EDITOR'S PROFILE of this issue

from a historical perspective …

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

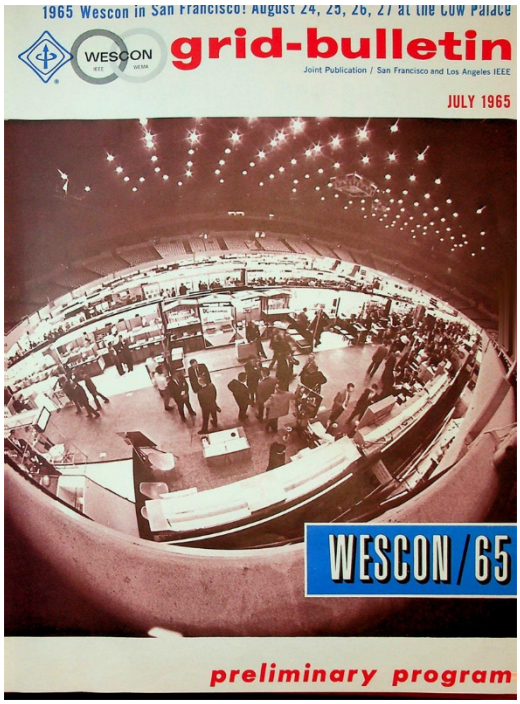
July, 1965:

Cover: Overhead view of the exhibits area at WESCON at the Los Angeles Sports Arena. This year it'll be at the San Francisco Cow Palace.

Page 6: All the sessions at this year's WESCON. Session B is chaired by Prof. Jim Gibbons, one of my instructors. He was the Stanford person working with Bill Shockley on silicon semiconductors; he also was instrumental in setting up Stanford's Honors Coop Program, where working engineers could take graduate-level EE courses at their work places (first using videotaped lectures, and later over a microwave network). He wrote several papers assessing the benefit of this sort of remote instruction (TVI: Tutored Videotape Instruction). Some years later I used this SITN network extensively to deliver evening IEEE short courses to these same companies (see Dec 1989 issue of the GRID).

Page 16: Gordon Moore gives a half-day tutorial on electronic devices.

Page 19: Bernard (Bernie) Oliver, head of R&D for HP, gives an update on what's ahead in radio-astronomy.



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1965 Wescon in San Francisco! August 24, 25, 26, 27 at the Cow Palace

WESCON
IEEE WEMA

grid-bulletin

Joint Publication / San Francisco and Los Angeles IEEE

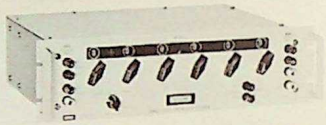
JULY 1965

WESCON/65

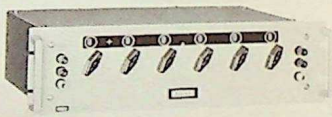
preliminary program

You can get *Gertsch** quality in Synchro and Resolver Bridges at the lowest prices in the industry

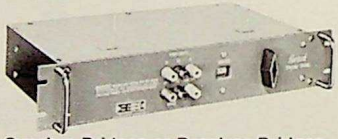
◁ **Decade Error Bridges.** Three models available, all with built-in phase angle null indicator: Synchro Bridge, Resolver Bridge, and the new combination Synchro and Resolver Bridge. 2 seconds-of-arc accuracy. Optional resolution of .001° or .0001°.



Decade Synchro/Resolver Bridges. Self-contained combination instrument tests both synchros and resolvers. 2 seconds-of-arc accuracy. Available in .001° or .0001° resolution.



Decade Synchro Bridge or Resolver Bridge. Either model available with dial-type readout. Other models provide digital angular readout with Nixie tubes. 2 seconds-of-arc accuracy. Resolution: .001° or .0001°.



Synchro Bridges or Resolver Bridges. One-knob or two-knob models available in either synchro or resolver bridge. Continuous angular rotation from 355° to 0° in 5° increments. 2 seconds-of-arc accuracy.

High quality—a *Gertsch* tradition!

Gertsch bridges employ the time-proven design techniques developed for *Gertsch RatioTran** precision voltage dividers. High input impedance, low output impedance, very low phase shift, and accuracy within 2 seconds-of-arc, are all inherent characteristics of these unique techniques.

Minimum maintenance.

All units are ruggedly constructed for long, trouble-free operation. Periodic re-calibration and maintenance checks are practically eliminated since *Gertsch* bridges are essentially ageless devices.

More models to choose from.

There is a *Gertsch* Synchro Bridge, Resolver Bridge, or combination unit, to meet all requirements. In addition to the models pictured, there are Rotary Solenoid and Relay (programmable) models. Associated instruments, including phase angle voltmeters, dividing heads, and null indicators, are also available.

For complete information, request Catalog 11—a valuable reference source for engineers.

Ask your Metrics Sales Representative about the new Singer Time Pay and Lease Programs—

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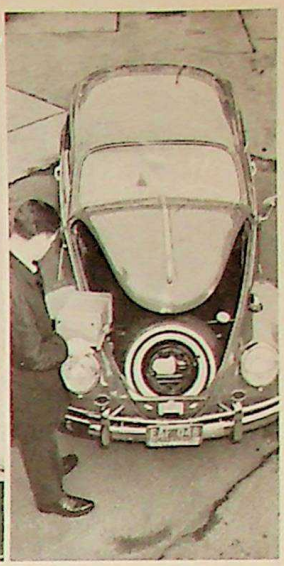
type 422

awkward situations

easy carrying

tight squeezes



small spaces

portability

The Type 422 is dimensionally proportioned for comfortable portability and on-the-job convenience.

Small Size — with maximum overall dimensions of 6¼" high x 10" wide x 17⅛" deep, including panel cover and handle, making it easy to carry anywhere, even through a revolving door.

Light Weight — ~21 pounds, with panel cover and included accessories.

Low Power Requirements—for AC model, ~40 watts; for AC-DC model, ~28 watts AC, ~22 watts DC; power drain on external DC is constant for 11.5v—35 v range.

Rugged Construction — designed and tested to meet Tektronix environmental requirements:

Storage (without batteries)	—55°C to +75°C, to 50,000 ft.
Operating (without batteries)	—15°C to +55°C, to 15,000 ft.
Storage (with batteries)	—40°C to +60°C
Operating (with batteries)	—15°C to +40°C, to 15,000 ft.

No fan used. Runs cool and stays clean.

Versatile Performance—with bandwidth of dc-to-15 Mc, sensitivity to 10 mv/div, sweep speed of 0.5 μsec div to 0.5 sec/div, and dual-trace operation in a compact instrument. Ch 2 X10 to 1 mv div (AC only).

Sharp, Bright Displays—even under high ambient light conditions. Rectangular 4" CRT provides 7.9 square inches of usable graticule area. (For comparison, 6 cm x 10 cm = 9.3 square inches.)

Quality — same ±3% calibration accuracy, value engineering, careful manufacture, strict quality control, and international engineering support as other Tektronix laboratory oscilloscopes.

Type 422 Oscilloscope (AC only) $1325

Type 422 Oscilloscope (AC-DC) $1750

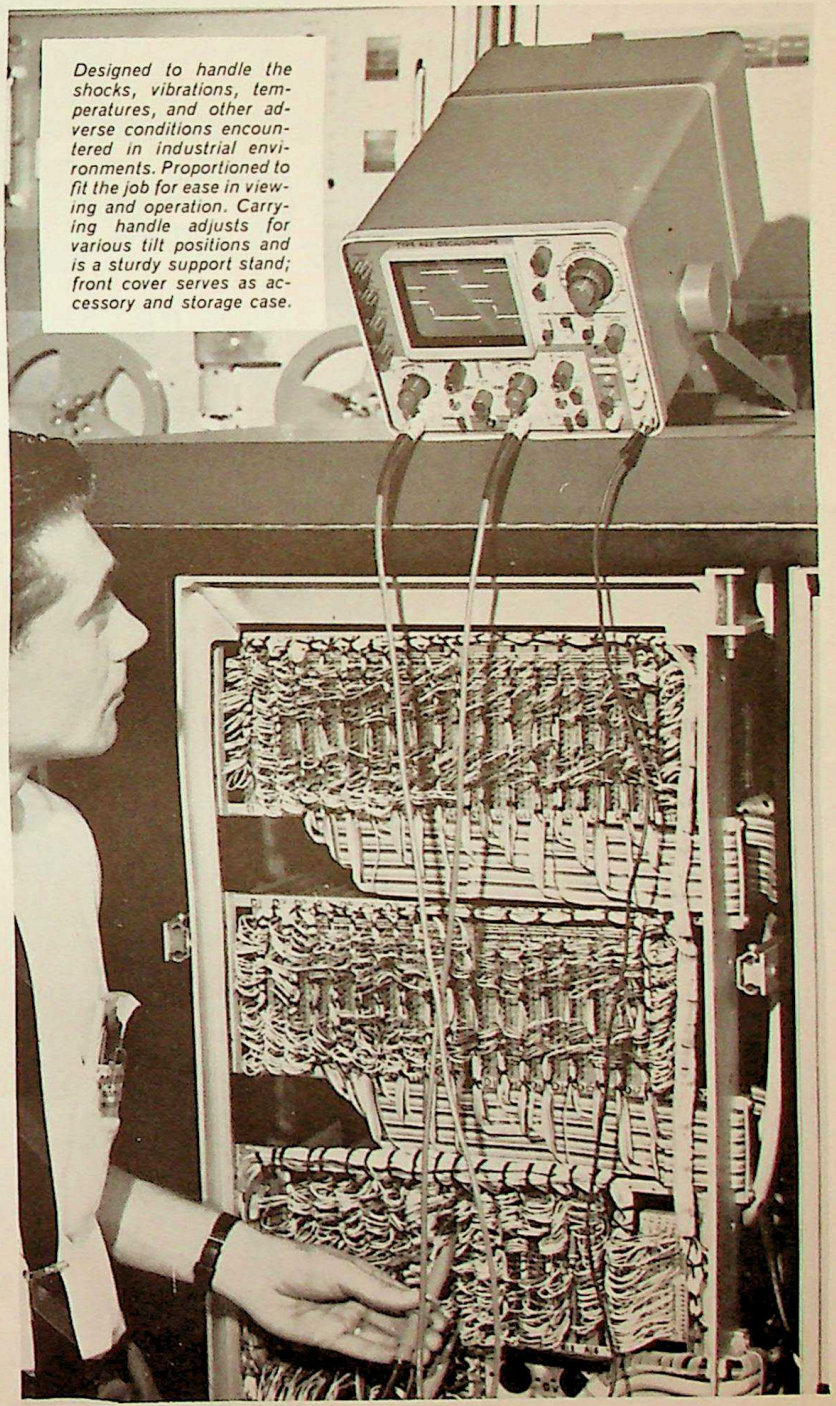
(Includes set of 20 NiCd cells)

U.S. Sales Prices f.o.b. Beaverton, Oregon

For a demonstration—call your Tektronix Field Engineer

Tektronix, Inc.

Designed to handle the shocks, vibrations, temperatures, and other adverse conditions encountered in industrial environments. Proportioned to fit the job for ease in viewing and operation. Carrying handle adjusts for various tilt positions and is a sturdy support stand; front cover serves as accessory and storage case.



SEE THE LATEST TEKTRONIX INSTRUMENTS AT WESCON BOOTH 3818-3822.

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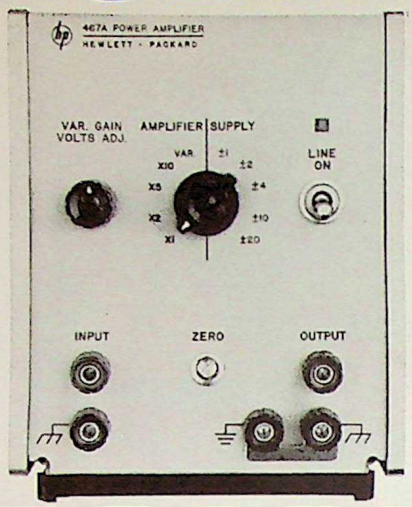
UNPRECEDENTED



PRECISION

with this versatile new hp power amplifier supply!

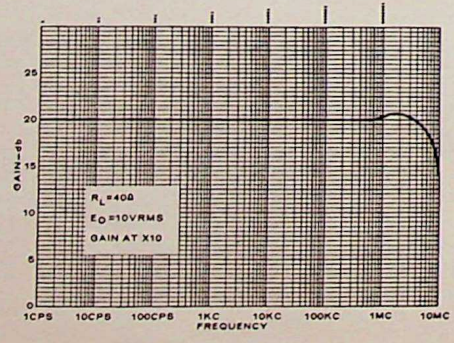
Use it to drive magnetic cores
ultrasonic transducers
recording galvanometers
servo motors

Or to amplify oscillator outputs
to supply dc power
for environmental testing

Precision features derived from premium components and multiple feedback techniques make the new hp 467A Power Amplifier Supply a unique instrument of its type. It's a 10 watt peak power amplifier and, —20 to +20 volt dc power supply. Features include low distortion (<0.01%), low drift, and 0.3% gain accuracy. The chart indicates the excellent frequency response of this general-purpose solid-state instrument. Other features of the 467A include low output impedance, and protection from short circuits or input overloads to 200 volts peak to peak.

The specs tell most of the story. Relate them to your task, then get complete information from your hp field engineer or write Hewlett-Packard, Palo Alto, California 94304, Tel. (415) 326-7000; Europe: 54 Route des Acacias, Geneva; Canada: 8270 Mayrand St., Montreal.

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



Power amplifier

Voltage gain: fixed steps X1, X2, X5, X10; variable 0 to 10, resolution better than 0.1% of full output

Accuracy: ±0.3%, dc to 10 kc with load of 40 ohms or greater

Frequency response (fixed steps): ±1%, dc to 100 kc; ±5%, dc to 1 mc

Output capacity: ±20 v peak at 0.5 amp peak

Distortion: <0.01% at 1 kc, <1% at 100 kc, <3% at 1 mc

Input impedance: nominal, 50 K shunted by 100 pf

DC power supply

Voltage range: >±20 v, ±10 v, ±5 v, ±2 v, ±1 v; continuously variable vernier between ranges, resolution >0.1% of full output

Current: 0.5 amp

Load regulation: <10 mv for load change from 0 to 0.5 amp

Line regulation: <10 mv for ±10% change in line voltage

General

Output impedance: nominal 5 milliohms in series with 1 μh

Capacitive load: 0.01 μf or less does not cause instability

Ripple and noise: <5 mv p-p

Current limit: approx. 800 ma

Input-output: front panel, banana terminals for input, output, chassis; rear panel, BNC terminals for input, output; signal leads may be floated 200 v dc above chassis

Price: $575

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WESCON

grid-bulletin

Joint Publication/San Francisco and Los Angeles IEEE

volume 10 *july, 1965* *number 1*

1965 Executive Editor: James D. Warnock, San Francisco Section IEEE, Suite 2210, 701 Welch Road, Palo Alto, Calif.

contents

cover

The "fish eye" lens of Vanguard Photography, Hollywood, caught a unique view of last year's Wescon exhibit area at the Los Angeles Sports Arena. Next month's Wescon/65 at the Cow Palace is expected to attract 35,000 from throughout the nation, making it San Francisco's biggest annual event short of a major medical or political convention. This issue and the entire August issue of the **Grid-Bulletin** cover the show for Region 6 IEEE members.

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wescon background

PLANS IN FINAL STAGES

The West's big "annual report" on electronics, in the form of Wescon's exposition and conference, is in final stages of preparation for its week-long presentation in San Francisco next month.

The Western Electronic Show and Convention, officially four days in length starting August 24, will be extended to five days with three notable "sidebar" events. The IEEE Group on Electron Devices will offer a national symposium on the 23rd and 24th at the Fairmont Hotel, and the sixth annual International Electronic Circuit Packaging Symposium will be presented by EDN at the San Francisco Hilton on the same dates. Wescon's Distributor-Manufacturer-Representative Conference will observe its 11th anniversary on Monday, August 23, in a day-long program at the Jack Tar.

More than 35,000 visitors to the Cow Palace during the week will find other innovations in the big show and convention, particularly in technical presentations.

The 1965 technical program committee, headed by Drs. Donald A. Dunn and H. Richard Johnson, co-chairmen, and Eugene L. Rogers, vice chairman, has departed from more traditional technical convention programming. They have selected 20 "project team" discussions to make up the bulk of the four-day program. Instead of sessions made up of individually submitted papers, each session will present a group of engineers who have been associated in the same project work. The goal is to present subject areas in greater detail and depth, and to explain the relationships of various technical contributions to projects, processes, and systems.

The team sessions will be presented five-at-a-time each morning of Wescon. Afternoons will be devoted to four special, invited sessions. A fifth special session, titled "Management and Marketing of Medical Electronic Devices," will be held Thursday morning.

A third kind of "session"—made up of a continuous program of outstanding technical and scientific films—will be shown all day every day in a Cow Palace "theater."

Wescon will offer a single technical tour in its program—a two-hour tour of the SLAC installation at Stanford. Price is $2, including bus transportation from the Cow Palace and return.

The "hardware" side of Wescon, as represented by 1,050 exhibits by 725 companies and organizations, has been designed in special-interest categories for the second year. Visitors will be able to view the exhibition of new products and processes from 9:30 a.m. to 6:30 p.m. on Tuesday and Friday, and from 9:30 a.m. to 9:30 p.m. Wednesday and Thursday.

A wide variety of special, social, and business-oriented activity will add to the over-all occasion. IEEE's board of directors and other national committees will meet in San Francisco during the week and the Western Electronic Manufacturers Association will hold its annual meeting.

Wescon's Industrial Design Awards exhibit will be on display at the Cow Palace, as will the experiments of 36 student-scientists competing for scholarship awards in the Future Engineers Show. Feminine visitors will view "The San Francisco Scene" in a program of their own that includes a fashion luncheon at the Mark Hopkins, a

(Continued on page 8)

WESCON/65

Special Sessions

Session A: New Power Sources

Tuesday, August 24, 2:00 p.m.-4:30 p.m.

Three distinguished authors discuss research and development work in new sources of power.

Session Organizer: A. W. Trivelpiece, University of California, Berkeley.

Session Chairman: Douglas V. Kelley, Pacific Gas and Electric, San Francisco.

Session B: Computer-Aided Engineering Design

Wednesday, August 25, 2:00 p.m.-4:30 p.m.

Use of computers to solve or simplify engineering planning and design problems will be reviewed, and research problems and opportunities will be assessed.

Session Organizer and Chairman: J. F. Gibbons, Stanford University.

Session C: Lasers—The-State-Of-The-Art

Thursday, August 26, 2:00 p.m.-4:30 p.m.

New techniques for selective excitation of desired energy levels in gas lasers, a discussion of the characteristics and future prospects of chelate lasers, pumping methods and characteristics of semiconductor lasers and new developments in optically pumping solid-state lasers will be surveyed.

Session Organizer: Burton J. McMurtry, Sylvania Electronic Systems, Mountain View, Calif.

Session Chairman: John R. Whinnery, University of California, Berkeley.

Session D: Computer-Controlled Systems

Friday, August 27, 2:00 p.m.-4:30 p.m.

Computer systems for a variety of medical, educational, and commercial uses, including systems for information retrieval, instruction, communications, and control.

Session Organizer: R. D. Smallwood, Institute in Engineering-Economic Systems, Stanford University.

Session Chairman: W. K. Linvill, Institute in Engineering-Economic Systems, Stanford University.

Contributed Sessions

Session 1: Low-Power Integrated Circuits

Tuesday, August 24, 10:00 a.m.-12:30 p.m.

Low-power operation for integrated circuits permits use of smaller, compatible power supplies, lower operating temperature and higher reliability, and lower operating costs.

This session, organized by Westinghouse Electric Corp., discusses the trade-offs of these advantages with the problems of low-power operation, and describes some low-power applications.

Session Chairman: H. C. Lin, Westinghouse, Baltimore.

Session Director: A. Burzio, University of Santa Clara, California.

Session 2: A Militarized, High-Speed, General Purpose Parallel Computer

Tuesday, August 24, 10:00 a.m.-12:30 p.m.

A militarized, high-speed, general purpose parallel machine, representing state-of-the-art advances in compatible designs that are pointed toward a variety of applications, incorporating integrated circuits, solid-state memory and advanced packaging.

Session organized by Honeywell, Inc.

Session Chairman: C. E. Collum, Honeywell, Inc., St. Petersburg, Florida.

Session Director: John Newman, University of Santa Clara, California.

Session 3: Portable and Storage Oscilloscopes

Tuesday, August 24, 10.00 a.m.-1:30 p.m.

Papers on storage tubes, the design of storage oscilloscopes, and storage oscilloscope applications will be presented, along with a paper on the design of portable oscilloscopes with laboratory-instrument performance characteristics.

Session organized by Tektronix Inc.

Session Chairman: Orvin Olson, Tektronix.

Session Director: Michael O'Flynn, San Jose State College, California.

Session 4: Mariner/Mars Science Subsystem

Tuesday, August 24, 10:00 a.m.-1:00 p.m.

Papers describe integration of instruments into the Mariner/Mars subsystem and of the subsystem into the spacecraft, the onboard science data handling, ground data handling, television system, planetary scan system, and magnetometer.

Session organized by Jet Propulsion Laboratory.

Session Chairman: Frank L. Schutz, J. P. L.

Session Director: R. B. Yarbrough, University of Santa Clara, California.

Session 5: Brushless DC Motors

Tuesday, August 24, 10:00 a.m.-12:30 p.m.

Program will present the principles of brushless DC motor operation, modification of basic drive motors and applications, precise speed control of brushless motors, and control of brushless DC torquer for reaction wheel.

Session organized by Sperry Farragut Co.

Session Chairman: R. D. Kincer, Sperry Farragut, Bristol, Tenn.

Session Director: Lincoln D. Jones, San Jose State College, California.

(Continued on page 8)

NEW PROGRAM APPROACH

Wescon's 1965 technical program includes four special, invited sessions, a technical tour to Stanford's SLAC project, and emphasis on the new "project team" format for a majority of the 25 sessions.

Drs. Donald A. Dunn and H. Richard Johnson are co-chairmen for the program.

Dr. Dunn reported his committee's selection of four major topics for the special afternoon sessions, which are held as the feature of each afternoon during Wescon. He said the sessions will feature invited papers and/or addresses by nationally known authorities in each field.

Topics for the four sessions are "New Power Sources," "Computer-Aided Engineering Design," Lasers—the State of the Art," and "Computer Controlled Systems."

He said arrangements are progressing for a technical tour by Bay Area visitors to the SLAC linear accelerator project on the Stanford University campus. The two-mile-long accelerator, being built at a cost of $114 million on a five-and-one-half-year schedule, will produce an electron beam with an energy of 10-20 Bev (billion electron volts—double the energy of any existing accelerator). Wescon visitors will see the completed underground housing for the accelerator and the portion of the accelerator now operative.

Drs. Dunn and Johnson said that the Wescon program will include 20 contributed sessions—full, 2½ to 3-hour sessions on a single product-line, product, system, technique, or other development, to be presented entirely by the organization engineering team responsible for its development.

"Film theater sessions," being presented by Wescon for the first time, will be made up of regularly scheduled showings of outstanding technical and scientific film produced by companies, universities and research centers, and governmental agencies. They will be programmed on a continuing basis each of the four days of Wescon in a special "theater" at the Cow Palace.

Special, contributed, and film sessions are expected to make up a total technical program of about 32 sessions, Drs. Dunn and Johnson said. All sessions—except the tour—will be held in meeting rooms at the Cow Palace.

The Wescon exhibit will also be presented in the Cow Palace and adjacent buildings. The exhibit will be

(Continued on page 8)

Team session 9 will be the Norad Story. Seen here in the Norad Spadats Operations Center, Lt. Col. C. D. Mitchell, USAF, chief of the Norad briefing team, points out on the Astro-Globe the exact position in space of the latest satellite vehicle launched by the United States. It is through methods such as this that the team, referred to by many of their fellow Norad staff officers as "walking encyclopedias," maintain their up-to-the-minute knowledge of the current aerospace situation. Members of the team, from left to right: Lcdr. N. H. Scawthorn, USN; Major H. A. Davis, USAF member; Flt. Lt. L. G. Jenks, RCAF member; and Lt. Col. Mitchell.

Session 6: Field Effect Transistors

Wednesday, August 25, 10:00 a.m.-1:30 p.m.

Authors from General Microelectronics and Union Carbide will discuss FET characteristics, design of FET circuits and patterns of performance, and recent developments in complex metal-oxide-silicon FET and their application to electronic systems.

Session Chairman: R. L. Pritchard, Stanford University.

Session 7: Significant Electronic Applications and Experimental Results from Project Echo

Wednesday, August 25, 10:00 a.m.-1:30 p.m.

The session will review the mission of Echo II vertical test programs, telemetry systems and communications experiments in the Echo II program, and will include film description of television systems and sound recording tests.

Session organized by NASA Goddard Space Flight Center.

Session Chairman: H. L. Eaker, NASA/Goddard.

Session Director: Glenn H. Keitel, San Jose State College, California.

Session 8: Time Domain Reflectometry and Voltage Measurements — DC to Microwave

Wednesday, August 25, 10:00 a.m.-1:30 p.m.

This combination session will review new advances in RF millivoltmeter techniques in the first half, and include discussions of time domain reflectometry as an advanced measurement technique and design tool, in the second half.

Session organized by Hewlett-Packard Company.

Session Chairman to be announced.

Session Director: J. D. Bruce, University of Santa Clara, California.

Session 9: The Norad Story — The Aerospace Defense of the North American Continent

Wednesday, August 25, 10 a.m.-11:30 a.m.

A special NORAD briefing team will discuss and illustrate the present joint American-Canadian aerospace defense system and some of the aspects of future plans for defense of the continent.

Session Chairman: Major A. H. Davis, Jr., USAF.

Session Director: E. Polak, University of California, Berkeley.

Session 10: Electronic Packaging In The Pershing Weapon System

Wednesday, August 25, 10 a.m.-12:30 p.m.

Presentation will cover initial design, trade-off studies, packaging conceptions, material selection, reliability and quality control in the electronic packaging of the Pershing weapon system.

Session organized by the Martin Company, Orlando, Florida.

Session Chairman: J. W. Chasteen, Martin/Orlando.

Session Director: Rajinder P. Loomba, San Jose State College, California.

Session 11: Integrated Circuits

Thursday, August 26, 10:00 a.m.-12:30 p.m.

The session, organized by an engineering project team of Texas Instruments Inc., covers new circuit design packaging and applications.

Session Chairman: Charles H. Phipps, Texas Instrument, Inc.

Session Director: R. M. White, University of California, Berkeley.

Session 12: A New Generation of Data Processing Systems

Thursday, August 26, 10:00 a.m.-12:30 p.m.

The Spectra-70 series of data processing equipment is designed to provide an open-ended family of compatible data processing systems. Different equipment configurations allow application to commercial, scientific, multi-computer, communications-oriented, and other information processing systems. An RCA engineering team will discuss all design, construction, language, and other technical considerations of the series.

Session Chairman: Harry Kihn, RCA/Princeton.

Session Director: R. B. Marxheimer, San Francisco State College.

Session 13: Laser Applications

Thursday, August 26, 10:00 a.m.-12:30 p.m.

Aspects of modern optical systems of interest to electrical engineers including devices and techniques for generation, modulation, demodulation, propagation, spacial filtering, optical data processing, and wave front reconstruction will be described. Laser application programs in the U. S. will be reviewed and current Stanford work in several areas will be discussed and demonstrated.

Session organized by Stanford Electronics Laboratories, Stanford University.

Session Chairman: W. H. Huntley, Stanford University.

Session 14: Trends in Aerospace Communications and Telemetry

Thursday, August 26, 10:00 a.m.-12:30 p.m.

Session covers a series of related and advanced development projects currently in progress. Five papers will review achievements to date and relate program objectives to future needs in space communications and telemetry.

Session organized by Lockheed Missiles & Space Co., Sunnyvale, California.

Session Chairman: D. Hochman, Lockheed/Sunnyvale.

Session 15: (Special Session) Manufacturing and Marketing of Medical Electronic Devices

Thursday, August 26, 10:00 a.m.-12:30 p.m.

An introductory paper and two panel presentations will cover various aspects of needs and trends in medical electronics.

Session Organizer and Chairman: Noel P. Thompson, M.D., M.S.E.E., Palo Alto Medical Research Foundation.

Session 16A: Latest Concepts and System Applications of Single Crystal Thin Film Semiconductors

Friday, August 27, 10:00 a.m.-12:00 Noon

Series of seven papers will cover the concepts, material fabrication techniques and latest device and systems applications of single crystal

(Continued on page 12)

MORE PLANS

floral arrangement program, and a tour of Wescon itself.

The social side will be highlighted by the all-industry cocktail party Tuesday evening at the Hilton, and a "no-speech" dinner-dance, also at the Hilton, on Thursday night.

If traditional patterns are followed, attendance at Wescon will come from throughout the United States and a dozen foreign nations. A contingent of about 10,000 engineering visitors will travel north from Los Angeles for the show, aided by extra airline services produced under a Wescon "Jet Set" air-commuter program.

Registration at the door is $2 per person, and includes admittance to all technical programs and exhibits throughout the week. Many organizations are making a "guest registration" card available to employees and colleagues at a reduced organizational rate (for qualifying groups) of 50 cents per person.

MORE PROGRAM

open two evenings—Wednesday and Thursday, August 25 and 26—an increase from the one-evening exhibit schedule of past years, according to Don Larson, general manager.

When this headline was current news...
digital recording tapes
had a packing rate of 200 bpi.

Today, 800 bpi is standard;
improvement in tape and base is the reason.

In analyzing the sensational development of EDP over the past decade, most of us naturally talk in terms of improvement of hardware. But when you stop to examine them, the contributions made by tape manufacturers have been quite remarkable.

The tape of today *looks* like the tape of 1954 . . . but think of the differences: improved oxide coatings to increase total capacity, reduce fluctuations in performance; much stronger binders to reduce dropouts and flaking, lengthen tape life; smoother surfaces to give longer, error-free wear; thinner coatings and better production controls to guarantee reel-to-reel uniformity.

Working hand in hand with the tape manufacturers during this time has been Du Pont. Improvements in the uniformity, stability and overall reliability of the base of MYLAR* have played a vital role in making possible the sophisticated tape in use today. Continuing cooperation of research and development facilites assures continuing improvements in the future. Your guarantee of the most advanced tape is the manufacturer's brand and a base of MYLAR polyester film.

*Du Pont's registered trademark for its polyester film.

DU PONT

only DU PONT makes MYLAR® POLYESTER FILM

Better Things for Better Living...through Chemistry

At the base of all tape improvements: Mylar®

Contributed Sessions

thin film epitaxially-deposited semiconductors on insulating substrates.

Session organized by Autonetics Division of North American Aviation, Inc.

Session Chairman: Arnold Miller, Autonetics Division, Anaheim.

Session 16B: A Failure Mechanism of Gold/Integrated Circuit Bonds

Friday, August 27, 12 Noon-2:00 p.m.

An Autonetics' project team will discuss work in which a failure mode of gold-aluminum thermal compression bonds used in integrated circuits has been detected and the mechanism metallurgically analyzed.

Session Chairman: D. G. Cummings, Autonetics Division of North American Aviation.

Session 17: Computer-Controlled Industrial Systems

Friday, August 27, 10:00 a.m.-12:30 p.m.

Analog, digital and hybrid computer process control systems will be discussed and compared in terms of applications and potential applications.

Session organized jointly by University of Santa Clara, Santa Clara, Calif., and Electronic Associates, Inc., Palo Alto.

Session Chairman: Richard C. Dorf, University of Santa Clara.

Session 18: Advanced Techniques In Memory Design

Friday, August 27, 10:00 a.m.-1:30 p.m.

Eight authors will discuss and describe Ampex' programs in design, application, and testing of various recording and memory techniques and equipments.

Session Chairman: Lane Wolman, Ampex Corporation.

Session Director: C. A. Desoer, University of California, Berkeley.

Session 19: Synchronous Satellite Technology

Friday, August 27, 10:00 a.m.-12:30 p.m.

Electronic design and system performance in Hughes Aircraft's continuing synchronous satellite program will be reviewed by four authors.

Session Chairman: F. P. Adler, Hughes Aircraft Co.

Session Director: Harry M. Engwicht, San Jose State College, California.

Session 20: Trends In Power Supply Design

Friday, August 27, 10:00 a.m.-12:30 p.m.

Session covers state-of-the-art and future design trends of aerospace electrical power conditioning systems and component design, as presented by an engineering team from Engineered Magnetics Division of Gulton Industries, Hawthorne, California.

Session Chairman: Donald L. McDermott, Engineered Magnetics.

Session Director: Byron Thinger, San Francisco State College.

wescon background

BLUE RIBBON COMMITTEE

Wescon next month will have a special significance for about 400 persons, most of them from the San Francisco Bay Area.

They are the volunteer committeemen who have carried out a major share of the work in organizing one of the nation's largest trade/technical events. The 15 committees, each armed with a budget and a series of "checkpoint" deadlines, have been working since January in every facet of the planning—from transportation to audio-visual aids, and from the Future Engineers Show to the annual dinner-dance.

For the "invasion" of about 35,000 visitors, the requirements are very sizeable. For example, the shuttle-bus service, continuous throughout Wescon (and preceding it and following it, too), would rival most suburban metropolitan schedules. Wescon also requires a total of 10 information centers at the airport, in hotels, and at the Cow Palace, and visitors will use up hotel/motel space in an area stretching from San Jose well into Marin County.

All visitors have to be registered, badged, ticketed, housed, and directed

(Continued on page 14)

CONCURRENT SESSIONS

For the first time, concurrent symposia are being held during Wescon week. Two have been scheduled: the IEEE Group on Electron Devices will hold a two-day symposium August 23 and 24 at the Fairmont Hotel; and the International Electronic Circuit Packaging Symposium (presented by EDN) will be held August 23 and 24 at the San Francisco Hilton. Wescon is cooperating with both technical events.

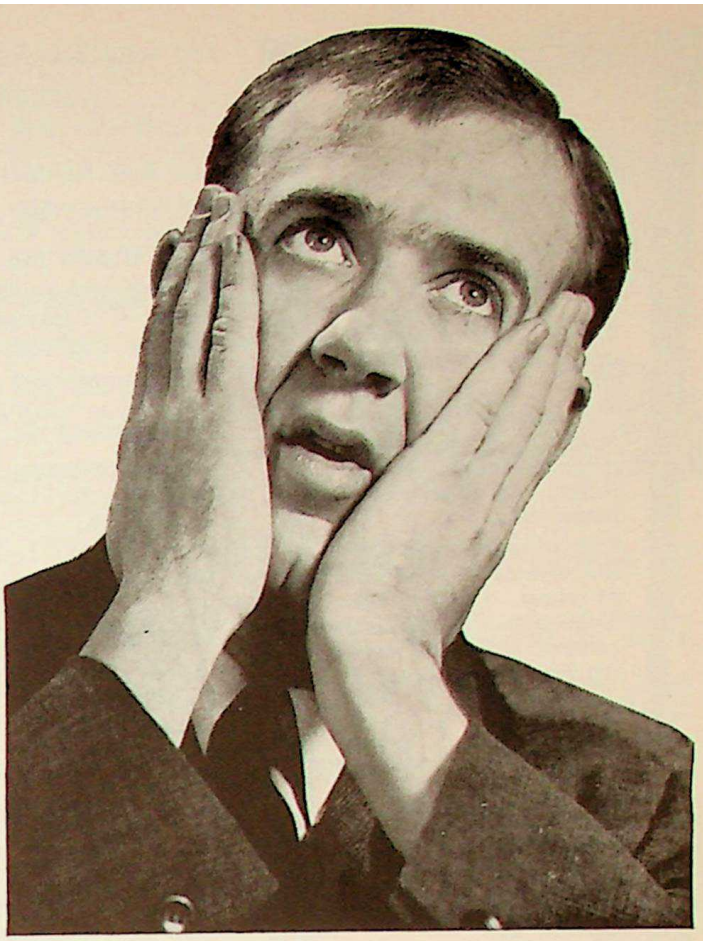
Attendance: chairman, Emmet G. Cameron, Varian Associates; vice-chairman, William A. Edson, Electromagnetic Technology Corp. Banquet: chairman, William A. Melchior, Eichorn & Melchior, Inc.; vice-chairman, David Steinberg, Lenkurt Electric Co.

Cocktail Party: chairman, A. George Ewing, Lenkurt Electric Co., vice-chairman, Tom Sege, Eitel-McCullough, Inc. Distributor-Manufacturer-Representative Conference: chairman, V. N. Zachariah, Zack Electronics; vice-chairman, David H. Ross, David H. Ross Company.

Exhibits: chairman, Harry J. Lewenstein, Hewlett-Packard Co., vice-chairman, Emmett N. Brownell, Varian Associates. Facilities: chairman, Karl W. Bizjak, General Electric Co.; vice-chairman, Robert Wardwell, Exactel Instrument Co.

Future Engineers Show: co-chairmen, E. W. Pappenfus, Granger Associates, and D. R. Scheuch, Stanford Research Institute. Hospitality: co-chairmen, Albert J. Morris, Energy Systems Inc., and John V. N. Granger, Granger Associates.

Industrial Design: chairman, Edward W. Vopat, Varian Associates; vice-chairman, Dale Gruye, Gruye-Brandt & Associates. Public Relations: chairman, Gregg Perry, Ampex Corp.; vice-chairman, David Kirby, Hewlett-Packard Co.



Relief is in sight for tired businessmen {or technical men} on the West Coast who must specify or buy servo motors for defense, aerospace or industrial applications

(See page 15)

wescon background

WESCON BOARD

Two new directors joined the Wescon board late in 1964.

John J. Guarrera, president of Guide Manufacturing Co. of North Hollywood, Calif., and William J. Moreland, general manager of Conrac Division of Giannini Controls, joined Wescon's eight-man volunteer board.

The executive committee of the board, who will direct the staging of the 1965 Wescon, includes John Chartz, executive vice president of Dalmo Victor Co., Belmont, Calif., who is chairman of the executive committee; Meyer Leifer, vice president of operations, Energy Systems Inc., Palo Alto, chairman of the board; John S. McCullough, Litton Industries, San Carlos, Calif., convention director; and Phillip L. Gundy, executive vice president of Technical Systems Inc., Palo Alto, show director.

Leifer, who previously served as a Wescon director, succeeded Edward W. Herold, who resigned because he left the western area.

Both new directors, Guarrera and Moreland, represent the Southern California area. They join Hugh P. Moore, president of Computer Equipment Corp., and Ralph Lamm, Bendix Pacific, as Southern members on the board.

Traditionally, Wescon is made up of four members each from Southern California and Northern California. Two each from each region represent IEEE, and two represent WEMA, Wescon's co-sponsors.

The executive committee, drawn from the host city for Wescon each year, in 1965 includes Leifer, Chartz, Gundy, and McCullough, plus Don Larson, Wescon general manager.

Wescon's exhibit will include about 1,100 exhibit booths, representing about 710 companies.

All exhibits and the Wescon technical program will be held at the Cow Palace. There is no "official" hotel, but Wescon special events will be held in several hotels.

MORE COMMITTEES

through four days of regular and special programming, social events, and side trips. More than 120 committeemen and women have worked since January. The committees will be supplemented by about 275 more volunteers during August.

Registration: chairman, Thomas A. Christiansen, Hewlett-Packard Co., vice-chairman, L. E. Henninger, Philco Corp., WDL Div. Technical Program: co-chairmen, Donald A. Dunn, Stanford Electronics Laboratory, and H. Richard Johnson, Watkins-Johnson Co.

Visitors Services: chairman, Fred J. MacKenzie, Stanford Research Institute; vice-chairman, Martin Wank, Ray-Tek, Inc. Women's Activities: chairman, Mrs. Stanley F. Kaisel; vice-chairman, Mrs. E. E. van Bronkhorst.

Wescon executive committee, directly responsible for this year's show and convention, are those above and Don Larson, Wescon general manager. Left to right are Phillip L. Gundy, show director, president of Vega Electronics Corp., Palo Alto; John S. McCullough, convention director, president of Litton Industries Microwave Group, San Carlos; John A. Chartz, chairman of the Wescon executive committee, executive vice president, Dalmo Victor Co., Belmont; and Meyer Leifer, chairman of the Wescon board, vice president-operations of Energy Systems, Inc., Palo Alto. In addition to Larson, they are aided by key Wescon staff members Ted Shields, assistant general manager, and Donel Davis, exhibit manager.

Members of the Wescon board who will have prime responsibility for the 1966 event to be held in Los Angeles are, left to right, Ralph A. Lamm, manager advanced requirements, Bendix Pacific Division, North Hollywood; Hugh P. Moore, president, Computer Equipment Corp., Los Angeles; John J. Guarrera, president, Guide Industries, Sun Valley; and W. J. Moreland, vice president, Giannini Controls Corp., Glendora.

Film Sessions

The following program of technical/scientific films will be presented daily, Tuesday through Friday, August 24-27, starting at 10:00 a.m. Films were selected from among submissions to WESCON.

Film Session Organizer: Matt Lehmann, Stanford University.

Session 1: Novel Electronic Devices
10:00 a.m.

Session 2: Novel Electronic Systems
10:45 a.m.

Session 3: New Solutions to Old Problems
11:30 a.m.

Session 4: General Information Films
12:45 p.m.

Session 5: Packaging Systems Using Microelectronics
Tuesday, August 24, 2:30-5:15 p.m.

International Electronic Circuit Packaging Symposium

August 23-24, San Francisco Hilton

This is the sixth International Electronic Circuit Packaging Symposium presented by EDN. It includes five technical sessions in the two days, all at the San Francisco Hilton. Advance registration per the enclosed folder, or at the San Francisco Hilton starting Aug. 22.

Session 1: Lasers At Work In Electronic Packaging
Monday, August 23, 11:00 a.m.-12 Noon

Session 2: Packaging for High-Speed Electronic Systems
Monday, August 23, 1:15-2:45 p.m.

Session 3: Interconnection Technology
Monday, August 23, 3:15-5:15 p.m.

Session 4: Microelectronic Packaging Techniques
Tuesday, August 24, 9:00 a.m.-12:00 Noon and 1:30-2:30 p.m.

Electronic Devices Tutorial Symposium

August 23-24, The Fairmont Hotel, San Francisco

This national symposium is being presented concurrent with WESCON by the IEEE Group on Electron Devices. It includes three half-day sessions at the Fairmont Hotel. Registration for the symposium will be at the Fairmont on Sunday, August 22, and Monday, August 23. Price: $3 for GED members, $5 for non-members. Preprint of the full symposium proceedings will be available at the Fairmont, at $5 each.

Tutorial Session 1:
Monday, August 23, 2:00-5:00 p.m.
Session Chairman: Gordon E. Moore, Fairchild Semiconductors, Mountain View, Calif.

Tutorial Session 2:
Tuesday, August 24, 9:00 a.m.-12:00 Noon
Session Chairman: Jack Sommerville, General Electric Company, Owensboro, Kentucky.

Tutorial Session 3:
Tuesday, August 24, 2:00-5:00 p.m.
Session Chairman: Peter B. Myers, Bunker Ramo, Canoga Park, Calif.

INDUSTRIAL DESIGN AWARDS

Eight San Francisco Bay Area industrial designers have been named to direct Wescon's annual Industrial Design Awards program to be held at the show and convention.

Edward Vopat, Varian Associates, chairman of the IDA committee, said that about 250 entries in the competition were received.

Vopat and his vice chairman, Dale Gruye (Gruye-Brandt Associates), have named a committee that includes Al Inhelder, head of industrial design, Hewlett-Packard Co.; Roy Ozaki, also of Hewlett-Packard; John Marsh and Tom Hisata of Hisata, Ishimuru, Montgomery, and Marsh; and Frank Walsh and Bob Bornschlegel, both of Ampex.

Entries were judged by an independent jury of designers. They selected about 30 product designs for the IDA exhibit at Wescon. From this final group, additional award-winning products will be chosen.

NEW EVENING HOURS

The Wescon show will be open to visitors two evenings — Wednesday, August 25, and Thursday, August 26 —until 9:30 p.m.

Wescon's industrial design awards program drew 150 product entries. Five prominent judges selected 17 for exhibit at Wescon, in an all-day judging session at Ampex Corp. Frank T. Walsh holds the award medallion, with model of IDA design area in foreground. Judges are, left to right: Frank T. Walsh, chairman; John Crane, Jack Crist, Cornelius Sampson, and John Duddy.

wescon background

PACKAGING SYMPOSIUM

The sixth annual International Electronic Circuit Packaging Symposium will be held concurrent with Wescon in cooperation with Electrical Design News, which sponsors the symposium.

Approval of a plan whereby the symposium will be presented by EDN, concurrently with Wescon itself, was voted by directors. The symposium will be held August 23 and 24 (Monday and Tuesday) in the new San Francisco Hilton Hotel.

The event is the first separate technical conference to be presented at the same time as Wescon under a plan in which Wescon will cooperate in such matters as pre-registration, visitor housing, information services, and promotion, it was noted by John Chartz, Wescon executive committee chairman.

The packaging symposium will present between 25 and 30 papers in its two-day program. A paper selection committee was headed by Glen Boe. L. L. Rosine, EDN editor, said an attendance of about 500 packaging specialists is expected to attend.

The entire program will be held at the Hilton, including luncheons on each of the two days. There will be no exhibits, Rosine said.

Registrants for the symposium will be registered for the full Wescon program as well, Chartz noted. The registration fee will include the symposium and Wescon registration fees, the two luncheons, and a copy of the preprinted symposium proceedings.

Packaging papers, presented at the symposium and determined to be of broad general interest to the over-all electronics industry, may be selected for Wescon's larger technical program.

SPECIAL EVENTS

The special events at Wescon will include: The 11th Annual Distributor-Manufacturer-Representative Conference at the Jack Tar Hotel August 23; the Future Engineers Show and program, and about 35 student participants from 13 western states; the 7th Wescon Industrial Design Awards program. The all-industry cocktail party will be held August 24 at the San Francisco Hilton, and the Wescon dinner-dance will be held August 26, also at the Hilton.

EXTRA BUS SERVICE

Wescon will operate continuous shuttlebus service at no charge between downtown, airport, and Cow Palace locations during show hours every day.

southland social note

SAN FERNANDO VALLEY

The annual installation dinner dance of the San Fernando Valley Section will be held at the Woodland Hills Country Club on July 17. The affair, which is always the high point of the year for valley members, will have an oriental theme. Dress is casual; prizes will be awarded for the best costume.

The program for the evening will start with cocktails at 6:00 and dinner at 7:30. There will be a brief business meeting for the installation of the new officers who are: Chairman: Don Lebell; Vice Chairman: Bill Lamb; Secretary: Bill Wilson; and Treasurer: Paul Alpine.

Attendance is limited to 200 persons and reservations are required. Checks should be made payable to S.F. Valley, IEEE and mailed to either K. W. Marsh, 8936 Garden Grove, Northridge, Calif., or IEEE Business Office, 3600 Wilshire Blvd., Los Angeles, Calif.

The Woodland Hills Country Club can be easily reached by taking the Ventura Freeway to Topanga Canyon, south on Topanga Canyon to Dumetz, then east on Dumetz to the club.

INSTALLATION DINNER AT MUSIC CENTER

Members of the Los Angeles District met for their third annual installation dinner on June 11 in the new Los Angeles Music Center.

A highlight of the evening was a talk by the president of the IEEE, Dr. Bernard Oliver, vice president in charge of research and development, Hewlett-Packard Company, Palo Alto.

Dr. Oliver's talk, "What's Ahead in Radio-Astronomy," detailed the progress made in the field during the past several years. He indicated that spectacular improvements in radio telescopes are technically possible and would undoubtedly lead to new understanding of the universe, and even possibly to discovery of other intelligent life.

Installed as new 1965-1966 officers of the Los Angeles District were Chairman, Edward C. Bertolet, Behlman-Invar Electronics Corp., Santa Monica; Vice Chairman, G. R. Woodman, Southern California Edison Company; Secretary, Charles M. Edwards, Bendix Corporation; Treasurer, Everett C. Ross, City of Riverside Public Utilities Department. Members-at-large elected for two-year terms are John D. Rosenblatt, Bechtel Corporation, and John W. Thatcher, Jet Propulsion Laboratory, Pasadena.

Oliver *Bertolet*

In addition to being installed as chairman of the Los Angeles District IEEE, Bertolet was honored by the district with a trophy. The award was given for his "warm and capable leadership for four years on the board of the Western Electronic Show and Convention." Last year he was chairman, board of directors of Wescon.

Bertolet has been an enthusiastic supporter of Los Angeles IEEE activities for more than 17 years. In 1959 he received the former Los Angeles IRE section recognition award for his work in helping organize its business office. He was chairman of the publicity committee, 1956-58.

PRE-PRINTS AVAILABLE

Preprints of all papers to be delivered at Wescon will be available to visitors at Wescon.

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Wescon programs and plans are developed by volunteer committees totalling 400 members, who represent Wescon's two sponsors, the Western Electronic Manufacturers Association; and Region 6 of IEEE, represented by the Los Angeles District and San Francisco Section.

ENGINEERS AND SCIENTISTS

Can you advance the precision of digital guidance in space?

Our Guidance and Controls Division, which is contributing to such major contracts as Polaris, Phoenix, Surveyor and VATE, is continuing its expansion into areas which will present the greatest challenge for the foreseeable future — advanced aerospace guidance and navigation digital computers and advanced interceptor computers./Openings exist in a wide variety of disciplines in Laboratories which are responsible for advanced technology, preliminary design and applications, and digital circuitry and components. All of these require accredited degrees and a demonstrable capacity to do creative design or analysis. Although experience is required for most of the positions, several are open to recent graduates./Opportunities are immediately available for:

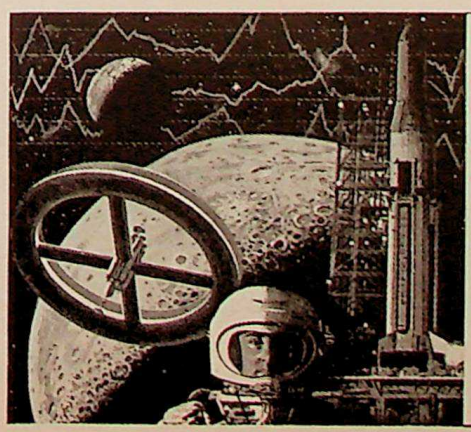
Preliminary Design Engineers: Experience in Digital Systems Applications Engineering, Logical Design, Memory Design (solid state, ferrite or drum) Electro-mechanical Design Engineering, or Physical Product Design—cold plate coating, thermal analysis, packaging trade-off studies—would be particularly helpful.

Automatic Test Program Analysts: Systems test, in-flight self test, time-sharing or maintenance depot experience would be directly applicable to our opening. A basic understanding of the mathematics involved with circuitry and computers or weapons systems analysis would be of particular value.

Circuit Design Engineers: Duties would involve the design of logic circuits, many forms of input output devices, high reliability low power circuits for spacecraft VHF and UHF counters.

Systems Integration Engineers: Experience is required in such areas as system integration, system checkout, test equipment design, test specification and procedure writing.

There are several openings also for Mechanical Engineers, Physicists, Reliability Engineers and Mathematicians who have acquired specialized, professional experience which is directly applicable to the design or analysis of aerospace digital systems.



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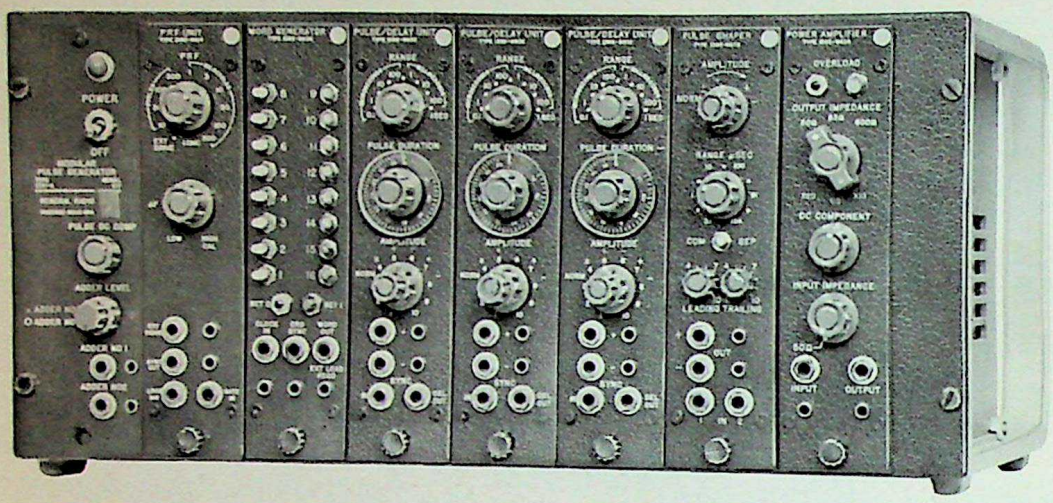
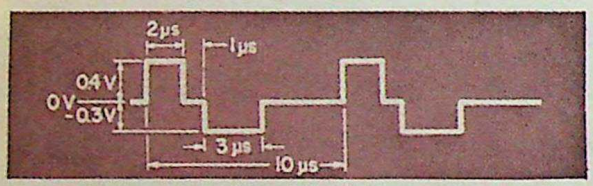
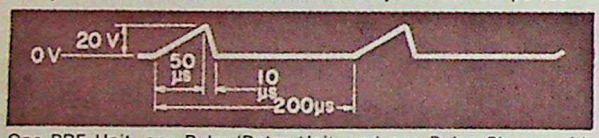


Type 1395-A Modular Pulse Generator containing three Pulse/Delay Units and one each of the PRF Unit, Word Generator, Pulse Shaper, and Power Amplifier modules.

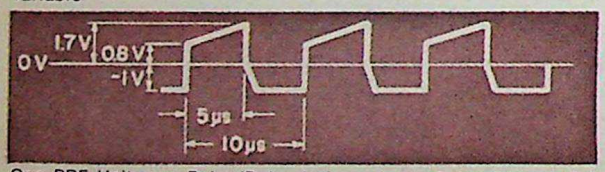
PULSES MADE TO ORDER



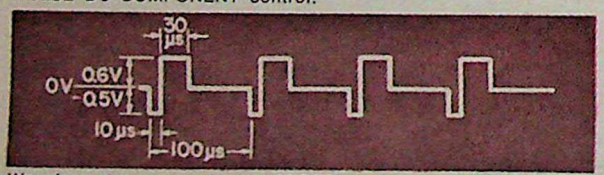
One PRF Unit and three Pulse/Delay Units operating at 100 kc/s. The positive and negative pulses are controlled by separate Pulse/Delay Units; the third unit controls the delay between the pulses.



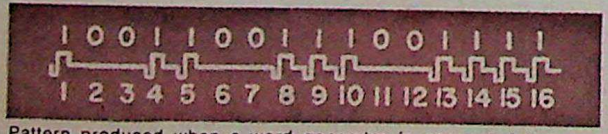
One PRF Unit, one Pulse/Delay Unit, and one Pulse Shaper with the PRF Unit set for 5 kc/s. Rise and fall times are independently variable



One PRF Unit, one Pulse/Delay Unit, and one Pulse Shaper. Prf is 100 kc/s, and the zero-volt level is adjusted by the main chassis PULSE DC COMPONENT control.



Waveform that appears at the ADDER No. 1 terminal with one PRF Unit driving two Pulse/Delay Units at 10 kc/s. Amplitudes and durations of positive and negative pulses can be independently adjusted.



Pattern produced when a word generator is connected between the PRF Unit and the first Pulse/Delay Unit of the example given above, with switches set as shown.

This new pulse generator can produce thousands of different pulse shapes as single pulses, in bursts, or as trains of pulses. You can even form the desired pulses into binary patterns or words up to 112 bits long. The pulses can be amplified internally, delayed in time, or have noise or sine waves added to them. Amplitudes, durations, and delays of all segments of complex pulses are independently controllable; positive and negative outputs are available simultaneously. Whatever you may need — rectangular pulses, doublets, pulses with pedestals, ascending staircases, descending staircases, triangles, trapezoids, etc. — this instrument can do the job for you.

This instrument has been designed in modular form so that you can order only the pulse-generating capability you require. The various circuits that generate and shape the pulses are packaged in five separate modules, and as many as seven of these can be inserted in the main frame of the generator.

The main frame contains a power supply and other circuits that are common to all modules. As each module is inserted, electrical connections are made through mating of a plug and jack. Two ADDER busses with their corresponding output controls and jacks are included on the main frame to provide signals that represent the "sum" of outputs from the individual modules.

Modules from which you can now custom build your own pulse generator include:

PRF UNIT — provides internally generated repetition rates from 2.5 c/s to 1.2 Mc/s, from dc to 2 Mc/s when driven externally. Price: $150

PULSE/DELAY UNIT — delays input pulses from 100 ns to 1 second and adjusts amplitude, polarity, and duration. Price: $165

PULSE SHAPER — adjusts rise and fall times from 100 ns to 10 ms, either individually or simultaneously. Limit of 3 per frame. Price: $375

POWER AMPLIFIER — delivers 20-volt pulses of either polarity into a 50-ohm load. Limit of one per frame. Price: $250

WORD GENERATOR — produces binary words up to 16 bits long; as many as seven modules can be cascaded to provide 112-bit capability. Price: $400

MAIN FRAME (without modules) — Price: $500

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