SAN FRANCISCO SECTION
INSTITUTE OF ELECTRICAL
AND
ELECTRONICS ENGINEERS

IEEE Grid

MAY 1966

W. W. HANSEN
1909 - 1949

HEINRICH HERTZ
1857 - 1894

meeting reminder

Aerospace & Electronic Systems, Thursday, May 26
Antennas & Propagation, Tuesday, May 17
Circuit Theory, Wednesday, May 18
Communication Technology/EWS/SCVSS, Wednesday, May 11
Computer, Tuesday, May 24
East Bay Subsection, Monday, May 9; Friday, May 20
Electromagnetic Compatibility, Wednesday, May 25
Engineering Writing & Speech/Comtech/SCVSS, Wednesday, May 11
Information Theory, Thursday, May 19
Industry & General Applications, Wednesday, May 11
Instrumentation & Measurement, Wednesday, May 11; Wednesday, June 8
Nuclear Science, Monday, May 16
Parts, Materials & Packaging, Tuesday, May 24
Power, Tuesday, May 17
San Francisco Section, Wednesday, June 15
Santa Clara Valley Subsection/Comtech/EWS, Wednesday, May 11

ELEVENTH INTERNATIONAL SYMPOSIUM
ON MICROWAVE THEORY AND TECHNIQUES
PALO ALTO CABANA • MAY 16 - 19

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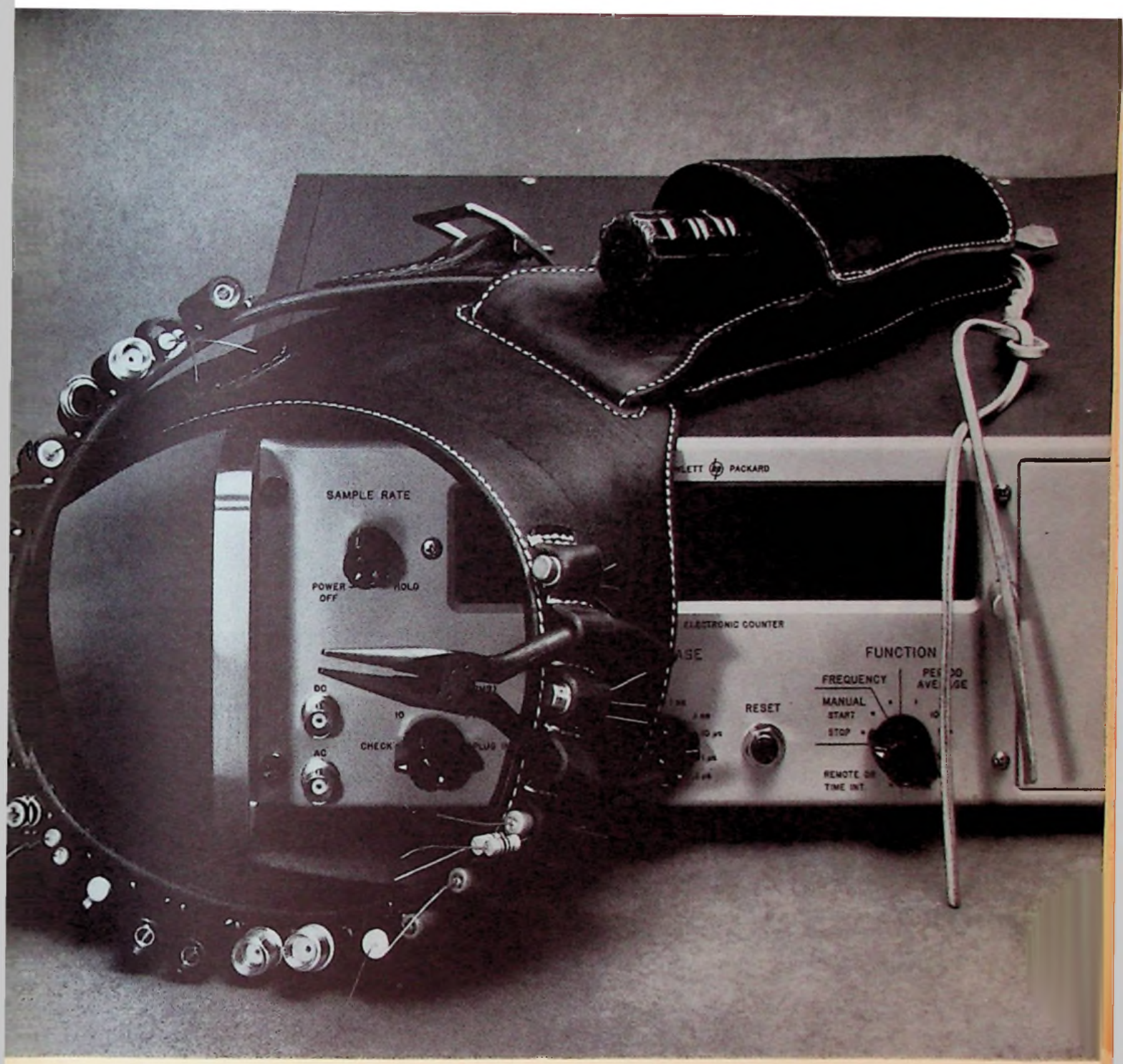

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when plug-ins receive SEEK command

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overrides the SEEK command and extends sweep range and deflection factors beyond capability of Automatic Seeking Mode. Both plug-ins are controlled manually, as in conventional operation. Settings are still conveniently indicated. In MANUAL OPERATION mode, deflection factor is 1 mV/div to 50 V/div (5 MHz at 1, 2 or 5 mV/div) and sweep range is 5 s/div to 10 ns/div. Indicators also light to show SWP MAG'D and UNCAL warnings.

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the section

MEMBERSHIP

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

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SHARE THE RESPONSIBILITY FOR THE SECTION

Take part in the membership pledge program. Bring in at least one new member in '66.

meetings ahead

EAST BAY SUBSECTION

The East Bay Subsection plans two meetings during May.

At the May 9 meeting officers will present awards for high school student papers and hear Prof. P.O. Vogelhut, head of the Bio-electronics laboratory at the University of California, discuss his specialty. The meeting will take place at Spenger's Fish Grotto, Berkeley.

On May 20 the subsection will present its annual ladies' night and installation of new officers at the Charles Krug Winery in St. Helena. Because of limited capacity tickets must be reserved no later than May 13.

cover

Cover, designed by Don Barrett, Stanford Research Institute, and Henry Kappelhof, Iconotype, welcomes those attending the 11th International Symposium on Microwave Theory and Techniques and honors two giants in the field, Heinrich Hertz, discoverer of electromagnetic waves, and W.W. Hansen, a developer of the first linear accelerator and klystron. Symposium coverage is on pages 6-8. Grid's appreciation to Associate Member Kappelhof for the sketches of Hertz and Hansen.

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meeting ahead

AMENDING NATIONAL CODE

W. Creighton Schwan, NEMA west coast representative in safety regulations department, Hayward, California, will address the May 11 meeting of the Industry and General Application chapter.

Mr. Schwan will describe briefly the method of amending the National Electrical Code and then cover some of the more significant changes in the 1965 edition. A 30-minute question and answer period is scheduled to follow his address.

The speaker has been a member of Panel 8, national electrical code committee since 1963. Prior to joining NEMA in 1965 he was on the staff of the State of California Division of Industrial Safety as an electrical safety engineer. He has served as member and chairman of several committees concerned with state codes or organization standards. Since 1955 he has taught electrical code for the Hayward adult and technical school.

Schwan *Ballam*

meeting ahead

FINAL PREP FOR SLAC

Sometime in early May the world's biggest electron microscope will be turned on in Palo Alto and a few months later members of the research staff at the Stanford Linear Accelerator Center will begin using the microscope to peer deeper into the mysterious realm of the atomic nucleus than anyone has done before. Preparation and plans will be discussed at the May 16 meeting of the Nuclear Science chapter.

The concept of a microscope isn't too far fetched for the SLAC electron Linac because, due to the dual wave-particle nature of the electron, the wave length will be so short at the high energies planned that it can essentially photograph the nucleus.

The microscope is the 10,000 foot long traveling wave linear accelerator at SLAC, now nearing completion. It represents the culmination of years of experience and planning at Stanford, where electron Linacs were born and have thrived.

The big machine, for which ground was broken in July of 1962, will be

(Continued on page 15)

Meeting Calendar

MAY 9, MONDAY, 7:30 PM — East Bay Subsection
Student relations meeting
P.O. Vogelhut, PhD., University of California, Berkeley
Place: Spenger's Fish Grotto banquet room, 1919—4th St., Berkeley (use University Ave. turnoff from East Shore Freeway)
Dinner: 6:30 PM, Spenger's
Reservations: Miss Houser, Livermore, 447-1100 ext. 7428, Mrs. Emerson, Oakland, 835-8500, or Miss Corbett, San Jose, 291-4567, by noon, May 9

MAY 11, WEDNESDAY, 8:00 PM — Communication Technology/ SCVSS/EWS/San Jose State Student Branch
Television for instruction — also a tour of college facilities
Glen Pensinger, technical director, instructional television ctr., San Jose State
Place: San Jose State College, Educational Bldg., Rm 100, 7th & San Carlos Sts. (Parking: State Garage, 25c, 7th near San Carlos St.)
Dinner: 6:15 PM, $2.75 (incl. tip) Spartan Cafeteria, San Jose State College
Reservations: Miss Wynne, 291-4039; Jim Shea, 294-6019 or C.G. Griffith, 591-8461, ext. 525, no later than May 6. Adv. payment accepted.

MAY 11, WEDNESDAY, 8:00 PM — Instrumentation & Measurement
Astrometric camera system for 36" Lick refractor
Bob Rach, Stanford Research Institute
Place: Hewlett-Packard Co. 1501 Page Mill Rd., Palo Alto
Dinner: 6:00 PM, L'Omelette, 4170 El Camino Real, Palo Alto
No reservations required

MAY 11, WEDNESDAY, 7:30 PM — Industry & General Applications
National electrical code — method of amending and changes in 1965 edition
W. Creighton Schwan, NEMA west coast representative in safety regulations
Place: Pacific Telephone Co. Bldg.—666 Folsom St., Rm 140, San Francisco
No dinner

MAY 16, MONDAY, 8:00 PM — Nuclear Science
Preparation and plans for experiments on Stanford 20 BeV accelerator
Prof. Joseph Ballam, associate director SLAC, head, SLAC research, Stanford Div.
6:15 — tour of experimental area, SLAC — end of Sand Hill Road, Palo Alto
Place: Slac cafeteria, end of Sand Hill Road, Palo Alto
Dinner: 7:15 PM, cafeteria
Reservations: Dixie Warner, 321-7801, Palo Alto; Cherrill Johnson, 447-1100 ext. 7421, Livermore by May 13

MAY 17, TUESDAY, 8:15 PM — Antennas & Propagation
The electronic scanned array — pro and con
J.B. Damonte, Dalmo Victor and A.S. Dunbar, Lockheed
Place: Lockheed Auditorium, Bldg. 202, 3251 Hanover St., Palo Alto
Dinner: 6:00 PM, Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto
Reservations: Claes Elfving, 966-3551 by May 16

MAY 17, TUESDAY, 7:30 PM — Power
PG&E and the northeast power failure
E.F. Kaprielian, manager of power control, Pacific Gas & Electric Co., San Francisco
Place: Engineers' Club of San Francisco, 206 Sansome St., SF
Cocktails: 5:30 PM
Dinner: 6:30PM Engineers' Club
Reservations: Engineers' Club, GA 1-3184 by May 16

MAY 18, WEDNESDAY, 4:15 PM — Circuit Theory
The imaginary world of frequency modulation (seminar preceding dinner)
M.O. Felix, chief engineer, videofile dept., Ampex Corp.
Place: Stanford University, Rm. 320 ERL
Dinner: 6:00 PM, Red Cottage, El Camino, Menlo Park
Reservations: Jan Mulvihill, 367-3169 by May 17

MAY 19, THURSDAY, 8:30 PM — Information Theory
Analysis and synthesis of models by time series methods
Dr. Emanuel Parzen, professor, statistics dept., Stanford University
Place: Stanford Research Institute, Bldg. 1, conf. room B, 333 Ravenswood Ave. Menlo Park
Dinner: 6:30 PM, L'Auberge, 2826 El Camino Real, Redwood City
Reservations: Miss Shirley Jackson, 966-3865 by May 18

MAY 20, FRIDAY, 7:30 PM — East Bay Subsection
Ladies' night, installation of officers
Place: Charles Krug winery in St. Helena
Dinner: 7:30 PM at winery; $4.50, steak dinner and wine tasting activities
Reservations: mail check or money order to J.L. Cattolica, PG&E Co., Box 1027, Concord, Calif. by May 13 deadline. Directions to the winery will accompany your tickets.

MAY 24, TUESDAY, 8:00 PM — Computer
The system/semiconductor interface with integrated logic arrays
Dr. Wendell Sander, head of the army development section of the digital integrated electronic dept., Fairchild Semiconductor
Place: McCullough bldg., Stanford University, Room ee-134
Dinner: 6:15 PM, Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto
Reservations: Dr. W. Sander, 321-7250, ext. 257 by noon, May 23

MAY 24, TUESDAY, 8:00 PM — Parts, Materials & Packaging
Circuit packaging engineering and cost factors
Neal A. Zellmer, Sr., staff engineer, Lenkurt Electric Co.
Place: Hewlett-Packard auditorium 5A, 1501 Page Mill Rd., Palo Alto
Dinner: 6:30 PM, El Rancho Motel, 3901 El Camino Real, Palo Alto
Reservations: Harmon Traver, 326-7000, ext. 2989, by May 23

MAY 25, WEDNESDAY, 8:00 PM — Electromagnetic Compatibility
Description and application of MOS and double diffused linear devices
Speakers from local semiconductor firms
Place: Lockheed auditorium, Bldg. 202, 3251 Hanover St., Palo Alto
Dinner: 6:00 PM, Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto
Reservations: G. Westwood, Fairchild, 962-2451 by May 23

MAY 26, THURSDAY, 7:00 PM — Aerospace & Electronic Systems
Tour of Paul Masson Vineyards — ladies welcome
Place: Paul Masson Vineyards
Dinner: 7:00 PM, $4.50, including tax & tip
Reservations: Stephen Marx, 326-4350, ext. 6048 by May 20

JUNE 8, WEDNESDAY, 8:00 PM — Instrumentation Measurement
Why and what-for of digital integrated circuit specification and testing
Dick Crippen, Fairchild Semiconductor
Place: Hewlett-Packard Co., 1501 Page Mill Rd., Palo Alto (visitors' entrance)
Dinner: 6:00 PM, L'Omelette, 4170 El Camino Real, Palo Alto
No reservations required

JUNE 15, WEDNESDAY, 8:00 PM — San Francisco Section/All Subsections and Chapters, ladies night
Annual meeting honoring 1966 Fellows; installation of 1966-67 Section Officers
Engineering education in Russia

Dr. Frederick E. Terman, vice president and provost emeritus, and advisor to the president, Stanford University
Place: The Bold Knight, 769 No. Mathilda Ave., Sunnyvale (2 blocks west of Bayshore)
Social hour: 6:00 PM (refreshments 65c)
Dinner: 7:00 PM — roast sirloin of beef, $4.50 incl. tax & tip
Reservations: Mrs. Jean Helmke, Section Office, 327-6622 by June 13
Tables of eight may be reserved for Subsections, Chapters, Committees and Companies

meeting ahead

IMAGINARY WORLD OF FM

M. O. Felix, chief engineer, video-file department, Ampex Corp., will discuss the imaginary world of frequency modulation at the May 18 meeting of the Circuit Theory chapter.

It is impossible to define precisely instantaneous frequency, and to this extent neither can one define frequency modulation. In most FM systems the approximations are so nearly exact, that the errors are undetectably small. However, in video tape-recording systems, this is not true, and the approximations prove to be the main limit on system performance.

The paper separates those areas in which the mathematical limitations are precisely known from those which are not. The practical problems of designing modulators and demodulators under these unusual constraints are discussed.

Michael Felix was born in Birken-

(Continued on page 20)

Felix

Parzen

meeting ahead

TIME SERIES METHODS

Prof. Emanuel Parzen, department of statistics, Stanford University, will describe an analysis and synthesis of models by time series methods at the May 19 meeting of the Information Theory chapter.

Various problems of system analysis, system identification and system optimization for stochastic systems (that is, systems whose inputs and/or outputs are stochastic series or time series) can be systematically treated by time series methods. This talk presents the modern theory of time series as a blend of statistical theory and systems theory and develops philosophy and techniques for fitting and testing linear models (or equivalently, synthesizing and analyzing linear models). Particular attention will be paid to certain problems which are now outstanding and whose solution seems plausibly imminent and potentially valuable.

A graduate of Harvard College and the University of California, Dr. Parzen has been at Stanford since 1956. He was visiting professor at Imperial College,

(Continued on page 12)

events of interest

PALO ALTO MTT SYMPOSIUM

Microwave people from many countries will meet May 16-19 for the IEEE Eleventh International Symposium on Microwave Theory and Techniques. All technical and social activities will be held at the Cabana Hotel in Palo Alto. The symposium will consist of invited and contributed papers of current interest. Eleven speakers from abroad will present papers, including H. Bosma, this year's recipient of the Microwave Prize. Countries represented include England (4), Japan (3), the Netherlands (2), Norway (1), and Scotland (1). Some of the speakers from abroad will be able to travel to the symposium through the cooperation and financial support of the U.S. Army Research Office, and the Office of Naval Research.

Registration may be made by completing the form attached in the center of the advance program booklet and returning it with appropriate payment to:

1966 International G-MTT Symposium
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Waldman Associates
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Sunnyvale, California 94080

Checks should be made payable to the 1966 G-MTT Symposium.

Registration rates after May 1 are: IEEE Members, $8.00; Non-Members, $10.00; Student Members, $2.00; and Ladies' Events, $10.00.

The registration desk will be open in the Atrium Room of the Cabana Motor Inn during the symposium as follows: Monday, May 16-8:00 a.m. to 4:00 p.m.; Tuesday, May 17-8:00 a.m. to 4:00 p.m.; Wednesday, May 18-8:00 a.m. to 4:00 p.m.; and Thursday, May 19-8:00 a.m. to 2:00 p.m.

Symposium Digest

A copy of the symposium digest will be distributed to each registrant. Additional copies may be purchased at the registration desk, or may be ordered by use of the registration form, at $3.00 per copy.

Technical Sessions

All sessions of the 1966 International G-MTT Symposium will be held in the Circus Maximus Room of the Cabana. There are no simultaneous sessions.

Cocktail Party and Banquet

A cocktail party will be held prior to the symposium banquet on Wednesday, May 18, 1966 starting at 6:00 p.m. at the outdoor swimming pool of the Cabana at $1.75 per person. The symposium banquet will be held in the Circus Maximus Room at 7:00 p.m. at $8.50 per person. The banquet speaker will be Prof. John Brown of University College, London. The master of ceremonies for the banquet will be Dr. Charles Susskind.

The presentation of the 1965 Microwave Prize Award will be made to Hendrik Bosma of the Philips Research Laboratories, Eindhoven, Netherlands, by E.N. Torgow, chairman, G-MTT Administrative Committee.

The banquet will include a steak dinner, entertainment, a dessert interlude with Don Obertone and his golden banjo, and a "night-cap" with The Rovers, a popular folk group.

Banquet tickets will be on sale at the registration desk. Reservations for large parties may be made with Marvin Waldman, Waldman Associates, 245-2500.

Tours of the Stanford Linear Accelerator Center will be offered in parallel with Sessions V and X (2-4:30 Tues. and Thurs.) Here gold plated bolt connects the last section of the two-mile accelerator after a final wrench from project director W.K.H. Panofsky (left) and L.G. Mohr, local AEC manager. When klystron power tubes and other equipment are installed above ground, the $114 million atom smasher will be ready for the first turn-on of its 10-20 Bev beams of electrons.

events of interest

MONDAY LUNCHEON

Dr. Hubert Heffner, Stanford University, will deliver the keynote address following the Monday luncheon at 12:15.

events of interest

SYMPOSIUM COMMITTEE

Peter Lacy is chairman of the steering committee for the symposium. Principal committee members and their areas of responsibility are: Leo Young, technical program; C. Louis Cuccia, and E. Wesley Matthews, digest; Paul Ely, Jr., hospitality; Vincent Price, special events; Jay Stone, local arrangements; Perry Vartanian, Jr., finance; Donald Weller, secretary; Gershon Wheeler, publicity; Marvin Waldman, registration; and Mrs. L. Ladouceur, ladies events.

events of interest

SYMPOSIUM BANQUET

Prof. John Brown of University College, London, the principal speaker at the Wednesday symposium banquet who will discuss technical education in developing countries, has a broad background in international engineering education. A former Colombo Plan consultant in India, where he served as visiting professor at the Indian Institute of Technology, Delhi, he recently returned from a study tour of engineering education in Zambia.

He received the master's degree in mathematics and natural philosophy from Edinburgh University and was a staff member of the radar research and development establishment at Malvern, where he achieved the rank of senior scientific officer before he left in 1951. A lecturer in electrical engineering at the Imperial College of Science and Technology from 1951 to 1955, he was responsible for the microwave laboratory both in respect to undergraduate teaching and postgraduate research.

He was awarded the Ph.D and D. Sc. by the University of London in 1955 and 1960, respectively, and joined the staff of the electrical engineering dept. at University College in 1955, becoming a professor in 1964.

John Brown

During a leave of absence from 1962 to 1965, he established the electrical engineering dept. at the Indian Institute. He has published about thirty papers, mostly in the I.E.E. proceedings, and three books on microwaves and communications. He has been a member of I.E.E. and various government committees.

His address will be of special importance because of the urgent requirements of new countries for trained technical personnel in order to function effectively in a world of changing technology.

HELP THE SECTION GROW BY PLEDGING YOURSELF TO BRING IN A NEW MEMBER.

Collins Bosma Nakahara Lewin

events of interest

TEN INVITED SPEAKERS FROM ABROAD

An eminent group of invited MTT experts from abroad will take part in MTT symposium technical sessions. Jeffrey H. Collins teaches electromagnetic theory, network theory and electrical materials science at the University of Glasgow. Hendrik Bosma leads a research group on high frequency ferrites at Philips Research Labs, Eindhoven, The Netherlands, where he has engaged in research of non-reciprocal devices and made a study of noisy linear systems. Tsueno Nakahara is chief of the weak current section, research division, Sumitomo Electric Industries, Ltd., and has worked on a broad range of projects in the microwave field. Leonard Lewin is assistant manager, transmission research division, microwave dept., Standard Telecommunication Labs., England.

Nobuaki Kumagai is associate professor of electrical communication engineering at Osaka University, engaged in electromagnetic theory, lines and components, devices and applications. Ralph Levy is lecturer in the department of electrical and electronic engineering at the University of Leeds, with research interests in microwave network synthesis and broadband components. Frans C. de Ronde in concerned with research on microwave techniques and components as chief engineer of Philips Research Labs, Eindhoven, The Netherlands. Peter Clarricoats is professor of electronic engineering at Leeds University with overall responsibility for research groups working on a variety of microwave projects. Michael Brady (not pictured), an American, conducts research on microwave systems and antennas for the firm of NERA A/S in Oslo, Norway. For background of John Brown, see banquet story.

Kumagai Levy de Ronde Clarricoats

Committee, left to right: J. D. Warnock (SFS, IEEE), E.M.T. Jones (TRG-West), Robert Prickett (Hewlett-Packard) Jay Stone, arrangements (Stone Associates), Donald Weller, secretary (Sylvania), Perry Vartanian, Jr., finance (Melabs), Leo Young, technical program (Stanford Research Institute), E. Wesley Matthews, digest, Paul Ely, Jr., hospitality (Hewlett-Packard), Vernon Price (Stanford Linear Accelerator Center), Gershon Wheeler, publicity (Sylvania), Peter Lacy, chairman (Wiltron).

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events of interest

MTT TECHNICAL PROGRAM

Following welcoming remarks by Dr. Peter D. Lacy, chairman, steering committee, 1966 MTT Symposium, and E.N. Torgow, chairman, G-MTT administrative committee at 9 a.m. on Monday, May 16, the first of ten technical sessions will convene at 9:20.

The sessions, chairmen and speakers follow. For complete details of their subjects and times consult the advance program.

Session I: SOLID STATE DESIGN

L. Lewin, chairman. B.W. Hakki, A.M. Cowley, H.O. Sorensen, M.R. Barber, J.H. Lepoff, F.A. Brand, V.J Higgins, J.J. Barnowski.

Session II: AMPLIFIERS, MULTIPLIERS AND CONVERTERS

C. Blake, chairman. B.C.DeLoach, D.B. Leeson, M.E. Hines, J.G. Ondria, E. Sard, B. Peyton, S. Okwit, R. Fisher, F.S. Coale, H.M. Weil, P. LaTourrette, H.L. Stover, R.C. Shaw.

Session III: LINEAR PARTICLE ACCELERATORS

W.K.H. Panofsky, chairman. G.A. Loew, P.B. Wilson, J.N. Weaver, R. Alvarez.

Session IV: FILTERS & COUPLERS

S.B. Cohn, chairman. R. Levy, I. Whiteley, N. Eberhardt, R.J. Wenzel, F.E. Emery, M. O'Hagen, S. Nolte, R.V. Garver, T.H. Mak, E.G. Cristal, C.P. Tresselt.

Session V: INTEGRATED CIRCUITS

I.H. Solt, chairman. R.L. Pritchard, B.T. Vincent, Jr., H.C. Okean, W.J. Moroney, A. Botka, R.W. Dawson, B.C. DeLoach, C.M. Howell.

Session VI: MICROWAVES ABROAD

W.W. Mumford, chairman. P.J.B. Clarricoats, N. Kumagai, J. Collins, B. Yazgan, M.M. Brady.

Session VII: ULTRAMICROWAVE & OPTICAL TECHNIQUES

A.G. Fox, chairman. E.A.J. Marcatili, T. Nakahara, J. Cohen, J.J. Taub, M. Wang, F. Arams, S.A. Harrison, W. Kahn, Y. Suematsu, K. Iga, S. Ito.

Session VIII: MICROWAVE TECHNIQUES

R.W. Beatty, chairman. J. Brown, W. Grove, G.D. Vendelin, S.A. Robinson, S. Lederman, E.F. Dawson, F.C. de Ronde, J.B. Chown, W.C. Taylor, T. Morita, R.E. Post, A.G. Potter.

Session IX: FERRITE PHASE SHIFTERS

M. Weiss, chairman. R.A. Stern, J.P. Agrios, M.C. Mohr, S. Monaghan, R.R. Jones, J.K. Parks, B.R. Savage, L.J. Lavedan, Jr., J. Brown, Jr., J.W. Simon, W.K. Alverson, J.E. Pippin, J.J. Green, C.R. Boyd, E. Schlomann, M. Harris.

meeting ahead

INTEGRATED CIRCUITS

Dick Crippen, Fairchild Semiconductor, Mountain View, will discuss digital integrated circuit specification and testing at the June 8 meeting of the Instrumentation and Measurement chapter.

This will be a discussion of the development of a test specification from a set of black-box logic "use rules". The trade-offs of producibility and the black-box purchase price with the fan-out, noise immunity, temperature range, and power supply voltage of the predictability of semiconductor integrated circuit characteristics as temperature and supply voltage are changed will also be discussed.

student branch news

S. F. STATE

Phillip W. Daniels has been elected chairman of the San Francisco State Student Branch. Gottfried Mauersberger has been elected secretary.

Session X: FERRITE CIRCULATORS AND LIMITERS

P. Vartanian, chairman. H. Bosma, P.C. Goodman, W.C. Passaro, J.W. McManus, F. Betts, D.H. Temme, J.A. Weiss, L.E. Davis, C.E. Fay, W.A. Dean, M. Omori.

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Design or Senior Engineers with communication theory background and/or interest in digital circuits. Preferably an MSEE. Minimum experience, two years. Should be familiar with digital circuit design and frequency calibration techniques.

Design or Senior Engineer with minimum of one year's experience in feedback, digital and analog circuitry. Applicant should be familiar with differential amplifiers, amplifier and feedback design, AC-DC converters, and state of the art measurement instruments. MSEE desired.

Associate Engineer with good scholastic record and BSEE. No experience necessary. Applicant should have an interest in analog and/or digital circuit design and knowledge of solid state circuitry.

Electronic Package Design Engineer with either BSEE or BSME. Applicant should be familiar with packaging methods in the MHz to 10 GHz region. Two to six years' experience with good mechanical design aptitude required.

Industrial Engineer with three years' experience in electronics or associated industry. Should possess a BSIE. A BSEE or BSME is acceptable if applicant has industrial experience. Candidate must have knowledge of methods, value, and process analyses, and work simplification.

Senior Production Engineer with four years' experience. Should be a mechanical engineer familiar with electronics or an electronic engineer familiar with mechanical engineering. Applicant must possess a BSME or BSEE. Must be able to carry new product from design to production.

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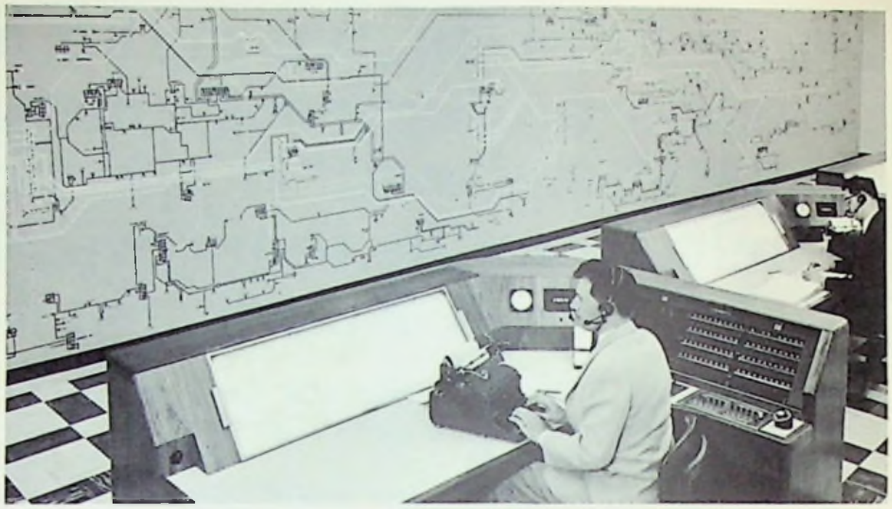

Pacific Gas & Electric Co.'s dispatcher's office, Oakland.

meeting ahead

NORTHEAST POWER FAILURE

At the May 17 meeting of the Power chapter, E. F. Kaprielian, manager of power control, Pacific Gas & Electric Company, will discuss the Northeast power blackout of November 9, 1965 and how it relates to the P G & E system reliability.

Within hours of the Northeast failure, Mr. Kaprielian was sent by P G & E management to the Northeast to get a first-hand report from the trouble area, to study P G & E's existing system design and operation in the light of that information, and to project the findings into the future when the Pacific intertie will be in service and unit sizes will be more than double the largest now in service.

His talk will deal with important factors which contributed to the Northeastern failure. He will also compare the CANUSE interconnection and its operation with the manner in which the major California systems are operated and cite several recent system trouble situations in California and report on how the California systems reacted to them. In addition, he will discuss specific tests which P G & E has conducted since November 9 to further demonstrate its belief that a failure of the Northeast type is unlikely here.

Mr. Kaprielian, a senior member of IEEE, currently serves as a representative from the Pacific Southwest Region to NAPSIC (North American Power Systems Interconnection Committee), and has taken active part in the work of this committee in the preparation of operating guides for inter connected system operation. He also serves as P G & E's representative on the Pacific Intertie Operations Task Force, and is the operating representative for P G & E on the California Power Pool Engineering and Operating Committee.

E. F. Kaprielian

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meeting ahead

CIRCUIT PACKAGING FACTS

The practicing engineer needs facts to do an effective job for his company. Facts regarding several versions of electronic packaging will be presented at the May 24th meeting of the Parts, Materials and Packaging chapter.

Neal A. Zellmer of Lenkurt Electric Company will present data drawn from studies which cover circuit packaging such as micro modules, cordwood, pellets or dots, thick film hybrid, and integrated techniques. Among the material to be presented by Mr. Zellmer will be a review of relative costs for various packaging techniques and considerations involved in setting up for in-house manufacture.

Zellmer

Sander

meeting ahead

COMPUTER MEETING

"The System/Semiconductor Interface with Integrated Logic Arrays" will be the topic presented by Dr. Wendell Sander at the 24 May meeting of the Computer chapter.

Dr. Sander will discuss some of the major problems confronting both the user and the manufacturer in working with complex integrated circuits incorporating hundreds of gates. As the semiconductor manufacturer begins to assume responsibility for higher-level system interconnections, Dr. Sander asks the big question, "What is the interface between the system manufacturer and semiconductor manufacturer?" The problems of custom versus standard products, and the problems of information exchange and quality assurance (or who gets blamed for what) will be discussed in detail. A systematic approach to complex arrays will be used to illustrate feasible interfaces.

Dr. Sander has been with the research and development laboratory of Fairchild Semiconductor since 1964. Initially, he worked in the digital systems research department, and he is now in charge of the army development section of the digital integrated electronics department that has the responsibility for development of integrated logic arrays and subsystem logic functions.

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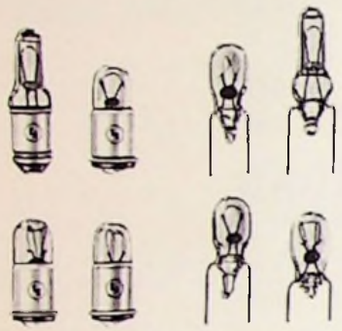

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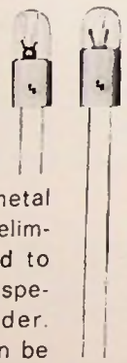

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Eleven eminent engineering pioneers gathered at the April 20 dinner meeting co-sponsored by the section and Santa Clara Valley Subsection for a fascinating set of reminiscences. Participants, seated left to right, were Joseph Cox, retired engineering manager of Westinghouse, Sunnyvale; L. E. Reukema, UC professor emeritus, past chairman S.F. Section, Dr. Frederick E. Terman, vice president and provost emeritus, Stanford, past chairman, S.F. Section and president, IEEE; and Dr. Smith DeFrance, retired director of Ames Research Center. Former participants in the annual event, standing left to right: Almon W. Copley, retired Westinghouse engineer; Donald I. Cone, early telephone systems power engineer for P.T.& T; Charles A. Powell, past president, AIEE, and early utility systems; Charles V. Litton, president, Litton Engr. Labs; Leonard F. Fuller, early carrier systems and telegraph; Alert M. Opsahl, first oscillograph in USA and lightning studies; and Ralph M. Heintz, first air to ground radio transmission. All received a special certificate of appreciation from the section and subsection.

section news

TERMAN ON USSR

Although Russia is producing engineers four-to-one over the United States and plans to turn them out even faster, the Soviet technical economy is far smaller than America's.

"What can they be doing with all those engineers?" asked Dr. Frederick E. Terman, renowned Stanford scientist-engineer-educator in a campus interview following his recent 26-day visit to the USSR.

With him on the trip were two educators from MIT, Mechanical Engineering Prof. Norman Dahl and International Center specialist Alexander Korol. Their educational exchange visit was sponsored by the U. S. Office of Education.

The three Americans visited Moscow, Leningrad and Kiev. They talked to administrators and faculty members of many Russian educational institutions concerned with science and engineering, from high schools to the highest university levels.

Dr. Terman will be the principal speaker at the section annual meeting scheduled for June 15 at the Bold Knight, Sunnyvale. He will present a report on his highly interesting tour of the U.S.S.R.

The annual event will honor 1966 Fellows and 1966-67 officers of the section, subsections and chapters. In addition to reservations for couples, tables of eight may be reserved for subsections, chapters, committees and companies by calling Mrs. Jean Helmke, 327-6622. Price of the dinner will be $4.50, including tax and tip, with cocktails at 65 cents.

MORE INFORMATION THEORY

London, in 1961-62, and MIT in 1964. His fields of research are probability limit theorems, applied probability, statistical inference on stochastic processes, time series analysis, spectral analysis, statistical communication and control theory, statistical computation.

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'66 CHAIRMEN NAMED

Committee chairmen and vice chairmen for 12 of 13 working WESCON committees have been announced by the WESCON executive committee.

The industry volunteers, who are actually the vanguard of nearly 400 volunteers representing WEMA and IEEE who will join in the work of WESCON, will start immediately on an eight-month drive to organize the hundreds of services and special events that are a part of WESCON week (Aug. 23-26).

Directors of 12 committees, representing both the "show" and "convention" sides of WESCON:

Attendance: William J. Miller, vice president, Kierulff Electronics; and Edward T. Clare, vice president, Cohu Electronics.

Cocktail Party: J. G. Beamish, purchasing agent, Litton Guidance & Control Systems; and C. J. Nace, president, W. Bert Knight Co.

Distributor-Manufacturer-Representative Conference: Homer Nielsen, vice president, Kierulff Electronics; and Jack Berman, Jack Berman Co.

Exhibits: Stephen Skilnyk, advertising manager, Bourns, Inc., chairman; Herb Becker, Herb Becker Co., and George Gramlich, advertising services manager, Beckman Instruments, vice-chairmen.

Facilities: Benton Bejach, program manager, Borg Warner Controls; and Jack E. Easterbrook, regional manager, Delco Radio.

Future Engineers Show: Dr. Leonard B. Gardner, president, Consulting Scientists Inc.; and N.L. Brotzman, senior engineer, Pacific Telephone Co.

Hospitality: Charles C. Olsefsky, senior technical specialist, North American Aviation (S.I.D.); and Thomas P. Walker.

Industrial Design: David Malk, chief industrial designer, Beckman Instruments; and David F. PonTell, executive vice president, Presentation Industries Inc.

Public Relations: Park H. Irvine, public relations coordinator, Autonetics; and Richard L. Hoffman, public relations manager, Nortronics.

Technical Program: Dr. Samuel Sensiper, manager, Research and Education Division, Space-General; and Robert B. Muchmore, vice president, Systems Laboratories, TRW Systems.

Visitor Services: Charles R. Fetty, president, Fetty/Schoenduve Inc.; and Tom Matthews, director of marketing, Electronic Specialty Co.

Women's Activities: Mrs. John F. Bishop and Mrs. Douglas Maure.

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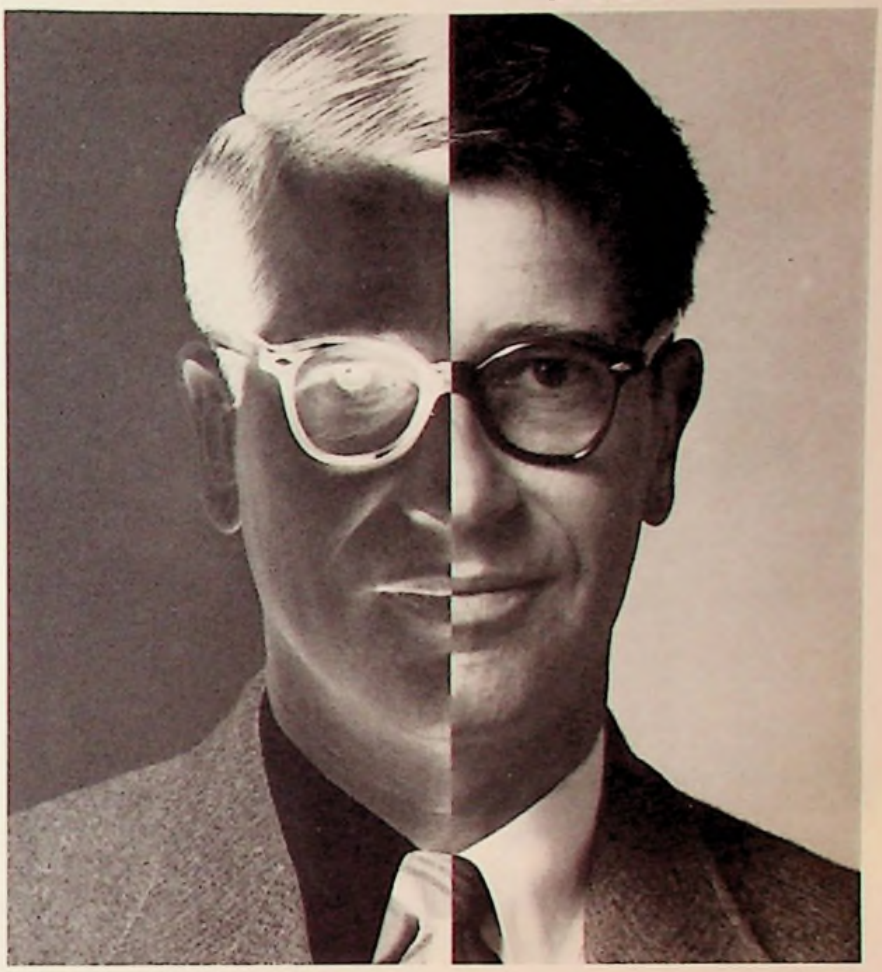

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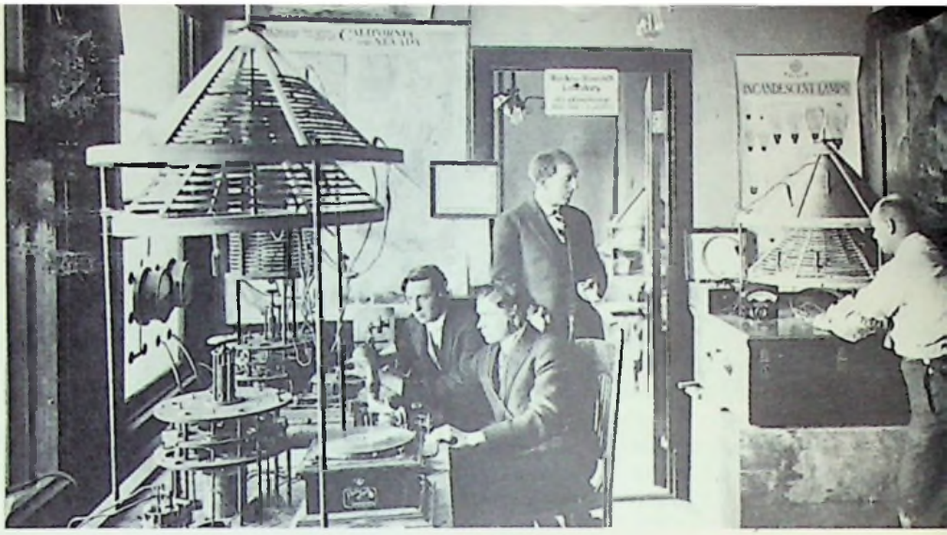

Typical of the electronic artifacts in the priceless Perham Collection, soon to be housed in a new museum at Foothill College, Los Altos Hills, are pieces of equipment from this, the first studio in history for radio broadcasting, built by Dr. Charles D. Herrold of San Jose in 1909. It subsequently became KQW, is now KCBS and has provided continuous broadcast service since its founding. Left to right are Prof. Herrold, Kenneth Saunders, Emile Portal, and Frank Schmidt, some of whom may have been charter members of the San Francisco Section of IRE, founded in late 1915. Prof. Gordon Grebb of the journalism dept., San Jose State College gave details of his research establishing the date of the station, including tapes from Dr. Herrold's associates, at a highly interesting meeting held by the Perham Foundation on April 14 at Dinah's Shack under the chairmanship of David Packard. The foundation announced that it has achieved $142,000 toward its goal of $250,000 for construction of the Foothills Electronic Museum, Foothills College having pledged the land and additional funds for administration. Contributions from corporations and individuals are tax-deductible. For more information, call Ralph Heintz, Jr., president, Perham Foundation, 326-6200; Earl Goddard, chairman of the section historical committee and a prime mover in the project, 591-1414, Ext. 593; or Jack Doscher, (408) 241-5125.

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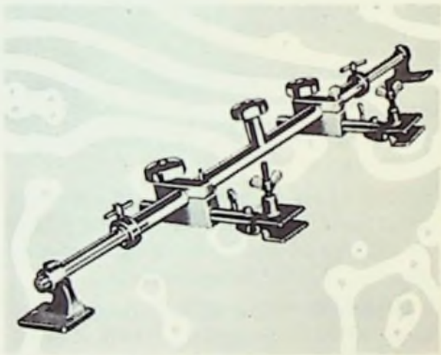

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Charles Elkind and Stanley Evans

wema news

TWO STAFF APPOINTMENTS

Appointment of Charles Elkind as communications manager and Stanley Evans as manager of legislative relations has been announced by the Western Electronic Manufacturers Association (WEMA).

Elkind will be editor of all WEMA publications and will handle the association's press relations and other public relations activities. Evans will be responsible for coordinating WEMA's legislative program. Assignment of a staff man full time to this activity reflects growing industry interest in state legislatures, in the west as well as the congress in Washington.

Elkind has been with IBM the past six years, most recently as communications manager of the systems manufacturing Division in Fishkill, N.Y.

Evans, before joining the WEMA staff last October, had been employed by the California Legislature since 1959. He was consultant for the assembly committee on finance and insurance five years, then served on the staff of Senator George Miller, Jr., who is chairman of the senate finance and joint legislative budget committees.

MORE NUCLEAR SCIENCE

completed in May within its original budget estimate of $114,000,000. The entire project has been under the direction of Prof. Wolfgang Panofsky, head of the accelerator center.

Prof. Joseph Ballam, associate director and head of the SLAC research division will be the speaker. SLAC hopes to be testing the beam by the time of the meeting, which may preclude a tour of the experimental area itself. If so, the group will still be able to visit such areas as target fabrication, the beam switchyard equipment test area and precision alignment laboratory, and be able to view much of the equipment being fabricated for handling secondary beam emission.

Prof. Joseph Ballam received his PhD in physics from the University of California 1951. He was with the U.S. Navy Department from 1941-1945, at the University of California 1945-1951, at Princeton 1951-1953, at Brookhaven National Laboratory 1956, and at Michigan State University 1956-1959. He was guest professor at CERN, Geneva, Switzerland, in 1961 and went to Stanford the same year as a professor.

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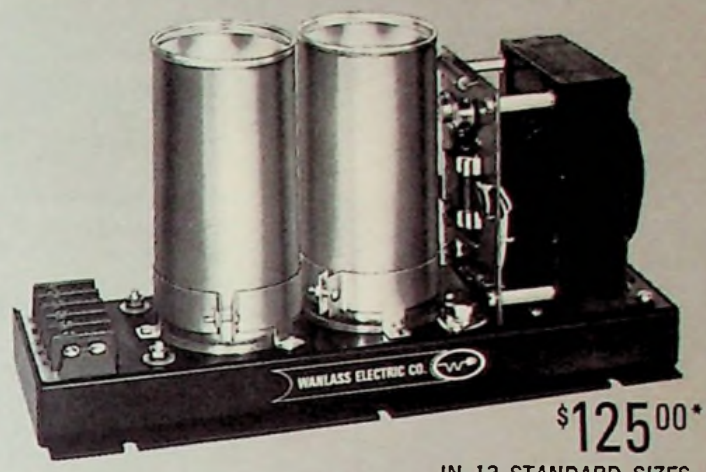

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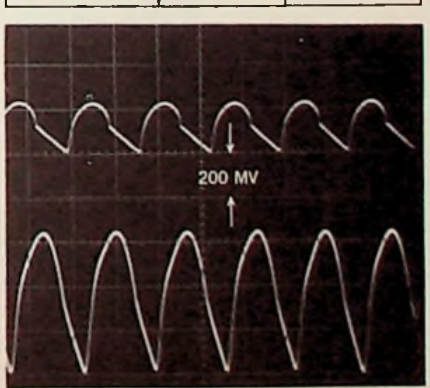
120-15LX5	5.0	0-15	120-2LX60	60	0-2
120-15LX6	6.3	0-15	120-1LX120	120	0-1
120-10LX12	12.0	0-10	120-0.7LX180	180	0-0.7
120-7LX18	18.0	0-7	120-0.5LX240	240	0-0.5
120-5LX24	24.0	0-5			

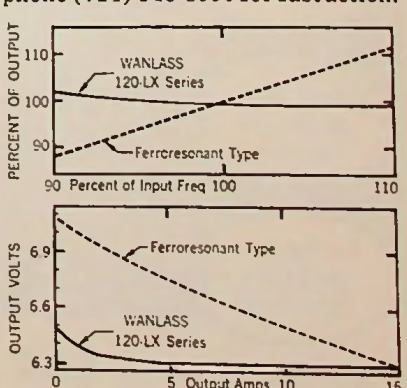
*VOLTAGE ADJUSTABILITY ±3%

PRODUCT COMPARISON CHART		
	WANLASS 120-L Series	Typical Ferroresonant
Output Volts	6.3	6.3
Output Amps	15	15
Line Regulation	±1%	±1%
Load Regulation	±1%	±6%
Input Frequency Regulation	±2%	±12%
Ripple	150mv RMS	400mv RMS
Line Transient Response	50 μ-sec	25,000 μ-sec
Voltage adjustability	±3%	NONE

The new Wanlass LX Power Supply Series is the long awaited replacement for less efficient ferroresonant units. Low in cost, the LX Series provides 1% load regulation—so important in microelectronic circuits requiring large currents at low voltages (4-5 vdc). Crowbar overvoltage protection optional. Open frame construction standard on all 13 units. Custom supplies? You bet! Write today for complete technical data. Wanlass Electric Co., 2189 S. Grand Ave., Santa Ana, Calif. Or phone (714) 546-8990 for fast action.



Unretouched dual scope photo shows WANLASS LX ripple output (above) vs. typical ferroresonant unit under identical conditions.



Upper graph shows frequency insensitivity of Wanlass LX Power Supplies vs. ferroresonant units. Lower graph, compares load regulation.

*FOB Santa Ana, Calif. Price & Specs subject to change. Patents Pending.

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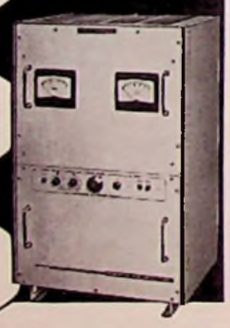

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section news

MY SON THE E E

"Should you major in electrical engineering or become an electronic technician?" is the title of a student counseling folder recently published by the San Francisco Section secondary education committee. Nearly 4000 copies were distributed at the Santa Clara County Career Guidance Institute, March 21-25, at the Santa Clara County fairgrounds. An additional 2500 will be given to interested students at the San Mateo County Career Guidance Center, May 2-6.

The folder will also be mailed in quanity to student counselors in the 22 counties covered by the section and is available to members for their sons or relatives. If Junior, because of S.M.S.G. —or in spite of it—shows a glimmer, he should have the folder. To receive a copy, send a 5¢ stamp to the section office.

Ten members of the section served as panelists on the student counseling seminars held during the Santa Clara County event: William Waters, Varian Associates; Eric Swarthe, LMSC; Con Rader, Beckman Instruments; Howard Poulter, Hewlett-Packard Co.; F. S. Beale, Lenkurt Electric Co.; Warren Davis, Pacific Telephone; A. M. Hopkin, University of California; Alex Tseng, SLAC; John Bruce, University of Santa Clara; and Ed Glover, San Jose State College. They addressed an aggregate of nearly 2000 ninth and tenth grade students during the week-long event, total student visitors to seminars in 20 different professional and vocational areas having been approximately 16,000.

events of interest

CERAMIC SOCIETY ANNUAL

Dr. W. Crawford Dunlap, assistant director of electronic components research and acting chief of the component technology laboratory, NASA Research Center, Cambridge, Massachusetts, will deliver the electronics division keynote address at the annual meeting of the American Ceramic Society, which will be held at the Sheraton Park Hotel, Washington, D.C. May 7. Dr. Dunlap will speak on "The Challenge of Materials Research in the Space Program".

The technical program of the electronics division, extending from May 9 to May 11, will consist of eight sessions in which 51 technical papers will be presented by eminent men in the electronics and ceramics fields.

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professional notes

UC WRITING COURSE

A four-day intensive course, "Written Communications for the Professional Engineer," will be given in June by Engineering Extension and the College of Engineering, University of California, Berkeley.

The course is designed to provide engineers with the tools of effective communications. It will cover technical writing of abstracts, reports, articles, memoranda, specifications, proposals, patent disclosures, and other forms of communication. The instructional staff is headed by Charles Susskind, professor of electrical engineering and assistant dean of the College of Engineering at Berkeley.

The course will meet Fridays and Saturdays, 8:30 a.m. to 4:30 p.m. on June 10-11 and 17-18. The enrollment fee is $125.

Further information may be obtained from Engineering Extension, University of California, 2223 Fulton Street, Berkeley, California 94720.

Twenty-three of the 31 IEEE Groups have active chapters in the San Francisco Section, more than in any other section or entity.

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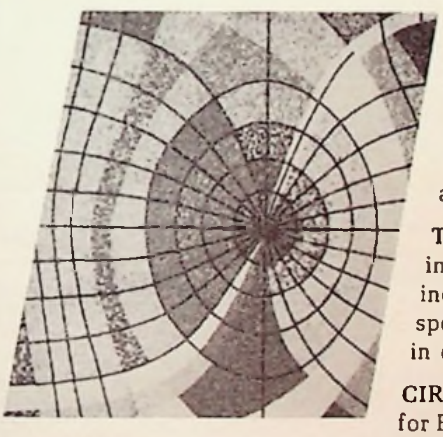

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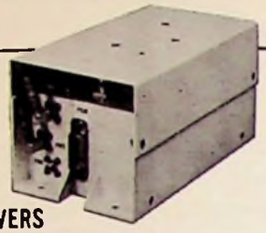

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IT IS REPORTED:

Dr. Jack L. Melchor, section chairman and president of HP Associates, Palo Alto, has received a Centennial of Science Award from the University of Notre Dame, given to alumni and former faculty members for distinction in the fields of scientific research, education, management and technology.

General Electric's atomic power equipment dept., San Jose, has announced plans for a $3 million expansion of office space for 800 employees. A $5 million expansion of manufacturing facilities was completed earlier this year.

Electro-Optical Systems, Inc., Pasadena, a subsidiary of Xerox Corp., has received a contract from the Service d'Aeronomie of France to construct solar cell arrays for the EOLE project, a series of atmospheric experiments with balloons to be carried out at Noumea, New Caledonia, for wind and atmospheric experiments.

United Technology Center, Sunnyvale, has been awarded a $94,400 contract by the Air Force to study flame characteristics of rocket propellants, determine the infrared output of liquid and solid propellants and assess their suitability as infrared flares for towed targets.

Hewlett-Packard Co., Palo Alto, reports net sales of $163,617,592 and net income of $13,907,212 for 1965, compared to $134,072,198 and $10,038,564 respectively for 1964 for the company and its 14 U. S. operating divisions and subsidiaries and 12 foreign subsidiaries and affiliates.

Gado Instrument Sales, Mountain View, has been named exclusive representative for Bourns Instrument Division in northern California, Washington, and Oregon.

Cycle Equipment Co., manufacturer of punched tape handling equipment, has moved from Los Gatos to Campbell.

Wadsworth-Pacific Mfg. Associates, Inc., Palo Alto and Los Angeles, has been named a representative for Advanced Metals Corp., United Precision Plastics, Ceramagnetics, and Indelco Corp.

Westmar Associates, San Jose, has been named a representative for McMaster Products Corp., Chicago.

Frauman Associates, electronic representative firm, has moved to new quarters at 1010 Doyle St., Menlo Park. Burt Frauman was formerly a vice president and northern California branch manager for Perlmuth Electronics which no longer maintains a northern office.

Sylvania Electric Products, Inc. has been awarded a $3.2 million Air Force contract for manufacture of components for airborne data processing equipment, the work to be performed at the Santa Cruz and Needham, Mass. facilities.

Granger Associates, Palo Alto, has been awarded a $250,000 U.S. Navy contract for manufacture of antennas for communications.

Astro Technology Corp., Mountain View, has been awarded a $240,000 U.S. Navy subcontract from Dynatronics, Inc., Orlando, Fla., to deliver and install support equipment for tracking antenna systems on the Pacific missile range.

Varian Associates tube division has received contracts from Hewlett-Packard Co. to provide microwave tubes for use in electronic test instruments, shipments during the coming year to amount to approximately $980,000.

Fairchild Semiconductor, Mountain View and Palo Alto, has embarked on an expansion program which will double its research and development facilities by the end of the year.

Systron Donner Corp., Concord, is increasing its plant space by 20,000 sq. ft. to accommodate a backlog of $6 million in contracts.

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(B.S., M.S., & Ph.D.)

Senior level openings available for persons with advanced degrees in Electrical Engineering or Physics, preferably with several years experience in one or more of the fields listed below:

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A demonstrated capability for organizing and leading group research and development, and/or a strong background in individual experimentation is highly desirable.

Openings also exist for electronic circuit solid-state engineers with B.S. and M.S. degrees. 1-3 years experience in the following solid-state circuit areas is desirable:

Receivers
Transmitters
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Santa Clara; 243-6661

O'Halloran Associates
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Palo Alto; 326-1493

Rupp Co., V. T.
1182 Los Altos Avenue,
Los Altos; 948-1483

SMA/WEST
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1094 West Evelyn Ave.,
Sunnyvale; 245-2500

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2443 Ash Street,
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*Several recent surveys in depth verify that those attending WESCON (a predicted 45,000 this year) spend most of their viewing time at exhibits they *planned in advance* to see!

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There is no more effective medium than the Grid-Bulletin, IEEE's own official WESCON magazine, jointly published by San Francisco and Los Angeles IEEE. About 30,000 IEEE members in Region 6, the eleven western states, receive it through specially controlled lists in July and again early in August, when they're deciding how they'll budget their time at WESCON and whether or not they'll see your exhibit and talk to your people. An additional 3000 visitors pick up the August issue as they come in the door.

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CLOSING DATES: June 17 for July issue, July 15 for August issue. You save $90 on a page ad if you contract for both the July and August issues. **CONTRACTS AND ORDERS:** IEEE Grid-Bulletin, 701 Welch Rd., Suite 2210, Palo Alto, 94304, (415) 327-6622. **MOUNTED PLATES, COPY TO SET:** IEEE Grid-Bulletin, 3600 Wilshire Blvd., Los Angeles, 90005, (213) 387-1203.

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Melabs, Palo Alto, reported sales of $3,075,446 for the six-month period ending January 28, a 33 per cent increase over the same period of last year, profits of $151,803 showing a 130 per cent increase. The current backlog is $3,874,350, $589,629 higher than a year ago.

William G. Bockhacker has been appointed industrial sales engineer, western division, Lenkurt Electric Co., San Carlos.

MORE CIRCUIT THEORY

head, England; he received the B Sc. (Hons) degree in 1942 from London University. After 5 years service in the Royal Air Force he worked for 7 years with British Telecommunications Research Ltd.; his last year there was spent in British Borneo installing 160 MHz equipment. His next 7 years were with Canadian Westinghouse in Hamilton where he led the design of a mobile 4GHz tropospheric scatter equipment.

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- Fundamental range: 5 Hz to 500 MHz.
- Stability of 1 part in 10^7 (with internal crystal). Accuracy and stability limited only by 1 MHz standard. May be driven by more precise external standard.
- Digital "dial-in" of desired frequency.
- Large "in-line" display of "dialed-in" frequency (not a counter).
- "Free" mode for use as conventional, continuously variable signal generator.
- AGC controlled attenuator input (no changing of level-set with frequency).
- Negligible non-harmonically related spurious signals.
- Precision, continuous attenuator (0 to —130 dbm) 50 ohms.
- Measures 10 KHz to 1 GHz direct (extends to 10 GHz with optional external harmonic generator/mixer assembly).
- Internal 400 or 1000 Hz amplitude modulation (50%).
- Built-in beat detector and beat meter for frequency measurement.
- All solid state.
- Reads peak FM modulation deviation with optional plug-in unit.

PRICE: $12,500.00

For complete details and applications assistance, please contact your nearest *Gertsch* representative, or the address below, requesting Bulletin SSG.

UTILITY MODEL: SSG-2

This model is functionally identical to the SSG-1 except for the removal of the modulation module, and the substitution of a levelled 0.5V RMS 50-ohm output for the variable attenuator. The display has been simplified by the use of a dial readout of frequency, instead of "Nixie" display.

The attenuator package and modulation module may be added at any time if desired.

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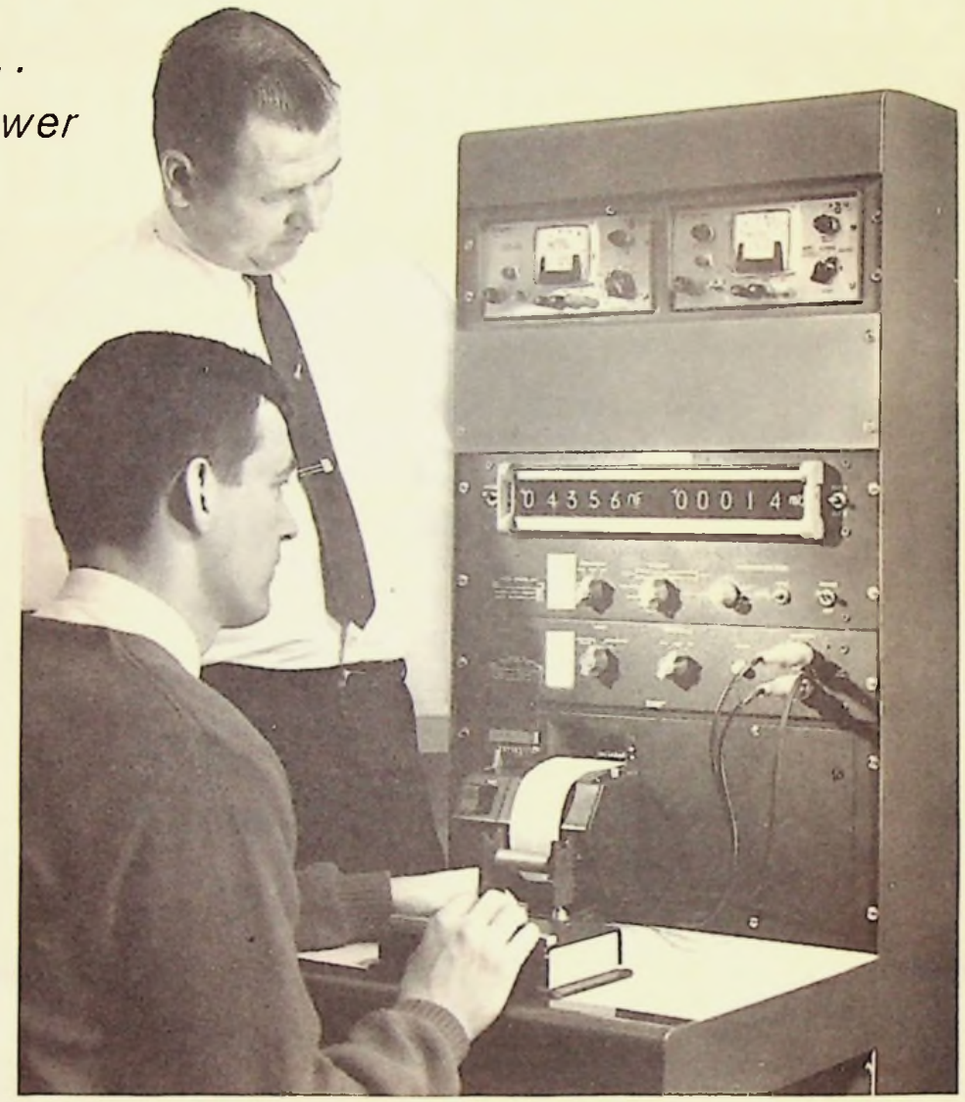

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Frequency	120c/s	400c/s	1kc/s
Capacitance	0.0001μF to 1000μF 4 ranges	0.01pF to 100μF 7 ranges	0.01pF to 100μF 7 ranges
Conductance	1μmʊ to 1ʊ 4 ranges	0.1nʊ to 1ʊ 7 ranges	0.1nʊ to 1ʊ 7 ranges

Dissipation Factor: 0.0001 to 1.0 in one range

Automatic Capacitance Bridge Assembly
Type 1680-A ... $4850 in U.S.A.

If you think a 1680 Automatic Capacitance Bridge can save you time and money and improve accuracy, why not write or call us for a demonstration?

RCA Aerospace Systems Division, Burlington, Massachusetts, has responded to the Department of Defense's challenge to industry to attain new levels of product quality by instituting a company-wide Zero Defects program. For example, in their Purchased Materials Inspection Department, new test equipment has been installed to upgrade measurement techniques and accuracy. A GR Type 1680 Automatic Capacitance Bridge and Type 1137 Data Printer are now used for incoming inspection of capacitors, whereas a manually balanced bridge was previously used. Capacitance measurements were not only tedious and time-consuming, but were also subject to a considerable amount of human error. With the installation of the Type 1680 Automatic Bridge, a thirty-percent saving in time has been realized; accuracy has been increased ten times; and data is automatically and permanently recorded.

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