandia Corporation.

Bandwidth Conservation and Interference Elimination (Friday afternoon, April 28)—"Communications Central, AN/MRC-66," Albert J. Toberman of Motorola Research Laboratory; "Hydroacoustical Simulation of Antenna Radiation Characteristics," Anthony Maestri, Jr., of Melpar, Inc.; "Practical Design Guides for Interference Reduction in Electronic Equipment," R. F. Ficcki of RCA Service Co.; and "Design and Development of a Bandwidth Compression System," Harvey L. Morgan of Phoenix.

WESCON—NORTH

COMMITTEE ORGANIZATION 1961

An impressive array of talent has been organized to lead the main committee functions of the 1961 Western Electronic Show and Convention in San Francisco next August 22-25. Albert J. Morris, Radiation at Stanford, WESCON board chairman, and O. H. Brown, Eimac, chairman of the executive committee announced the following:

Convention Committees

Answering to Dr. John V. N. Granger, Granger Associates and convention director, are the following: Technical Program—E. W. Herold of Varian Associates, chairman; L. G. Clarke of Stanford Research Institute, vice-chairman. Facilities—Robert Craig of Hansen Laboratory, Stanford University, chairman; H. M. Meyer of Stanford Research Institute, vice-chairman. Field Trips—Richard J. Reynolds of Hewlett-Packard, chairman; Robert E. Miller of Applied Electronics, Stanford University, vice chairman. Women's Activities—Mrs. Bernard M. Oliver of Los Altos Hills, chairman; Mrs. Norman H. Moore of Atherton, vice-chairman. All-Industry Banquet—John S. McCullough of Litton Industries, Inc., electron tube division, chairman; Cortlandt Van Rensselaer of Hewlett-Packard Co., vice-chairman. Future Engineers Show—Jack L. Melchor,

chairman; Alan T. Waterman of Applied Electronics, Stanford University, vice-chairman. Hospitality—John A. Chartz of Dalmo Victor Co. and Donald B. Harris of SRI, co-chairmen.

Show Committees

Answering to Calvin K. Townsend, Jennings Radio Mfg. and show director, are the following: Exhibits—Jack Silhavy of Varian Associates, chairman; Berkley J. Baker of Litton Industries, electron tube division, vice-chairman. Visitors' Service—W. A. Melchior of Eichorn & Melchior, Inc., chairman; Norman P. Hiestand of Varian Associates, vice-chairman. Registration—Robert E. Johnston of Jennings Radio Manufacturing Corp., chairman; Fred J. MacKenzie of Stanford Research Institute, vice-chairman. Cocktail Party—Emmet G. Cameron of Varian Associates, chairman; Glenn A. Walters of Dalmo Victor Co., vice-chairman. Distributor-Representative Conference—Elvin Feige of Elmar Electronics, chairman; Charles N. Meyer of Meyer and Ross Co., vice-chairman. Industrial Design Competition—Carl J. Clement, Jr. of Hewlett-Packard Co., chairman; J. W. Stringer of IBM, San Jose, vice-chairman.

Heading Public Relations, which answers to Don Larson, manager of WESCON, are Peter N. Sherrill of Hewlett-Packard Co., chairman, and Charles Elkind of IBM, San Jose, vice-chairman.

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PROGRAM PLANNING

Early work on the technical program for the 1961 WESCON has developed several points of immediate interest to authors expecting to participate in the convention August 22-25 in San Francisco. E. W. Herold, chairman of the technical program committee, reported for Albert J. Morris, WESCON board chairman, and Dr. John V. N. Granger, convention director, the decision of the WESCON board to reproduce individual preprints of the papers. They will be made available at a nominal charge in advance of the presentations.

Authors scheduled for the technical program will be asked to submit papers to WESCON headquarters in reproducible form by July 1. There will be no restriction on authors for post-convention publication of their material in journals and magazines of choice. Authors will be encouraged to seek publication, Herold said, and are assured of assistance from WESCON.

Discussions to Be Continued

Herold said the technical program committee has decided to develop further the "new look" approach initiated at the 1959 WESCON. "In this approach," he said, "technical sessions will include invited discussion of all formal papers by internationally known experts, as well as floor discussion, thereby enhancing interest considerably over presentation of the papers alone. In addition to submitted papers, the committee promises to exploit new media for exceptional invited papers and expects the program content to be the best in history."

Special Session on Radio Astronomy

Herold further announced that a special radio-astronomy session will be held jointly with the International Astronomical Union, whose worldwide members will be meeting simultaneously at Berkeley.

Among the program departures will be special attention to the generation, detection and application of coherent infrared and optical electromagnetic radiation, using the latest quantum-electronic techniques.

"WASHINGTON—The Federal Communications Commission authorized ITT Federal Laboratories, Nutley, N. J., to operate an experimental radio station that will bounce signals off the moon and off space satellites for reception on earth.

"The concern is a division of International Telephone & Telegraph Co., New York."

—From the Wall Street Journal, January 13, 1961.

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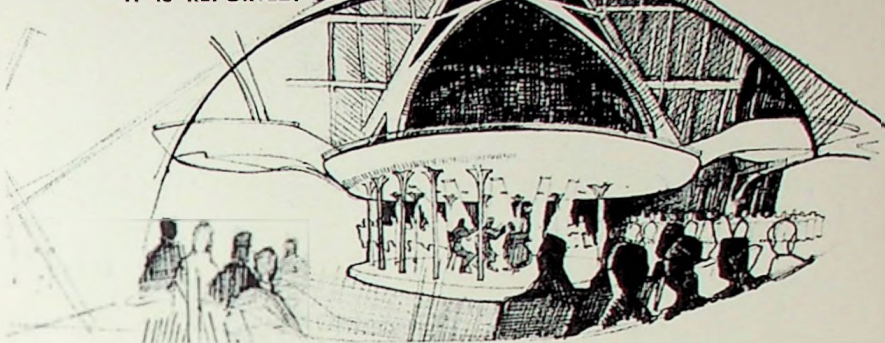
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IT IS REPORTED:



Phoenix Foundation and the Audio-Visual Research Foundation have announced an alliance. Phoenix Foundation is the organization which rescued a San Francisco church roof to be restored as an art center—probably in Sausalito—while AVRF is the group which originated Vortex, the audio engulfment which has provided performances in the Morrison Planetarium in

the last year or two. A urethane dome is being included in the plans for the center to provide a regular locale for Vortex performances and a workshop for related projects. Facilities will be made available for composers of electronic music and musique concrete. Further details on the general program can be had from Ernest Burden, 552 Roosevelt Way, San Francisco.

International Business Machines Corp. has announced five new managerial appointments in the advanced systems development division laboratory, San Jose. R. L. Haug was named to the newly created position of manager of technical programs. He previously was assistant manager for product development. Other appointments include those of Dr. E. A. Quade and N. A. Vogel. Presently manager of applied physics, Quade formerly headed the recognition and association project. Vogel, who assumes duties as manager of the file programs, previously managed the memory sub-systems project. R. W. Porter and Dr. A. S. Hoagland were named managers respectively of information retrieval systems and departmental data processing systems. Dr. Allen Kahn, former manager of applied physics, was named technical assistant to Haug. I. R. Martin was named a technical assistant with responsibility for contract administration and field engineering.

Dr. Stanley E. Sobottka and Kurt E. Zublin have joined the technical staff of Watkins-Johnson Co. Sobottka, a physicist, initially will be engaged in research and development of a low-noise millimeter-wave traveling-wave tube. He came from Boeing Airplane Co., Seattle, where he investigated the microwave interaction between electron beams and gaseous plasmas.

Zublin is a native of Germany, has a diploma degree in electrical engineering from the Federal Institute of Technology at Zurich, Switzerland, and has had graduate studies at Stanford Uni-

Jay Stone and Associates of Sunnyvale has been appointed sales representative in Northern California for Quan-Tech Laboratories. Quan-Tech offers transistorized laboratory power supplies, noise-measuring equipment, and other test instruments to the electronics industry.

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TECHNICAL CERAMICS

(Continued on page 22)

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MORE SWINGS



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versity. Before joining Watkins-Johnson to conduct research and development in the field of high-power traveling-wave tubes, Zublin was with General Electric microwave laboratory here as project engineer on a multi-megawatt S-band traveling-wave-tube program.

Robert W. Dilts has been promoted to manager of the patent department of Eitel-McCullough, Inc. Dilts has been a member of the patent department since 1956. His new duties will include the administration of domestic and foreign patents, trademarks, and copyrights. Dilts received his BS degree in engineering law from Indiana University and his LLB degree from Purdue University. He has been admitted to practice before the bar of the state of Indiana and the federal courts. Before joining Eimac, he served as patent attorney on electron tubes with RCA Laboratories, Princeton, New Jersey.

Harry G. Heard, formerly chief engineer at Levinthal Electronic Products, has been appointed vice president of Radiation at Stanford.

Winner of the top \$1,000 scholarship in the Bay Area Engineers' Week celebration just past was Douglas M. Campbell, a senior at Carlmont High School, Belmont. The award was made by Dr. H. C. Ries of Berkeley, a research engineer and chairman of the Engineers' Week Scholarship Committee. Awards to runners-up (\$700 each) went to Charles Kimble of Benicia High School and David H. Weinstein of Oakland High School.

Winners were selected after a series of eliminations to determine the top 10 high school senior science or mathematics students in the area. Zone committees interviewed students, reduced the total to 10. Dr. Ries' committee chose the three from this group. Other seven winners each received a \$100 savings bond.

Dan Larson, manager of WESCON (Western Electronic Show and Convention), has been named to the board of directors of the National Association of Exhibit Managers.



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IRE MEETINGS SUMMARY

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

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

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

April 19-21—**S.W. IRE Conference and Electronic Show.** Dallas Memorial Auditorium and Baker Hotel, Dallas, Texas. Dr. L. D. Strom, Texas Instrument Co., 6000 Lemmon Avenue, Dallas, Texas.

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

May 2-4 — **Electronic Components Conference,** Jack Tar Hotel, San Francisco, Calif. Daniel Breeding, Fairchild Semiconductors, Inc., Palo Alto.

May 4-5—**Second National Symposium on Human Factors in Electronics.** Marriott-Twin Bridges Motor Hotel, Arlington, Va. Ezra S. Krendel, Franklin Institute Laboratories, Philadelphia 3, Penna.

NON-IRE LOCAL EVENTS

March 18—**KPFA-FM** will broadcast the regular "Equipment Report" program at 3:15 P.M. conducted by R. S. MacCollister. The subject is the Sherwood S-7000 AM/FM Stereo Receiver.

March 21 — San Francisco Section, Industrial Division, **American Institute of Electrical Engineers:** "The Latest Concepts for High Voltage Switchgear in Industry" by T. E. Palmer, S&C Electric Co., Whitcomb Convention Center, Market at 9th Street, San Francisco, Calif., 7:30 P.M.

March 23—Fresno Subsection, **American Institute of Electrical Engineers:** "The Point Mugu Story" by William W. Cuthbert, technical consultant to Range Operations Dept., Pacific Missile Range, U.S. Naval Missile Center, Point Mugu, California. 8:00 P.M., Room 101, In-

dustrial Arts Bldg., Fresno State College, Shaw Ave., Fresno. Dinner 6:00 P.M., Tower House Restaurant. Phone McRae Jarrett, Baldwin 2-5161, Ext. 486 for reservations.

March 28 — San Francisco Section, Communications Division, **American Institute of Electrical Engineers:** "Solid State Carrier for Voice Multiplexing" by Ralph W. May, General Electric Co. Conference Room, Crown Zellerbach Bldg., 1 Bush Street, San Francisco, Calif., 7:30 P.M.

April 3—Santa Clara Valley Section, **Instrument Society of America:** General subject, "New Developments in Linear Accelerometer Technology and Applications" by speakers from Varian's Radiation Div. Rudolfo's, 4020 El Camino Real, Palo Alto. Social hour 6:15 P.M., dinner 7:00 P.M., meeting 8:00 P.M. For reservations contact Russ Palmer, Consolidated Electrodynamics Corp., Los Altos, WH 8-8294.

April 13-14 — **Society of Technical Writers and Publishers:** Eighth Annual Convention, Mark Hopkins Hotel, San Francisco, Calif. Sid Swirsky, Publicity Chairman, 645 Castle Hills Road, Redwood City, Calif.

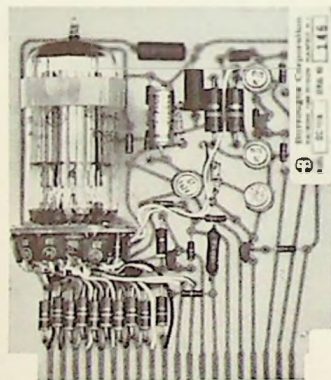
April 18-20—**Stanford Research Institute:** Symposium on Chemical Reactions, Mark Hopkins Hotel, San Francisco, Calif. R. D. Cadle, Stanford Research Institute, Menlo Park, Calif.

IRE PAPERS CALLS

March 20—500-word abstracts for the Second National Symposium on Human Factors in Electronics (Arlington, Va., May 4-5, 1961). Send in triplicate, plus name and position of the author and name and address of his company or organization to: Ezra S. Krendel, Manager, Engineering Psychology Laboratory, Franklin Institute Laboratories, Philadelphia 3, Pennsylvania.

March 21 — Abstracts and 50-word summaries for Electronic Components Conference sponsored by AIEE, IRE, and WEMA (Jack Tar Hotel, San Francisco, May 2-4, 1961). Complete papers due April 5. Send to: Hugh Ross, Jennings Radio Mfg. Co., P.O. Box 1278, San Jose 8. Telephone CY 2-4027.

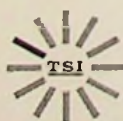
April 1—300-word abstracts and 50-word summaries for the 4th International Conference on Medical Electronics combined with the 14th Annual Conference on Electrical Techniques in Medicine and Biology (New York City, July 16-21, 1961). Send to: Dr. Herman P. Schwan, Program Chairman, Moore School of Electrical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



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MORE UNITY (from page 12)

vidual societies, there have been in the past, and there are at present, strong efforts to achieve a condition known by the rather vague term of "engineering unity." Engineering unity refers, in general, to the achieving of some sort of an organization or arrangement of organizations which will be concerned with topics and problems that are broader in scope than the individual fields of engineering and the interests of the individual technical societies. In general, such an organization or arrangement seems to be considered as needed to supplement but not to take over or supplant, the individual technical societies. The main theme is on unified action and a unified front for the engineering profession as a whole.

(3) There does not appear to be absolutely total agreement in the engineering profession as to whether anything describable as engineering unity is really necessary. However, no out-and-out attacks on the idea have been uncovered, as compared with a fairly substantial mass of material in favor of the idea. There certainly is not, however, any widespread agreement on specifically what unity should mean in terms of activities, organizations, policies and the like. The following is a list, in no particular order, of some of the reasons commonly cited in justifying the need for unity and some of the things it is proposed a unified professional organization might do.

(4) It is proposed that a unity organization could serve as both a forum for the discussion of broad-scale problems within the engineering profession, and also as a spokesman to represent the engineering profession.

(Continued on page 26)



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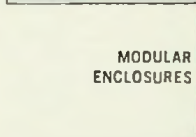


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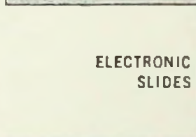
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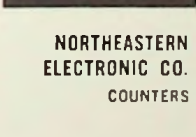
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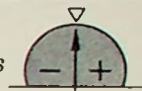
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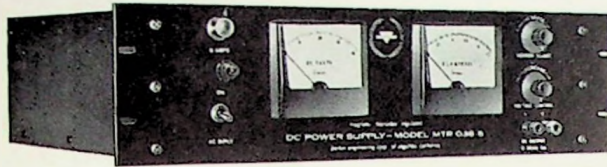
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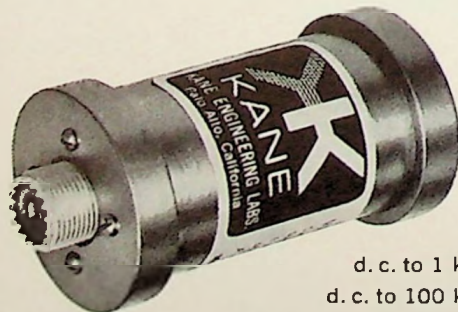
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profession as a whole to *outsiders*. Comparison is often made to the American Medical Association and the American Bar Association. It is noted that the AMA is not divided into an American Institute of Brain Surgeons, an American Association of Pediatricians, and the like, but is a single unified society. A unity organization, according to one spokesman, would be concerned with a "means of effective action to solve various problems of the engineering profession" and with "relations between individual branches within the profession, and between the profession as a whole and the general public."

(5) One proposed activity for such a group would be to *formulate and present to those outside the profession opinions on various technical questions related to national policy*, such as might be involved in questions of water policy, transportation policy, national defense policy, sources of energy, and the like.

(6) Another activity, and one on which there seems to be the most general agreement, has to do with *education*: vocational guidance for young people, maintenance of educational standards, accreditation of engineering schools, development of new forms of engineering training as needed, and the like.

(7) It is asserted that a unified organization could work to *enhance the prestige, status, and economic standing of the engineer*. This includes some or all such activities as public relations, labor representational activities, codes of ethics, and unspecified activities in the areas of employment practices, salaries and fees, etc.

(8) Such an organization would serve as the American engineer's representative in *dealings with foreign engineering groups, UNESCO, and the like*.

(9) There are various minor activities like maintaining a *national roster of engineers*.

(10) There is a broad area having to do with *legislation*. There exists a large amount of legislation affecting engineers in various ways: setting up standards for engineers, setting up codes for engineering work (the building code being a homely example), defining various technical standards, and so on. It is felt that such legislation should be formed by and determined within the engineering profession itself, as medical legislation is apparently formed almost entirely by the AMA. It is claimed that there should exist a unified engineering organization which the government will recognize as the representative voice of the engineering profession, to which the government will turn for authoritative judgments in such matters on any legislation that affects engineers. It is claimed that this is highly essential both to protect the engineering profession and the public at large from laws, which otherwise will regulate engineers but which will not be formulated or judged by engineers.

Presently Existing Professional Organizations

(1) There presently exist three major professional organizations which are of broader scope than the individual technical societies. These are the Engineers Council for Professional Development (ECPD), the Engineers Joint Council (EJC), and the National Society of Professional Engi-

needs (NSPE). Each is briefly described in the following.

(2) *The Engineers Council for Professional Development (ECPD)*. This organization is a federation of engineering societies aimed at sponsoring the intellectual and professional development of engineers. The member societies are:

- Am. Soc. of Civil Engrs.
- Am. Inst. of Mining and Met. Engrs.
- Am. Soc. of Mech. Engrs.
- Am. Inst. of Elec. Engrs.
- Am. Inst. of Chem. Engrs.
- Engr. Inst. of Canada.
- Am. Soc. for Engr. Educ.
- Nat. Coun. of State Bds. of Engr. Examiners.

The tasks it is directed to include: (a) assuring entrance into the engineering profession of high-quality young people; (b) keeping engineering education standards at a high level; (c) helping young engineering graduates integrate into industrial or professional practice; (d) finding methods to recognize engineers who meet professional standards. The activities it carries out include: (a) vocational guidance programs for high-school students; (b) accreditation procedures for engineering schools; (c) training and development programs for junior engineers; (d) assistance in certification procedures for professional engineers. Accreditation is probably the major activity—over 150 schools with more than 800 departments are currently covered. Extent of the final two activities is not known exactly. ECPD is presently tax-exempt.

(3) *The Engineers Joint Council*. This is a federation of engineering societies of rather broad scope. A succinct statement of its purposes and activities has not been obtained. It overlaps to some extent the activities of NSPE and ECPD, and seems to be distinguished from ECPD in being concerned more with the mature practicing engineer than with the engineering student or newly graduated engineer-in-training. Present membership includes:

- Am. Inst. Elec. Engrs.
- Am. Soc. Min. Met. and Pet. Engrs.
- Am. Soc. Civil Engrs.
- Am. Water Works Assoc.
- Am. Soc. Engr. Ed.
- Am. Soc. Heat, Refrig. and Air-Cond. Engrs.
- Am. Inst. Ch. Engrs.
- Am. Soc. Military Engrs.
- Am. Inst. Indus. Engrs.

There are also so-called Affiliate and Associate societies, which include:

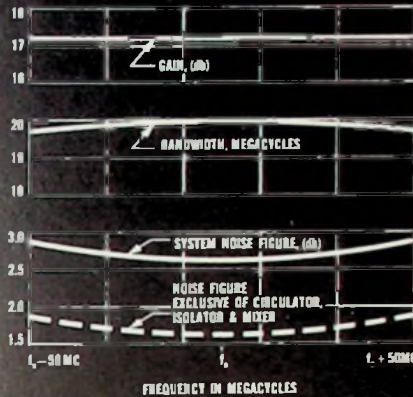
- Am. Soc. Agricultural Engrs.
- Am. Inst. Consulting Engrs.
- Los Angeles Coun. of Engr. Soc.
- Kentucky Soc. of Prof. Engrs.
- Western Soc. Engrs.
- Engr. Soc. of New England
- Louisiana Engr. Soc.

The EJC has carried on activities in the fields of employment conditions, labor legislation, codes of engineering practice, social security legislation, special surveys, large-scale technological policy matters such as water policy and transportation policy, activities in UNESCO, national defense technical matters, a national register of engineers, and cooperation with foreign engineering societies. EJC has recently begun publication of a magazine called *Engineer*. It has a tax-exempt classification.

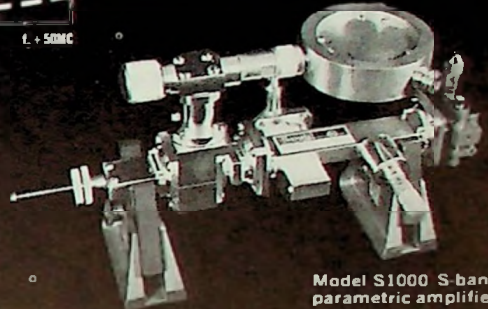
(4) *The National Society of Professional Engineers (NSPE)*. This is an individual-membership organization with a total

(Continued on page 28)

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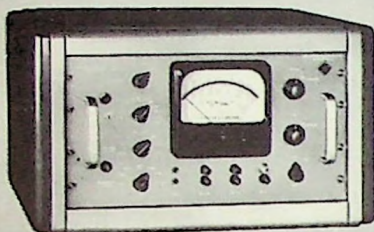
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membership of around 50,000 devoted to the "professional, ethical and social aspects of engineering." It is not a tax-exempt organization. Its membership is composed entirely of registered engineers, and registration is a specific requirement for membership. It is organized in state chapters, e.g. the California Society of Professional Engineers (CSPE). Individual engineers join the state organization. Each state then selects a delegate, and these delegates collectively form the national society. The national group is "actively engaged in programs for the advancement of the engineering profession in the fields of employment practices, ethical practices, legislation, salaries and fees, military affairs, public relations, and education of young engineers," according to one of their brochures. The NSPE is, among other things, militantly opposed to engineers' unions. The CSPE has 8 or 10 chapters in the Bay area, which are active in holding meetings and dinners.

(5) There have been in the past, and may be at the present, various proposed re-alignments, mergers, combinations, or reorganizations of these three organizations, in order to achieve one overall unified engineering organization. The history and status of these various proposals has not been gone into here because it appears to be a dismayingly complicated set of studies, committees, proposals, reports, and so on; and also because the so-called Functional Plan to be described below appears to be the most prominent successor to all of these earlier schemes at the present time. Therefore, it is the only scheme discussed in detail here.

The Tax Question

(1) The question of tax exemption arises in connection with any discussion of this topic because of the importance to organizations of their tax status. According to information obtained, an organization can either fall in a tax classification C-3 (exempt) or C-6 (non-exempt). In general, the deciding test is whether or not money is spent to influence legislation. The influencing can be direct or indirect.

(2) Most technical societies are exempt. The NSPE is not; EJC and ECPD are.

(3) In general, an individual member can deduct his dues to either an exempt or non-exempt organization, on the grounds that they are a necessary professional expense. However, contributions to an organization cannot be deducted unless the organization is C-3 (exempt).

(4) A C-3 organization cannot give money to a C-6 organization without endangering its own classification.

The AIEE's Functional Plan

(1) The American Institute of Electrical Engineers in 1957 put forth a plan which proposed that engineering unity should be achieved through a voluntary agreement among the existing organizations just listed, under which each of these organizations would undertake certain specific functions and leave other functions to the other organizations. This has become known as the Functional Plan for the engineering profession.

(2) The Functional Plan has now gained the support of the American Society of Mechanical Engineers and apparently also of the National Society of Professional Engineers.

(3) Briefly, this plan proposes that the individual technical societies continue their activities in individual technical fields, as at present. The ECPD would concern itself wholly with activities having to do with education, which is its most important function at the present time. The EJC would concern itself with technological matters which were of a broader scope than could be handled by the individual technical societies. Both ECPD and EJC would continue as federations of the technical societies but would open up their membership to more societies than at present. Finally, NSPE would handle the so-called professional activities, having to do with registration, legislation, economic matters, and so on.

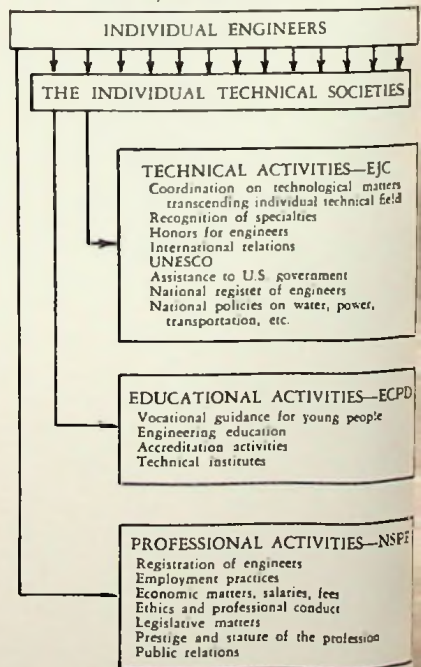
(4) In connection with the last point, the AIEE does not think that all engineers should necessarily be registered and it therefore is urging that NSPE drop its present registration requirement for membership and open its membership to properly accredited members of technical societies in fields where registration is not required by law. NSPE's reaction to this is not yet apparent.

(5) The Functional Plan, and also some of the commonly cited reasons for a unity organization or arrangement of organizations, will be better illustrated by the chart attached.

(6) It is noted that the individual technical societies could still continue to handle nontechnical matters within their own branch of engineering, as desired. For example, a society could be concerned with educational matters in its own field and could carry out activities therein, at the same time cooperating with the ECPD in dealing with educational matters having to do with the engineering profession as a whole.

(7) The following references are noted:
A. "A message from the President" (first statement of Functional Plan), *Elec. Engr.*, June 1957, p. 516.

Chart of the Functional Plan



(Continued on page 30)

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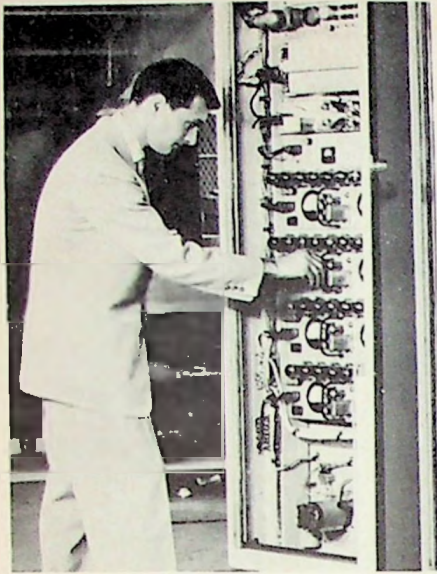
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- B.* "The Functional Plan," Walter J. Barrett, President of the AIEE, *Elec. Engr.*, February 1958, p. 119.
- C.* "Position on Organization of the Engineering Profession," a report by the AIEE Board of Directors, *Elec. Engr.*, February 1959, p. 124.
- D.* "The Trek Toward Unity," part of a report on AIEE functions, *Elec. Engr.*, August 1959, p. 835.

The Question of Registration

(1) Legislation for the legal recognition of the engineering profession, and the registration and licensing of engineers by the states, began in Wyoming in 1907, primarily with surveyors and civil engineers. At present every state and territory in the U.S. and every province in Canada has registration legislation.

(2) Many of the states pattern their registration laws after a "Model Law" which was drawn up and is periodically revised by various groups within the engineering profession. California apparently has its own legislation and does not follow the Model Law at present, although there is some movement in this direction, described in a later section.

(3) There does not appear to be any major organization of any sort which actively or publicly opposes registration; there are several groups which actively support and promote registration and registration legislation.

(4) The legal basis for the registration of engineers or any other profession, from the point of view of the state, is as a protection to the health, safety and welfare of the public. This is supposed to be accomplished by setting minimum standards of experience, training and competence to insure that none except those fully qualified can practice a profession. There may be additional reasons why engineers should favor registration, but the public health, safety and welfare is the only reason that the state is supposed to be concerned with in setting up a registration process.

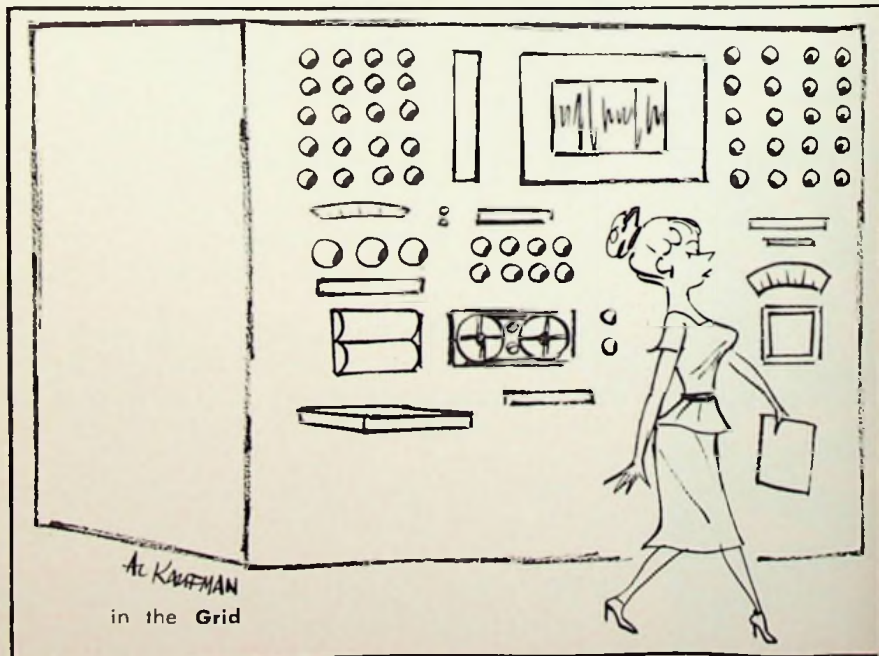
(5) Those who actively support registration for engineers advance a number of

reasons why registration is of benefit to the profession. Many of these reasons are similar to the reasons advanced for engineering unity in general. It is asserted that engineers need to work together to advance their mutual interests and protect the public interests, and that this can best be accomplished if there is a clearly defined and legally recognized way of recognizing who is and who is not an engineer.

(6) A point frequently emphasized is that registration gives the engineering profession a legally recognized and defined existence which it otherwise lacks. Legal registration becomes the means by which courts, legislators, government bodies, and the like can recognize who is and who is not an engineer. The following is quoted from reference E: "Among the great body of engineers employed in industry, registration is still considered as optional and few concerns have yet made it a prior condition of employment. However, it is both feasible and desirable to restrict by law or public regulations certain appointments to registered professional engineers, and the courts and public regulatory bodies alike tend increasingly to limit formal recognition of professional standing to those engineers so qualified" . . . "State and national organizations of registered engineers are making concerted efforts to dissuade or prevent firms not including registered engineers from using the word engineer or engineering." . . . "public appointments are now generally restricted to licensed engineers of proved competence" . . . "(The engineer) will want to assure himself of full professional recognition by any court or legislative body or regulatory commission before which he may have occasion to appear."

(7) Many individual engineers are strongly opposed to registration, particularly compulsory registration, and particularly for fields of engineering other than civil. Arguments commonly cited include: The exam is so minimal as to be no true measure of competence, and any true measure would be difficult or impossible to accomplish; in most of the engineering work in such fields as mechanical or electrical engineering, the public welfare is not

(Continued on page 32)



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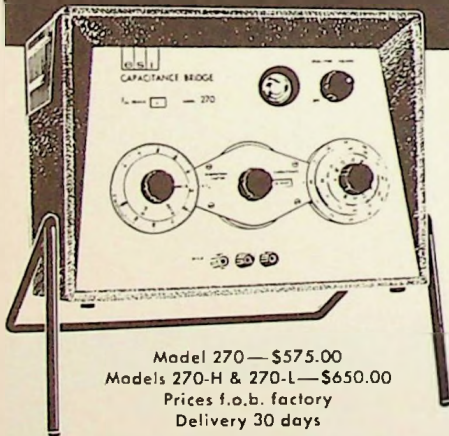
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directly involved and need not be protected; in any case, the minimal assurance provided by registration is no real protection; more than adequate protection is furnished by ordinary business competition and the competition of ideas; registration leads to additional, unnecessary and expensive bureaucracy and government control, and loss of individual freedoms; the only persons benefiting from the enhanced prestige given by registration are the mediocre who cannot get recognition otherwise; the registration procedure gives unwarranted power to the registration group, both power over the livelihood of individual engineers, and also power to make statements which purport to represent the engineer when this may not be the case; obsolete examinations and control of the examination procedure by conservative elements can be a block to progress in engineering education and the introduction of new ideas into the curriculum; an adequate alternative way for recognizing an engineer exists by membership in technical societies or by graduation from an educational institution which is properly accredited by the profession.

(8) Various individuals have expressed the opinion that the strength of engineering registration legislation is going to increase with time, whether or not the majority of engineers favor it. The groups in favor of registration appear to be influential and active. They are organized and are anxious to extend the importance of registration. Being already registered and thus legally recognized, their statements carry added weight with the legislatures and other government agencies.

(9) A survey of engineers in industry in all branches was once carried out by NSPE (reference F). It found, among other things, that two-thirds of the engineers surveyed considered registration as "not very valuable." In fact, even of those registered, over half held this opinion. The percentage of those registered was significantly higher among those with the Bachelor's degree as compared to those with higher degrees. It was also much higher among 'supervisory' than among 'technical' persons.

(10) References include:

- E. "A Professional Guide for Junior Engineers," by William E. Wickenden, published by ECPD. (Cf. Chapter 5 in particular). (Stanford Engineering Library 620.7/W636p).
- F. "Career Satisfaction of Professional Engineers in Industry," a research survey, published by NSPE. (Stanford Engineering Library 620.7/P964).
- G.* Clippings from the *San Francisco Engineer*, 1960, concerning registration and readers' response thereto.
- H.* "Professional Registration," N. L. Freeman, *Elec. Engr.* January 1960, p. 50.

Present Position of the IRE

(1) The IRE has two explicitly stated policies of long standing, as follows: "One, that the Institute shall not engage directly or indirectly in legislative activity; and the other, that the Institute, as a society, is not entitled to represent its members as individual members of the engineering profession or as a body on social or general professional matters, and shall not, as a society, take a stand even on technical matters . . ." (from reference I).

(2) In 1953 the IRE received an invitation to join the Engineers Joint Council (EJC), which was planned to function as an engineering unity organization. The Board of Directors of the IRE regretfully declined this invitation, noting that the above cited policy made acceptance impossible and that it did not appear desirable to reverse these policies.

(3) In April 1957, the Board of Directors of the IRE voted to seek membership for the IRE in the Engineers Council for Professional Development (ECPD). A primary reason for this request was the desire to take a more active part in the ECPD's program of accreditation of engineering schools, as well as the other professional tasks undertaken by the ECPD. However, the ECPD did not respond to the IRE's request. The IRE was later informed that if it wished to join the ECPD, it must also join the EJC. Since the IRE was not prepared to alter the decision stated above, the matter has not progressed further. IRE President McFarlan has indicated, however, that the matter may soon be resolved by modification of EJC, and entrance of IRE into both EJC and ECPD.

(4) Outside of these actions, the IRE has apparently not taken any official action on any other related topics such as professional registration for its members, or the AIEE functional plan.

(5) References are:

- I. "Organization for Engineering Unity," (under Institute News and Radio Notes), *Proc. IRE*, August 1953, p. 1067.
- J. Item from "Poles and Zeros," *Proc. IRE*, July 1957, p. 929.
- K. Item from "Poles and Zeros," *Proc. IRE*, October 1958, p. 1683.

The Present Situation in California

(1) The California Department of Professional and Vocational Standards is the overall agency responsible for licensing some thirty or so professions, covering the range from accountants, architects, barbers, bedding inspectors, cemetery salesmen, cosmetologists, dentists, detectives, embalmers, engineers, and guide dog schools, to physicians, surgeons, nurses, optometrists, pest control operators, shorthand reporters, social workers, veterinarians, and yacht brokers.

(2) One of the subdivisions of this Department is the State Board of Registration for Civil and Professional Engineers, consisting of 8 engineers appointed by the governor, and responsible for registering engineers and land surveyors.

(3) Besides the land surveyors, who form a somewhat separate group, California currently registers engineers in the following classifications: civil, structural (a sub-group under civil), chemical, electrical, mechanical, petroleum, and engineer-in-training (for those going through the required pre-registration period of professional experience). In general, registration as a professional engineer in any branch requires 6 years of professional experience in school and in professional work, plus an examination.

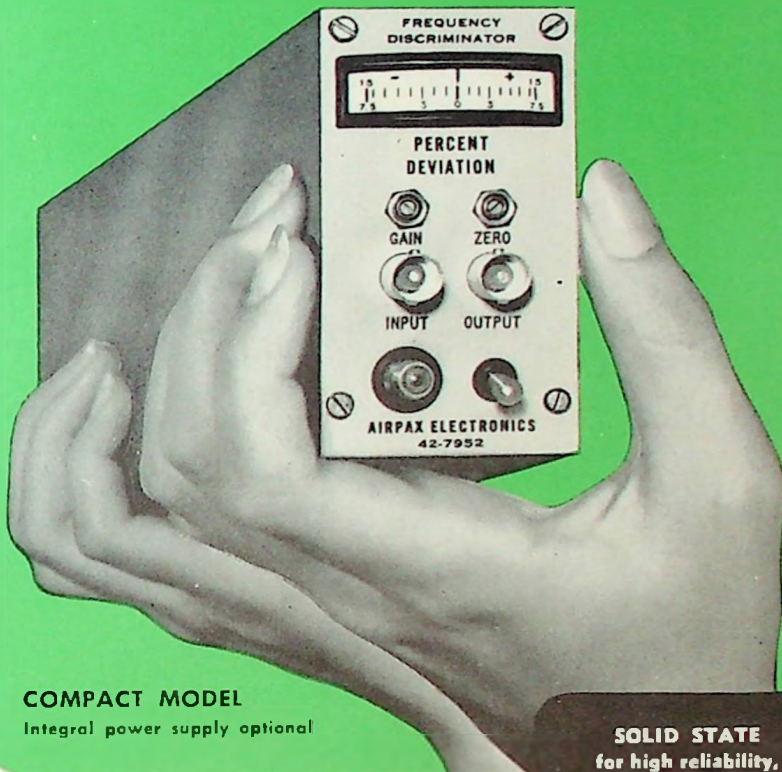
(4) There are about 30,000 registered engineers and surveyors in California at the present. About 3000 of these are surveyors, and 12,000 are civils. Breakdown of the remainder is not known, exactly, but there are believed to be about 6000 electricals. Local IRE members known to be registered include Profs. L. A. Manning, Ralph J. Smith, Hugh H. Skilling, J. M.

(Continued on page 34)

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Pettit, and F. E. Terman at Stanford, Ernest J. Moore at SRI, Robert F. Mozeley at the Stanford accelerator, and Mr. Arthur Goldsmith.

(5) At the present time, the engineer-in-training registration fee is \$15, with no annual renewal fee. Registration in any professional grade requires a \$30 application fee, a \$10-\$15 initial registration fee, and a \$4-\$8 renewal fee annually.

(6) The registration examination consists of a fundamentals portion (which is taken also by engineer-in-training applicants), plus an exam specific to each particular engineering field. Some sample questions from a typical Electrical Engineering examination are attached.

(7) All civil engineering plans, specifications, drawings, etc., for essentially anything larger than a two-story dwelling must by law be signed and sealed by a registered civil engineer. In essence, no one may practice as an independent civil engineer in California without registration. Such restrictions do not apply, at present, to the other professional branches.

(8) However, according to the registration act, no one may use the title "mechanical engineer," "chemical engineer," "electrical engineer," etc., with or without the word "professional" attached, unless he is legally registered.

(9) In February 1959, Assembly Bill 1281 of the California legislature was introduced to amend the registration laws in several ways. In particular, the requirement that plans, specifications, reports, etc., be prepared and signed by a registered engineer in the appropriate branch would have been extended to apply not only to civil, but also to electrical and mechanical engineering. The requirement in the electrical engineering case would have applied, essentially, to any installation where the main entrance current exceeded 400 amperes. Smaller installations would have been exempt from this requirement. This bill, during its progress through hearings, etc., was heavily amended and re-amended in various confusing fashions. Its present form is not known, but when last seen, the compulsory requirements for electrical and mechanical engineering had been deleted, leaving the contents of the bill nothing more than various minor formal changes and technicalities.

(10) More recently, Senate Bill 1203 was initiated by the California branch of the American Institute of Industrial Engineers to change the California registration system to conform to the "Model Law" (see above). This would remove the classification of separate branches of engineering, and simply register all engineers as "professional engineers." Hearings were to be held on this bill in San Francisco in August 1960. Its present status is not known.

(11) There exists at present an organization called the California Legislative Council of Professional Engineers (CLCPE), composed of delegates from various engineering groups in California (See reference G). Its duties are to keep informed on all legislation in California which relates in any way to engineering or engineers, and to attempt to formulate policies on such legislation. Its budget is about \$15,000 per year at present, raised by heavy dues paid by the member societies. Its work is done by its member delegates, in meetings and study sessions. It is, apparently, the only engineering organization in California which does this job on a regular continuing

basis. If the Functional Plan were to be adopted, it is apparently believed that this group would be disbanded and its functions taken over by the California Society of Professional Engineers. CLCPE is apparently at present in danger of losing some of its member societies because the latter are fearful of losing their tax-exempt status by contributing.

(12) References are:

- L.* Copy of the California Civil and Professional Engineers' Act and the Land Surveyors' Act of 1960.
- M.* Copies of Application Forms for the various types of registration.
- N.* Copy of Letter from Mr. Frank Giovanini of the American Institute of Industrial Engineers concerning California Senate Bill 1203.
- O.* Copies of two versions of California Assembly Bill 1281.
- P.* Copies of California 1960 registration examinations for Engineer-in-Training classification (one day) and for registration in Electrical Engineering (two days). cf. also *Professional Engineer's Examination Questions and Answers* by W. S. LaLonde, Jr., McGraw-Hill Book Co., Inc., New York, 1956. (Stanford Engineering Library 620.7/L212).
- Q. Roster of California Civil and Professional Engineers and Surveyors available from the State Board of Registration, price \$1.04.

Conclusions and Suggested Policy

(1) It appears clear that neither the IRE nationally nor the San Francisco Section may adopt any official public policy on questions of registration, because of national IRE policy, and because of the tax question. However, the personal conclusion of the authors of this study is certainly *strong opposition to any compulsory legal registration of electrical engineers*. The reasons for this have been listed earlier. We emphasize particularly the lack of any real need or justification for registration, in benefiting either the public or the profession, and we emphasize that many of the proposed benefits of registration can be obtained in less objectionable ways.

(2) We point out again that the forces pushing registration legislation are strong, well-organized, and ambitious. It seems certain that this will continue to be a problem of interest and concern to IRE members.

(3) There do appear to be worthy objectives, e.g., in the field of education, which would benefit from closer unification of the engineering profession. We do not condemn such efforts per se, objecting primarily to the legal registration aspects which we consider totally unnecessary.

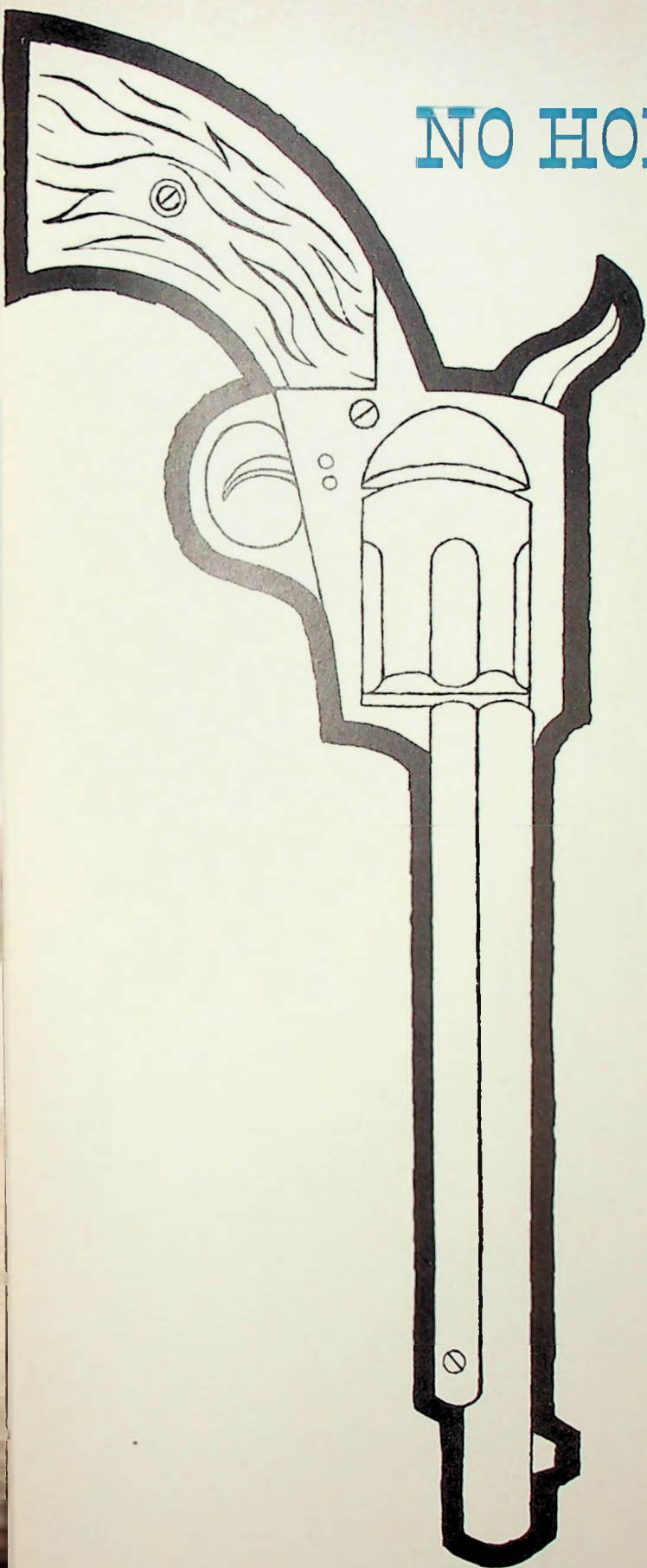
(4) In order to keep watch on possible registration legislation and related activities in California, we suggest that the San Francisco Section should take the necessary steps to keep informed of developments in this area. We further suggest that such information could well be passed along to the local membership via the Grid, without editorial comment and purely as a matter of record, without violating IRE or tax policies.

(5) We further suggest that the San Francisco Section formally request the national IRE to undertake the same service on a national scale.

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— END —

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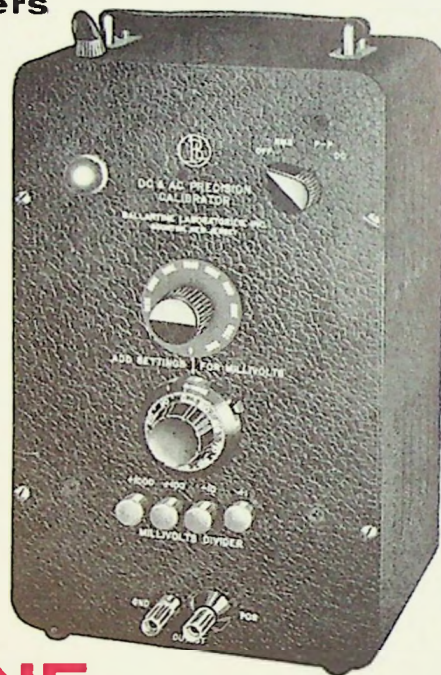
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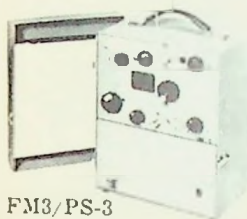
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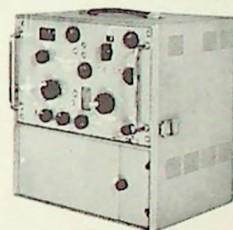
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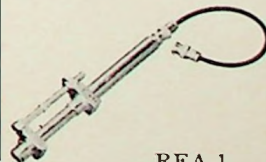


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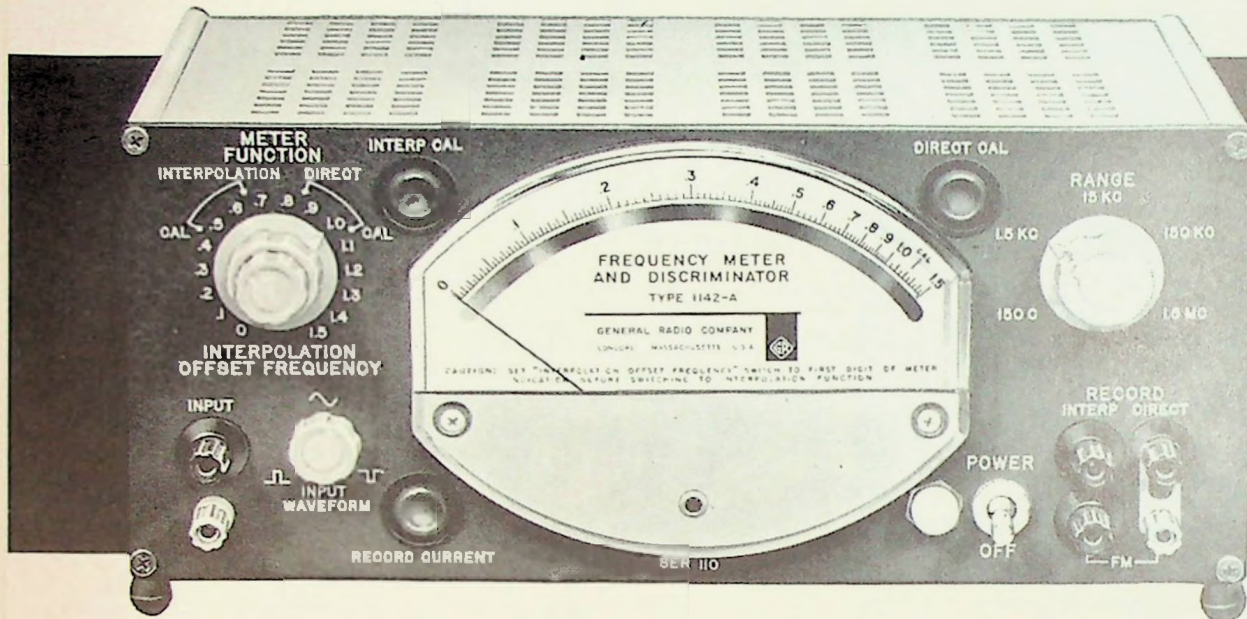
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