

# EDITOR'S PROFILE of this issue

*from a historical perspective ...*

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

May, 1965:

Cover: A piezoelectric transducer developed by Ames Research Center detects the heartbeat of a bird embryo inside an egg. This instrument is a spin-off development of NASA's space program.

Page 12: Charles "Bud" Eldon is pictured as the chair of the committee to select representatives from the Science Fairs for the upcoming Future Engineers Show. Bud goes on to be Region 6 Director and IEEE President.



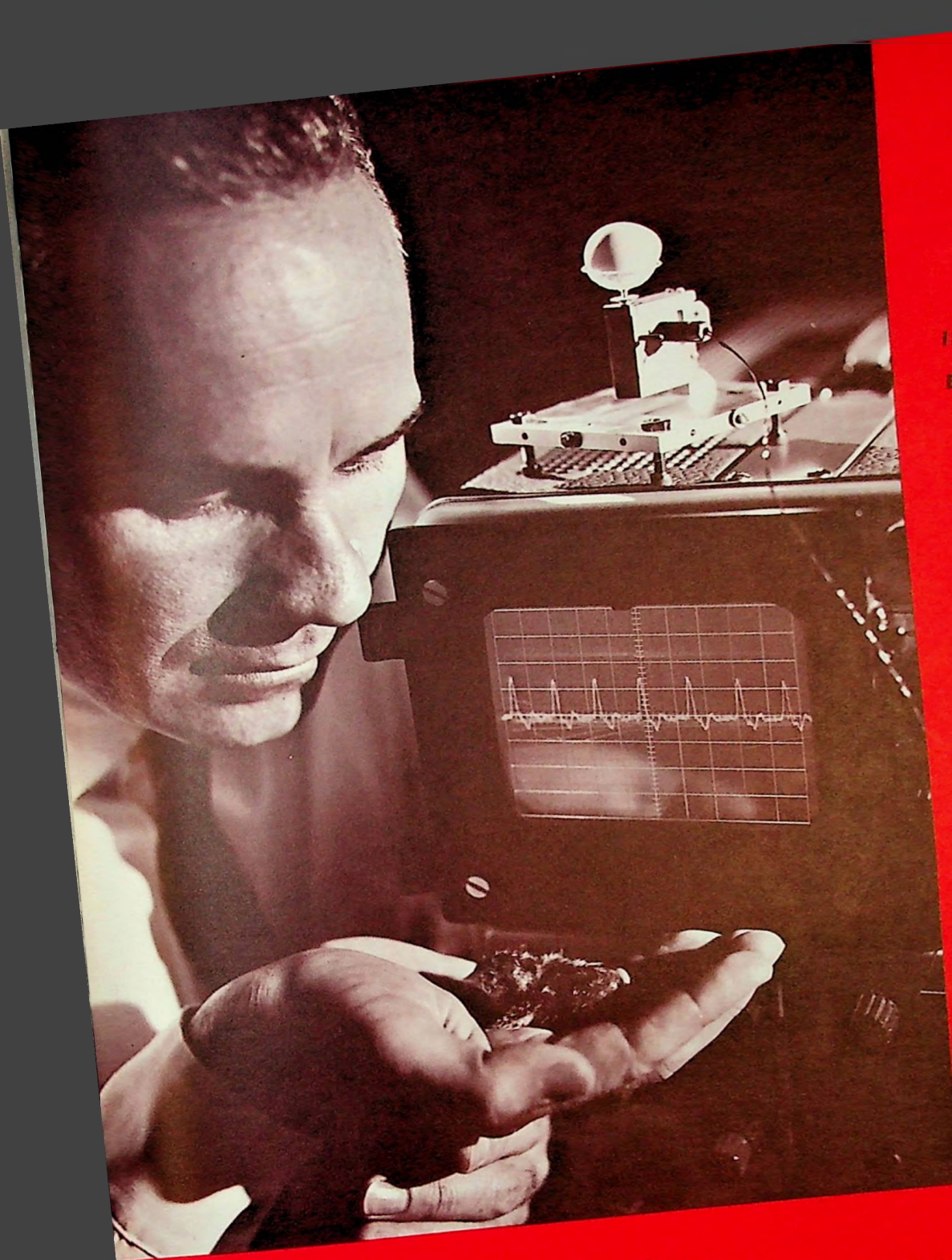
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At time of scanning, the bound volumes are held by Paul Wesling.

July, 2021

Contact [p.wesling@ieee.org](mailto:p.wesling@ieee.org)



# IEEE Grid

May 1965  
SAN FRANCISCO SECTION  
INSTITUTE OF ELECTRICAL  
AND  
ELECTRONICS ENGINEERS

Make reservations now!

## SECTION ANNUAL MEETING

Tuesday, June 1, Palo Alto Cabaña  
"Spin-off Benefits of Space Program"

*Plan now*

*attend WESCON*

*COW PALACE*

*Aug. 24-27*

*Info: 324-4497*



## meeting reminder

- May 17 (Monday) Engineering Writing & Speech
- May 18 (Tuesday) Antennas & Propagation, Biomedical Engineering, Computer, Industry & General Applications
- May 19 (Wednesday) Santa Clara Valley Subsection, Aerospace & Electronic Systems (Aerospace, Military Electronics, Space Electronics & Telemetry, Aerospace Navigational Electronics)
- May 20 (Thursday) Information Theory, Microwave Theory & Techniques, Vehicular Communications
- May 24 (Monday) East Bay Subsection, Engineering Management
- May 25 (Tuesday) Power, Product Engineering & Production
- May 27 (Thursday) Aerospace & Electronic Systems (Aerospace, Military Electronics, Space Electronics & Telemetry, Aerospace Navigational Electronics) Circuit Theory
- June 1 (Tuesday) San Francisco Section
- June 3 (Thursday) Reliability
- June 15 (Wednesday) Santa Clara Valley Subsection

POSTMASTER: RETURN REQUESTED—  
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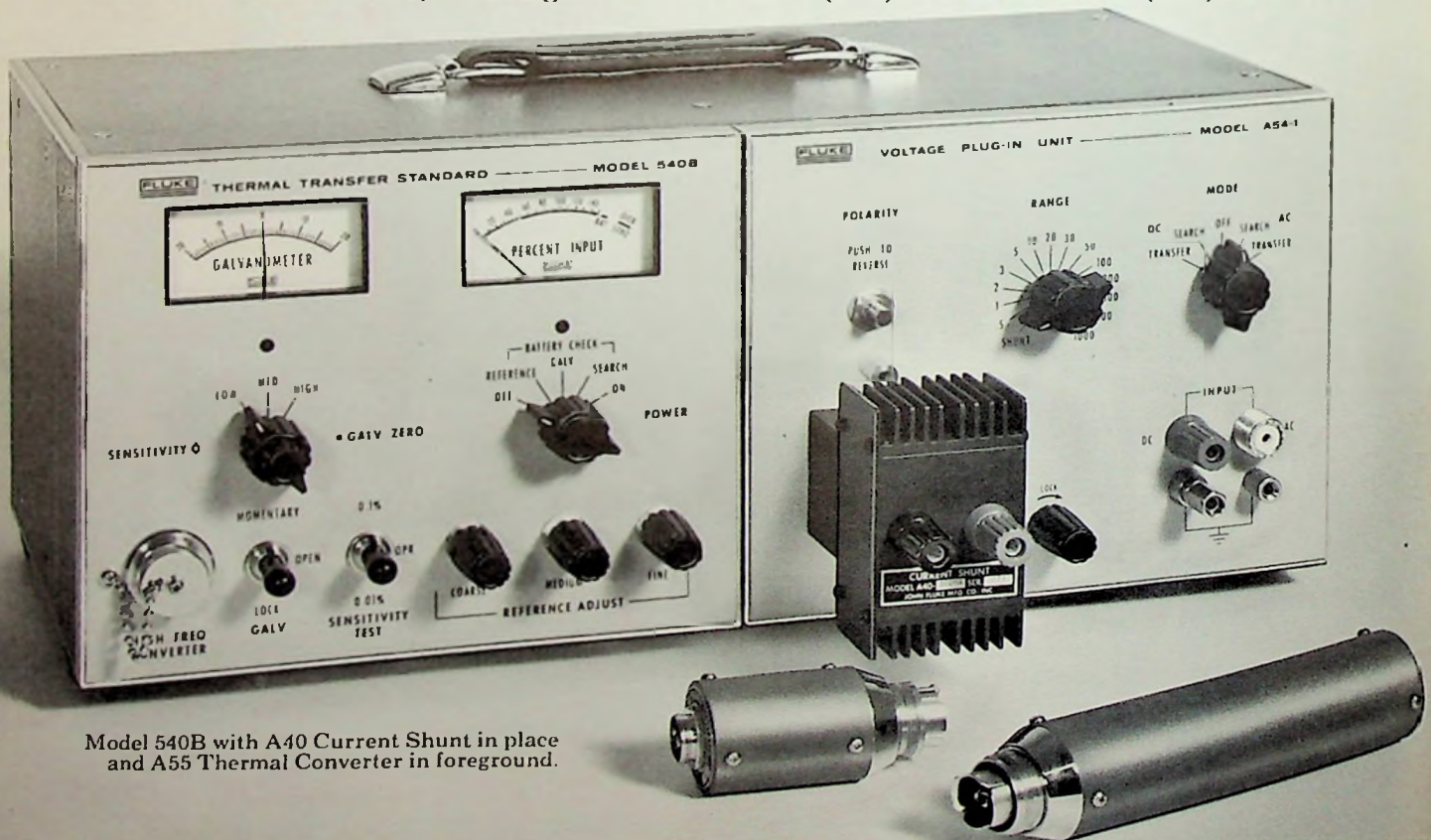
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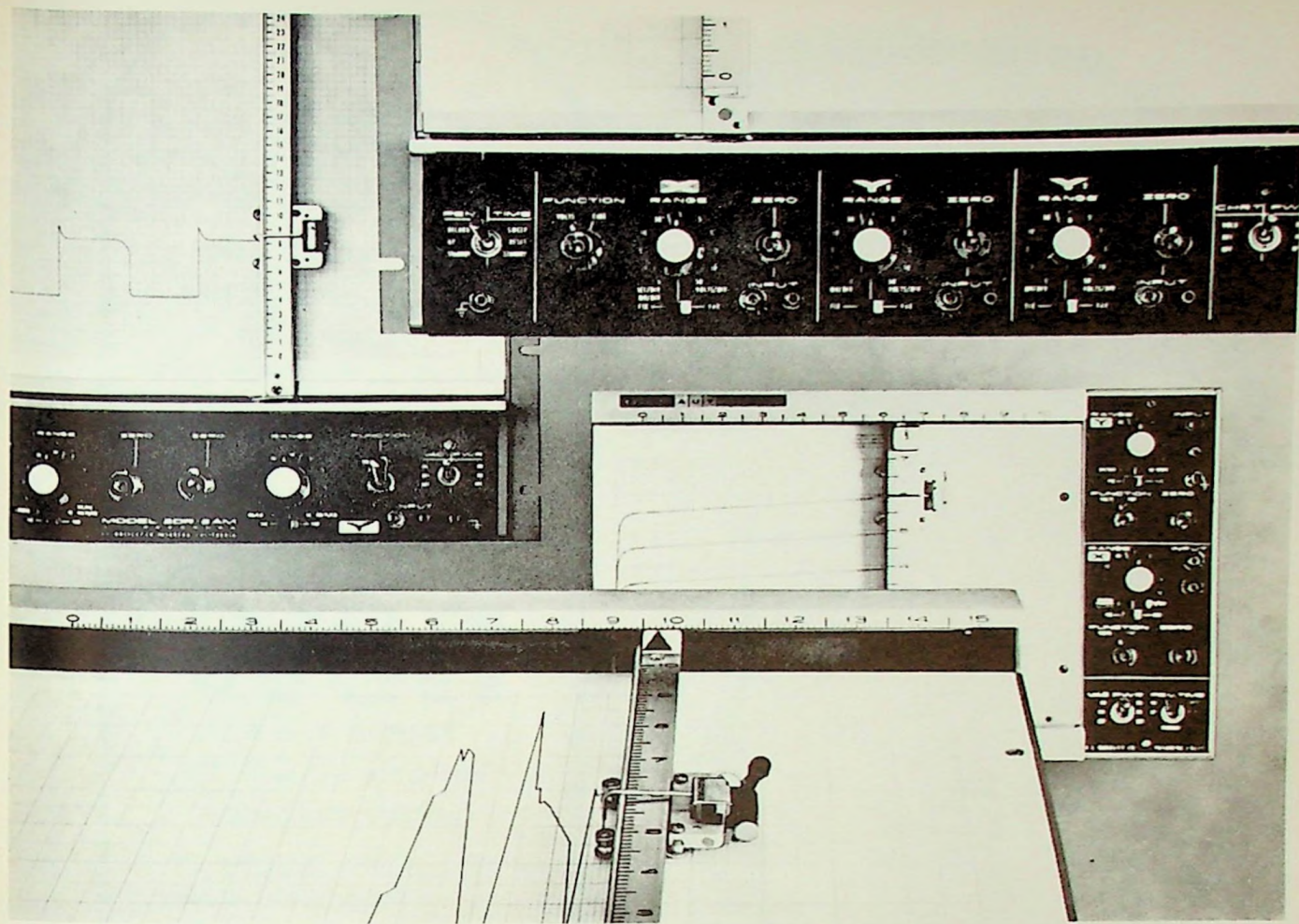
Model 540B with A40 Current Shunt in place and A55 Thermal Converter in foreground.



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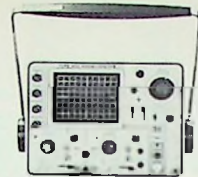
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7030A	8½" x 11" x-y recorder, 100 microvolts/in. sensitivity, portable or rack mount; AUTOGRIP®; 1 megohm input impedance on all ranges, floating and guarded, high common mode rejection	\$1795
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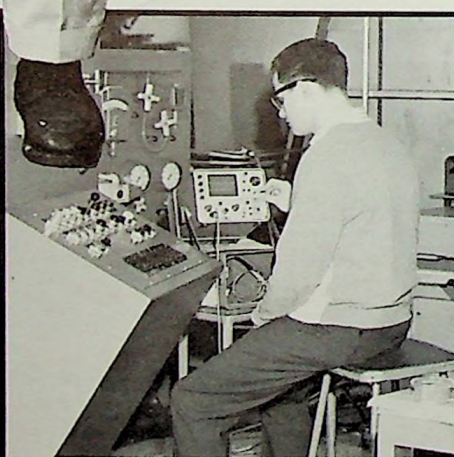
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#### section news

##### CHAIRMAN'S REGION REPORT

During Calendar 1964 the San Francisco Section, its three subsections, and its 22 active group chapters had a total of 110 meetings, with a total attendance of 6,284 and an average attendance of 57, Chairman John C. Beckett reported at the meeting of the Region Six committee in Las Vegas on April 14.

Section meetings had an average attendance of 121; subsection meetings an average of 69; and chapter meetings an average attendance of 43. A study of the organization of the section in relation to the membership population densities is under way, under the ad hoc chairmanship of C. F. Hochgesang, and will probably be concluded in the Fall of 1965, he said.

New chapters activated during 1964 were Aerospace, Nuclear Science, and Industry and General Applications. Two chapters, previously chartered, were reactivated—Circuit Theory and Vehicular Communications. The Power chapter, organized late in 1963, became official on July 1, 1964.

The record cards and mailing plates maintained by the section office showed a membership total on December 31 of 7,248, but headquarters records show that the total was 7,692, a total difference of 444 members and a 641 difference in higher grade members. "This is a serious and continuing problem which we are hopeful that the headquarters computer can solve," he said.

Following the decline in Grid advertising which began in September of 1963, the section faced a potentially dangerous deficit in 1964. Retrenchment through cutting the Grid back to

(Continued on page 14)

#### cover

The Piezoelectric Transducer, designed by Vernon L. Rogallo, (shown on the cover) measurements research branch, Ames Research Center, for micrometeroid momentum measurement in outer space, has a more earthly possible application as well. The instrument was used successfully in a biological experiment to measure the heartbeat of an egg embryo. Here, Mr. Rogallo holds a tiny bobwhite whose heartbeat was measured throughout the embryonic stage. The measurement device is shown above the oscilloscope with a bobwhite egg in the plastic cup. This typical spin-off development from the NASA space program is one of many to be described and presented through films and slides at the June 1 annual meeting of the section at the Palo Alto Cabaña. (NASA photo)

# LOOK to BRILL for

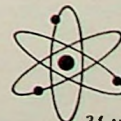
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**SECTION ANNUAL MEETING**

George G. Edwards, chief of the office of technology utilization at NASA's Ames Research Center, Moffett Field, will be guest speaker at the annual meeting of the section on Tuesday, June 1. His subject, "Spin-off benefits to the Bay Area resulting from space exploration," will be of great current interest to members of the section and their ladies, his presentation being based largely on films and slides not previously seen at general meetings.

A research scientist in aeronautics and space activities for the past 23 years, he is now engaged in a NASA program to accelerate the transfer to civilian uses of technological advances deriving from the nation's space program. The office which Mr. Edwards now heads is similar to those which have been set up at each of NASA's field centers. Their functions are to monitor research at the centers in order to identify and retrieve information on new technology having possible application outside the nation's space program. These offices furnish the link between the laboratory and a central dissemination system through which the information will flow to the public domain.

The dinner meeting in the Circus Maximus room of the Palo Alto Cabaña will also honor 1965-66 section officers and 1965 Fellows and award winners. Tables for ten may be reserved for subsections, chapters, committees, and companies.



Edwards

Bingham

**PARAMETRIC FILTERS**

John A. C. Bingham, Stanford Linear Accelerator Center, will be the guest speaker at the May 27 meeting of the Circuit Theory chapter. His subject will be parametric filters.

A graduate of Imperial College, London, and Stanford, he has worked principally at Lenkurt Electric Co., San Carlos, and the G.P.O. research station, London. He was specialized in computer methods for modern filter synthesis.

**MEETING CALENDAR**

**SAN FRANCISCO SECTION**

6:00 P.M. • Tuesday, June 1

Annual meeting honoring 1965 Fellows and Prize Winners; installation of 1965-66 Section Officers  
**Spin-off benefits to the Bay Area resulting from space exploration**  
*George G. Edwards, chief, office of technology utilization, NASA Ames Research Center, Moffett Field*  
 Place: Palo Alto Cabaña, Circus Maximus Room  
 Social Hour: 6:00 P.M.  
 Dinner: 7:00 P.M. Roast sirloin of beef, \$5.75, including tax and tip  
 Reservations: Mrs. Helmke, Section Office, 327-6622, by May 28  
 Tables of ten may be reserved for Subsections, Chapters, Committees and Companies

**EAST BAY SUBSECTION**

8:00 P.M. • Monday, May 24

Annual ladies night and installation of officers  
**Plowshare—status and problems**  
*Dr. Gerald W. Johnson, associate director, LRL Plowshare program*  
 Place: Kaiser Center, 300 Lakeside Drive, Oakland  
 Dinner: 7:00 P.M., Kaiser Center banquet room  
 Reservations: Frank Chandler, OL 2-3770, by May 19

**SANTA CLARA VALLEY SUBSECTION**

7:00 P.M. • Wednesday, May 19

Field trip—tour of the Coyote facility of UTC  
 1050 E. Arques Ave., Sunnyvale  
 Place: Coyote  
 Dinner: none  
 Reservations: Steve Anderson, 262-2414, Ext. 572, or Don McCauley, 326-4350, Ext. 4757, by May 17

**SANTA CLARA VALLEY SUBSECTION**

7:00 P.M. • Wednesday, June 16

Wine-tasting dinner—ladies' night  
*Charles McKenna, host*  
 Place: Paul Masson Vineyards, Saratoga  
 Dinner: Evening, at the vineyard  
 Reservations: John May, 742-9155, or Don McCauley, 326-4350, Ext. 4757

**GROUP CHAPTERS**

**Aerospace and Electronic Systems**

8:00 P.M. • Wednesday, May 19

(Joint meeting of Aerospace, Military Electronics, Space Electronics and Telemetry, and Aerospace and Navigational Electronics, which are merging to form new group and chapter)  
**Bioastronautics and bio-medicine**  
*J. A. Kraft, LMSC; assistant manager, bioastronautics*  
 Place: Lockheed Auditorium, Bldg. 202, 3251 Hanover Street, Palo Alto  
 Dinner: 6:30 P.M., Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto  
 Reservations: Ralph Franks, 743-0525, by May 18

**Aerospace and Electronic Systems**

7:30 P.M. • Thursday, May 27

(Joint meeting of Aerospace, Military Electronics, Space Electronics and Telemetry, and Aerospace and Navigational Electronics which are merging to form new group and chapter)  
**20,000/200,000 RPM alternators and motors**  
*Fred B. McCarty, senior development engineer, Aircsearch Manufacturing Co., Torrance*  
 Place: Old Plantation, El Camino Real at Bernardo, Sunnyvale  
 Social hour: 6:30 P.M.  
 Dinner: 7:30 P.M.—steak, \$3.50 (including tax and tip)  
 Reservations: Mrs. Beverly May, 735-2226, by May 25

# MEETING CALENDAR

## Antennas and Propagation

8:15 P.M. • Tuesday, May 18

Large aperture millimeter wave antennas and observations at 3.2 mm

*Howard E. King, Aerospace Corp.*

Place: Lockheed Auditorium, Bldg. 202, Palo Alto

Dinner: 6:15 P.M., Sakura Gardens, 2116 N. El Camino Real, Mountain View

Reservations: Charles Phillips, 321-4175, by May 17

## Biomedical Engineering

8:00 P.M. • Tuesday, May 18

Engineering aspects of stereotaxic surgery: electronic, mechanical, and thermodynamic

*Burton B. Rutkin, senior engineer, department of neurological surgery, U.C. Medical Center*

Place: Stanford Medical School, Room M-112

Dinner: 6:15 P.M., Red Cottage, El Camino Real, Menlo Park

Reservations: Ellen Campbell, 326-6200, Ext. 3372, by May 17

## Circuit Theory

8:00 P.M. • Thursday, May 27

Parametric filters

*John Bingham, SLAC*

Place: Room 102, central lab bldg., SLAC, 4349 Sand Hill Road, Stanford

Dinner: 6 P.M., Stone Cellar, 1906 El Camino Real, Menlo Park

Reservations: Mrs. Kelley, 326-6200, Ext. 3285, by May 26

## Computer

8:00 P.M. • Tuesday, May 18

Automatic classification and indexing by computer

*Donald V. Black, head, technical processes at University of California in Santa Cruz*

Place: GE Computer Lab, 310 DeGuigne Drive, Sunnyvale

Dinner: 6:30 P.M., Old Plantation, El Camino Real at Bernardo, Sunnyvale

No reservations required

## Engineering Writing and Speech

8:00 P.M. • Monday, May 17

Business meeting and the election of officers for the forthcoming year

Place: Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto

Dinner: 7:00 P.M., The Captain's Room (Rick's)

Reservations: Robert S. Howland, 324-0768 (evenings); 399-2951 (days)

## Engineering Management

8:00 P.M. • Monday, May 24

When do good engineers make good engineering managers?

*L. S. Burbank, Burbank Associates, San Francisco*

Place: Lockheed Auditorium, Bldg. 102, 3251 Hanover Street, Palo Alto

Dinner: 6:15 P.M., Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto

Reservations: 326-6200, Ext. 2550, by May 21

## Industry and General Applications

7:30 P.M. • Tuesday, May 18

Direct digital control for industrial processes

*Frank Willard, advisory engineer of Westinghouse, computer system department*

Place: Engineers' Club of San Francisco

Cocktails: 5:30 P.M.

Dinner: 6:30 P.M.

Reservations: Alex Tseng, 854-3300, Ext. 534 (Peninsula), Dan McDade,

761-1360 (San Francisco), by May 17

## Information Theory

8:10 P.M. • Thursday, May 20

Operations on noise that map second-order properties

*Dr. Sandor Csibi, Telecommunications Research Institute, Budapest*

Place: SRI Conference Room B, 333 Ravenswood Avenue, Menlo Park

Dinner: 6:20 P.M., The Red Cottage, El Camino Real, Menlo Park

Reservations: Miss B. Serrano, 321-3300, Ext. 450

*meeting ahead*

## EBSS ANNUAL EVENT

Dr. Gerald W. Johnson, associate director of the Lawrence Radiation Laboratory Plowshare program, will be guest speaker at the annual ladies' night and installation of officers of the East Bay Subsection on May 24.

The Plowshare program, devoted to exploring the possible engineering and scientific uses of nuclear explosions, has been sponsored by the Atomic Energy Commission at LRL since 1957. During that period there has been continuous improvement of explosives for special purposes and the development of the understanding of the behavior of nuclear explosions in a number of underground environments. Concurrent with the experimental program have been discussions with industry and government to assess the economic and scientific potentials of the technology.

There is increasing promise of successful use of nuclear explosives to the solutions of many problems involved in the recovery of minerals, including oil, and in projects requiring massive excavation such as sea-level canals, diversion channels, harbors, and strip mining.



*Johnson*

*Hurd*

*meeting ahead*

## RELIABILITY

Walter Hurd, reliability and quality engineering division manager of the Polaris missile system for Lockheed Missiles and Space Co., Sunnyvale, will address a joint meeting of the Reliability chapter and the San Jose subsection of the American Society for Quality Control and the Maintainability Assn. on June 3.

He will describe the activities of the Air Force weapon system effectiveness industry advisory committee. The group was formed in 1963 for the purpose of providing technical guidance and assistance to the Air Force systems command in the development of a technique to appraise management of current and predicted system effective-

*(Continued on page 7)*





Kraft



McCarty

meeting ahead

MERGED CHAPTER FORMED

The Aerospace and Electronic Systems chapter, result of a national and local merger of Aerospace, Aerospace and Navigational Electronics, Military Electronics, and Space Electronics and Telemetry effective July 1, plans two meetings in May and one in June.

J. A. Kraft, assistant manager, bio-astronautics, research and development division, Lockheed Missiles and Space Co., will be the speaker on May 19. Mr. Kraft, an Ed.D. in psychology-personnel, assists in directing planning and maintaining an advanced technical competence in bio-astronautic disciplines involving life support environment and systems, bioinstrumentation, human factors and performance, crew system simulation, and study of astronaut requirements.

Fred B. McCarty, senior development engineer, AiResearch Manufacturing Co., Torrance, will address members of the former chapters on May 27. His subject will be 20,000/-200,000 RPM alternators and motors, his design specialty being brushless alternators, including such various applications as gas-turbine-electric vehicle propulsion systems, cyclo-converter and DC link frequency conversion systems, helium and nitrogen refrigeration systems, electric dynamotors for alkali-metal-vapor turbines, electric drive shafts for hydrofoil boats, and high inertia sonar power supplies.

Bobby D. Johnson, national sales manager of International Energy Conversion, Inc., Dallas, will address the June meeting on thermo electricity, the key to effective temperature control of electronic components.

Mr. Kraft, the May 19 speaker, is a member of the American Psychological Assn., the Human Factors Society, and the American Society of Mechanical engineers (general committee on human factors). He is the author of numerous articles in the area of human factors.

Mr. McCarty, the May 27 speaker, directs design development and testing of high-speed machinery and has published several papers on brushless machines.

MEETING CALENDAR

Microwave Theory and Techniques

8:00 P.M. • Thursday, May 20

Absolute measurement of microwave power

Dr. Alexander L. Cullen, professor of electrical engineering, University of Sheffield, visiting MacKay Professor of EE, UC, Berkeley

Place: Hewlett-Packard, Room 1A, 1501 Page Mill Road, Palo Alto

Dinner: 6:30 P.M., Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto

Reservations: Bob Prickett, 326-7000, Ext. 2666, by May 18

Military Electronics

8:00 P.M. • Wednesday, May 19

7:30 P.M. • Thursday, May 27

(Joint with Aerospace and Space Electronics and Telemetry, see above)

Power

7:30 P.M. • Tuesday, May 25

EEl research project on parallel operation of AC and DC transmission lines

J. J. Dougherty, EEl project manager and senior engineer of Philadelphia Electric Co.

Place: Engineers' Club, 206 Sansome Street, San Francisco

Cocktails: 5:30 P.M.

Dinner: 6:30 P.M., Engineers' Club

Reservations: 421-3184 by May 24

Product Engineering and Production

8:00 P.M. • Tuesday, May 25

(Joint with Components Parts Group, merging with PEP)

Construction and application of photon-coupled devices

Dr. Irwin Wunderman, research engineer, Hewlett-Packard

Place: Hewlett-Packard conference room 1A, 1501 Page Mill Road, Palo Alto

No dinner

Reliability

8:00 P.M. • Thursday, June 3

Joint with San Jose Subsection of the American Society for Quality Control and the Maintainability Association

The activities of the Air Force weapon system effectiveness

Walter Hurd, manager, Polaris reliability and quality engineering div., LMSC

Place: PH 101, Stanford

Dinner: Time and place to be announced with reservations

Reservations: Stuart Bessler, 327-4212, by June 1

Space Electronics and Telemetry

8:00 P.M. • Wednesday, May 19

7:30 P.M. • Thursday, May 27

(Joint with Aerospace and Military Electronics, see above)

Vehicular Communications

8:00 P.M. • Thursday, May 20

A unique VHF radio system for Canadian natural gas pipeline

T. R. Ferry, supervising communications engineer, PG&E, San Francisco

Place: SRI little theater, 333 Ravenswood Avenue, Menlo Park

Dinner: 6:15 P.M., Ramor Oaks, 3435 El Camino Real, Atherton

Reservations: Sue Day, 593-8419, by May 16

meeting ahead

GOOD ENGINEERING MANAGERS

L. S. Burbank, Burbank Associates, management consultants, San Francisco, will discuss the question, "When do good engineers make good engineering managers?" at the May 24 meeting of the Engineering Management chapter. The meeting was originally scheduled for March 16, but had to be postponed.

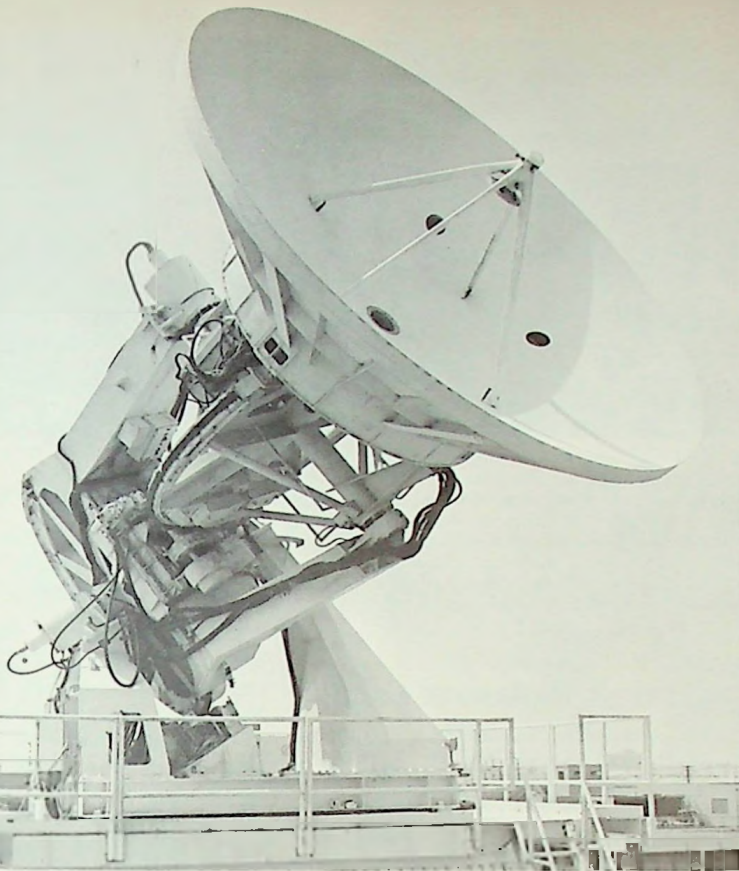
The chapter's June meeting will be held at the IBM Research Laboratory in Los Gatos on the subject of management information systems.

meeting ahead

COYOTE FIELD TRIP

A field trip to the Coyote facility of the United Technology Center division of United Aircraft Corp. is planned for the May meeting of the Santa Clara Valley Subsection. A description of the testing site, the testing work done there, and a tour of the area will highlight the event.

To get to the site, go toward Coyote on 101 and turn east at the United Technology sign. Since reservations are required, they should be made early.



The 15-foot diameter precision millimeter-wave antenna has been used for measurements which have yielded some pioneering, interesting, and significant data on the moon, the earth's atmosphere, the sun, Venus, and Jupiter.

### meeting ahead

#### ANTENNAS AND OBSERVATIONS

Howard E. King, head, electromagnetics section, Aerospace Corp., Los Angeles, will address the May 18 meeting of the Antennas and Propagation chapter. He will discuss a large aperture millimeter wave antenna and observations at 3.2 MM.

A graduate of the University of Washington and the University of Illinois, Mr. King has been with the broadcast section of RCA Victor division, designing FM and television transmitting antennas. He took part in the development of the Empire State Building multiple television antenna system. At Aerospace Corp., Mr. King is engaged in the development of wave components and antennas. He is the current chairman of the GAP for the Los Angeles District of IEEE.

#### MORE RELIABILITY

ness at all phases of system life. The committee has taken the position that system effectiveness is a quantitative measure, to the extent that a system may be expected to achieve a set of specific mission requirements. It can be expressed as a function of availability, dependability, and capability.



Howard E. King

### meeting ahead

#### COMPUTER CHAPTER

Donald V. Black, head, technical processes at the University of California library at Santa Cruz, will discuss automatic classification and indexing by computer at the May 18 meeting of the Computer chapter. He will describe a line of research which might develop a process which could assign formalized subject terms after processing by a digital computer of the natural language input.

The speaker, a member of the committee on information retrieval of the reference services division, American Library Assn., is concerned with the uses of machine maintained book catalogs for academic libraries.

# MEASUREMENTS' UHF

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*E. L. Woodbams has the appreciation of his fellow panel members as he provides a humorous moment during the lively discussion on "Management Tradeoffs in Today's Reliability Programs" at the April joint meeting of the Engineering Management, Reliability, and Product Engineering and Production chapters. Left to right—Richard W. Towle, engineering manager, Advanced Technology Laboratory; John R. Mulken, research scientist, Reliability and Quality Assurance, Ames Research Center, NASA; Mr. Woodbams, product assurance manager, medium space vehicle program, Lockheed Missiles & Space Co.; Merwin Fetzer, manager of reliability, Ampex; and George Reyling, Varian Associates (moderator).*

*meeting ahead*

## MEASURING MICROWAVE POWER

Dr. Alexander L. Cullen, professor of electrical engineering at the University of Sheffield and visiting McKay professor at UC, Berkeley, will discuss absolute measurement of microwave power at the May 20 meeting of Microwave Theory and Techniques chapter.

The term absolute measurement is here used in the sense that the only standards to which reference is made are those of mass, length, and time.

Three quite distinct wattmeters will be described. The first is a feed-through wattmeter (for 3 cm wavelength) suitable for powers in the range of tens to hundreds of watts and a response time of about one second. Next is an instrument employing both electrical and mechanical resonance, and capable of measuring a power of as little as 10 mw at 8 mm wavelength. Finally, a wattmeter employing the angular momentum of a circularly polarized wave to produce torque is described. By employing mechanical

resonance, powers of the order of 100 mw can be measured at 8 mm wavelength. At the power levels indicated, all of these instruments have been shown to be capable of measuring power within some limits of  $\pm 2\%$ ; greater accuracy could be obtained with further development of the technique.

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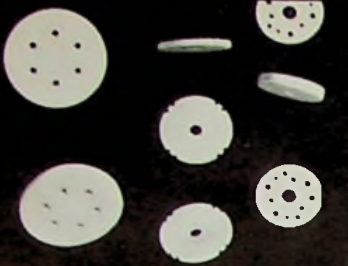
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T. R. Ferry

*meeting ahead*

### VEHICULAR COMMUNICATIONS

T. R. Ferry, supervising communications engineer, Pacific Gas & Electric Co., San Francisco, will address the first meeting of the newly activated Vehicular Communications chapter on May 20.

He will describe a unique VHF radio system for the Canadian natural gas pipeline which transports approximately 400,000,000 cubic feet of natural gas a day into California load centers from the Alberta province gas fields. The pipeline transverses very rugged and isolated terrain which puts increased demands on the communications systems required to operate it.

The paper discusses the design of one facet of the communication system, that of the vehicular radio system used for the project. Due to the distances involved and the peculiarities of pipeline operations, a rather unique system has been developed. Also discussed will be the technical details of operating mobile repeaters on very narrow frequency separation.

For the past twelve years, Mr. Ferry has been in charge of engineering design for the company's outdoor communication plant. In addition to VHF radio systems, this includes microwave, power line carrier, telephone carrier, telemetry, control, and data systems.

All local VC Group members have been sent a ballot for election of officers for the group, and by meeting day these ballots will have been counted and the newly elected officers will go to work immediately. Business at this meeting will be brief, and the newly elected program chairman will take over.

"Response to a questionnaire sent to G-VC members in January indicated much enthusiasm, and we are all looking forward to a most active group," according to Ben Wright, chief engineer, Kaar Engineering Corp., who served as organizer of the



Irwin Wunderman

*meeting ahead*

### PHOTON COUPLED DEVICES

Dr. Irwin Wunderman, research engineer, Hewlett-Packard, will describe the construction and application of photon coupled devices at the May 25 meeting of the Product Engineering and Production chapter.

Optoelectronic circuit components which couple the infrared emission from a gallium arsenide diode to a photodetector, the devices employ a light pipe as an integral part of the package, permitting great electrical isolation between the light source and the detector.

A graduate of CCNY, USC, and Stanford, Dr. Wunderman was an electronic research engineer from 1952 to 1956 at Lockheed Aircraft Corp., where he was engaged in transistor circuit development and taught semiconductor electronics in the company's educational program.

He has been with Hewlett-Packard since 1956 as laboratory section leader responsible for the design of transistorized counters and an advanced research engineer concerned with solid-state devices. He transferred to HP Associates in 1961 to engage in optoelectronics research and development.

chapter. "As of now we have 76 registered members. This meeting is open to IEEE members and non-members."

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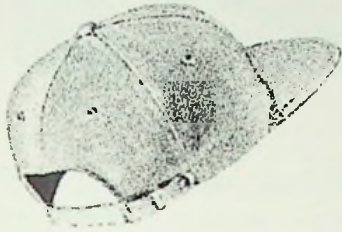
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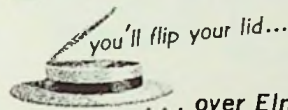
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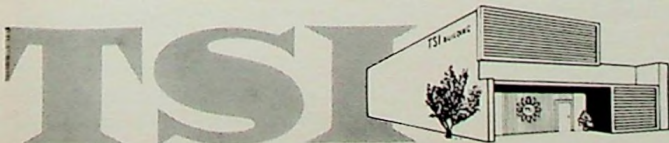
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Future Engineers Show selection committee of the section is seen conferring at the recent Bay Area Science Fair from which the section's representatives in the FES were partially chosen. Eleven participants and their science teacher sponsors will represent the section at WESCON. Left to right are George Mathers, Hewlett-Packard; W. Dale Fuller, LSMC; Bud Eldon, Hewlett-Packard, selection committee chairman; and Art Kromer, Varian Associates.

### meeting ahead

#### PARALLEL TRANSMISSION

J. J. Dougherty, EEI project manager and senior engineer of Philadelphia Electric Co., will discuss the current research programs being conducted by EEI in the field of parallel operation of AC and DC transmission systems at the May 25 meeting of the Power chapter.

Such parallel operations are being planned for the West Coast intertie. Mr. Dougherty will describe the analog simulator work that EEI is doing jointly with Allis-Chalmers and the University of Wisconsin, the joint analytical study between EEI and General Electric using the digital computer approach, and EEI's own intermediate power level model that is being presently constructed.

### meeting ahead

#### EWS ELECTION

Members of the Engineering Writing and Speech chapter will elect officers for the coming program year at the meeting of May 17. Chairman Robert S. Howland will review activities of the past year, followed by the announcement of a slate selected by the nominating committee and nominations from the floor.

### meeting ahead

#### JUNE WINE TASTING

Santa Clara Valley Subsection members and their ladies will enjoy a wine-tasting dinner at the Paul Mason Vineyards in Saratoga on June 16. Charles McKenna will be host. Because of limited parking and dining facilities, reservations will be required and may be made by calling John May, 742-9155, or Don McCauley, 326-4350, Ext. 4757.

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Frank Willard

*meeting ahead*

**INDUSTRIAL DIGITAL CONTROL**

Frank Willard, advisory engineer of Westinghouse computer system department, will be the speaker at the May 18 meeting of the Industry and General Applications chapter. He will discuss direct digital control for industrial processes.

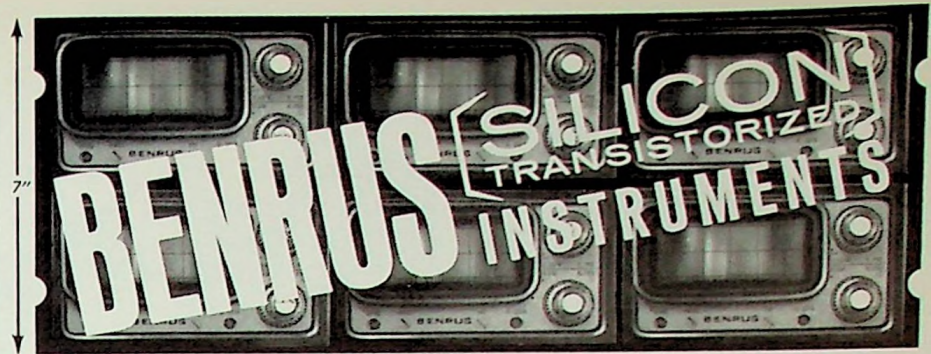
As advisory engineer, the speaker has been associated with every Westinghouse PRODAC computerized process control system. He is currently the chief design consultant for Westinghouse in this field. Holder of an M.S. degree in electrical engineering from the Thayer School of Engineering, Dartmouth College, he has been involved in systems control design since coming to Westinghouse eleven years ago. In his earlier design work on steel mill applications he developed various data loggers, reversing mill instrumentation, and primary hot mill control. One of his contributions was the development of the system for automatic turning of an ingot.

*meeting ahead*

**INFORMATION THEORY**

Dr. Sandor Csibi, Telecommunications Research Institute, Budapest, a visiting United Nations Fellow, will address the May 20 meeting of the Information Theory chapter. He will discuss operations on noise that map second-order properties.

The correlation function of the input noise (not necessarily Gaussian) does not suffice in general to calculate the correlation function of the error at the output of a communication channel. However, other information, e.g., previous specifications and experiments on adjacent or interacting channels, together with methods of mapping second-order properties, may aid in such calculations. Some conditions make such calculations possible. The examples will consider certain bilinear and nonlinear situations that are amenable to treatment in terms of spectral representations.



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* 22-107	300	225-425	0.150
22-109	450	250-500	0.300
22-110A	150	80-260	0.150
22-118	150	110-165	0.500
22-119	300	275-325	0.500
* 22-121	150	130-170	0.250
22-122	400	375-425	0.240
22-123	300	280-320	0.300
22-124	150	130-170	0.500
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Members of the Section, the Santa Clara Valley Subsection, and the Industry and General Applications chapter who attended the Pioneers Night dinner meeting on April 21 were rewarded with highly interesting and amusing set of reminiscences by (left to right above) Brodie Leiby, publisher, Electrical West, moderator; Walter Schymic, re-

tired design engineer; Joseph S. Thompson, founder, Pacific Electric; Charles V. Litton, president, Litton Engineering Labs; and Almon W. Copley, retired Westinghouse engineer. Mr. Litton showed early prototype tubes and discussed early manufacturing problems and techniques to solve them.

## MORE REGION REPORT

once-a-month publication and eliminating one office position reduced this deficit to a minimum by year's end. "Operations are currently showing a small monthly gain," Beckett reported.

A number of national meetings are scheduled to take place in San Francisco during 1965 and 1966: the Ninth Annual Conference on Rural Electrification, May 24-25; the Twelfth Nuclear Science Symposium, October 18-20; the 11th Annual Conference on Magnetism and Magnetics, November 16-19; the 12th Annual Symposium on Reliability, January 25-27, 1966; the 1966 National Symposium on Microwave Theory and Techniques, May 16-18; and the Fall Joint Computer conference, November 8-10, 1966.

"We are happy to have these conferences meet in San Francisco, provided they do not create local timing conflicts, but the pre-merger policy of requesting permission from the local section as a courtesy is increasingly not being followed, several of the above having been learned about after all plans had been formulated and announced through headquarters.

"A serious communication problem presents itself annually to the Future Engineers Show chairman when he endeavors to learn the name of the selection chairman with whom he should deal in each section of the region. It is suggested that all sections appoint their local FES selection chairman in the Fall and inform WES-CON at that time, this being an important and continuing annual obligation," he concluded.

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meeting review

**MICRON-SIZED TUBES**

Louis Heynick, of Stanford Research Institute, discussed experimental micron-size electron tubes and associated experimental work at the April 28 meeting of the Electron Devices Group at Stanford University.

The devices will be particularly useful in logic-type systems, where reliability and stability are of major importance. To accomplish these objectives, refractory materials, particularly alumina and molybdenum, are used throughout, and are subjected to high-temperature bakeout. The small dimensions allow the use of field-emission without excessive voltages, even with a tungsten emitter. Layers are stacked and micro-machined to form the devices, and even the devices may be stacked by this process to form complete modules. By stacking triodes in series, a two-state computer-type module can be formed without conventional resistors, capacitors, and inductors. Packing densities are  $10^8$  devices per square inch, and, with stacking,  $10^{11}$  devices per cubic inch.

A first step in obtaining field emission was to use a 17 micron mesh for the anode. A single emitting point was manipulated into one hole of the control grid mesh, and good emission was obtained with little interception. Thus, it appears feasible to use, for the control grid in a tube, a single aperture of such size.

Field emission has been accomplished both with a single emitting point and with a plane containing bumps on an otherwise smooth surface. The bumpy surface sees a lower electric field than a single emitting point (because of mutual shielding of the bumps), but it may emit higher current because of the higher bump density. Fabrication of the surfaces is one field of the experimental work.

Fabrication is performed by an electron-resist technique, similar to photoresistive etching. It can machine to smaller dimensions than are permitted by optical limits, but it does require a very high precision, high temperature electron lens. The first such lens took two or three years to make. Molecular beam etching is also under consideration.

The lens, ultra-vacuum system, and manipulators were described and illustrated. The group is now making good smooth-films. A micron-size tube should come in the next few months. A by-product is some very nice instrumentation.

-RICIARD ALVAREZ

the section

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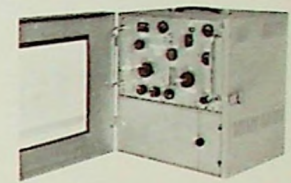
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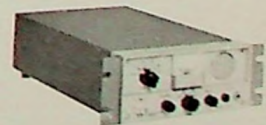
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