EDITOR'S PROFILE of this issue

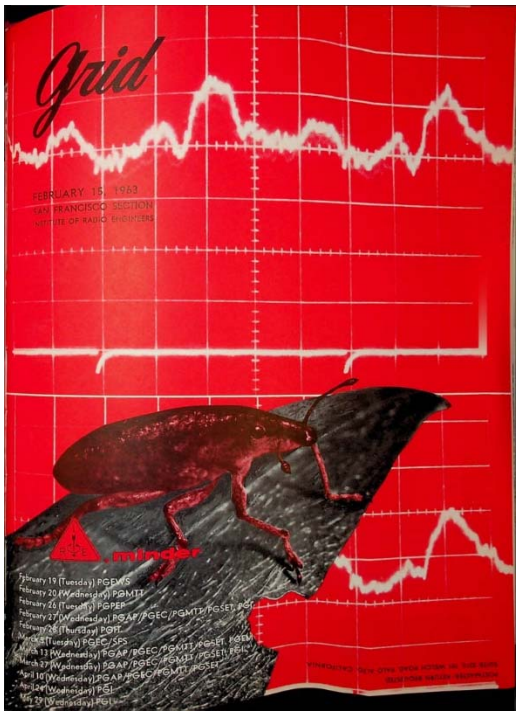
from a historical perspective …

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

February, 1963 (mid-month):

Cover: Focus is on visual processing in insects, and visual responses to stroboscopic light. More on page 7.

Page 5: Stanford's Bernie Widrow talks to the Electronic Computers chapter about his Adeline adaptive information-processing system, work he is doing with Ted Hoff (who goes on to invent the microprocessor at Intel).

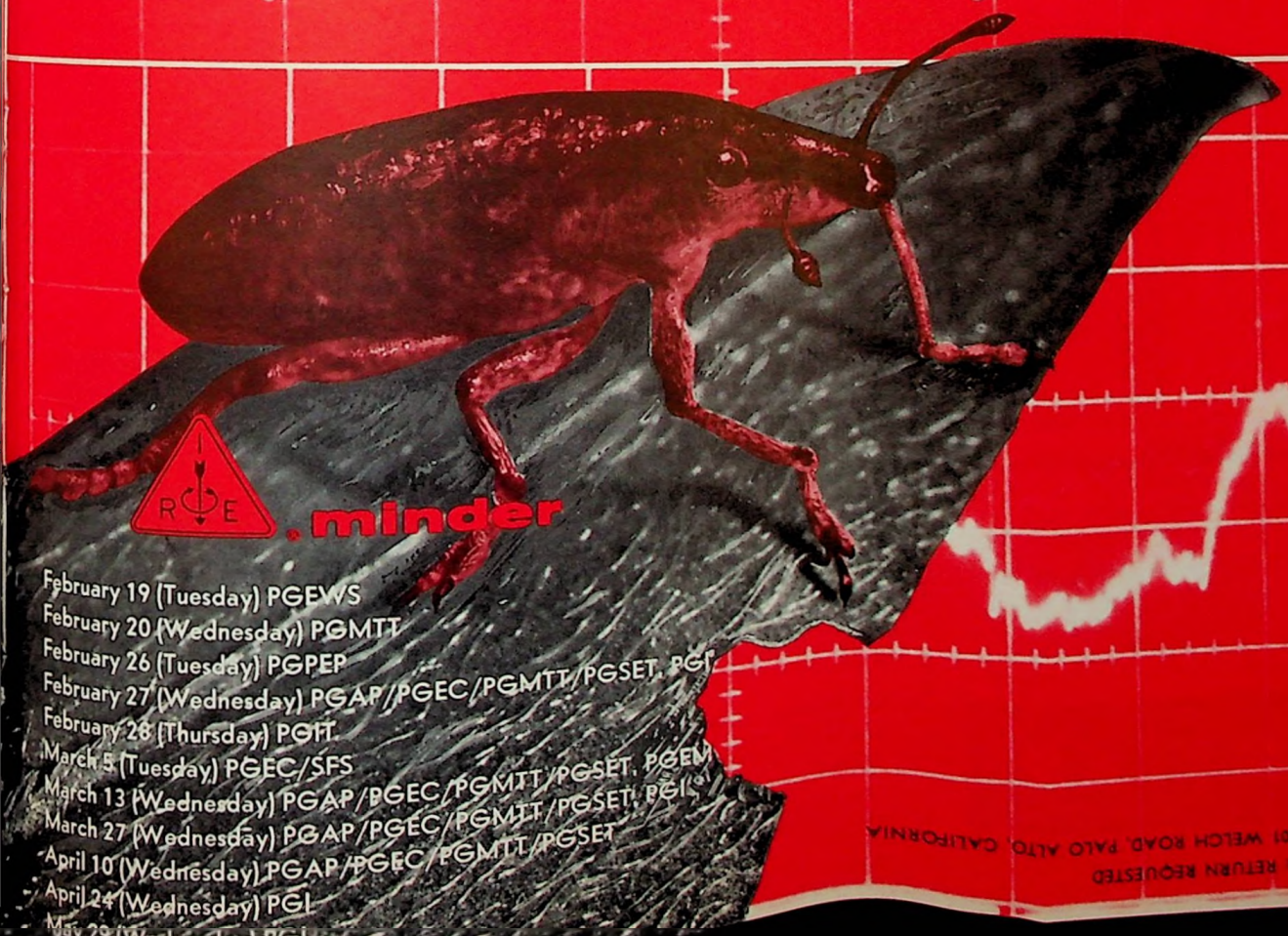


Archive of available SF Bay Area GRID Magazines is at this location:
https://ethw.org/IEEE_San_Francisco_Bay_Area_Council_History

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

Grid

FEBRUARY 15, 1963
SAN FRANCISCO SECTION
INSTITUTE OF RADIO ENGINEERS



minder

February 19 (Tuesday) PGEWS
February 20 (Wednesday) PGMTT
February 26 (Tuesday) PGPEP
February 27 (Wednesday) PGAP/PGEC/PGMTT/PGSET, PGI
February 28 (Thursday) PGTT
March 5 (Tuesday) PGEC/SFS
March 13 (Wednesday) PGAP/PGEC/PGMTT/PGSET, PGEM
March 27 (Wednesday) PGAP/PGEC/PGMTT/PGSET, PGI
April 10 (Wednesday) PGAP/PGEC/PGMTT/PGSET
April 24 (Wednesday) PGI
May 29 (Wednesday) PGI

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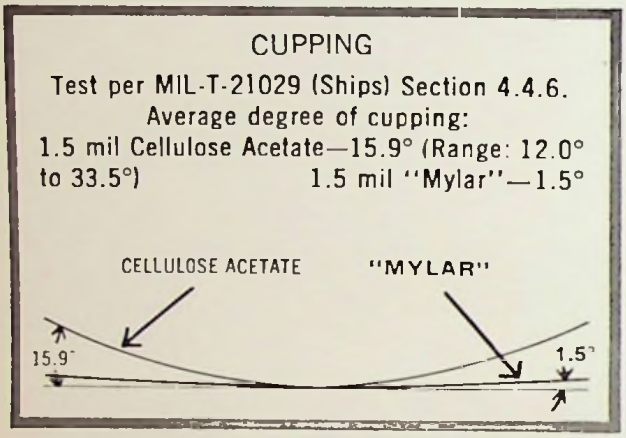
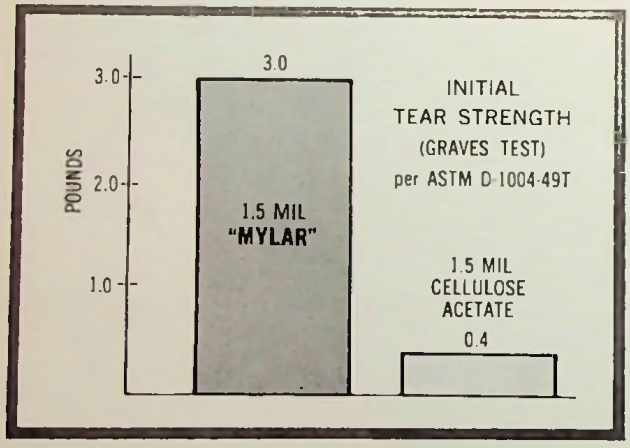
GUARD AGAINST READ/WRITE ERRORS WITH RELIABLE TAPES OF MYLAR®





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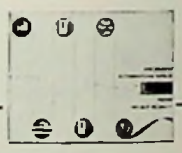

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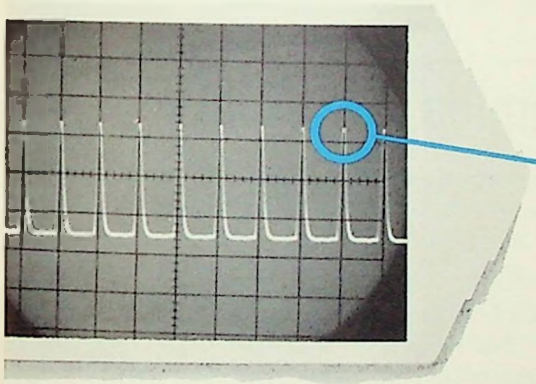
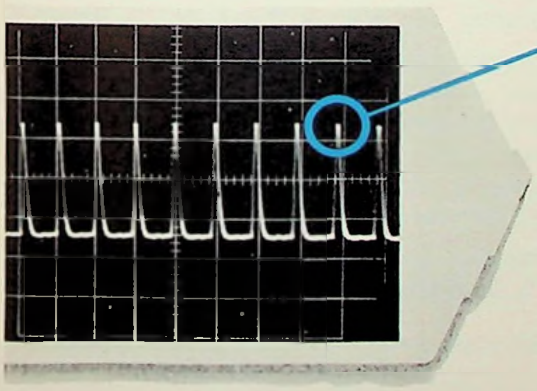


Perfectly linear signal *reads* perfectly. Exclusive hp development places calibrating graticule in identical *inside* plane with trace. Since trace and graticule are on the same plane, there is no reading error— even at wide viewing angles.



Conventional scopes have calibrating graticule a full ¼ inch in front of trace. Note identical signal on old-type cathode ray tube. Parallax is inescapable and errors up to 5% are possible.

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7658

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contents

cover

LIXUS BLAKEAE CHITTENDAN and his electroretinograms (ERG's) showing visual response to 600 strobatic light pulses per minute may lead to development of a theory for the neural basis for behavior, according to Dr. James Bliss of SRI and PGBME. For more about visual processing in insects, see page 7.

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MEETING CALENDAR

SAN FRANCISCO SECTION — 8:00 P.M. • Tuesday, March 5
(Joint meeting with PGEC, see below)

Antennas & Propagation — 8:00 P.M. • Wednesday, February 27
(Four-part Tutorial Lecture Series: "Laser Theory, Technique, and Application" —Joint with PGEC, PGMTT, and PGSET)
"Optically Pumped Lasers—Cesium Vapor to Solid State"
Speaker: Professor Arthur Schawlow, Stanford University
Place: Physics Lecture Hall, Stanford University
Dinner: Information and reservations, Darlene Wheeler, DA 6-6200, Ext. 2695

Antennas & Propagation — 8:00 P.M. • Wednesday, March 13
Lecture No. 2: "Gas Discharge and Semiconductor Lasers"
Speaker: Dr. Arnold Bloom, Spectra-Physics Inc., Mountain View
Place: Physics Lecture Hall, Stanford University
Dinner: To be announced

Antennas & Propagation — 8:00 P.M. • Wednesday, March 27
Lecture No. 3: "Laser Techniques and Applications"
Speaker: Professor Anthony Siegman, Stanford University
Place: Physics Lecture Hall, Stanford University
Dinner: To be announced

Antennas & Propagation — 8:00 P.M. • Wednesday, April 10
Lecture No. 4: "Laser Developments Overseas—Report on Third International Quantum-Electronic Conference, Paris, 1963"
Speaker: Dr. Malcolm Stitch, Hughes Aircraft Co., Culver City
Place: Physics Lecture Hall, Stanford University
Dinner: To be announced

Electronic Computers — 8:00 P.M. • Wednesday, Feb. 27, Mar. 13, 27
(Tutorial Lecture Series: Joint with PGAP, PGMTT, and PGSET, see above)

Electronic Computers — 8:00 P.M. • Tuesday, March 5
(Joint meeting with SFS)
"Practical Applications for Adaptive Circuits and Systems"
Speaker: Professor Bernard Widrow, Stanford University
Place: Physics Lecture Hall, Room 101, Stanford University
Dinner: 6:00 P.M., The Red Shack, 4085 El Camino Way, Palo Alto
Reservations: Call May Sharp (Lockheed), DA 3-1831, Ext. 141, by March 4

Engineering Management — Wednesday, March 13
Speaker: Dr. Walter H. Schwidetsky, Manager, Space Navigation and Data Systems, General Dynamics/Astronautics
Place: Rickey's Hyatt House, Palo Alto

Engineering Writing & Speech — 8:00 P.M. • Tuesday, February 19
"Good Telephone Usage"
Speaker: Miss Kathy Mijares, service consultant for the Peninsula Division of Pacific Telephone
Reservations: Mrs. Marje Andrews, DA 1-3300, Ext. 273
Place: Sylvania Electronic Systems, West, Bldg. 2, 123 N. Whisman Road, Mountain View
Dinner: 6:15 P.M., Chez Yvonne, 1854 El Camino Real, Mountain View
Reservations: Paul Jensen, YO 8-6211, Ext. 2795, or Robert Howland, EX 9-2951, by noon Mon., Feb. 18

MEETING CALENDAR

Information Theory — 8:00 P.M. • Thursday, February 28
"On Multivariate Prediction"
Speaker: Dr. Frederick J. Beutler, University of Michigan
Place: Philco Auditorium, Bldg. 56, 3825 Fabian Way, Palo Alto
Dinner: 6:00 P.M., Sakura Gardens, 2116 N. El Camino Real, Mountain View
Reservations: Mrs. Radl, YO 8-6211, Ext. 2460, 2522, or 2244

Instrumentation — 8:15 P.M. • Wednesday, February 27
Lecture No. 2: A panel discussion moderated by Dr. J. W. Muehlner, senior member, communications & controls research, electronic sciences laboratory, Lockheed Missiles & Space Co.
Place: Lockheed Missiles & Space Co., Bldg. 202, 3251 Hanover St., Palo Alto
Dinner: 6:15 P.M., L'Omelette Restaurant, 4170 El Camino Real, Palo Alto
Reservations: Mrs. Marje Andrews, DA 1-3300, Ext. 273

Instrumentation — 8:15 P.M. • Wednesday, March 27
Lecture No. 3: "The Instrumentation and Performance of the Mariner Experiments"
Speaker, place to be announced

Instrumentation — 8:15 P.M. • Wednesday, April 24
Lecture No. 4: "Detection of Planetary Life"
Speaker, place to be announced

Instrumentation — 8:15 P.M. • Wednesday, May 29
Lecture No. 5: "Instrumentation for Man in Space"
Speaker, place to be announced

Microwave Theory & Techniques — 8:00 P.M. • Wednesday, February 20
"A Step-Recovery Diode Microwave Frequency Mark Generator"
Speaker: Robert B. Mouw, engineer, microwave division, Melabs, Palo Alto
Place: Physics Lecture Hall, Room 100, Stanford University
Dinner: 6:00 P.M., Happy Hour; 6:30 P.M., Dinner, Red Shack, 4085 El Camino Way, Palo Alto
Reservations: 324-0631

Microwave Theory & Techniques — 8:00 P.M. • Wednesday, Feb. 27, Mar. 13, 27
(Tutorial Lecture Series: Joint with PGAP, PGEC, and PGSET, see above)

Product Engineering & Production — 7:45 P.M. • Tuesday, February 26
"Production Engineering and Production for Semiconductor Integrated Circuits Micrologics"
Speaker: Millard H. Phelps, Jr., Micro-circuits marketing mgr., Fairchild Semiconductor
Place: Fairchild Conference Room, 545 Whisman Road, Mountain View
Information: W. Dale Fuller, DA 4-3311, Ext. 45821

Space Electronics & Telemetry — 8:00 P.M. • Wednesday, Feb. 27, Mar. 13, 27
(Tutorial Lecture Series: Joint with PGAP, PGEC, PGMTT, see above)

Bernard Widrow

meeting ahead

ADALINE REVISITED

Practical applications for adaptive circuits and systems will be covered at the March 5 joint PGEC/SFS meeting, when Professor Bernard Widrow of Stanford will report on the progress of Adaline and Madaline I. The 8:00 p.m. gathering in Physics 101 on the campus will be preceded by a 6:00 p.m. dinner.

Three main causes have motivated the development of adaptive information-processing systems, according to Professor Widrow:

> Automation of system design, systems being taught instead of being designed or programmed. Self-adaption to changing signal environments and performance requirements, to acquire competency beyond that trained in by the teacher. Reliability improvement in electronic system means of "self-healing" redundant and adaptive circuits.

A basic building block for adaptive decision-making systems is an automatically adapted threshold logic element called "Adaline." Networks of these elements have been at Stanford in a variety of practical applications.

- A speech-recognition system has been constructed that can be trained to type out spoken words with a reliability in excess of 98 percent on vocabularies of 10 words.
- An Adaline has been trained on a very limited amount of data to forecast rain or no rain 24 hours into the future for San Francisco during the rainy season with a reliability approaching that of the

(Continued on page 6)

Kenneth M. Hall

meeting ahead

SYSTEMS EFFECTIVENESS

The PGRQC meeting for February will feature Ken Hall of Sylvania on "Systems Effectiveness Models." The meeting will be held at the Stanford Physics Lecture Hall Room 101 at 8:00 p.m., February 20, 1963.

This discussion will present some of the problems which are encountered in determining the effectiveness of various systems. It will be shown that measures which adequately describe the worth of one system may be totally inadequate for another system. An example will be given to illustrate typical measures of worth and to discuss various methods which can be used in obtaining these.

Kenneth M. Hall is a senior engineer in the reliability analysis section of the Western operation of Sylvania Electronic Systems in Mountain View. He received the B.S. in physics from Washington State University, the M.S. in mathematics from San Jose State, and is continuing graduate study in statistics at Stanford.

the worried deans

ENROLLMENTS STILL DROPPING

Third in a series of articles devoted to the engineering candidate lag, a problem of increasing concern to educators and the entire profession.

Enrollments in freshman engineering curricula dropped again alarmingly in the United States last fall despite widespread efforts by government and private agencies to counter the decline.

The continuing lack of interest by young America in engineering as a career was shown in a study of enrollment reports published in the December 1962 issue of the ISA Journal, official trade publication serving the instrumentation and automatic-control industry.

Even pessimists upset

"Even the most pessimistic predictions of manpower experts were upset," the ISA Journal said, when only about 66,000 freshmen enrolled in the nation's engineering schools for the first semester for the 1962-63 term. This compares with total enrollments of approximately 68,000 in the fall of 1961 and the fall of 1960.

Taking into account normal dropouts and changes in curricula made by students, the ISA Journal report said "the class of 1966 will have only slightly more than 28,000 engineering graduates."

This is counter to an admittedly "pessimistic" study on engineering demand released six months ago by the Engineering Manpower Commission that recognized a continuing, but much more gradual, decline in engineering enrollment. EMC estimated in June that 33,200 engineers would graduate in 1966 and that the class of 1970 would count 29,000 engineers in its ranks, with the average graduating class for the decade running to about 31,000.

"Now it appears that the commission must lower its sights," the ISA Journal commented.

Supply and demand

The article said many observers, recalling unfounded predictions of engineering shortages in the late '40's, wonder if supply simply is adjusting to demand. It also pointed out, however, that the NASA alone wants 1000 Ph.D. engineers and scientists per year by 1970.

"The first of those men will receive their B.S. degrees in 1966, and some industrial recruiters worry about what this effect alone will have on the supply of top men," the ISA Journal stated.

Deans blame standards

"The reason for the continuing decline puzzles experts, in light of burgeoning college enrollments for all curricula. Engineering deans claim that higher entrance requirements are the reason. But EMC also emphasized the decline of war veteran enrollment and dilution of intellectual capacity and stamina among entering freshmen."

The article also cited a study by interviewers at a U.S. Navy research station which "put the finger on poor high-school preparation, tough college courses, lack of drive, and cost" as reasons for declining engineering enrollment. One of three engineers interviewed by the Navy also mentioned low salary.

"Whatever the reason, and despite the attention given to the decline, high-school graduates in the space age do not see engineering as a promising career," the article concluded.

STWP MEET

Second annual seminar on technical writing and publishing will take place at Stanford on Saturday, March 2, under co-sponsorship of the department of communications and journalism and GG chapter of STWP, including morning, luncheon, and afternoon sessions, all for $7.50. Quality assurance for space-age technical publications is theme.

MORE PGEC/SFS

best in human weather prediction.

- The linearly separable logic functions realized by Adaline are useful in controllers for certain bang-bang control systems. A "broom-balancing" machine has been stabilized by an Adaline which can recognize patterns in "state space," and can make control decisions according to a previously learned strategy.
- A theoretical study has shown how the effectiveness of redundancy can greatly be enhanced in increasing the reliability of digital systems by using Adaline as an adaptive majority vote-taker.

The ability to self-repair by adapting around its own internal flows is an inherent property of systems that are adaptive "from the ground up." An experimental machine (Madaline I) was trained to make very complex pattern discriminations in spite of the fact that 25 percent of its circuitry was totally defective.

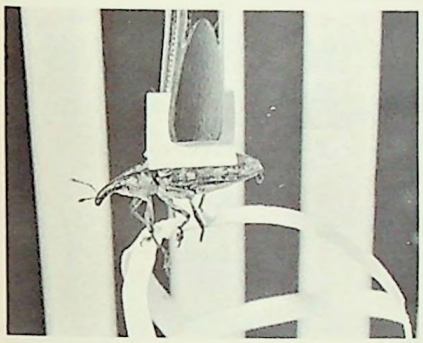
This field of research has motivated the invention of new electronic components and circuits. The necessary analog memory functions are provided by magnetic or by electrochemical (memistor) elements. Adaptive machines will be demonstrated at the meeting.

ALL ABOUT LIXUS

"The Visual System of the Beetle" was the subject of discussion at the December PGBME meeting at Stanford.

Dr. James Bliss discussed behavioral experiments he has performed on the beetle Lixus. Dr. Bliss is a research engineer at Stanford Research Institute and is engaged in bioengineering research. The talk is the outgrowth of a continuing program at SRI on visual information processing in insects.

Experiments indicate that special information processing takes place in the eye of the beetle. Specifically, the processing involves autocorrelation. The speaker presented mathematical analysis which described this information processing.



Decisions, decisions, decisions!

Dr. Bliss stated that the beetle is an excellent experimental animal. This is because nerve systems composed of relatively few large units are common in insects. Also, the nervous system is arranged so that the coordinating mechanisms for different types of behavior are distributed in well-separated regions. And from a practical standpoint, the beetle Lixus is numerous, inexpensive, and hardy.

The visual system of these insects is the basis for complex behavior. According to the speaker, studies of the visual information processing in insects may lead to development of a theory for the neural basis for behavior. This theory could inspire the development of artificial systems that perform sensory functions.

A basic experiment performed on the beetle is the "rotating drum" experiment. In this experiment, the beetle is suspended off the floor from above and is allowed to hold a Y-maze globe with his feet. The Y-maze globe

(Continued on page 8)

MORE PGBME

is a small, spherical tetrahedron which can be easily held by the beetle. As the beetle voluntarily "walks" the Y-maze globe under him, he is constantly confronted with a fork, or division, in his path. At each division a decision must be made. The suspended beetle, with his portable path, is placed at the center of a rotating drum. The tendency to turn right or left depends upon movement in the visual field. A quantitive measure of the response can be defined as $\frac{W - A}{W + A}$ where W is the number of choices in the direction of, and A is the number against, the movement in the visual field, e.g., the rotating drum.

The variables in the experiment are the stripe spacing on the drum measured as wavelength in degrees, and drum rotating speed measured in degrees/second.

Experiments show that there is a definite, positive reaction for wavelengths of 4 and 18 degrees, increasing as drum speed increases. A 6-degree wavelength gives a negative reaction. Wavelengths of 8 and 12 degrees gave near zero reactions.

An interesting application of photo transistors was made to keep track of the direction the beetle turned. Two light beams were positioned so that when the Y-maze globe is turned by the beetle, light is intersected and the corresponding photo transistor activates a relay. The reactions are thus read directly on counters.

Additional experimental work involved electrical recordings. These recordings are called electroretinograms (ERG's). To obtain recordings, a micropipette was placed in the dorsal margin of the beetle's eye. A visual stimulus from a strobe-light at about 100 pulses per second caused ERG responses. These responses, when viewed on a scope, appeared to be delayed from the visual stimulus by about 16 milliseconds. An electrical network that approximates the ERG data was formulated.

The talk by Dr. Bliss was followed by an enlightening discussion. It appeared that no one left the meeting unconvinced of the worth of research along these lines.

CON RADER

INDEX TO ADVERTISERS

the section

MEMBERSHIP

Ely

Lee

Following are the names of members who have recently been transferred to a higher grade of membership as noted:

Senior Member

P. C. Ely, Jr.
T. H. Lee

Member

K. Fong
R. S. Muller
E. J. Sands

Following are the names of individuals who have been elected to current membership:

P. E. Allen	F. W. Greene
T. W. Brigham	R. W. Hall
A. Caccia	H. B. Kappelhof
S. K. Cheu	L. F. Lee
A. Chune	R. L. Mattson
M. D. Coats	J. R. Pollock
A. M. Costa	J. P. Ramirez
R. A. Du Bridgo	N. E. Ritchey, Jr.
R. H. Gannett	A. D. Williams
M. V. Golubovich	P. L. C. Young

Following are the names of IRE members who have recently entered our area, thereby becoming members of the San Francisco Section:

R. W. Bixler	Y. S. Powers
W. N. Carlsen	D. J. Schneider
A. S. Dunbar	T. E. Schoen
R. L. Drummond	R. A. Scholtz
R. C. Hedlund	L. R. Shaw
Emil Hopner	W. G. Snyder
R. J. Hruby	D. J. Thompson
J. F. Irwin III	J. E. Walker
G. K. K. Loeng	B. G. Watkins
J. H. Moore	W. J. Woodside
W. E. Nordgren	L. C. Van Atta
R. I. Powell	

meeting review

SPACE COMPUTER SPECS

PGMIL started a new year with an outstanding meeting that featured a talk by Captain John H. Van Dusen of the United States Air Force Space Research Directorate. His dual topics were, "Non-Space Application for Space Computer Technology" and "Future Requirements for Space-Type Computers."

In the reliability area, particularly, circuits have been developed that are able to absorb inevitable component failures. This "failure tolerance technique" in design makes possible the raising of mean time before failure figures by an order of magnitude.

In the microminiaturization area, since we are rapidly reaching a plateau in reduction of component size, integrated circuits or "functional electronic blocks" developed primarily for space-borne computer applications make possible reductions in the order of 500:1 of computer size. The advantages of this size reduction in power, air-conditioning, and installation costs are obvious.

The second part of his talk postulated (after 1970) the requirement for a ½-cu.-ft., 35-lb., 75-watt computer that would have 15,000 words of nondestructive readout, 2000 words of destructive readout, 5000 words of associated (or scratch path memory), a two-megacycle bit rate, 5-microsecond addition time, and 25-microsecond multiplication time. This device would also carry a rating of 10,000 hours mean time before failure. Captain Van Dusen indicated that such a computer would be required in space craft of this era for data management of space-craft.

JEROME J. DOVER

PAPERS CALL

Apr. 15: (1) Three copies of a 100-to-200-word abstract, including title of paper, name and address of author; (2) three copies of a 500-to-1000-word summary of the paper which identifies "related work" and "new contributions"; (3) indication of the technical field in which the paper falls (use IRE professional group classification to aid rapid distribution to reviewers). Technical program chairman: Dr. Jerre D. Noe, 1963 WESCON, Suite 2210, 701 Welch Road, Palo Alto, Calif.

Wilcox

Jipp

grid swings

IT IS REPORTED:

Jon (cq) W. **Wilcox** has been appointed supervisor of public relations for Varian Associates, responsible for the Palo Alto operation and five subsidiary companies. He received the M.A. in communications-journalism in 1959, joining the company that year as magazine editor.

John Jipp has been appointed a vice president of Precision Instrument Co. and will also serve as marketing manager of the magnetic recorder manufacturer, after nine years in a similar capacity with Ampex and other experience with Motorola communications division and the U.S. Signal Corps.

Canzoneri

Brooks

Richard M. Canzoneri has been named manager of transducer engineering for the Western facility of the electronics division of Baldwin-Lima-Hamilton Corp.

Rex E. Brooks, formerly vice president of Electro Engineering Works, San Leandro, has been appointed vice president and general manager of Compar San Francisco, Inc., according to Charles E. Ault, president of the northern California affiliate of Compar Corp., national electronic component marketing organization.

Gordon Westwood, branch manager of Carl A. Stone Associates, announces representation of AD-YU Electronics Labs, Inc., effective February 11.

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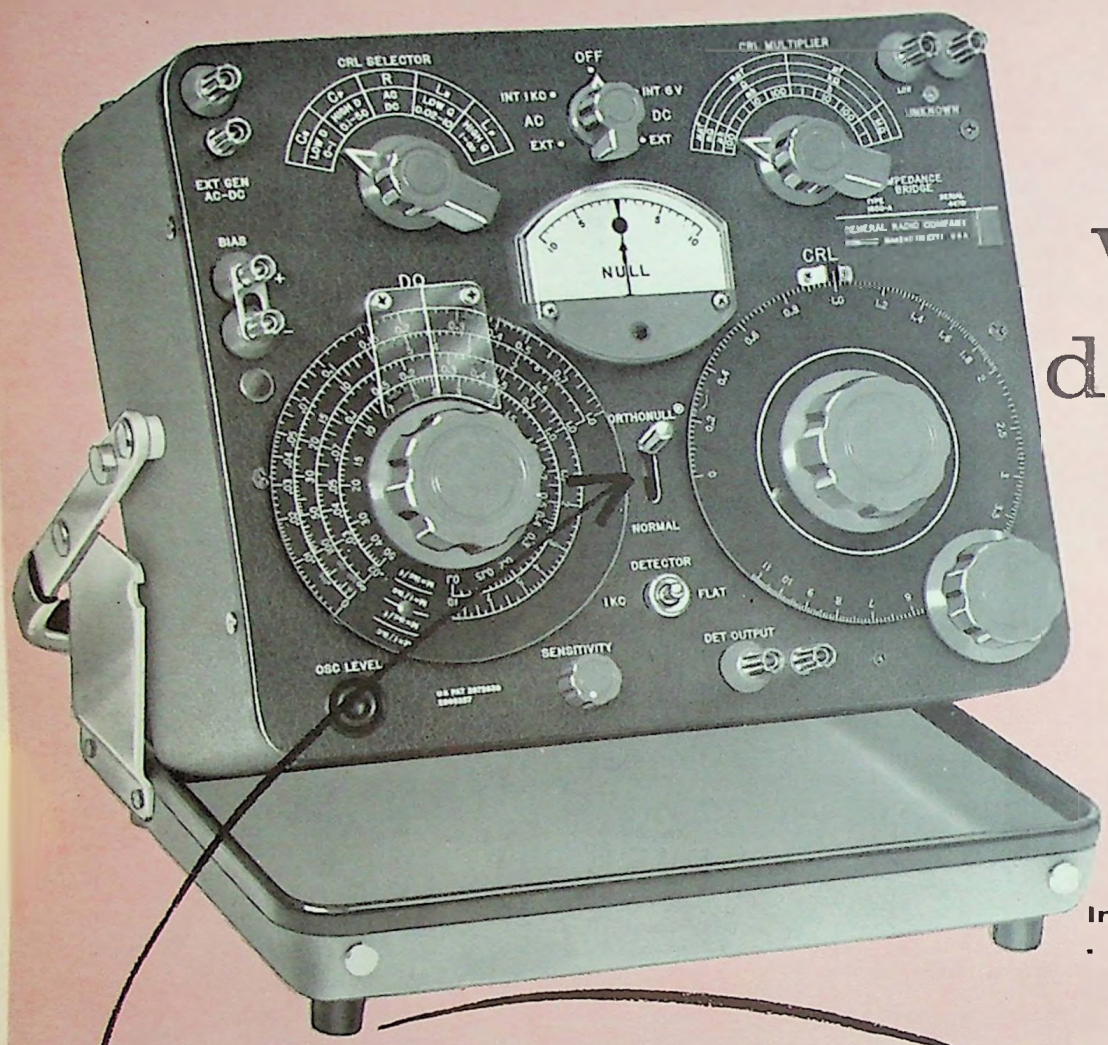

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