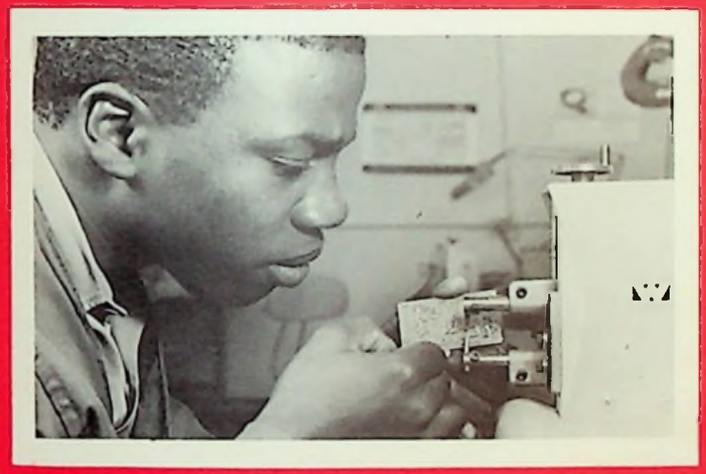
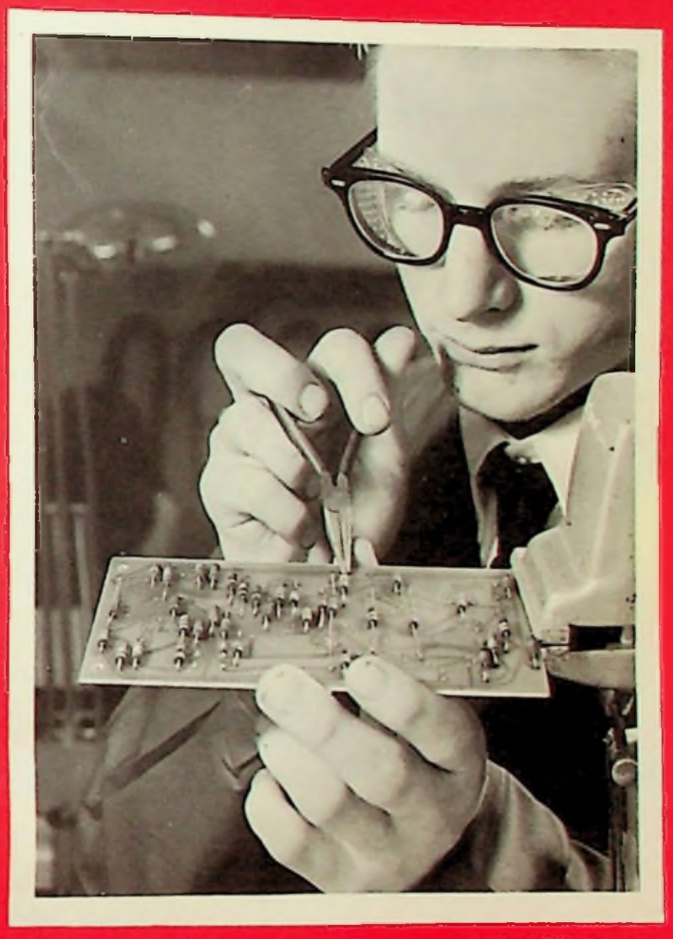
IEEE Grid

January 1966

SAN FRANCISCO SECTION
INSTITUTE OF ELECTRICAL
AND
ELECTRONICS ENGINEERS





Job Corps electronic tech training for industry

meeting reminder

Aerospace & Electronic Systems, Thursday, February 24
Antennas & Propagation, Tuesday, January 18
Audio & Electroacoustics, Thursday, January 20
Communications Technology, Wednesday, February 23; Wednesday, March 30
East Bay Subsection, Wednesday, January 12 (SFS/EM/I&GA); Monday, January 24
Electromagnetic Compatibility, Wednesday, January 26
Engineering Management, Wednesday, January 12 (SFS/EBSS/I&GA)
Fresno Subsection, Tuesday, January 18
Industry & General Applications, Wednesday, January 12 (SFS/EBSS/EM)
Information Theory, Thursday, January 27
Microwave Theory & Techniques, Thursday, January 20
Nuclear Science, Tuesday, February 15
Parts, Materials & Packaging, Tuesday, January 25
Power, Tuesday, January 18
Reliability, Monday, January 17
San Francisco Section, Wednesday, January 12 (EBSS/EM/I&GA)
Santa Clara Valley Subsection, Wednesday, January 19
Vehicular Communications, Thursday, January 13

SUITE 3212, 301 WILLOW ROAD, PALO ALTO, CALIFORNIA

Brand new in DVM's

Less than $1,000 buys 0.01% accuracy and 100μV sensitivity in Cohu's Model 511 DC DVM/Ratiometer

When it comes to digital voltmeters, we feel there's an "optimum combination" of capabilities which might be offered. So, with this in mind, we set out to design our Model 511. Here's the story.

Smaller on the outside

We've kept things like size and weight (not to mention cost) down to a bare minimum. The entire cabinet-enclosed instrument weighs only 12 pounds, measures only 5¼ x 10½ inches at the front panel, and 15 inches deep. And it costs just $995.

Bigger on the inside

With all solid-state circuitry, it gives you 0.01% accuracy, is sensitive to 100μV, and ranges from .0000 to ±999.9 volts. And it automatically tracks voltage bidirectionally. Input impedance is 10 megohms, with a special 10,000 megohm, 0 to .9999-volt high impedance (hi-Z) range.

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This Cohu 511 is an 0.01% accuracy ratiometer as well. DC/DC ratios are from .0000:1 to ±.9999:1 in the 1:1 range through 000.0:1 to ±999.9:1 in the 1000:1 range. Including hi-Z, there are five ratio ranges. So why not check out the Model 511 DVM/Ratiometer with your Cohu engineering representative. He's in every major city.

DC DVM/RATIOMETER
MODEL 511

ACCURACY	0.01% of reading ±1 digit
SENSITIVITY	100 microvolts
COMMON MODE REJECTION	60 db at 60 cps
RANGE	.0000 to 999.9 volts
DC/DC RATIOS	.0000:1 to ±999.9:1
INPUT IMPEDANCE	10 megohms
PRICE	$995 F.O.B. San Diego. Additional export charge

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KINTEL DIVISION

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406 Channing Ave.
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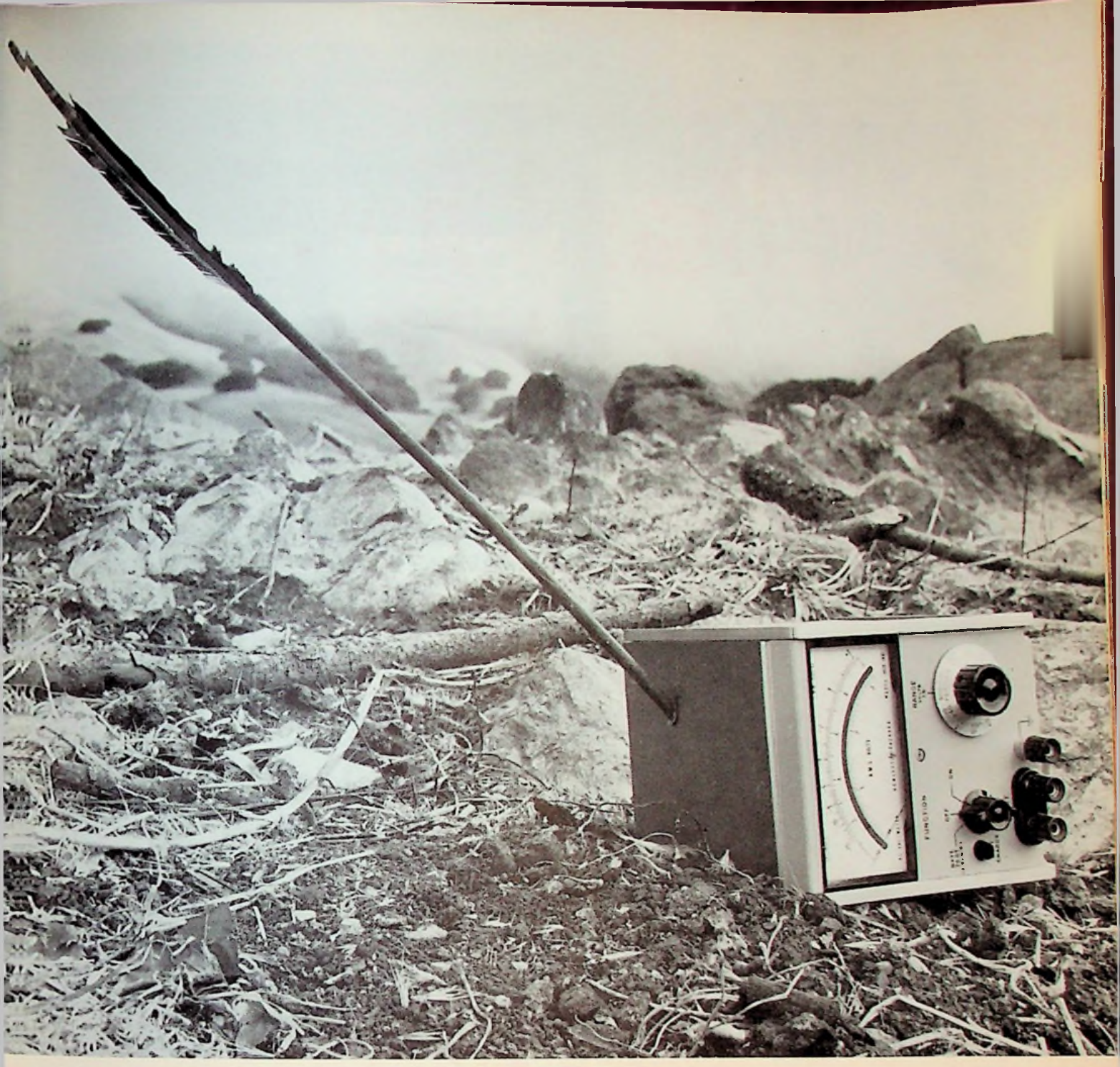
Phone: 415-327-3911



Meanwhile, back at the ranch...

"Down-time" is a short, uncomplicated word for your Neely man, the one who sells you quality Hewlett-Packard instrumentation. Back at the "ranch", he has a bunkhouse full of factory-trained technicians ready to cope with most any situation. Whether it be a matter of repair, calibration or modernization, your Hewlett-Packard instrumentation can be put in new condition in a matter of a few days at your Neely service center. For quality instrumentation with service to match, call Neely:

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with your existing Type 530, 540, 550, or 580* Series Oscilloscopes

Here's a new dc-1 GHz sampling unit with operation practically as simple as conventional plug-ins—as you can see by the front panel of the sampling plug-in. You need no pretriggers or external delay lines—the 1S1 unit has internal triggering with a built-in delay line.

Many other features add to the capabilities and operating ease of the Type 1S1, such as: A tunnel-diode trigger circuit that insures stable triggering through 1 GHz • A single control to select the sweep rate and magnify the display up to X100 when desired • Direct readout of the sweep rate even when magnified • A dc-offset control that permits observation of millivolt signals in the presence of up to ±1 volt input levels • Less than 1 mV noise in the display, with a smoothing control for further reduction • Output signals available at the front panel for driving chart recorders—and for powering an auxiliary time domain reflectometer pulser unit.

BASIC CHARACTERISTICS

RISETIME ≤0.35 ns. SENSITIVITY from 2 mV/cm through 200 mV/cm, in 7 steps. DYNAMIC RANGE ±2 V. Safe overload is ±5 V. DC OFFSET range is greater than ±1 V. SWEEP RATES from 100 ps/cm to 50 μs/cm, with ±3% accuracy normal or magnified. SAMPLES/CM continuously variable. TRIGGERING ac-coupled, ± internal, ± external, and free run. DISPLAY MODES are repetitive, single display, manual scan, or external scan. VERTICAL OUTPUT is 200 mV per displayed cm through 10 k. HORIZONTAL OUTPUT is 1 V per displayed cm through 10 k.

Type 1S1 Sampling Plug-In Unit	$1100
Type 281 TDR Pulser Unit	$95

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**used with Type 81 Plug-In Adapter.*

For a demonstration, call your Tektronix field engineer.

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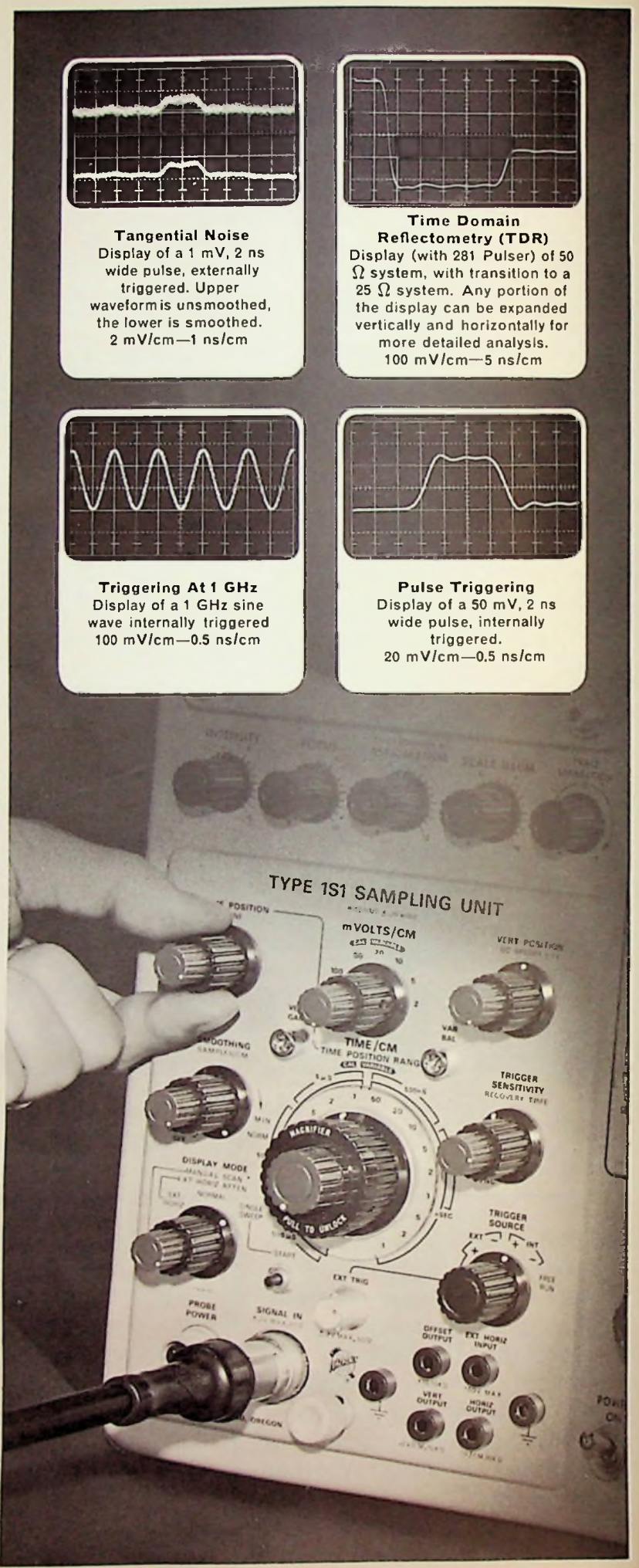

Tangential Noise
Display of a 1 mV, 2 ns wide pulse, externally triggered. Upper waveform is unsmoothed, the lower is smoothed.
2 mV/cm—1 ns/cm

Time Domain Reflectometry (TDR)
Display (with 281 Pulser) of 50 Ω system, with transition to a 25 Ω system. Any portion of the display can be expanded vertically and horizontally for more detailed analysis.
100 mV/cm—5 ns/cm

Triggering At 1 GHz
Display of a 1 GHz sine wave internally triggered
100 mV/cm—0.5 ns/cm

Pulse Triggering
Display of a 50 mV, 2 ns wide pulse, internally triggered.
20 mV/cm—0.5 ns/cm

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Kirby *Zeidler*

section news

KIRBY FOR ZEIDLER

David B. Kirby, public relations manager of Hewlett-Packard Co., has been appointed publications advisor of the San Francisco Section by Chairman Jack L. Melchor.

He succeeds Howard Zeidler, Stanford Research Institute, who served the Section for many years in that capacity and as a member of the publications board.

Prior to joining Hewlett-Packard in 1962, Kirby was public relations director of the San Francisco division of Lennen & Newell, advertising and public relations agency. Previously he had been associated with the public relations staffs of Kaiser Aluminum & Chemical Corp., the Wine Institute, and Bechtel Corp. He also was on the editorial staff of the S.F. News, since incorporated into the S.F. Examiner.

A UC journalism graduate, he also serves the Section as chairman of the public relations committee and was vice chairman of the WESCON public relations committee in 1965.

The thanks of Grid and the Section go to Zeidler for many years of service.

section news

MEMBERSHIP CAMPAIGN

Many members of the Section have sent in the pledge card carried in the December **Grid**, agreeing to take the responsibility of bringing in a new member of the IEEE. Most have requested additional application forms for their engineering colleagues.

Have you done your part?

You are IEEE's best membership salesman. Return the pledge card in the December issue and deliver the application form to one of your engineering colleagues, following up to see that he completes and mails it with his check.

cover

For details of the highly interesting tour of the electronic tech training facilities at Parks Job Corps Center, Pleasanton, planned for January 12 under joint sponsorship of the Section, East Bay Subsection and Engineering Management and Industry & General Applications chapters, see page 4.

Martin

Hockley

meeting ahead

JOB CORPS TECHS

Job Corps electronic technician training for industry will be the subject of a joint Section, East Bay Subsection, Engineering Management, and Industry & General Applications meeting at Parks Job Corps Center, Pleasanton, on January 12. Ladies are particularly welcome, many having expressed an interest in the program.

The session will begin at 7:30 with an hour tour of the electronics department in Bldg. 870, during which visitors will meet instructors and corpsmen and view the training program and electronic equipment in action.

A panel discussion will begin at 8:30, with the department head, department supervisor, instructors, corpsmen, and two IEEE representatives taking part, the latter being William L. Martin, engineering manager, Berkeley Division, Beckman Instruments, and Al Hockley, director, technical personnel, HP.

Prof. Harry Belman, head of corpsmen placement, George Mathews of placement, and Dr. Steve Gale, vocational training dept., will also answer questions.

Approximately 1,900 corpsmen are being trained at Parks by Litton Industries under contract, about 550 of them in the electronics dept., other training operations being culinary arts, building and grounds maintenance, and automotive repair.

The main gate is off of Highway 50 on Daugherty Rd. Guards will direct visitors to Bldg. 870.

Reservations for the highly interesting tour, already sampled by the Section vice chairman and Grid editor, must be made by January 10 with Mrs. Helmke, Section office, 327-6622.

meeting ahead

OUTER SPACE BEINGS

L. E. Reukema, professor of electrical engineering emeritus, University of California, will address the January 24 meeting of the East Bay Subsection. His subject will be space communications for consideration of the possibilities and techniques of communication with intelligent beings beyond our solar system.

MEETING CALENDAR

all those interested, members or non-members, are welcome

January 12, Wednesday, 7:30 p.m.—San Francisco Section/East Bay Subsection/Engineering Management/Industry & General Applications—Ladies Night

Job Corps electronic tech training for industry

Tour of Parks Job Corps Center electronics school and panel discussion with electronics instructors

Place: Parks Job Corps Center, Pleasanton
Dinner: 6:00 p.m., Hap's, Pleasanton; cross rib roast—$3.25 including tax
Reservations: Required for dinner, tour and panel discussion; Mrs. Helmke, Section office, 327-6622, by January 10

January 13, Thursday, 7:30 p.m.—Vehicular Communications

The role of audio in vehicular communications

Al Goldstein, area systems engineer, Motorola Communications & Elect., Inc.

Place: College of San Mateo, Bldg. 11, Room 130; meeting to be followed by tour of CSM electronics dept. and Channel 14 campus educational TV station
Dinner: 6:30 p.m., College Cafeteria; $1.25
No reservations required
Directions: From Bayshore west on 19th Ave. Freeway to end. Bldg. 11 north of TV tower

January 17, Monday, 8 p.m.—Reliability

Role of functional reliability in electrical design

G. A. Faruqui, project engineer at Service Bureau Corp., Palo Alto

Place: Physics Hall 101, Stanford University
No dinner

January 18, Tuesday, 8:15 p.m.—Antennas & Propagation

Solution of antenna and microwave problems by digital computer technique

Dr. Mogens G. Andreasen, senior supervisory engineer, TRG West

Place: Lockheed Auditorium, Bldg. 202, 3251 Hanover St., Palo Alto
Dinner: 6:15 p.m., L'Omelette, 4170 El Camino Real, Palo Alto
Reservations: Claes Elfving, 966-3551, by January 17

January 18, Tuesday, 7:30 p.m.—Fresno Subsection

Design and construction of California aqueduct

L. R. Illingworth, chief, operations section, San Joaquin Dist. Dept. of Water Resources

Place: PG&E Bldg., 10th floor, 1401 Fulton St., Fresno
No dinner

January 18, Tuesday, 7:30 p.m.—Power/American Nuclear Society, Northern California Section

Desalination and electric power

W. K. Davis, vice president, Bechtel Corp.

Place: Engineers' Club, 206 Sansome St., San Francisco
Dinner: 5:30 p.m.—cocktails; 6:30—dinner; 7:30—meeting
Reservations: Engineers' Club, GA 1-3184

January 19, Wednesday, 7:30 p.m.—Santa Clara Valley Subsection/University of Santa Clara Student Branch

Employment opportunities for new engineers in industry

John Cage, manager, advanced technical planning, Hewlett-Packard Co., Palo Alto
L. Fitzsimmons, chief division engineer, PT&T, San Jose
A. Steele, division manager, Lockheed's NASA vehicle design, LMSC, Sunnyvale

Place: University of Santa Clara, Sullivan Engineering Center, Room E551
No dinner

January 20, Thursday, 8:15 p.m.—Audio & Electroacoustics

Calibration and construction problems of a new low-cost capacitor microphone system

Problems and solutions to audio compression and limiting devices

Ted Gourley, senior engineer, and Charles Swisher, marketing dept., Vega Electronics Corp., Santa Clara

Place: Stanford Research Institute, Conference Room B, 333 Ravenswood Ave., Menlo Park
Dinner: 6:00 p.m., Menlo House, 1850 El Camino Real, Menlo Park
Reservations: Renda Blackler, 948-0571, by January 19

MEETING CALENDAR

January 20, Thursday, 8:00 p.m.—Microwave Theory & Techniques

Panel discussion on the problems encountered by engineers as they venture into business for themselves

Moderator: George R. Chambers, Stanford Research Institute

Place: Hewlett-Packard, Conference Room 1A, 1501 Page Mill Rd., Palo Alto

No dinner

January 24, Monday, 7:30 p.m.—East Bay Subsection

Space communications for consideration of the possibilities and techniques of communicating with intelligent beings beyond our solar sytem

Professor Emeritus L. E. Renkema, University of California

Place: PG&E Oakland Service Center, 4801 Oakport Rd., Oakland

Dinner: 5:30 p.m., Oakland Airport Inn

Reservations: Oakland: Mrs. Emerson, 835-8500; Concord: Mrs. Grey, 685-4441; San Jose: Mrs. Dhuyvetter, 291-4852

January 25, Tuesday, 8:00 p.m.—Parts, Materials & Packaging

Rewards and penalties of micro-electronics usage: a panel discussion of various aspects of microwave applications, by representatives of current or anticipated users

Moderator: W. Dale Fuller

Place: Lockheed Auditorium, Bldg. 202, 3251 Hanover St., Palo Alto

No dinner

January 26, Wednesday, 8:00 p.m.—Electromagnetic Compatibility

Measurement of electromagnetic radiation

Dr. Fred Morris, Electromechanics Co., Austin, Texas

Place: Hewlett-Packard Auditorium, 1501 Page Mill Rd., Palo Alto

Dinner: 6:00 p.m., Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto

Reservations: Gordon Westwood, 962-2451, by January 24

January 27, Thursday, 8:15 p.m.—Information Theory

Digital measurements of frequency

Dr. Norman M. Abramson, visiting lecturer, Harvard University

Place: Stanford Research Institute, Bldg. 1, Conference Room B, 333 Ravenswood Ave., Menlo Park

Dinner: 6:30 p.m., Villa D'Este, 3401 El Camino Real, Atherton

Reservations: Shirley Jackson, 966-3865, by January 26

February 15, Tuesday, 8:00 p.m.—Nuclear Science

X-Raying the Egyptian pyramids

Dr. Luis W. Alvarez, University of California, Berkeley

Place: Spenger's Fish Grotto, 1919 - 4th St., Berkeley

Dinner: 6:30 p.m., Spenger's Fish Grotto

Reservations: 447-1100, Ext. 7821, by February 14

February 23, Wednesday, 7:30 p.m.—Communications Technology

Communications for the power industry

Robert J. Brown, general project administrator, PT&T, San Francisco

Place: PT&T Bldg., 666 Folsom St., Room 140, San Francisco (near cor. 3rd St.)

Dinner: 6:00 p.m., Schroeder's Cafe, 240 Front St., San Francisco (No-host cocktails at 5:45 p.m.)

Reservations: A. R. Dole, 399-4430; C. G. Griffith, 591-8461, Ext. 525; or Miss Wynne, 291-4039, by February 21

February 24, Thursday, 8:00 p.m.—Aerospace & Electronic Systems

Tour of Federal Aviation Authority facility at Fremont

Limited to 50 persons with advance reservations

Place: 5125 Central Ave., Fremont

No dinner

Reservations: Steve Marx, (415) 326-4350, Ext. 6048, by February 17

(Continued on page 6)

Goldstein *Faruqui*

meeting ahead

AUDIO IN VC

Alvin Goldstein, area systems engineer of Motorola Communications & Electronics, Inc., Burlingame, will discuss the role of audio in vehicular communications at the January 13 meeting of the Vehicular Communications chapter.

His talk will deal with audio considerations, two-way mobile, and point-to-point systems with emphasis on distortion, frequency response and signal-to-noise considerations. A tape will be played demonstrating effect of improper and proper audio level settings on a typical 150mc point-to-point system with seven intermediate paths.

A graduate of Illinois Institute of Technology, Mr. Goldstein also studied at Lake Forest College. He has been a systems engineer at Boom Electric Corp., Chicago, and Motorola, Inc., Chicago, prior to his present assignment.

meeting ahead

FUNCTIONAL RELIABILITY

G. A. Faruqui, project engineer at the Service Bureau Corp., Palo Alto, will describe the role of functional reliability in electronic design at the January 17 meeting of the Reliability chapter.

The talk will be exploratory in nature, discussing the impact and necessity of reliability at the design level, rather than at the acceptance level.

A native of Karachi, Pakistan, the speaker was formerly senior lecturer in electrical engineering at Peshawar University and instructor at Case Institute of Technology, Cleveland, Ohio.

meetings ahead

SCVSS PROGRAM PLANS

Meetings planned by the Santa Clara Valley Subsection: January 19, joint with University of Santa Clara Student Branch; February meeting, joint with Santa Clara Valley Engineers' Council as part of Engineers' Week; March 23, plant tour of IBM, San Jose; April 20, Pioneers' Night; May 18, joint with Comtech with San Jose State speaker.

Watch the Grid for details.

New Vega Electronics Corp. microphone is fondly regarded by Charles Swisher and Ted Gourley, speakers at the January 20 Audio & Electroacoustics meeting.

meeting ahead

CAPACITOR MICROPHONE

A new low-cost capacitor microphone system having very flat frequency response and extremely low distortion will be described at the January 20 meeting of the Audio & Electroacoustics chapter. Calibration and construction problems will be discussed. A unique compression/distortionless limiter will also be described. Problems and solutions to audio compression and limiting devices will be discussed. Demonstrations will follow the presentation.

The papers will be presented jointly by Ted Gourley, senior engineer, and Charles Swisher, marketing department, Vega Electronics Corporation, Santa Clara. Mr. Gourley studied electrical engineering at Oregon State University and was on a special assignment at IBM before joining Vega in 1964. Mr. Swisher graduated from the University of Illinois with an electrical engineering degree. Prior to joining Vega early this year, he worked for Ampex.

Have you returned the membership pledge card carried in the December issue?

section news

FELLOW NOMINATIONS

Dr. Stanley F. Kaisel, chairman of the section committee on Fellows & National Nominations, invites suggestions from the membership for nominations for the grade of Fellow for 1967.

To submit suggestions for nominations, send a brief letter to Dr. Kaisel, c/o the Section Office, by February 1, including a biography of the candidate and an indication that you would serve as sponsor.

Nominees must meet the requirements for Senior Member as stated in the bylaws (even though they may hold the present grade of Member) and must have been a member in any grade for a period of seven years preceding nomination, other than in exceptional cases. The principal criterion is the nominee's technical contribution.

meeting ahead

AES CANCELLATION

The January 27 meeting of the Aerospace & Electronic Systems chapter, a tour of Ames Laboratory announced in the December Grid, has been cancelled.

MEETING CALENDAR

March 30, Wednesday, 7:30 p.m.—Communications Technology

Communication systems for the Bay Area Rapid Transit
David Noton, engineer, Bechtel Corp.
Place: Bechtel Corp. Bldg., 101 California St., San Francisco
Dinner: to be announced

Up in Seattle, we make basic tools for precision electronic measurement. We make them well. If you think you'd like to help us make them even better and live in the Great Northwest too, let's talk.

For almost a generation, we (The John Fluke Mfg. Co., Inc.) have been one of the world's leaders in metrology. Recently, the demand for our quality instrumentation has created a number of unusually fine professional employment opportunities.

So if you want to join a medium size, well-respected company where your contribution stands out and your identity means something to everyone from the president on down, this is a grand opportunity. Our engineers work in a sophisticated technical environment with great personal freedom to pursue design problems as they see fit. We pick up the total tab on a company-sponsored graduate program for eligible personnel at the University of Washington (now widely regarded as one of the 10 best universities in the Nation).

But, though the job is the main thing, living in the Pacific Northwest shouldn't be ignored either. About 85% of our employees live on wooded acres within 10 minutes of the plant. You can buy twice the house in Seattle for the same dollars you spend in San Francisco or Los Angeles. And the taxes aren't too steep either (there is no state income tax).

Schools are good. The State of Washington ranks among the first three in literacy and number one in terms of college graduates per thousand population. Art, theatre and music flourish in the great new Seattle Center, built for the World's Fair.

If the outdoors is your after hours bailiwick, Washington State offers great skiing (with short lift lines), the nation's best boating, outstanding hunting and fishing (sometimes, the other guy on the stream is five miles away), and fine hiking and climbing.

The company offers in addition to your salary (which is as good or better than anywhere else) profit sharing, medical insurance, and retirement benefits. So if all this excites you and you fit one of the job descriptions below, write our Engineering Manager, Mr. Ted Thomsen, in confidence. Interviews will be arranged in Los Angeles, San Francisco, or Seattle at your convenience. Please address Mr. Thomsen at P.O. Box 7428, Seattle, Washington.

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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Davis

Andreason

meeting ahead

DESALINATION & POWER

W. K. Davis, vice president-scientific development department, Bechtel Corporation, will discuss large scale desalting of sea water in combination with electric power production at the January 18 meeting of the Power chapter.

Special attention will be directed toward the recent prominent study for the Metropolitan Water District of Southern California—Office of Saline Water, Department of the Interior—and the U.S. Atomic Energy Commission by Bechtel Corporation, which is regarded as a possible first step to the actual construction of large dual-purpose desalting plants. Also, other national and international developments will be briefly discussed. The talk will cover both the design and application of dual-purpose desalting plants, including their integration in a combined electric power grid and water distributing system, economic comparison between conventional and nuclear fueled plants, optimization of the output, and basic design features.

Mr. Davis is a leader in the U.S. nuclear power industry. In addition to his responsibilities with Bechtel, he is now president of the Atomic Industrial Forum. He was formerly director of reactor development for the U.S. Atomic Energy Commission and, before that, manager of the research division of California Research and Development Company.

Because of the special interest in applications of nuclear reactors to dual-purpose desalting plants, this will be a joint meeting with the American Nuclear Society, No. Calif. Section.

Help the Section grow by pledging yourself to bring in a new member. Return the card in the December Grid.

SOLVING ANTENNA PROBLEMS

Dr. Mogens G. Andreason, senior supervisory engineer, TRG-West, Menlo Park, will discuss solution of antenna and microwave problems by digital computer technique at the January 18 meeting of the Antennas & Propagation chapter. R. L. Tanner is the co-author of the paper he will present.

The development of modern high-speed digital computers has made possible the solution in an essentially exact manner of a great many electromagnetic problems that could heretofore be treated only by relatively crude approximation. The technique employed—the direct solution by numerical techniques of the relevant integral equations—is much less subject to restraints imposed by coordinate systems and other considerations which have restricted the range of problems amenable to treatment by classical analytical methods. Among the problems that can be dealt with are the impedance, radiation pattern, and distribution of current on linear antennas of arbitrary configuration; radiation from wave guides and slots; current distribution and radiation patterns of reflector type antennas; and radar bi-static and back scattering cross-sections.

Chambers *Craig*

Geiszler *Kaisel*

meeting ahead

RADIATION MEASUREMENT

Dr. Fred Morris, Electromechanics Co., Austin, Texas, will be the speaker at the January 26 meeting of the Electromagnetic Compatibility chapter. His subject will be the measurement of electromagnetic radiation.

The general problems encountered in EMC rf radiation measurements will be described and various approaches to their solution discussed. Special emphasis will be given to new techniques of broadband spectrum measurements and characteristics and recommended use of log conical antennas for MIL-STD-826 type measurements as well as new techniques for measuring ELF signals presented. The talk will be summarized by a discussion of the objectives and philosophy of interference measurements and their relationship to future analysis and control techniques. A movie and slides will supplement the talk.

A graduate of the University of Texas, the speaker is the author of many articles on electromagnetics, and founder and director of research of his company.

Morris *Abramson*

meeting ahead

MEASURING FREQUENCY

Dr. Norman M. Abramson, visiting lecturer at Harvard University, will discuss digital measurements of frequency at the January 27 meeting of the Information Theory chapter.

He will investigate the use of zero-crossing rate as an estimate of the instantaneous frequency of several random processes. The expected value of the number of zero-crossings in an interval $(-\frac{T}{2}, +\frac{T}{2})$ and the conditional expected value, given the instantaneous frequency at $t = 0$, are

(Continued on page 12)

meeting ahead

EE BUSINESS VENTURES

Five panelists will wrestle with the problems encountered when engineers venture into business for themselves at the January 20 meeting of the Microwave Theory & Techniques chapter. George R. Chambers of the electronics industry economics group at Stanford Research Institute will moderate the discussion.

Taking part will be Robert A. Craig, president, Physical Electronics Laboratories, Menlo Park; Herbert M. Dwight, vice president, Spectra-Physics, Inc., Mountain View; Theodore D. Geiszler, president, Western Microwave Laboratories, Inc., Santa Clara; Stanley F. Kaisel, president, Microwave Electronics, Palo Alto; and Keith Petty, attorney, Petty, Andrews, Olsen & Tufts, San Francisco.

Participation from the floor will be encouraged.

Cage

Fitzsimmons

meeting ahead

SCVSS/UNIVERSITY MEETING

The Santa Clara Valley Subsection will present a meeting at the Sullivan Engineering Center, University of Santa Clara, on January 19 jointly with the University of Santa Clara Student Branch. Three speakers from various industries will discuss employment opportunities and the relative advantages of their respective industries, followed by a question-and-answer period.

Panelists will be John Cage, manager, advanced technical planning, HP; L. Fitzsimmons, chief division engineer, PT&T, San Jose; and A. J. Steele, division manager of Lockheed's NASA design, Sunnyvale.

Engineering students from all local universities and colleges are invited to attend, and representatives of local industries are also encouraged to attend, in order that employment opportunities can be described.

Fuller *Antony* *Koenig* *Lansdon* *Rock* *Zell*

meeting ahead

MICRO-ELECTRONICS

The rewards and penalties of micro-electronics usage will be discussed by a panel of experts at the January 25 meeting of the Parts, Materials & Packaging chapter. W. Dale Fuller, project leader, Lockheed Missiles & Space Co., will serve as moderator.

Panelists will include Charles Antony, manager of product design, Dalmo-Victor; Walter A. Koenig, assistant manager of electronic design, LMSC; Dan Lansdon, engineering manager of frequency and time division, HP Co.; John Rock, production engineer, analytical instrument division, Varian; Neale A. Zellmer, senior staff engineer, Lenkurt.

MORE FREQUENCY MEASURING

evaluated. In some cases, bias terms are found which affect the accuracy of the digital frequency measurements.

Dr. Abramson, a graduate of Harvard, UCLA, and Stanford, and a member of the Stanford faculty from 1958 to 1965, was visiting professor at UC from January to June, 1965. He has served as consultant in communications and radar problems to several government and industrial laboratories.

He has worked on the analysis and synthesis of radar systems for processing data in the presence of noise. He has also done work in sampling theorems frequency modulation, properties of binary communication channels, and burst error correcting codes. Recently his research has been concerned with the theory of pattern recognition and machine learning and with data processing for seismic signals. He is the author of "Information Theory and Coding," published by McGraw-Hill Book Company in 1963. He is also editor of the Holden-Day series on communication and information processing.

group honors

AUDIO AWARDS

Two members of the San Francisco Section have been honored with awards recognizing the quality of their articles in institute publications.

They are Donald F. Eldridge, vice president, corporate development, Memorex Corp., Santa Clara, and Dr. C. Denis Mee, senior scientist, device technology department, IBM, San Jose.

They were presented the Achievement Award of the IEEE Audio Group, a certificate, and $200 check at a meeting of the Audio chapter at Stanford Research Institute. Making the presentation was Dr. Jack L. Melchor, chairman of the San Francisco Section and president of HP Associates, Palo Alto.

Both were honored for meritorious publication in the audio field over a period of years. Eldridge received the award for 1963, Mee for 1964.

Eldridge was formerly head of the magnetics department research for Ampex Corp. before resigning in 1960 to join Memorex. Mee formerly engaged in shortwave magnetic recording research for CBS Labs, Stamford, Conn., before joining IBM at Yorktown Heights, N.Y., in 1962 and transferring to the San Jose facility in 1965.

Audio Achievement Award winners C. Denis Mee and Donald F. Eldridge with Section Chairman Jack L. Melchor.

ieee news

RELIABILITY SYMPOSIUM, SAN FRANCISCO, JANUARY 25-27

The 1966 Annual Symposium on Reliability will be held January 25-27 at the Sheraton-Palace Hotel, San Francisco. Formerly known as the National Symposium on Reliability and Quality Control, the meeting is held annually in various cities and attracts close to 1,500 engineers and scientists from the United States and abroad.

Professional societies sponsoring the Symposium are: the American Society for Quality Control, electronics division; the Institute of Electrical and Electronics Engineers, Reliability Group; the Institute of Environmental Sciences; and the Society for Nondestructive Testing.

Highlights of the program include an address by Daniel J. Haughton, president, Lockheed Aircraft Corporation, who will keynote the symposium.

Local information: William Wahrhaftig, Philco, Palo Alto, 326-4350, Ext. 4255.

BANNER YEAR

1966 will be a record year for national IEEE conferences and symposia in the San Francisco area, ten having been announced as the Grid went to press:

January 25-27, 12th Symposium on Reliability, Sheraton Palace Hotel, San Francisco; Program Chairman: A. R. Park, General Precision Inc., 1370 Encinitas Rd., San Marcos, Calif.

May 1-6, Joint Railroad Conference & Transportation Symposium, Jack Tar Hotel, San Francisco; Co-chairman: Jack Barkle, Bechtel Corp., P.O. Box 3965, San Francisco, Calif. 94119.

May 16-18, 1966 International Symposium on Microwave Theory & Techniques, Cabana Hotel, Palo Alto; Chairman: Peter Lacy, Wiltron Co., 930 E. Meadow Dr., Palo Alto.

July 11-13, 8th IEEE Symposium on Electromagnetic Compatibility, San Francisco Hilton; Chairman: Guy L. Ottinger, 1213 Sesame Dr., Sunnyvale, Calif.

July 18-22, Nuclear & Space Radiation Effects Conference, Stanford University; Chairman: S. C. Rogers, Bell Labs, Whippany, N.J.

August 29-31, Second International Congress on Instrumentation in Aerospace Simulation Facilities, Stanford University.

October 26-28, VII Annual Conference on Switching Theory & Logical Design (Computer Group), University of California, Berkeley; Local Information: Prof. M. A. Harrison, Dept. of Electrical Engineering, University of California, Berkeley, Calif.

November 8-10, Fall Joint Computer Conference, Brooks Hall, Civic Center, San Francisco; Chairman: R. G. Glaser, McKinsey & Co., 100 California St., San Francisco.

November 14-16, 1966 Conference on Engineering in Medicine & Biology, Sheraton Palace Hotel, San Francisco; Chairman: Dr. Victor W. Bolie, 3400 Miraloma Ave., Anaheim, Calif.

December 5-7, Antennas & Propagation Symposium, Cabana Hotel, Palo Alto; Chairman: R. D. Egan, Granger Associates, 1601 California Ave., Palo Alto.

Share the responsibility for the Section. Take part in the membership pledge program. See your December Grid for details.

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the section

MEMBERSHIP

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

A. E. Bradley
B. F. Doolin
A. S. Grove
A. B. Leach
F. J. Kielian
B. W. Mayer
D. C. McKenzie
P. A. Millino
A. C. Rauchle
J. J. So

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

J. W. Ball
R. J. Beckley
J. Bentkowsky
H. A. Brown, Jr.
C. H. Busby
J. P. Clark
J. T. Corsiglia
G. L. Daniel
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Write or call: Ernesto A. Montano, IEEE Grid, Suite 2210, 701 Welch Rd., Palo Alto, Telephone (415) 327-6622.

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Planned for San Francisco in 1968, with dates not yet set, is the IEEE/ASME Power Generation Conference. Local information: J. J. McCann, PG&E, 245 Market St., San Francisco.

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The Type 1398-A is designed to meet a broad range of pulse testing needs in a single, economical package. Like the popular Type 1217, this new Pulse Generator has repetition rates that allow it to reach easily from low frequencies to the high speeds of computer circuits, while its continuously adjustable 0.1-μsec to 1.1-sec duration control covers the entire range of commonly used pulse widths. Other features include high power output (to 60 mA, positive and negative) and fast rise and fall times (less than 5 nanoseconds).

This new pulse generator produces a full complement of synchronizing signals. Positive and negative "prepulses" are simultaneously available in advance of the output pulses. A delayed sync pulse, coincident with the late edge of each output pulse, is also provided for triggering other pulse generators (to form composite pulses, e.g.). The power supply is built into the 12" x 5¼" x 8¼" cabinet.

SPECIFICATIONS (Type 1398-A)

Pulse Repetition Frequency

Internally Generated: 2.5 c/s to 1.2 Mc/s.

Externally Controlled: Aperiodic, dc to 2.4 Mc/s with 1-V, rms, input (0.5 V at 1 Mc/s and lower). Output pulse is started by negative-going input transition.

Output-Pulse Characteristics

Duration: 100 ns to 1s in 7 decade ranges, ± 5% of reading or ± 2% of full scale or ± 35 ns, whichever is greater.

Rise and Fall Times: Less than 5 ns into 50 or 100 Ω; typically 60 ns + 2 ns/(pF external load capacitance) into 1 kΩ (60 V).

Voltage: Positive and negative 60-mA current pulses (60 V into 1-kilohm load) available simultaneously. Dc coupled, dc component negative with respect to ground.

Overshoot and Noise: Less than 10% of amplitude with correct termination.

Rampoff: Less than 1%.

Synchronizing Pulses:

Prepulse: Positive and negative 8-V pulses of 150-ns duration. If positive sync terminal is shorted, negative pulse can be increased to 100 V.

Delayed-Sync Pulse: Consists of a negative-going transition of approx 5 V and 100-ns duration, coincident with the late edge of the main pulse, immediately followed by a positive transition of approx 5 V and 150 ns.

Stability: With external-drive terminals short-circuited, prf jitter and pulse-duration jitter are each 0.04%. (Jitter figures may vary somewhat with range switch settings, magnetic fields, etc.)

Duty Ratio Restrictions: None.

Price: $535. in U. S. A.

SPECIFICATIONS (Type 1397-A)

Mode	Input Impedance	Drive Required	Rise and Fall Times
NORMAL	100Ω or 100kΩ shunted by approx 50 pF, switch selected	—3V, p-to-p, minimum	<50 ns (typically 30 ns) with input rise and fall times of <20 ns
VARIABLE Linear	30 kΩ, approx	—30 V, p-to-p, approx, minimum	0.2 to 100 μS, approx, linear, continuously adjustable
Exponential	100Ω	—3 to —4 V, p-to-p, approx	0.5 to 500 μs, approx; exponential, continuously adjustable

Output (ground reference; dc coupled):

Rampoff: Approx 25% with 5-ms pulse duration

Overshoot: 10%, or less, of minimum transition time

Amplitude: 1.2 A, p-to-p, max (60 V into 50Ω). 1 A, p-to-p, with 10% duty ratio. Automatic overload protector with manual reset.

Amplitude Variation: 20% for duty ratio changes from minimum to 10%. With ± 10% line voltage changes, positive output variation is ± 10%, negative output is ± 5%.

Internal Shunt: Positive output, 50Ω or open circuit; negative output, 50, 100Ω, or open circuit.

Transfer Characteristics: Operation approximates linear amplifier in normal mode.

Transconductance: 0.5℧ (2 V in produces 1 A out).

Inherent Delay: 50 ns between input pulse and output pulse.

Max. Duty Ratio: 10%.

Terminals: Input, Type 938 Binding Posts; output, GR874 recessed, locking connector.

Price: $495. in U. S. A.

1.2 amperes, positive or negative

less than 50-nanosecond rise & fall times

repetition rates up to 1 Mc/s

Type 1397-A Pulse Amplifier

This new instrument makes available signals that formerly required much more specialized and expensive equipment.

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