EDITOR'S PROFILE of this issue

from a historical perspective …

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

August, 1967:
Cover: The focus is on WESCON, being held at the San Francisco Cow Palace.

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

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

grid-bulletin

San Francisco Section IEEE • August 1967

Wescon67

AUGUST 22, 23, 24, 25

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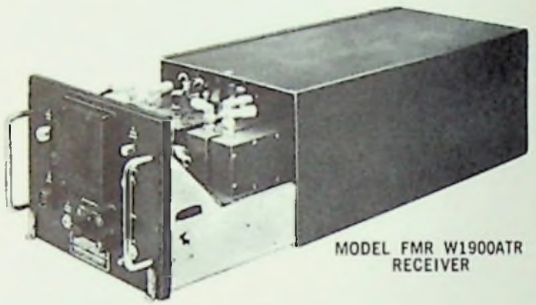

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AN EQUAL OPPORTUNITY EMPLOYER

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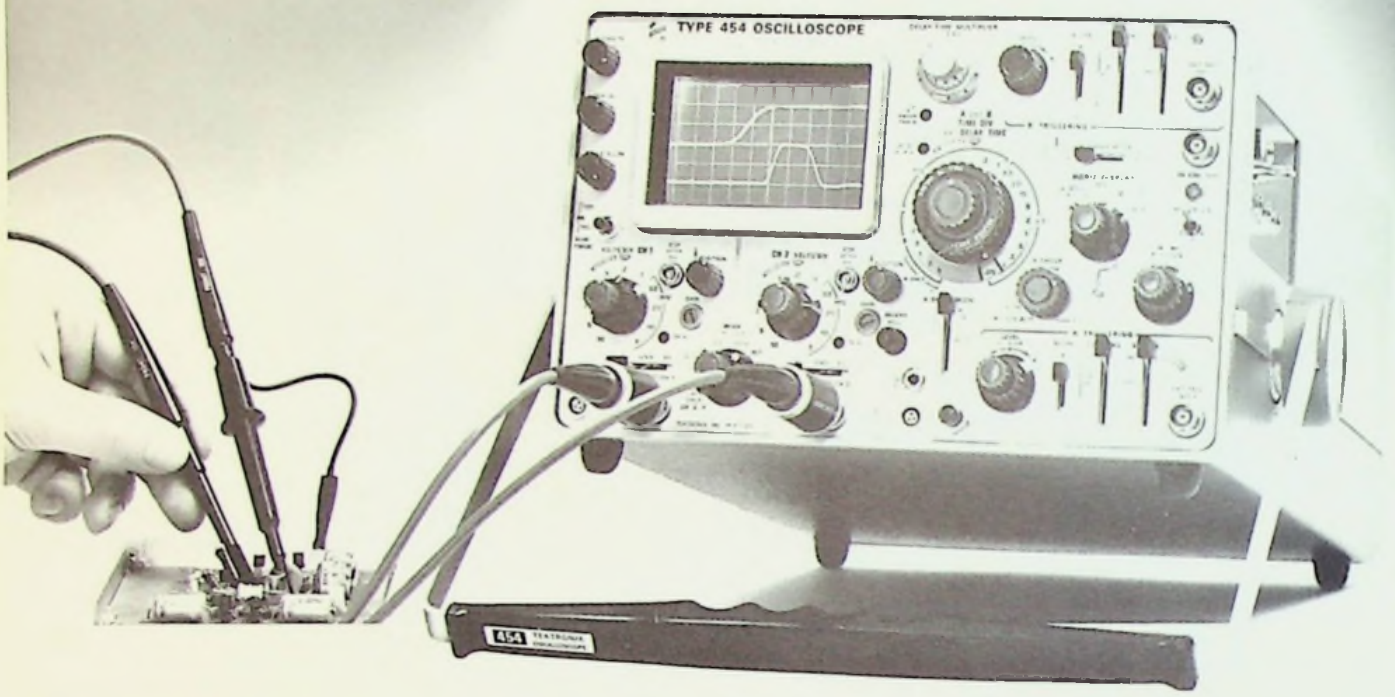
150 MHz, 2.4 ns

New performance from probe tip to CRT!



The Tektronix Type 454 is an advanced new portable oscilloscope with DC-to-150 MHz bandwidth and 2.4-ns risetime performance where you use it — at the probe tip. It is designed to solve your measurement needs with a dual-trace vertical, high performance triggering, 5-ns/div delayed sweep and solid state design. You also can make 1 mV/div single-trace measurements and 5 mV/div X-Y measurements.

The vertical system provides the following dual-trace performance, either with or without the new miniature P6047 10X Attenuator Probes:

*Deflection Factor**	*Risetime*	*Bandwidth*
20 mV/div to 10 V/div	2.4 ns	DC to 150 MHz
10 mV/div	3.5 ns	DC to 100 MHz
5 mV/div	5.9 ns	DC to 60 MHz

*Front panel reading. With P6047 deflection factor is 10X panel reading.

The Type 454 can trigger internally to above 150 MHz. Its calibrated sweep range is from 50 ns/div to 5 s/div, extending to 5 ns/div with the X10 magnifier on both the normal and delayed sweeps. The delayed sweep has a calibrated delay range from 1 μs to 50 seconds.

For further information, contact your nearby Tektronix field engineer, or write: Tektronix, Inc., P. O. Box 500, Beaverton, Oregon 97005.

Type 454 (complete with 2 P6047 and accessories)	$2550
Rackmount Type R454 (complete with 2 P6047 and accessories)	$2635
New Type 200-1 Scope-Mobile® Cart	$ 60

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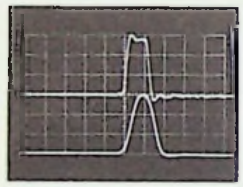
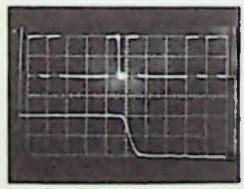


10 ns/div



Double Exposure

150 MHz AM

Pulse fidelity

This double-exposure photograph shows the same 12-ns-wide pulse displayed on the Type 454 (upper display) and on a 7-ns, 50-MHz oscilloscope (lower display). Note the difference in detail of the pulse characteristics displayed on the Type 454 with its 2.4-ns risetime performance.

5 ns/div delayed sweep

The delayed sweep is used to measure individual pulses in digital pulse trains. The Type 454 with its 1 μs-to-50 s calibrated delay time, 5-ns/div sweep speed and 2.4-ns risetime permits high resolution measurements to be made. Upper trace is 1 μs/div; lower trace is 5 ns/div.

X-Y

The upper display is a 150-MHz signal that is 50% modulated by a 2 kHz signal. The lower display is an X-Y trapezoidal modulation pattern showing the 150-MHz AM signal vertically (Y) and the 2kHz modulation signal horizontally (X). Straight vertical line is the unmodulated carrier. Multiple exposure.

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Volume 12 No. 2

August 1967

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contents

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WESCON DIRECTORS

In the years that WESCON has grown from a "jewel-box" show to one of the largest and most diversified technical expositions in the world, perhaps the most consistent contributors to the progress have been 38 men who have never received much more than a handshake for their efforts.

The 38 members of that exclusive group are the past and present directors of the show and convention — all volunteers for terms that most often lasted four years, and in some cases more.

The list reads something like a progress report on western electronics itself, starting nearly two decades ago. The "duty includes a schedule of at least five full-day board meetings each year, plus subcommittee work, supervision of all other working WESCON committees, public addresses and appearances, liaison with the IEEE sections or with WEMA, and dozens of other policy-making as well as shirtsleeve jobs.

Past and present directors, listed approximately chronologically according to the years they served, include:

Noel W. Eldred, Howard G. Grove, Richard G. Leitner, Richard A. Huggins, Leon B. Ungar, Noel E. Porter.

Walter E. Noller, W. D. Hershberger, Thomas P. Walker, Frederick C. Wolcott, Norman H. Moore, Gramer Yarbrough.

E. P. Gertsch, Bernard M. Oliver, H. Myrl Stearns, L. W. Howard, Hugh P. Moore, Walter E. Peterson, Albert J. Morris.

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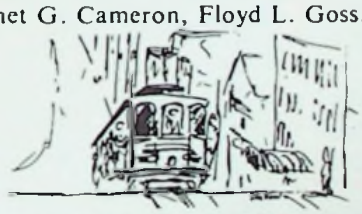


cover & credits

The sights and sounds of WESCON and San Francisco again await members of Region 6 in August. Cover: Photos, S.F. Convention & Visitors Bureau, Hal Lawrence, Inc., Roger Kennedy; Design, H. Kappelhof, J. Factotum. Editorial: WESCON data and photos, Ted Shields; sketches, Dale Zamzow. Typography & make-up: Iconotype. Printing: Thomson Lithograph.

Wescon67

SHUTTLE BUS SERVICE

Free shuttle bus service to the Cow Palace and return will be available at the following points:

Downtown Airline Bus Terminal (375 O'Farrell Street, corner of Taylor, adjacent to the San Francisco Hilton Hotel)

Fairmont Hotel (Mason Street side)

Jack Tar Hotel (Van Ness Street side)

Townehouse Hotel (8th Street, corner of Market)

San Francisco International Airport (bus zone, lower level)

In order to establish speeded-up service, a special arrangement has been made to provide every-ten-minute service both ways between the Downtown San Francisco Airline Bus Terminal and the Cow Palace. Feeder buses will bring hotel guests to the Terminal from the Fairmont, Jack Tar and Townehouse. The following is the frequency of the service:

Departure Point	Starting Hour	Frequency	Destination
Downtown Airline Bus Terminal	*8:00 a.m.*	*Every 10 minutes*	*Cow Palace*
Fairmont Hotel	*7:45 a.m.*	*Every 15 minutes*	*Airline Bus Term.*
Jack Tar Hotel	*7:30 a.m.*	*Every 30 minutes*	*Airline Bus Term.*
Townehouse Hotel	*7:40 a.m.*	*Every 30 minutes*	*Airline Bus Term.*
San Francisco International Airport	*8:00 a.m.*	*Every 30 minutes*	*Cow Palace*

This service operates Tuesday through Friday, August 22-25, until one-half hour after closing of exhibits each night. (Tuesday, Thursday and Friday closing at 5:30 p.m., and Wednesday closing at 9:30 p.m.).

Wescon67

SPECIAL LADIES' BUS

A special Peninsula round-trip bus has been arranged for the ladies' luncheon and house tour on Thursday, August 24, and will leave Stanford Shopping Center from a spot near I. Magnin's at 9:45 a.m. Bus fare is $1.00.

Fee for the luncheon at Sabella's on Fisherman's Wharf and tour of five Pacific Heights homes (with Joseph Magnin fashions being shown at each home) is $8.50.

Mrs. Stanley Kaisel will serve as advisor to Mrs. Philip J. Rice and Mrs. Robert DeLiban and their women's activities committee.

SPECIAL PENINSULAR BUS SERVICE

The following schedule will operate between Rickey's Hyatt House in Palo Alto and the Cow Palace:

	Lv. Rickey's Hyatt House	Ar. Cow Palace	Lv. Cow Palace	Ar. Rickey's Hyatt House
Tuesday	*8:00 a.m.*	*9:15 a.m.*	*9:30 a.m.*	*10:30 a.m.*
Aug. 22	*10:45 a.m.*	*11:45 a.m.*	*12:15 p.m.*	*1:15 p.m.*
	1:30 p.m.	*2:30 p.m.*	*5:00 p.m.*	*6:15 p.m.*
Wednesday	*8:00 a.m.*	*9:15 a.m.*	*9:30 a.m.*	*10:30 a.m.*
Aug. 23	*10:45 a.m.*	*11:45 a.m.*	*12:15 p.m.*	*1:15 p.m.*
	1:30 p.m.	*2:30 p.m.*	*4:00 p.m.*	*5:15 p.m.*
	6:00 p.m.	*7:00 p.m.*	*10:00 p.m.*	*11:00 p.m.*

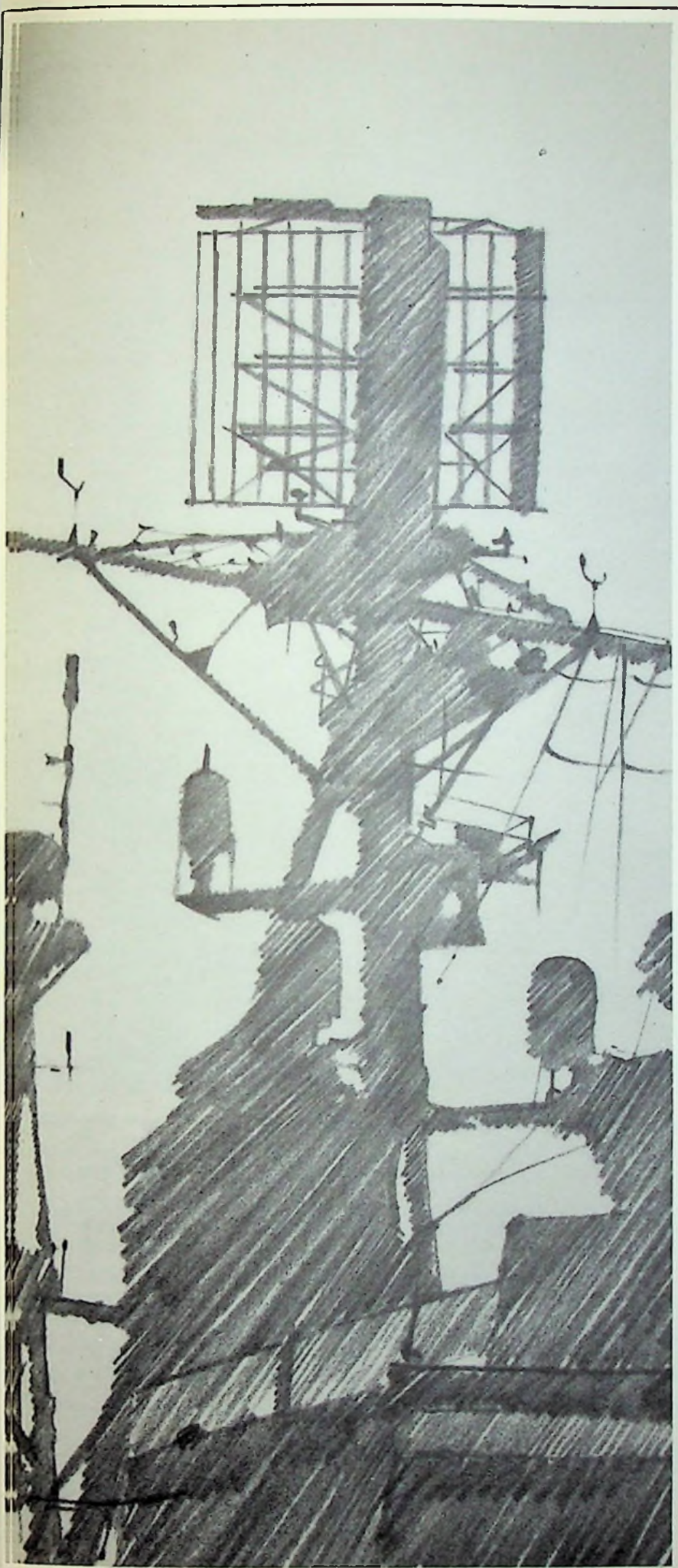
Thursday, August 24, and Friday, August 25—Same as Tuesday, August 22.

SPECIAL EXHIBITOR BUS SERVICE

To accommodate exhibitors during move-in and move-out of exhibits, buses depart from the Downtown San Francisco Airline Bus Terminal every half hour during the following days:

Monday, August 21	*7:30 a.m. to 10:00 p.m.*
Friday, August 25	*7:00 p.m. to 11:00 p.m.*
Saturday, August 26	*8:00 a.m. to Noon*

(No connecting buses to hotels will operate during the above hours)



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QUICK-CHECK LIST OF WESCON, WEMA, RELATED MEETINGS

EVENTS—TIME—PLACES

ADDITIONAL INFORMATION: Wescon Information Centers at the airport, Cow Palace and in the major hotels should be checked for last minute information on events. The centers may be reached by calling the Fairmont (DO 2-8800), or the Cow Palace (JU 4-2480). See also quick-check list of IEEE, related committee meetings, which follows.

MONDAY, AUGUST 21

7:30 AM-5:30 PM:	D-M-R Conference, International Ballroom, Jack Tar Hotel
9:00 AM-5:00 PM:	Women's Hospitality Suite, California Room, Fairmont
9:00 AM-5:30 PM:	WESCON Press Room, Convention Hall, Cow Palace
9:00 AM-5:00 PM:	IECP Packaging Symposium, Continental Ballroom 6, Hilton
12:00 Noon-2:00 PM:	IECP Luncheon, Imperial Ballroom, Hilton
4:30 PM-7:00 PM:	IECP Reception, Teakwood Suite, Hilton

TUESDAY, AUGUST 22

9:00 AM-11:00 AM:	Women's Continental Breakfast, Top of the Mark
9:00 AM-5:00 PM:	IECP Symposium, Continental Ballroom 6, Hilton
9:00 AM-5:00 PM:	IECP Press Conference, Tamalpais Room, Hilton
9:00 AM-5:00 PM:	Women's Hospitality Suite, California Room, Fairmont
9:00 AM-5:30 PM:	WESCON Press Room, Convention Hall, Cow Palace
9:30 AM-5:30 PM:	WESCON Exhibits, Future Engineers Show, Industrial Design Exhibit, Cow Palace
10:00 AM-2:00 PM:	WEMA Government Procurement Committee, 20th Century Room, Fairmont
10:00 AM-12:30 PM:	WESCON Technical Session No. 1, Du Bridge Hall, Cow Palace
10:00 AM-12:30 PM:	WESCON Technical Session No. 2, Terman Hall, Cow Palace
10:00 AM-12:30 PM:	WESCON Technical Session No. 3, De Forest Hall, Cow Palace
10:00 AM-4:00 PM:	Science Film Theater, East Exhibit Hall, Cow Palace
12:00 Noon-2:30 PM:	WESCON Keynote Luncheon, Edison Hall, Cow Palace
1:00 PM-5:00 PM:	CCA Workshops, North Continental Parlors 7, 8, & 9, Hilton
2:00 PM-5:00 PM:	WESCON Special Session A, De Forest Hall, Cow Palace
2:30 PM-5:00 PM:	WESCON Technical Session No. 4, Du Bridge Hall, Cow Palace
3:00 PM:	Exhibitors Meeting, Terman Hall, Cow Palace
4:30 PM-6:00 PM:	IECP Reception, Lassen Room, Hilton
6:00 PM-8:00 PM:	WESCON Cocktail Party, Grand Ballroom, Fairmont

WEDNESDAY, AUGUST 23

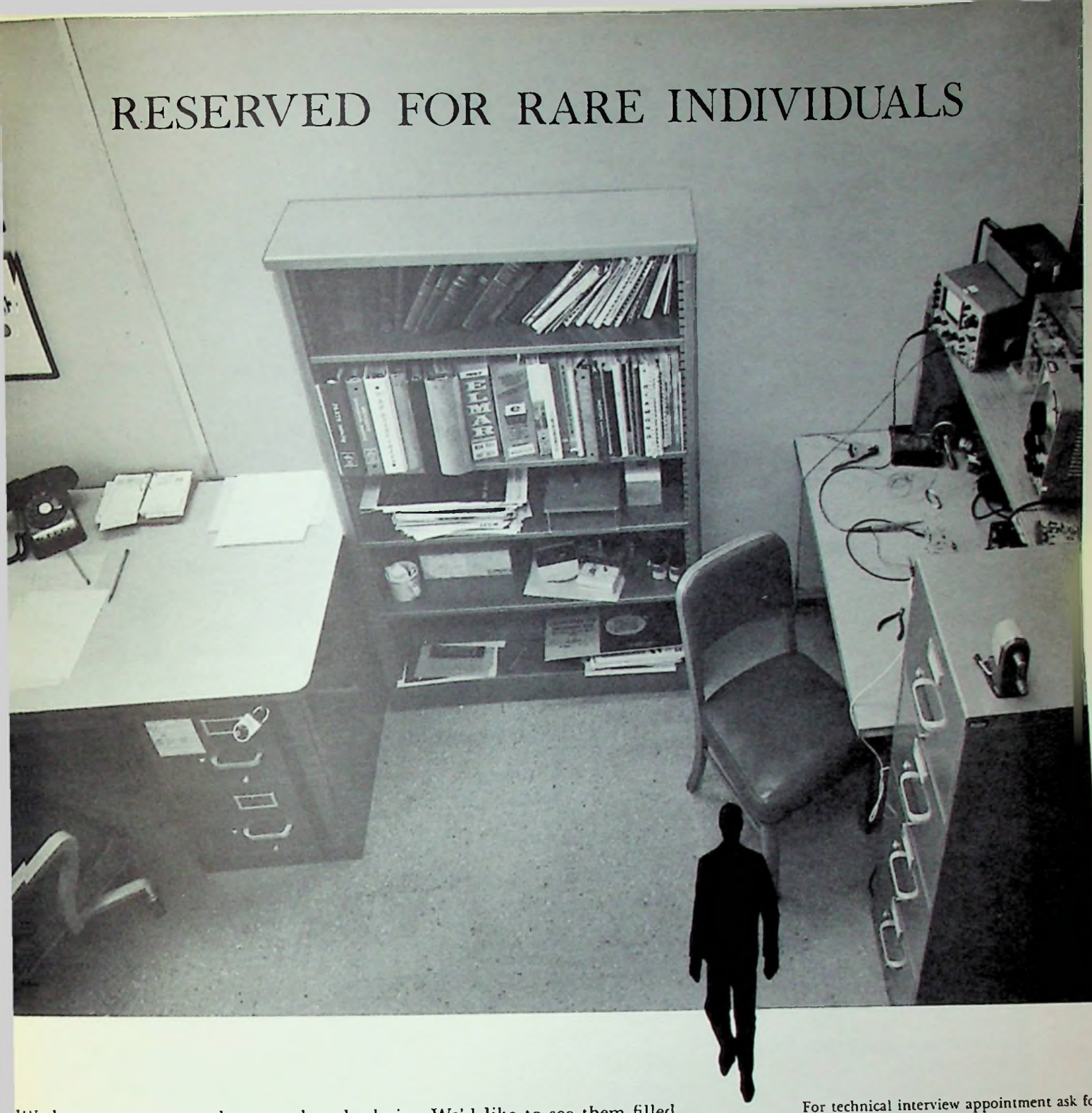
8:30 AM-5:00 PM:	Microelectronics Symposium, Continental Ballroom 6, Hilton
9:00 AM-5:00 PM:	Women's Hospitality Suite, California Room, Fairmont
9:00 AM-5:30 PM:	WESCON Press Room, Convention Hall, Cow Palace
9:00 AM-4:00 PM:	WEMA Board Meeting, Garden Room, Fairmont
9:30 AM-9:30 PM:	WESCON Exhibits, Future Engineers Show, Industrial Design Exhibit, Cow Palace.
10:00 AM-12:30 PM:	WESCON Technical Session No. 5, Edison Hall, Cow Palace
10:00 AM-12:30 PM:	WESCON Technical Session No. 6, Du Bridge Hall, Cow Palace
10:00 AM-12:30 PM:	WESCON Technical Session No. 7, Terman Hall, Cow Palace
10:00 AM-12:30 PM:	WESCON Technical Session No. 8, De Forest Hall, Cow Palace
10:00 AM-4:00 PM:	Science Film Theater, East Exhibit Hall, Cow Palace
12:00 Noon-2:00 PM:	Microelectronics Symposium Luncheon, Imperial Ballroom, Hilton
12:00 Noon-2:00 PM:	WEMA Annual Meeting & Luncheon, Gold Room, Fairmont
2:00 PM-4:30 PM:	Future Engineers Symposium, Terman Hall, Cow Palace
2:00 PM-4:30 PM:	WESCON Special Session B, Edison Hall, Cow Palace

THURSDAY, AUGUST 24

9:00 AM-5:00 PM:	Women's Hospitality Suite, California Room, Fairmont
9:00 AM-5:30 PM:	WESCON Press Room, Convention Hall, Cow Palace
9:00 AM-5:00 PM:	Microelectronics Symposium, Continental Ballroom 6, Hilton
9:30 AM-5:30 PM:	WESCON Exhibits, Future Engineers Show, Industrial Design Exhibit, Cow Palace
10:00 AM-2:00 PM:	WEMA Industrial Relations Committee Meeting, Florentine Room, Fairmont
10:00 AM-12:30 PM:	WESCON Technical Session No. 9, Edison Hall, Cow Palace
10:00 AM-12:30 PM:	WESCON Technical Session No. 10, Du Bridge Hall, Cow Palace
10:00 AM-12:30 PM:	WESCON Technical Session No. 11, Terman Hall, Cow Palace

(Continued on page 10)

RESERVED FOR RARE INDIVIDUALS



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Mr. Charles Zumba, Director of Systems Engineering

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Mr. John Adkins, Director of Equipment Development Engineering

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Wescon67

FIRST MICROFILM DIRECTORY IN HISTORY FOR WESCON

A special "microfilm directory" of WESCON exhibits—cross-filed by product definition and by company name, will be offered as a special feature of the San Francisco show.

Information Handling Services Inc., originators of the VSMF microfilm service to the industry, has classified all products to be shown at WESCON and all exhibitors showing them. A visitor can go to either of the two main Cow Palace entrances and ask for any company location in the show, or any locations for a product in which he is interested. The answer will be displayed on a large monitor screen in a matter of seconds—and if necessary, a photocopy of the information can be produced in five seconds.

The system, provided by Information Handling, is believed to be the first exhibit directory of its kind ever produced, and will have its debut at WESCON.

About 600 exhibitor companies have cooperated with WESCON and Information Handling in providing detailed product information necessary to produce the master microfilm files.

Photocopy service to WESCON visitors, in the form of two Xerox 2400 copiers, will be extended at no charge. The copiers will be installed in WESCON's two main Cow Palace information centers, and will be available for copy work throughout the show.

Wescon67

BART FIELD TRIP

A special field trip, limited to 60 participants, has been arranged during WESCON for Wednesday, August 23, to visit the Bay Area Rapid Transit test track in Concord. Tickets, at $2, may be ordered in advance from the WESCON Business Office, 3600 Wilshire Blvd., Los Angeles, Calif. 90005, or purchased at the ticket booths in the registration areas during WESCON. The tour will depart from the east entrance of the Cow Palace at 12:30 p.m. and return from the BART facility, only one of its kind, by 5 p.m.

MORE WESCON QUICK-CHECK LIST

10:00 AM-4:00 PM:	Science Film Theater, East Exhibit Hall, Cow Palace
12:00 Noon:	Women's Luncheon and Tour, Sabella's Restaurant on Fisherman's Wharf
12:00 Noon-2:00 PM:	Eta Kappa Nu Luncheon, Hunt Room, Fairmont
12:00 Noon-2:00 PM:	FES Awards Luncheon, Bordeaux & Burgundy Rooms, Hilton Inn, S.F. Airport
2:00 PM-4:30 PM:	WESCON Special Session C, Edison Hall, Cow Palace

FRIDAY, AUGUST 25

8:30 AM-11:30 AM:	Women's Continental Breakfast, Fountain Room, Fairmont
9:00 AM-5:30 PM:	Women's Hospitality Suite, California Room, Fairmont
9:00 AM-5:30 PM:	WESCON Press Room, Convention Hall, Cow Palace
9:30 AM-5:30 PM:	WESCON Exhibits, Future Engineers Show, Industrial Design Exhibit, Cow Palace
10:00 AM-12:30 PM:	WESCON Technical Session No. 12, De Forest Hall, Cow Palace
10:00 AM-12:30 PM:	WESCON Technical Session No. 13, Edison Hall, Cow Palace
10:00 AM-12:30 PM:	WESCON Technical Session No. 14, Du Bridge Hall, Cow Palace
10:00 AM-12:30 PM:	WESCON Technical Session No. 15, Terman Hall, Cow Palace
10:00 AM-12:30 PM:	WESCON Technical Session No. 16, De Forest Hall, Cow Palace
10:00 AM-4:00 PM:	Science Film Theater, East Exhibit Hall, Cow Palace
11:30 AM:	Women's Tour of WESCON, Cow Palace
2:00 PM-4:30 PM:	WESCON Special Session D, Edison Hall, Cow Palace

YOUNGSTERS: **Main exhibit areas**—no one under 10 admitted. Students 10-18 admitted during entire show if accompanied by registered adult and for $1.00 fee.

Future Engineers Show—No age restriction if youngster accompanied by registered adult. Enter East Entrance.

LADIES: $1 registration fee at Cow Palace or no charge at the women's hospitality room, California Room, Fairmont Hotel.

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QUICK-CHECK LIST OF IEEE, RELATED COMMITTEE MEETINGS

MONDAY, AUGUST 21

8:00 AM-12:00 Noon:	EIA Hermetic Seal Meeting, Rosewood Room A, Hilton
8:00 AM-6:00 PM:	IEEE Executive Committee Meeting, 20th Century Room, Fairmont
9:00 AM-5:00 PM:	IEEE GED Committee for International Electron Devices, Green Room, Hilton
9:00 AM-5:00 PM:	EIA MED-4.1 Physical Characterization Requirements, Diablo Room, Hilton
9:00 AM-5:00 PM:	EIA MED-4.2 Electrical Requirements, Shasta Room, Hilton
9:00 AM-5:00 PM:	EIA MED-4.3 Microelectronics Reliability Characterizations, Whitney Room, Hilton
9:00 AM-5:00 PM:	EIA JS Semiconductor Council, International Room, Fairmont
9:30 AM-4:30 PM:	IEEE NT & SAC Meeting, Far East Room, Fairmont
10:00 AM-3:00 PM:	IEEE GED Committee, Empire Room, Fairmont
12:00 Noon-2:00 PM:	IEEE Board of Directors Luncheon, State Room, Fairmont
6:00 PM-8:00 PM:	IEEE Board of Directors Dinner, Hunt Room, Fairmont

TUESDAY, AUGUST 22

8:00 AM-6:00 PM:	IEEE Board of Directors' Meeting, Hunt Room, Fairmont
8:00 AM-12:30 PM:	EIA Microelectronics Device Application, Rosewood Room, Hilton
8:30 AM-12:00 Noon:	IEEE Administrative Committee of the Reliability Group, Hunt Room, Fairmont
9:00 AM-1:00 PM:	IEEE Cadar Committees, Empire Room, Fairmont
9:00 AM-5:00 PM:	EIA TC-47 Meeting, Teakwood Suite, Hilton
9:00 AM-5:00 PM:	EIA MED-3.3 Active Analog Circuits, Shasta Room, Hilton
9:00 AM-5:00 PM:	EIA C-83.2 RF Connectors Meeting, Whitney Room, Hilton
9:30 AM-5:00 PM:	IEEE TAB Systems Council, International Room, Fairmont
12:00 Noon-2:00 PM:	IEEE Board of Directors Luncheon, Florentine Room, Fairmont
12:00 Noon-1:30 PM:	IEEE Administrative Committee of Reliability Group Luncheon, Garden Room, Fairmont
12:00 Noon-2:30 PM:	IEEE TAB Systems Council Luncheon, Far East Room, Fairmont
1:00 PM-5:00 PM:	IEEE Editorial Board Meeting, State Room, Fairmont
2:30 PM-6:00 PM:	IEEE TAB Organization Committee Meeting, Frontier Room, Fairmont
6:30 PM-10:30 PM:	IEEE Intersociety Relations Dinner Meeting, Florentine Room, Fairmont

WEDNESDAY, AUGUST 23

8:00 AM-12:00 Noon:	EIA Magnetic Tape Section, Lassen Room, Hilton
9:00 AM-1:00 PM:	IEEE Sections Committee Meeting, Empire Room, Fairmont
9:00 AM-5:00 PM:	IEEE Publications Board Meeting, International Room, Fairmont
9:00 AM-5:00 PM:	EIA G-42 Maintenance Ability Committee, California Room, Hilton
9:00 AM-5:00 PM:	EIA JS-14 Meeting, Teakwood Suite, Hilton
9:00 AM-5:00 PM:	EIA MED-1, Shasta Room, Hilton
9:30 AM-5:00 PM:	IEEE TAB Operating Committee Meeting, Frontier Room, Fairmont
12:00 Noon-1:30 PM:	IEEE TAB Committee Luncheon, State Room, Fairmont
12:00 Noon-1:30 PM:	IEEE Publications Board Luncheon, 20th Century Room, Fairmont
1:00 PM-5:00 PM:	EIA Shaft Encoder Section, Lassen Room, Hilton
7:30 PM-9:30 PM:	IEEE Forum for Section Chairmen, Crystal Room, Fairmont

THURSDAY, AUGUST 24

8:30 AM-5:00 PM:	IEEE 6th Region Committee Meeting, French Room, Fairmont
9:00 AM-12:00 Noon:	IEEE Subcommittee on Cultural & Scientific Changes, International Room, Fairmont
9:00 AM-5:00 PM:	IEEE Subcommittee 3.02A Electronic Power Conversion Meeting, Far East Room, Fairmont
9:00 AM-5:00 PM:	EIA JS-1 Rectifier Diodes, Whitney Room, Hilton
9:30 AM-5:00 PM:	IEEE TAB Committee Meeting, Florentine Room, Fairmont
12:00 Noon-2:00 PM:	IEEE TAB Luncheon, 20th Century Room, Fairmont
1:00 PM-5:00 PM:	IEEE Electron Devices ADCOM Meeting, Empire Room, Fairmont
1:30 PM-5:30 PM:	IEEE Pulse Techniques Subcommittee Meeting, Green Room, Fairmont

FRIDAY, AUGUST 25

9:00 AM-5:00 PM:	IEEE Subcommittee 3.02A, Far East Room, Fairmont
9:00 AM-5:00 PM:	IEEE Group 4 on Circuit Theory, International Room, Fairmont

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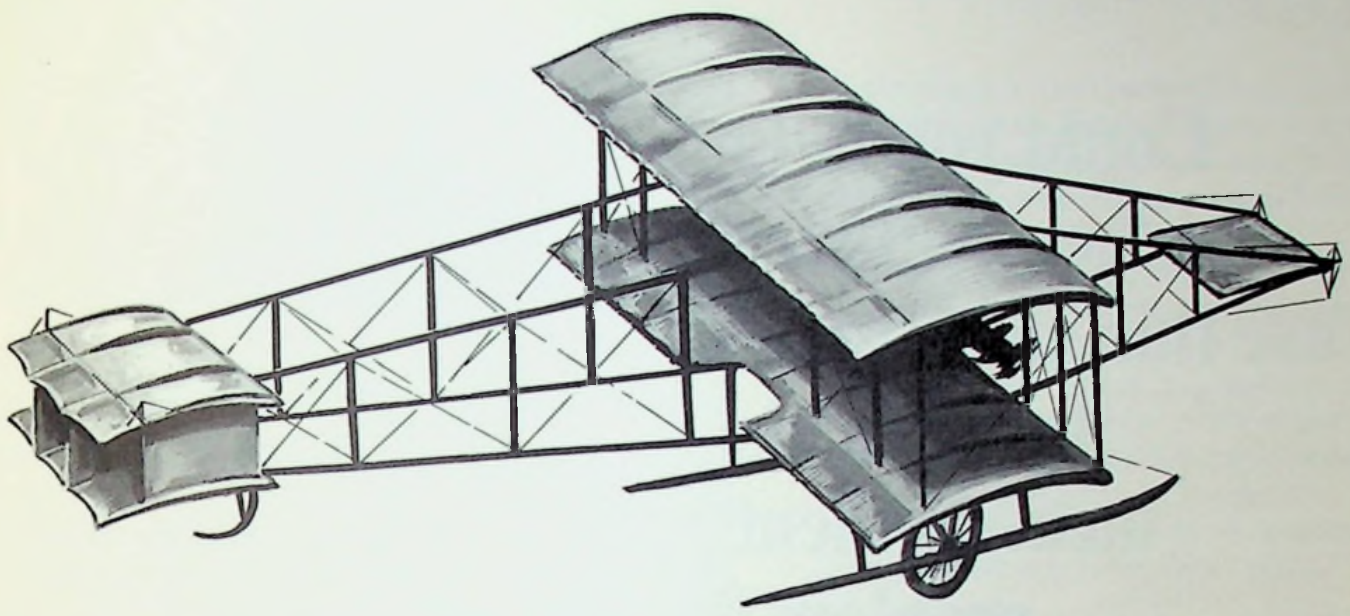
We Call Ours....PARAMETRIC POWER



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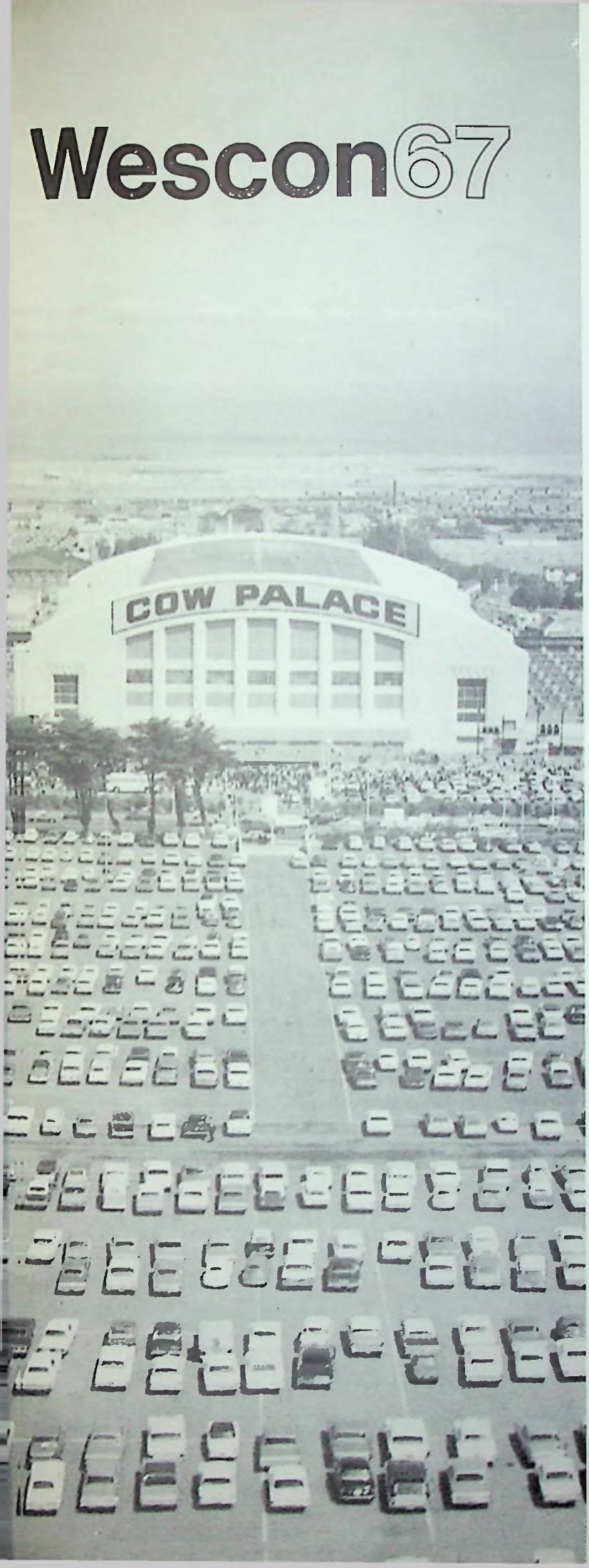

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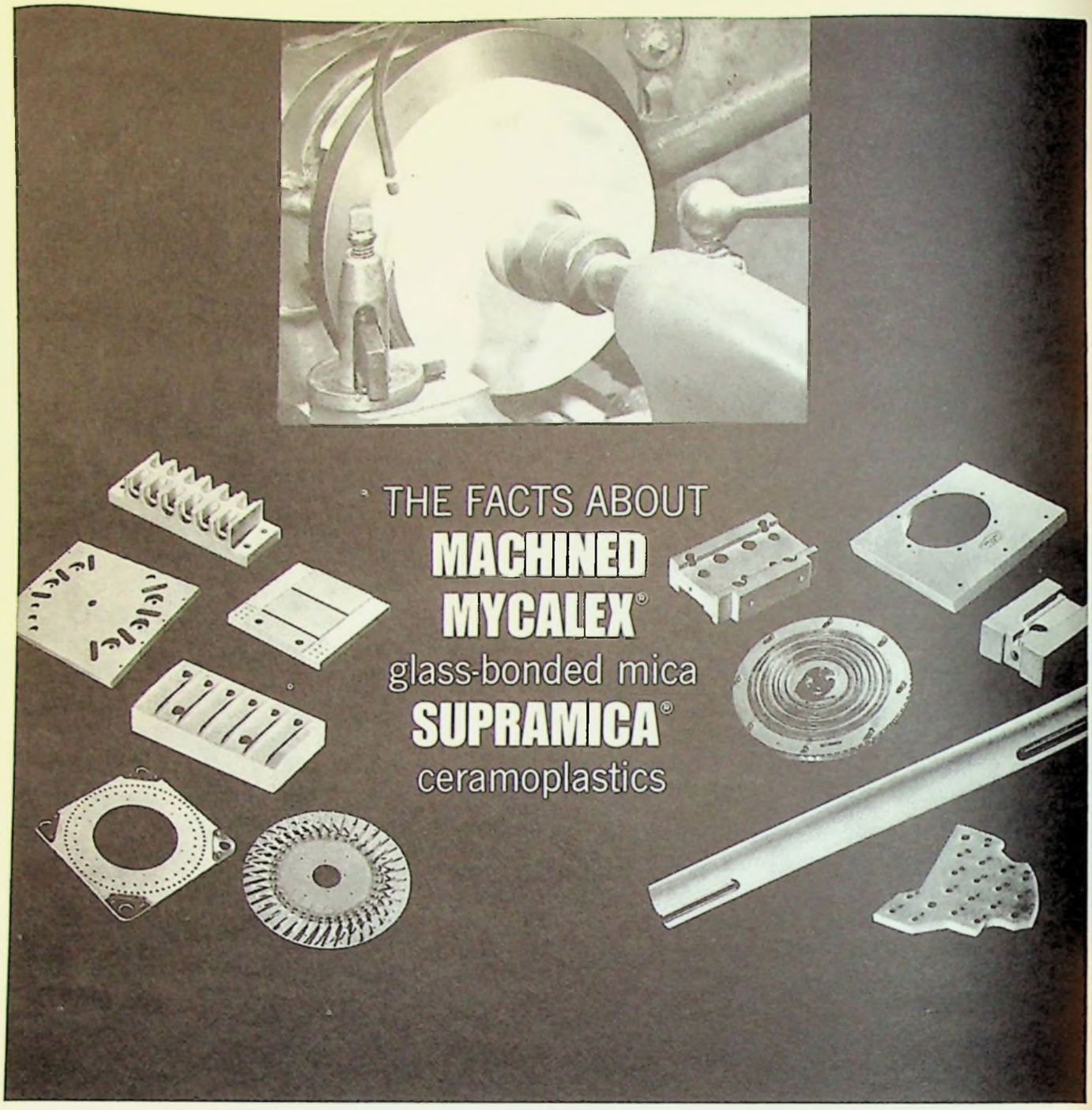
WESCON
IEEE WEMA

Top left: STANLEY F. KAISEL, Region 6 Director, IEEE; *Top right:* FRED J. MAC KENZIE, Chairman, San Francisco Section, IEEE; *Bottom left:* CHARLES M. EDWARDS, Chairman, Los Angeles Council, IEEE; *Bottom right:* JOHN S. MC CULLOUGH, President, Western Electronic Manufacturers Association.



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EXECUTIVE COMMITTEE AND Wescon67 EXHIBIT INNOVATION

Always noted for its exhibit and technical program innovations, WESCON is this year introducing into the United States what may become the exhibit look of the future—solid wall booths, discovered by the WESCON board at the 1966 *Electronica* show in Munich.

A standard unit, with carpet, sign work and lighting provided by the show at little more cost than the floor space, the solid wall booth saves the exhibitor set-up, tear-down and shipping time and money, can provide a separate, curtained conference room for clients, and enhances the visual appeal of the exhibit to the visitor, particularly when enough are used to form an aisle.

See this important innovation by visiting, in the east Cow Palace arena, Booths 2211-2216 (Darcy and Redcor), 2322-2325 (General Precision and Miller), and 2922-2925 (Spectra Physics). Other adventurous exhibitors who deserve a salute are Industrial Electronic Engineers (3201-3202), Microtech Co. (4918-4919), Dormeyer, Gordos and Fetty-Schoenduve (5100-5105).

The WESCON executive committee is shown above with a model: left to right, Don Larson, general manager; Phil Gundy, chairman of the board; Emmet Cameron, show director; Jack Beckett, convention director; and Mike Leifer, chairman of the executive committee. Below, awaiting with interest your reaction to the importation, are Ted Shields, assistant general manager, and Bob Rankin, exhibit manager.

Ted Shields

Bob Rankin

Wescon67 TECHNICAL PROGRAM AT A GLANCE

	SESSION 1	SESSION 2	SESSION 3	SESSION 4	SPECIAL SESSION
TUES. 8/22	Linear Integrated Circuits J. Eimbinder IEEE	Business Management: Engineer Becomes Manager Don Hoefler Electronic News	Radar Performance on Hypersonic Re-Entry Vehicles J. A. Cooper Sandia	Varactor Tuning of Receivers G. Schaffner Motorola Semi.	Electronics in Meteorology M. G. H. Ligda Stanford Researc
	SESSION 5	**SESSION 6**	**SESSION 7**	**SESSION 8**	**SPECIAL SESSION**
WED. 8/23	Gas Laser Stabilization D. E. Caddes Sylvania	Data Compression C. M. Kortman Lockheed M&S	Patient Monitoring Systems: Progress, Problems & Prospects Curtis D. Miller Beckman Instruments	Designing Radio Frequency Circuits Using FETs Roy Hejhall Motorola	Large Scale Integra and Computer Syst W. H. Davidow Hewlett-Packard
	SESSION 9	**SESSION 10**	**SESSION 11**	**SESSION 12**	**SPECIAL SESSION**
THURS. 8/24	Recent Developments In Communications Systems Timothy Healy Univ. of Santa Clara	Digital Approach to Analog Functions Maria Dekany Electronic Design	Progress in Fluidics Applications D. F. Folland Sperry Utah	High Density Recording Techniques Roy D. Sturkie Leach Corp.	Spectrum Management J. D. O'Connell Telecomm. Manage
	SESSION 13	**SESSION 14**	**SESSION 15**	**SESSION 16**	**SPECIAL SESSION**
FRI. 8/25	Solid State Imaging, An Evolving Technology W. F. List Westinghouse	Future of Solid State Phased Arrays A. S. Robinson RCA	Static Power Syst—Controls, Inverters, Rect., Power Systs. S. P. Jackson Solidstate Controls	Computer as a System Component R. A. Burks Scientific Data Systems	Electronic Contro of Natural Resources R. J. Pafford Bureau of Reclam

Wescon67 TECHNICAL PROGRAM
TUESDAY, AUGUST 22

1

Linear Integrated Circuits

Tuesday, August 22, 10 a.m.-12:30 p.m.
(DuBridge Hall, Cow Palace)

The "chicken or egg" dichotomy is similar to the constraints which accompany *Linear Integrated Circuits*. Monolithic linear *IC's* have potential low fabrication cost. However, the low cost must be accompanied by high use which is stimulated by low cost.

To interrupt this round robin, this session describes not only the design considerations, but also the economic and marketing effects.

Session Organizer and Chairman: Jerry Eimbinder, EEE Magazine, New York.

1/1 APPLICATIONS FOR Rf/I-f INTEGRATED-CIRCUIT AMPLIFIERS. Ralph Seymour, Signetics Corp., Sunnyvale, Calif.

1/2 DUAL INTEGRATED-CIRCUIT OPERATIONAL AMPLIFIERS. Leo L. Wisseman and Bill Ehrsam, Motorola Semiconductor Products, Phoenix, Ariz.

1/3 THE TRADE-OFF BETWEEN COST AND PERFORMANCE IN OPERATIONAL-AMPLIFIER INTEGRATED CIRCUITS.

PART 1—DESIGNING FOR INDUSTRIAL / CONSUMER APPLICATIONS. Jerry W. Gibbs, Amelco Semiconductor, Mountain View, Calif.

PART 2—THE PERFORMANCE/ECONOMICS/MARKETPLACE INTER-RELATIONSHIPS. Jack Gifford, Fairchild Semiconductor, Mountain View, Calif.

2

Business Management: The Engineer Becomes Manager

Tuesday, August 22, 10 a.m.-12:30 p.m.
(Terman Hall, Cow Palace)

"Congratulations, you've just been promoted to a managerial position." How will you handle it? *Business Management: The Engineer Becomes a Manager* provides directly applicable management information to the man whose education is science and technology, but whose career emphasis has shifted—or may likely shift—to management.

Session Organizer and Chairman: Don C. Hoefler, Electronic News, San Francisco, Calif.

2/1 MANAGEMENT IS THE DIRECTION OF PEOPLE. James F. Riley, Signetics Corp., Sunnyvale, Calif.

2/2 PITFALLS IN MONEY MANAGEMENT. Daniel G. White, Commonwealth National Bank of San Francisco.

2/3 A MODEL FOR MANAGEMENT ACTION. Charles H. Keller, Illumination Industries, Sunnyvale, Calif.

2/4 MANAGING A MAJOR TURNAROUND. Martin H. Dubilier, Friden Inc., San Leandro, Calif.

3

Radar Performance On Hypersonic Re-entry

Tuesday, August 22, 10 a.m.-12:30 p.m.
(DeForest Hall, Cow Palace)

"In the next few minutes we will lose contact with the vehicle during its re-entry." The crucial moments at re-entry are masked by an envelope of plasma. These effects have been known for years, but the implications are just now being fully understood. Recent studies of these phenomena are emphasized in this session.

The contribution of ablative gases to the complex dielectric properties of vehicle flow fields, simulation of re-entry using an arc-jet generator, and the effects of roll position on radar altimeters are discussed.

Session Organizer: James A Cooper, Sandia Corp., Albuquerque, N.M.

Session Chairman: Lloyd M. Melick, Sandia Corp., Albuquerque, N. M.

3/1 HIGH PRESSURE PLASMA SHEATH ANALYSIS. Charles D. Joerger, McDonnell Aircraft Corp., St. Louis, Mo.

3/2 EFFECT OF RE-ENTRY VEHICLE ENVIRONMENT ON ELECTROMAGNETIC TRANSMISSION. J. B. Chown, SRI, Menlo Park, Calif.

3/3 AN EXPERIMENTAL EVALUATION TECHNIQUE FOR RE-ENTRY VEHICLE ANTENNA WINDOWS. Lt. Bruce J. Benedict, Kirtland AFB, Albuquerque, N. M.

3/4 A TECHNIQUE FOR ANALYZING ANTENNA PATTERN AND RADAR RETURN EFFECTS ON SPINNING VEHICLES. James A. Cooper and C. D. Ouverson, Sandia Corp.

WEDNESDAY, AUGUST 23

4

Varactor Tuning Of Receivers

Tuesday, August 22, 2-4:30 p.m.
(DuBridge Hall, Cow Palace)

When you think about it, receiver tuning elements haven't changed much in over 50 years. They didn't need to; they were efficient, reliable and inexpensive—albeit bulky. Within the next few years, this will change. *Varactor Tuning of Receivers* will be widespread, which is in line with the trend to integrated circuits.

Varactor tuning offers instantaneous search and remote tuning capability with improved reliability and small size. These factors as well as many recent applications will be discussed.

Session Organizer: Gerald Schaffner, Motorola Semiconductor, Phoenix

Session Chairman: Johnnie Cochran, Motorola Semiconductor, Phoenix.

4/1 DESIGNING AROUND THE TUNING DIODE INDUCTANCE. G. Schaffner, Motorola Semiconductor, Phoenix.

4/2 APPLICATION OF ELECTRONIC TUNING TO TACTICAL COMMUNICATIONS EQUIPMENTS. Dean Strief, Avco Electronics, Cincinnati, Ohio.

4/3 VOLTAGE VARIABLE CAPACITOR TUNING OF RADIO FREQUENCY AMPLIFIERS. Jorge E. Roza, General Dynamics Electronics Div., Rochester, N.Y.

4/4 VARACTOR TUNING APPLIED TO RADIO RECEIVERS. Rinaldo DeCola, Warwick Electronics, Niles, Illinois.

4/5 HYPERABRUPT TUNING DIODE THEORY AND APPLICATION TO AM RADIO. Peter M. Norris, Motorola Semiconductors, Phoenix

5

Gas Laser Stabilization

Wednesday, August 23, 10 a.m.-12:30 p.m.
(Edison Hall, Cow Palace)

Even an ideal laser has random fluctuations in amplitude and frequency. To remove these fluctuations, caused by external perturbations or inherent noise, *Gas Laser Stabilization* techniques are required.

In this session, four acknowledged authorities present specific results for two types of stabilization schemes.

Session Organizer and Chairman: D. E. Caddes, Sylvania Electronic Systems, Mountain View, Calif.

5/1 THE SPECTRUM OF A LASER OSCILLATOR. A. E. Siegman, Stanford University, Stanford, Calif.

5/2 PRESSURE SHIFTS AND RELATED EFFECTS IN THE HE-NE LASER. Arnold L. Bloom, Spectra-Physics, Inc., Mountain View, Calif.

5/3 FREQUENCY STABILIZATION OF GASEOUS ZEEMAN LASERS. W. Culshaw, J. Kannelaud, and D. G. Peterson, Lockheed Missiles and Space Co., Sunnyvale, Calif.

5/4 A FREQUENCY STABILIZED FM LASER. Russell Targ and L. M. Osterink, Sylvania Electronic Systems, Mountain View, Calif.

6

Data Compression

Wednesday, August 23, 10 a.m.-12:30 p.m.
(DuBridge Hall, Cow Palace)

The information explosion has far reaching effects on the data links used to transmit the information. The straightforward approach is to increase communications link capacity. However, costs are often prohibitive.

A more economical approach is the use of *Data Compression*. With this technique, computers detect and reject redundant data prior to transmission and reconstruct the compressed data at the receiving terminal.

Session Organizer and Chairman: C. M. Kortman, Lockheed Missiles & Space Co., Sunnyvale, Calif.

6/1 MECHANIZATION OF A DIGITAL COMPRESSOR FOR BIOMEDICAL DATA. G. M. Loh, Lockheed Missiles & Space, Sunnyvale.

6/2 THE EFFECT OF CHANNEL ERRORS ON DATA COMPRESSION. L. D. Davisson, Princeton University, New Jersey.

6/3 ADAPTIVE BUFFER DESIGN FOR DATA COMPRESSION SYSTEMS. G. R. Schwarz, IBM, Federal Systems Div., Gaithersberg, Md.

6/4 GENERAL PURPOSE VS. SPECIAL PURPOSE COMPUTERS FOR DATA COMPRESSION. D. Hochman, Adcom, Inc., Palo Alto, Calif.

6/5 GENERAL PURPOSE TELEMETRY DATA COMPRESSION. J. J. Downing, W. E. Smith, and J. E. Stubbles, LM&SC, Sunnyvale, Calif.

7

Patient Monitoring Systems: Progress, Problems and Prospects

Wednesday, August 23, 10 a.m.-12:30 p.m.
(Terman Hall, Cow Palace)

Patience is a virtue, especially when trying to determine the "right" approach to patient monitoring. Many potential users do not really know what they want—either the measurements they need, or the manner in which they want to make them.

This session will give a critical review of present and future instrument needs. New and improved measurements, ways of obtaining them, and a proposed standard for patient-intensive care systems will be outlined.

Session Organizer and Chairman: Curtis E. Miller, M.D., Beckman Instruments, Fullerton, Calif.

7/1 Eliot Corday, M.D., Cedars-Sinai Hospital, Los Angeles, Calif.

7/2 C. William Hall, M.D., Baylor University, College of Medicine.

7/3 Donald C. Harrison, M.D., Stanford University School of Medicine.

7/4 John Mannes, Methodist Hospital, Houston. (PAPER TITLES TO BE ANNOUNCED.)

8

Designing Radio Frequency Circuits Using FETS

Wednesday, August 23, 10 a.m.-12:30 p.m.
(DeForest Hall, Cow Palace)

Circuit innovations using *FET's* are occurring every day. Now it appears *FET's* will find their area of greatest usefulness at radio frequency, for here they have some unique characteristics.

The session will be a balance between theory and practice. Certain device characteristics, circuit configuration, and design principles will be discussed. Equally important will be the emphasis on techniques to "get things done."

Session Organizer: Roy Hejhall, Motorola Semiconductor, Phoenix.

Session Chairman: Robert Dale, Motorola Semiconductor, Phoenix.

8/1 FIELD EFFECT TRANSISTOR RF MIXER DESIGN TECHNIQUES. Siang Ping Kwok, Motorola Semiconductor, Phoenix.

8/2 FIELD EFFECT TRANSISTOR RF POWER DESIGN TECHNIQUES. J. B. Compton, Siliconix, Sunnyvale, Calif.

8/3 FIELD EFFECT TRANSISTOR RF AMPLIFIER DESIGN TECHNIQUES. Roy Hejhall, Motorola Semiconductor, Phoenix.

8/4 FIELD EFFECT TRANSISTOR DESIGN TECHNIQUES AT BROADCAST FREQUENCIES. Donald L. Wollesen, Philco Microelectronics Division, Santa Clara, Calif.

8/5 USING INSULATED-GATE FIELD-EFFECT TRANSISTORS AS VERSATILE OSCILLATOR ELEMENTS. George D. Hanchett, RCA, Somerville, N.J.

SPECIAL SESSION A

Electronics and Meteorology

Tuesday, August 22, 2-4:30 p.m.
(DeForest Hall, Cow Palace)

In the last few years electronics has contributed significantly to transforming meteorology from an art to a science. Sophisticated sensing elements, combined with high speed data systems, have produced a wealth of climatological knowledge. Several in-progress projects will be reviewed and a look at future electronic requirements will be included.

Session Co-Chairman: Bruce B. Lusignan, Stanford University.

Session Co-Chairman: Allen M. Peterson, Stanford Research Institute.

Session Organizer: M. G. H. Ligda, Stanford Research Institute.

A/1 FEASIBILITY AND UTILITY OF SATELLITE LIDAR. William E. Evans, Stanford Research Institute.

A/2 OBSERVATIONS OF EARTH'S CLOUD COVER FROM SYNCHRONOUS SATELLITE. Verne Suomi, University of Wisconsin.

A/3 WEATHER EXPERIMENTS FOR APOLLO APPLICATIONS. Dallas Evans, NASA, Houston.

A/4 METEOROLOGICAL SATELLITE ELECTRONICS REQUIREMENTS OF THE FUTURE. Speaker to be announced.

The WESCON show will be open from 9:30 a.m. to 5:30 p.m. on three of its four days. On Wednesday, August 23, however, the Cow Palace exhibits will remain open until 9:30 p.m. This represents a change from the two previous years, when the show remained open two evenings.

Special symposia on electronic packaging and on microelectronics are to be presented in the San Francisco Hilton Hotel. Each is a two-day program, designed to complement the regular program.

SPECIAL SESSION B

Large-Scale Integration of Computer System Design

Wednesday, August 23, 2:00-4:30 p.m.
(Edison Hall, Cow Palace)

Where does large scale integration stand today? *Large Scale Integration of Computer System Design* attempts to answer this question by reporting on the state-of-the-technology. The factors that influence the cost of *LSI*, how *LSI* will be used in large and small systems, effects on design, and predictions for the future will be examined.

Session Chairman: W. H. Davidow, Hewlett-Packard, Palo Alto, California.

Session Coordinator: Kenneth T. Larkin, Lockheed Missiles & Space Co., Sunnyvale, California.

B/1 THE STATE OF LSI TECHNOLOGY. Richard Petritz, Texas Instruments.

B/2 PRESENT AND FUTURE COST FACTORS IN LSI. Gordon Moore, Fairchild, Palo Alto.

B/3 USE OF LSI IN FUTURE LARGE COMPUTER SYSTEMS. Gene M. Amdahl, IBM Corp., San Jose.

B/4 LSI IN SMALL SYSTEMS: PRACTICALITY AND ECONOMIC CONSIDERATIONS. L. C. Hobbs, Hobbs Associates, Corona del Mar, Calif.

THURSDAY, AUGUST 24

9

Recent Developments in Communications Systems

Thursday, August 24, 10 a.m.-12:30 p.m.
(Edison Hall, Cow Palace)

Where *do* we stand with regard to electronic communications? A large number of communications systems are being proposed or developed using new techniques. It's time to review *Recent Developments in Communications Systems*, the new techniques, the problems associated with their application, as well as the economic and social aspects.

Session Organizers: Timothy Healy, University of Santa Clara, and W. R. Vincent, Stanford Research Institute.

Session Chairman: John V. N. Granger, Granger Associates, Palo Alto.

9/1 TRENDS IN COMMUNICATIONS SYSTEMS DEVELOPMENT. W. R. Vincent, SRI, Menlo Park, Calif.

9/2 PROGRESS IN MODULATION AND DEMODULATION TECHNIQUES. W. L. Hatton, Defense Telecommunications Establishment, Ottawa, Canada.

9/3 LIMITATIONS OF RADIO PROPAGATION MEDIA. Thomas Kailath and Paul Shaft, SRI, Menlo Park, California.

9/4 TRANSPORTATION OR COMMUNICATIONS—SOME BROAD CONSIDERATIONS. Timothy Healy, University of Santa Clara, Santa Clara, California.

The Science Film Theater will screen about 20 outstanding scientific and engineering motion pictures daily in a special "theater" in the east exhibit hall. There is no admission charge for the program, which is repeated each day of the show.

10

Digital Approach to Analog Functions

Thursday, August 24, 10 a.m.-12:30 p.m.
(DuBridge Hall, Cow Palace)

"Alternative" is a familiar word to engineers. One alternative to the use of linear integrated circuits (Session 1) is the *Digital Approach To Analog Functions*.

Digital *IC's* are relatively inexpensive, reliable and easy to use, though there is difficulty adapting digital design philosophies. This session presents some of the design requirements techniques, and applications.

Session Organizer: Maria Dekany, Electronic Design Magazine, N. Y.

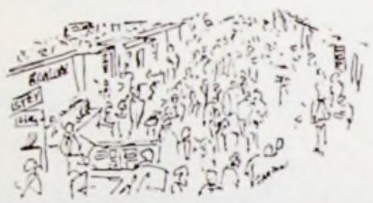
Session Chairman: James F. Kaiser, Bell Telephone Labs, Murray Hill, N. J.

10/1 WHY USE DIGITAL ICs FOR ANALOG FUNCTIONS. Donald Breslow, Itek Corporation, Lexington, Mass.

10/2 FOUR DIGITAL ARRAYS DO ALL ALGORITHMS. George T. Sendzuk, General Electric Company, Binghamton, New York.

10/3 A COMPARISON OF ANALOG AND DIGITAL INTEGRATED CIRCUIT TECHNIQUES FOR SINE AND COSINE GENERATION. James R. Garvey, RCA Aerospace Systems Division, Burlington, Mass.

10/4 STAGGERED PHASE CARRIER CANCELLATION EXTENDS POWER-FREQUENCY COMPROMISE OF POWER DEVICES. Richard J. Ravas and Paul F. Pittman, Westinghouse Research Labs, Pittsburgh, Pa.



11

Progress in Fluidics Applications

Thursday, August 24, 10 a.m.-12:30 p.m.
(Terman Hall, Cow Palace)

Anyone who says Fluidics will replace Electronics is all wet! During the past six years, the potential of Fluidics has been recognized, but so have the limitations.

Progress in Fluidics Applications is oriented to allow the electronic engineer to assess the effect of Fluidics on the electronic field. It is apparent that the field is large for both disciplines and that Fluidics and Electronics can complement each other.

Session Organizer and Chairman: D. F. Folland, Sperry Utah Co., Salt Lake City, Utah.

11/1 SECONDARY INJECTION THRUST VECTOR CONTROL USING FLUIDIC VORTEX VALVES. Jerome G. Rivard, Bendix Research Labs, Southfield, Mich.

11/2 FLUIDIC TIME OPTIMAL ADAPTIVE CONTROL SYSTEM. Robert F. Turek, Bowles Engineering Corp., Silver Spring, Md.

11/3 FLUIDIC DEVICE TESTING. Harold L. Fox, Fluidonics Research Labs, Div. Imperial Eastman Corp., Salt Lake City, Utah.

11/4 PROPORTIONAL CONTROL SYSTEMS IN INDUSTRY. Robert L. Blosser, Sperry Utah Co., Div. of Sperry Rand Corp., Salt Lake City.

11/5 A PNEUMATICALLY CONTROLLED DOCUMENT HANDLING SYSTEM. R. R. Coleman, Jr. and Richard S. Gluskin, Univac, Div. of Sperry Rand Corp., Blue Bell, Pa.

12

High Density Recording Techniques

Thursday, August 24, 10 a.m.-12:30 p.m.
(DeForest Hall, Cow Palace)

Billion-bit storage requirements now threaten to inundate us with warehouses. Vast amounts of information collected by government and industry must ultimately be stored.

High Density Recording Techniques can increase the tape storage of the computer by a factor of 20 or more. This session will encompass advanced developments—including electron and laser beam recording—as well as current technology.

Session Organizer and Chairman: Roy D. Sturkie, Leach Corp.—Controls Div., Azusa, Calif.

12/1 HIGH DENSITY ELECTRON AND LIGHTBEAM RECORDING. Charles F. Spitzer, Ampex Corp., Redwood City, Calif.

12/2 MAGNETIC HEADS FOR HIGH DENSITY DIGITAL RECORDING. Donald T. Best, Ferroxcube Corp., Saugerties, N. Y.

12/3 A TECHNIQUE FOR HIGH DENSITY DIGITAL RECORDING. Kermit Norris, Leach Corp.—Controls Div., Azusa, Calif.

12/4 ULTRA-HIGH DATA PACKING DENSITY RECORDING RELATED TO MANNED SPACECRAFT. Donald Ray Smith, NASA, Houston, Texas.

SPECIAL SESSION C

The Frequency Spectrum—A National and International Resource

Thursday, August 24, 2:00-4:30 p.m.
(Edison Hall, Cow Palace)

What can be expected as the use of the electromagnetic spectrum expands? What are the economical, political and sociological effects of frequency allocation? Will international agreements be made in time to advance development of communications satellites?

These are some of the aspects of spectrum management, to be discussed by a panel of expert spokesmen, led by James D. O'Connell, Director, Telecommunications Management, Office of the President.

Session Chairman: James D. O'Connell, Executive Office of the President, Washington, D. C.

Session Organizer: Edward E. Nolan, Farinon Electric, San Carlos, Calif.

FRIDAY, AUG 25

Solid State Imaging, an Evolving Technology 13

Friday, August 25, 10 a.m.-12:30 p.m.
(Edison Hall, Cow Palace)

Imagine an Image without high voltage, magnetic fields, vacuum envelopes or filament power. *Solid-state Imaging: An Evolving Technology* gives this promise as early research begins to bear fruit. The session provides an understanding of the basic concepts involved, as well as the performance of present and advanced hardware.

Session Organizer: W. F. List, Westinghouse Electric, Baltimore, Md.

Session Chairman: Carl Huggins, Marshall Space Flight Center, Huntsville, Ala.

13/1 100 x 128 ELEMENT SOLID STATE IMAGING SYSTEM. D. E. Callahan, R. A. Anders, W. F. List, M. E. Wing, and D. H. McCann, Westinghouse Electric Corp., Baltimore, Md.

13/2 A REPORT ON THE DEVELOPMENT AT FAIRCHILD SEMICONDUCTOR OF INTEGRATED ARRAYS OF SILICON PHOTODETECTORS FOR IMAGE SENSING. G. P. Weckler and R. H. Dyck, Fairchild Semiconductor Research and Development Laboratory, Palo Alto, Calif.

13/3 A SELF-SCANNED SOLID STATE IMAGE SENSOR. P. K. Weimer, G. Sadasiv, J. E. Meyer, L. Meray-Horvath and W. S. Pike, RCA Labs, Princeton, New Jersey.

13/4 SOLID STATE IMAGE INTENSIFIER. R. D. Stewart, General Electric, Syracuse, N. Y.

14

The Future of Solid State Phased Arrays

Friday, August 25, 10 a.m.-12:30 p.m.
(DuBridge Hall, Cow Palace)

The Future of Solid-state Phased Arrays is bright indeed. In this session, capabilities and limitations of solid-state phased arrays will be explored by examining present and projected advances in solid-state microwave art.

Session Organizer and Chairman: Arthur S. Robinson, RCA Missile & Surface Radar Div., Moorestown, N. J.

PANELISTS:
R. D. Alberts, Air Force Avionics Lab, Wright-Patterson AFB, Ohio
Carl Blake, Lincoln Laboratories, Lexington, Mass.
Douglas Mather, Rome Air Development Center, Griffiss AFB, New York.
Thomas Hyltin, Texas Instruments, Dallas, Texas.
Frank A. Brand, Electronic Components Laboratory, Ft. Monmouth, N. J.
Thomas Madigan, Bell Telephone Labs, Whippany, New Jersey
Malcolm Vosburg, Institute of Defense Analysis, Arlington, Va.
Arthur S. Robinson, RCA, Missile & Surface Radar Div., Moorestown, N. J.

15

Static Power Systems: Controls, Inverters, Rectifiers, Power Systems

Friday, August 25, 10 a.m.-12:30 p.m.
(Terman Hall, Cow Palace)

On land, under the sea, and in the air, *Static Power Systems* are being used. While most power is generated and trasmitted as a-c, it has been estimated that 40% of the power is rectified at the load. Moreover, almost all power is subject to some control. Then, there is sudden absence of power—hence the need for standby systems. These aspects are discussed in this session.

Session Organizer: Stuart P. Jackson, Solidstate Controls, Inc., Worthington, Ohio.

Session Chairman: David W. Borst, International Rectifier Co., El Segundo, Calif.

15/1 PROBLEMS IN DESIGNING A D. C. POWER TRANSMISSION SYSTEM. Stuart P. Jackson, Solidstate Controls, Inc., Worthington, Ohio.

15/2 CURRENT REGULATORS FOR ELECTROCHEMICAL RECTIFIER SYSTEMS. R. P. DePuy and J. W. Luoma, General Electric Co., Philadelphia.

15/3 APPLICATION & DESIGN ASPECTS OF A 2.5 KVA SOLID STATE FREQUENCY CONVERTER FOR AN AIRBORNE INSTALLATION. S. G. Campbell and T. H. Ussher, The de Havilland Aircraft of Canada Ltd., Malton, Ontario, Canada.

15/4 STATIC STANDBY POWER SYSTEMS. Chris F. Seyer, Fansteel Metallurgical Corporation, North Chicago, Illinois.

15/5 REDUNDANCY AND SWITCHING IN STANDBY SYSTEMS. Stuart P. Jackson and Dennis M. Swing, Solidstate Controls, Inc., Worthington, Ohio.

16

The Computer as a System Component

Friday, August 25, 10 a.m.-12:30 p.m.
(De Forest Hall, Cow Palace)

New system approaches, streamlined design procedures or greater system capability, can be obtained by using the *Computer as a System Component.*

This session views the computer as an element within a problem-oriented system, rather than considering computer technological advances alone. By clarifying the new tools and techniques, the growing need for systems that are natural and easy to use is emphasized.

Session Organizer: R. A. Burks, Scientific Data Systems, Santa Monica, Calif.

Session Chairman: Pete England, Scientific Data Systems, Santa Monica, Calif.

16/1 THE IMPACT OF THIRD-GENERATION COMPUTERS ON SYSTEM DESIGN. David L. Stein and Joe Glasier, Scientific Data Systems, Santa Monica, Calif.

16/2 A THIRD GENERATION COMPUTER IN A NUCLEAR PHYSICS LABORATORY. Richard F. Au, John V. Kane, and William E. Merritt, Michigan State University, East Lansing, Mich.

16/3 SOFTWARE AS A COMPONENT IN COMPUTERIZED SYSTEMS. Bob L. Ryle, Planning Research Corp., Los Angeles, Calif.

16/4 ON-LINE COMPUTERS AND PATIENT CARE. Shannon Brunjes and Robert F. Maronde, USC, Los Angeles, Stanley Seibert, Los Angeles County Hospital, Los Angeles, and John C. Soutter, IBM, Los Angeles, Calif.

SPECIAL SESSION D

Systems Approach to Natural Resources Control

Friday, August 25, 2:00-4:30 p.m.
(Edison Hall, Cow Palace)

This session will give an overview to the problems associated with hydroelectric power generation. The balance between hydro and thermal power requirements, control of water storage levels and flow, and navigation requirements will be examined. Future system applications will be noted.

Session Chairman: R. J. Pafford, Jr., Bureau of Reclamation, Sacramento, California.

Session Coordinator: Ernest W. Pappenfus, Granger Associates, Palo Alto, California.

D/1 INTEGRATING HYDRO AND THERMAL GENERATION. E. F. Kaprielian, Pacific Gas and Electric Co., San Francisco.

D/2 SYSTEMS ANALYSIS APPLICATIONS FOR THE FUTURE. John Eichelman, Stanford Research Institute, Menlo Park.

D/3 MISSOURI BASIN FLOOD CONTROL AND WATER CONSERVATION. Tim Waara, Missouri River Div., U.S. Corps of Engineers, Omaha.

D/4 BONNEVILLE POWER ADMINISTRATION SYSTEM CONTROL. Marvin Harris, Bonneville Power Administration, Portland, Oregon.

Wescon67

FUTURE ENGINEERS SYMPOSIUM & LUNCHEON

The Future Engineers Symposium will be held from 2 to 4:30 p.m. on Wednesday, August 23 in Terman Hall at the Cow Palace. Five student participants will have been selected to compete for the $300 Frederick Emmons Terman Award and a $200 second prize scholarship. All interested are cordially invited to hear the presentations.

Winners of the total $2800 in FES prizes will be honored on Thursday at the Future Engineers luncheon at the Hilton Inn, S.F. Airport, when Dr. William E. Ayer, president of Applied Technology, Inc., Palo Alto, leads the salute to the talented young engineers. Jesse R. Lien, vice-president and general manager, Sylvania Electronic Systems, Mountain View, will be the principal speaker. All those interested are invited to attend the $5 luncheon.

Wescon67

WHAT ELSE IS NEW?

To find out what's new in San Francisco special events and entertainment, dial 391-2000 for the Phon-Dex service of the Convention & Visitors Bureau.

The system accommodates 10 incoming calls at one time and functions 24 hours a day, with daily program changes. Messages are beautifully voiced by the bureau's information director, Nancy Henry. As many as 3500 calls have been logged in a single day.

What's eve

yone so excited about?

Just coming to the San Francisco Bay Area is excitement! No place on earth has more to see, more to do and more to enjoy, per square mile. Devoting your talents and efforts to a challenging career in a fast-paced, growth oriented organization makes living here doubly rewarding. Sylvania is searching for serious, career-minded individuals who think a whole new way of life might be a great thing. We think we have enough to offer to make moving here attractive. Thousands of our top pros think so. Want to join them?

OUTSTANDING
Career Opportunities

RECEIVER ENGINEERS

To design and evaluate receiver circuits such as low noise RF amplifiers and oscillators, IF and Video amplifiers, parametric upconverters, and wave form generators. Work will involve network synthesis, control systems, and information theory, and will consist of receiver system design, technique investigation and equipment development. BSEE or MSEE required plus 1–6 years' applicable experience.

TRANSMISSION ENGINEERS

Designs a wide variety of transceiver circuits and equipment. Assumes responsibility for the coordination and technical direction of small projects (1 to 5 engineers). Has thorough grasp of equipment and circuit design, including RF, nonlinear, and simple digital circuits. Makes significant individual contributions to the more difficult design problems. Assists in preparation of estimates and proposals for future work. Significant design capability in most of the following areas: RF circuits, modulation theory, information theory, feedback techniques, digital circuits, voltage tuning techniques, mixer and detector design, and environmental resistance. MSEE or BSEE required: 5 to 10 years of progressively maturing circuit and equipment design experience. Proven high level technical competence in equipment design areas mentioned above.

ADVANCED SECURITY
SYSTEMS DESIGN ENGINEERS

Equipment and circuit design of security devices, security systems and special purpose detection equipment. Will be a member of a small engineering group responsible for the application of various types of sensors to security and detection systems, for the design, development and worst case analysis of solid state circuitry required for system implementation and for the testing, evaluation and analysis of test data to determine system sensitivity, effectiveness and false alarm criteria. BSEE required, MSEE desired with 3–6 years of experience designing solid state circuitry for military equipment.

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Wescon67 FUTURE ENGINEERS SHOW

Gaylen Atkinson and Dean Malmstrom, of Hillcrest High School, Midvale, Utah. "A Balloon Telemetry."

Thirty-seven western teen-agers will gather in San Francisco on August 19, and their main purpose will be a "think-in."

They are the prize-winning contestants in WESCON's eleventh annual Future Engineers Show, and they will come from eight states to reflect the scope and depth of today's outstanding high school science students.

Every one of the 35 actual projects to be displayed (two of them have co-designers) has been chosen by professional IEEE committeemen, who carried out judging programs in local Science Fairs this Spring. Each section in Region 6 had the opportunity to nominate students from their local areas, and most of them responded.

Represented in this year's Future Engineers Show will be the states of Alaska, Arizona, California (15 IEEE sections), New Mexico, Oregon, Utah, Washington, and Idaho.

As the guests of WESCON in San Francisco, they and their school science instructors will actually present a "junior WESCON" of their own, complete with a four-day display of their experiments, a technical symposium, field trips, and their own awards luncheon.

As an example, their field trip will be to Berkeley facilities of the Lawrence Radiation Laboratory, where they will receive a briefing and tour of present rad lab projects led by professional staff members.

Their awards, totalling $2800 in college scholarships, will be judged in two categories: the experiments themselves, and presentation of papers in the symposium. Top awards at stake are the Lee DeForest exhibit award of $1000, and the Frederick Emmons Terman symposium award of $300. There are second, third and fourth place awards for exhibits, and a second place award for the symposium.

Including this year, more than 300 entries have participated in the WESCON student program, which has the goal of encouraging careers in science and engineering, and recognizing outstanding promise in work being done by high school students. After their selection for the program, students and their instructors are provided with roundtrip air fare to WESCON, a subsistence allowance, and are guests at a number of special events planned in their honor. In addition, each participant receives a U.S. Savings Bond.

High enthusiasm for the program in 1967 has brought a "standing-room-only" number of participants from IEEE sections throughout the West, according to Alan Simpkins, Hewlett-Packard Co., and Fred MacKenzie, SRI, who head the volunteer committee planning the four-day events. "We are gratified with the cooperation and follow-through of the sections," Simpkins said, "and an outstanding student program seems to be assured."

Students, their project titles, and their schools, are as follows:

ALASKA

Albert Swank, 17, West Anchorage High School, "Plas-

ma Consignment by Means of Cusp Mirror System."

ARIZONA

Buddy Gene Clifton, Douglas High School, "Laser Functions."

Ronald Clot, West High School, Phoenix, "A Quantitative Investigation of the Hydrogenation of Benzene Using an Electrical Corona."

Joe Rosbeck, Catalina High School, Tucson, "Light Modulation by Quantum Electronics."

NORTHERN CALIFORNIA

Philip W. Lee, Sacramento High School, "Diffusion Cloud Chamber."

Ronald William Hunt, 17, Clovis High School, "Electronic Binary Computer."

George Fong, Oakland High School, "The Effects of Radiation on Semiconductor Devices."

Larry B. Sorensen, 17, Peterson High School, Sunnyvale, "Mechanical Stimulation of Luminescence Induced by Breaking Chemical Bonds."

Burton L. Johnson, Newark High School, Newark, "Construction of a He-Ne Gas Laser."

Tom Nozaki, Jr., Cubberley High School, Palo Alto, "Model Hydroelectric Power Plant."

Rick Mann, Fremont High School, Sunnyvale, "What are Waves and How Do They Behave?"

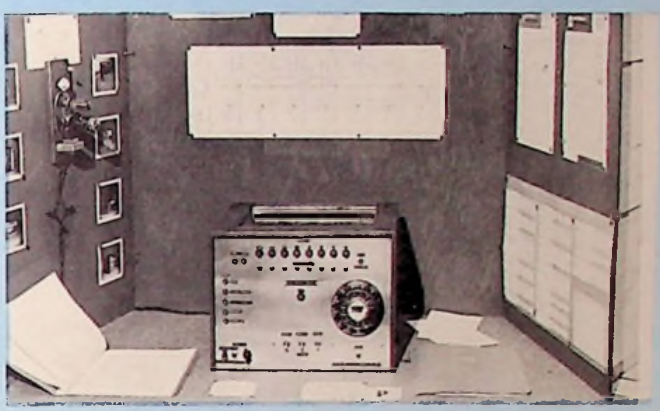
Peter Aronstam, Lowell High School, San Francisco, "Binary-Digital Electro-mechanical Computer."

Niles Severy, Santa Rosa Sr. High School, "Radioactivity Measurements with Home-Made Scaler."

Masaaki Yamato, 17, Oakland High School, "Ion-Propelled Aircraft."

(Continued on page 38)

George Fong, Oakland High School, "The Effects of Radiation on Semiconductor Devices."



Ronald William Hunt, 17, Clovis High School, "Electronic Binary Computer."

a HAPPENING just for chicks

Women who visit WESCON with their husbands are being invited to "drop in, come on, and turn out" for "A Happening in San Francisco" by Peninsula wives who are planning the ladies' program.

Late last month, Mrs. Phillip Rice, chairman, and Mrs. Robert DeLiban, vice chairman, announced their committee plans via a psychedelic poster in jarring green and improbable orange. It invites feminine visitors to make the San Francisco scene in a series of WESCON week activities planned just for them, bracketed by a Top of the Mark Breakfast on opening day (Aug. 22) and a tour of the show itself on closing day.

In between, there will be luncheon at Sabella's on Fisherman's Wharf, followed by a tour of five elegant Pacific Heights homes. In each of the exclusive residences, fashions by Joseph Magnin will be shown as part of the tour.

The Tuesday breakfast, a first-time event for the WESCON women, will be held from 9 until 11 a.m. at no charge for feminine visitors. The luncheon and tour, scheduled for Thursday, is $8.50 per person, and is the only ladies' event for which there is a charge.

A continental breakfast at the Fairmont and guided tour of WESCON on Friday is also without charge.

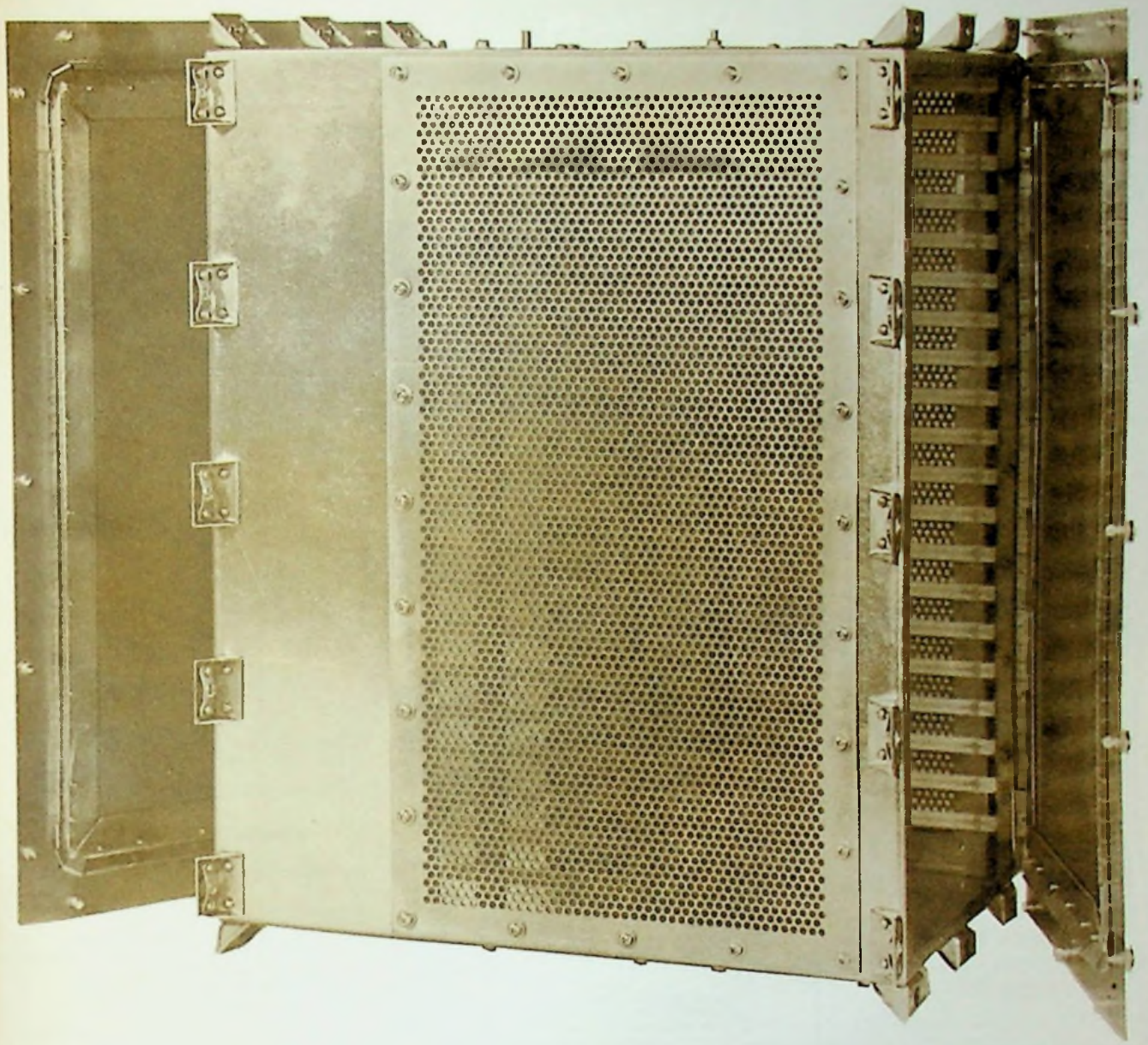
All week long, a hospitality suite for women will be operating in the California Room of the Fairmont, with light refreshments, aids to the first-time visitors, and other informational services offered by volunteer Bay Area hostesses.

Of course, most of the lady visitors will join their husbands for the all-industry international cocktail party Tuesday evening in the Grand Ballroom of the Fairmont.

Serving on the ladies' program steering committee with Mrs. Rice and Mrs. DeLiban are Mrs. Robert Lorenzini, Mrs. William McGuigan, Mrs. Ernest Pappenfus, Mrs. Robert Craig, Mrs. Charles Piercey, Mrs. William Floyd, and Mrs. Robert Ward.

The committee will be greatly expanded with volunteer hostesses during WESCON.

CAPABILITY...



Stanford Applied Engineering has the experience and capability to design, develop and manufacture in several highly specialized areas such as the RFI shielded rack and housing assembly shown here.

Literature available on these products:

P/C Card Files • P/C Guides • P/C Card Pullers & Ejectors • P/C Card Connectors • Custom Electronic Chassis • Molded BNC Cable Assemblies • Connector Design, Development & Mfg. • Cirkut Sockets™

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MISSOURI, Boweng, 10414 Oak Ave., St. Louis
NEW JERSEY, Talbe Co., Inc., 19 Sylvan Ave., Englewood Cliffs
OHIO, Talbe Co., Inc., 5899 Huberville Ave., Dayton
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WESCON INDUSTRIAL DESIGN AWARDS

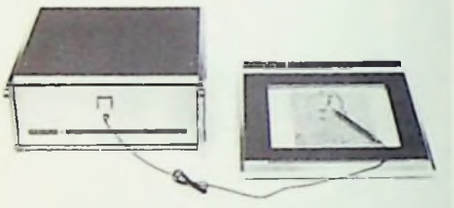
A panel of five professional judges has chosen 16 electronic products for inclusion in the Industrial Design Awards exhibit at the 1967 Western Electronic Show and Convention. The products, selected from 155 entries, will be shown during WESCON at the Cow Palace.

The 16 winners will undergo a second round of judging before WESCON, and several may be selected for "awards of excellence," according to Carl J. Clement, Spectra-Physics Inc., who is chairman of the WESCON Industrial Design Committee. The judges are Richard Coyne, publisher, *Commercial Art;* Jack Crist, coordinator of industrial design, San Jose State College; Robert Montgomery, engineering design manager, Varian Aerograph; J. Budd Steinhilber of Tepper/Steinhilber Associates Inc.; and Harold Zierhut of Zierhut/Vedder/Shimano.

Eleven electronics firms are represented by the 16 winning products, chosen for their outstanding industrial design. The products, companies, and designers are:

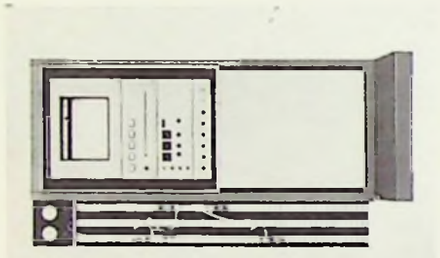
Remote Control Unit for Slow Motion Television System, Ampex Corp., Redwood City, Calif.; R. W. Bornschlegel, F. T. Walsh.

Studio Camera, Ampex Corp., Elk Grove Village, Ill.; Arden Farey.

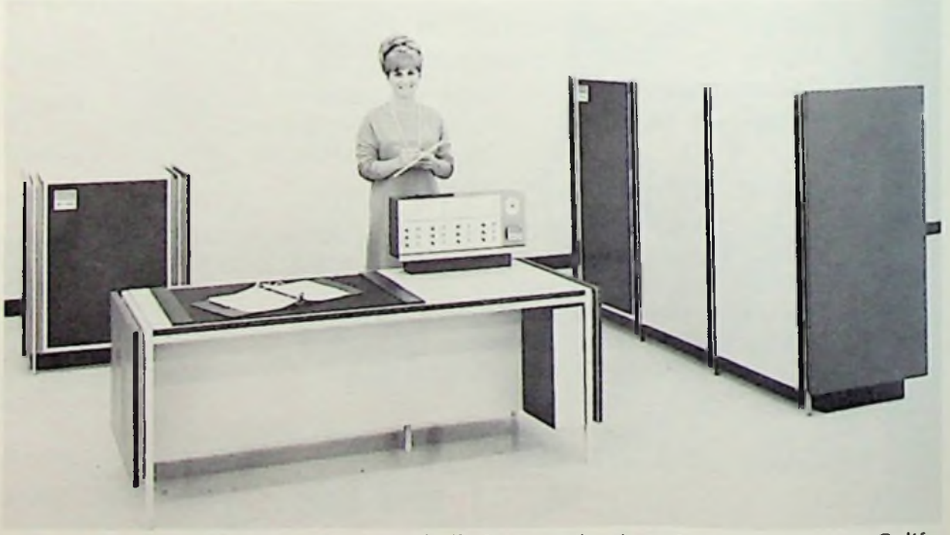


Data Tablet, Sylvania Electronic Systems, Waltham, Massachusetts; Oskar Heininger.

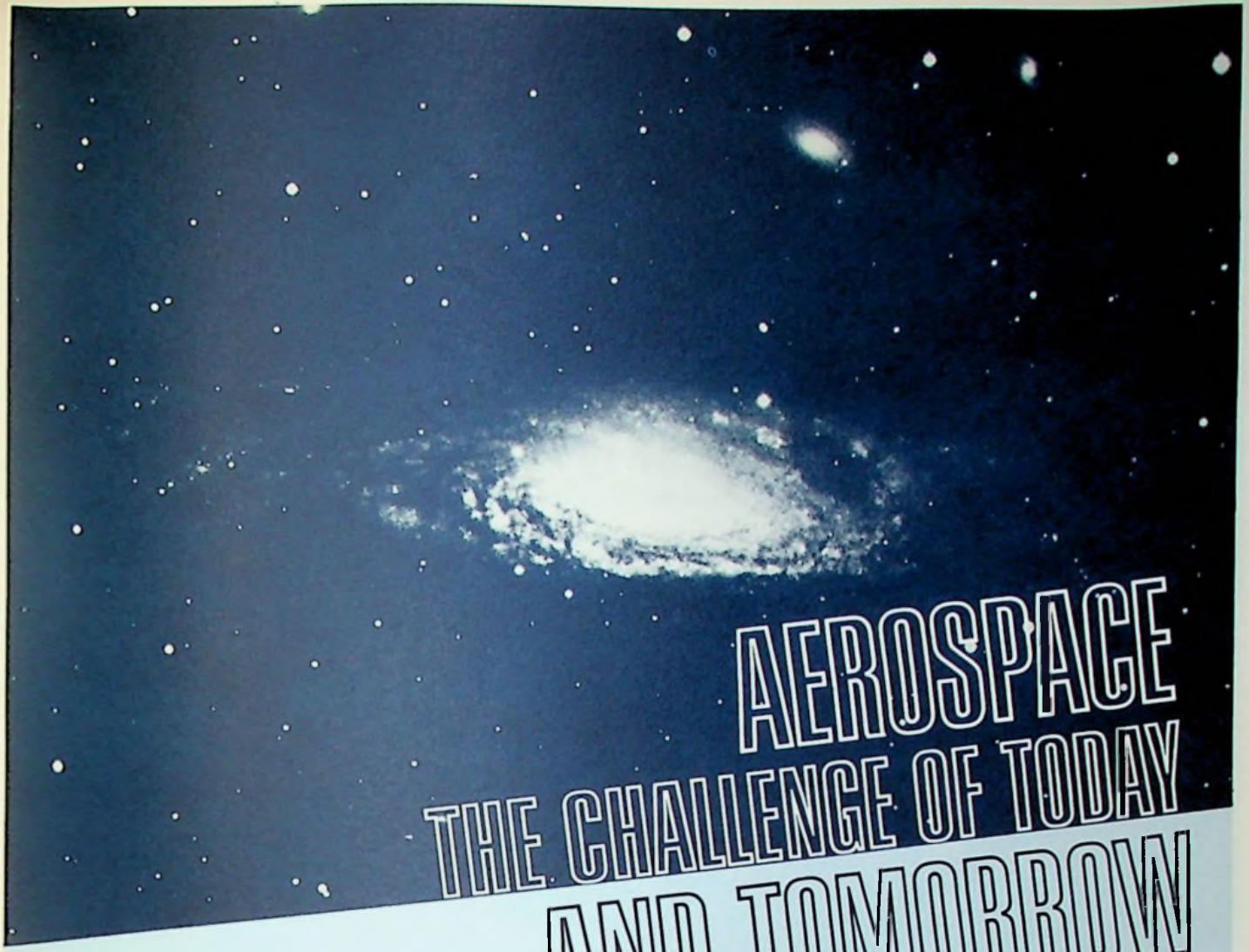
(Continued on page 36)



Amino Acid Analyzer, Beckman/Spinco Division, Palo Alto, Calif.; Charles W. Dodge.



Data Communications System, Marshall Communications Inc., Santa Ana, Calif.; Moto Shimano, Robert Noyer, Zierhut/Vedder/Shimano (consultants).



We are now just on the threshold of an exciting new field. Even with the moon probes, the manned space flights and the countless orbiting satellites, the future holds even more.

At Kaiser Aerospace & Electronics our challenge today is in the application of airborne TV display systems to both military and commercial markets. Our challenges tomorrow will be up to you. If you would like a career where your personal efforts will be used today and TOMORROW then Kaiser is the place for you. We have openings in the following areas:

Electronic Design Engineers

Openings exist for intermediate and senior level circuit design engineers for analog video circuit design and digital video synthesis and control design work. Experience in the following areas preferred:

- Timing Generators
- Pulse Shaping Circuits
- Counters
- Shift Registers
- CRT Excitation Circuits
- Decoding Circuits
- Logic Circuits
- Video Circuits
- Deflection & Sweep Circuits

Reliability Engineers

Responsibilities will include reliability prediction estimates, reliability models, reliability apportionment, configuration analysis, design review, circuit analysis. A technical degree plus familiarity in circuit analysis is preferred. Position reports directly to the Manager of Product Assurance.

Maintainability Engineers

Position reporting directly to Product Assurance Manager includes activity in program planning and maintainability analysis on existing contracts and proposal activity. Should have degree plus direct experience in electronic design and maintainability.

Mechanical Engineers

BSME with 3-7 years' experience in the development of airborne electronic systems. Responsibilities include product design and packaging of military and commercial aircraft instrumentation; ability to carry through engineering assignments from conception to completion on projects which involve disciplines in analytical and experimental structural-thermal analysis and design, vibration control, and precision electro mechanical mechanisms. Experience with designs incorporating precision optical assemblies is highly desirable.

To arrange for an interview please contact: Mr. E. M. Russell, Employment Manager

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Horace A. Shepard

Wescon67

WEMA LUNCHEON

Horace A. Shepard, president of TRW Inc., will address the annual luncheon of the Western Electronic Manufacturers Association, August 23, at the Fairmont Hotel, San Francisco.

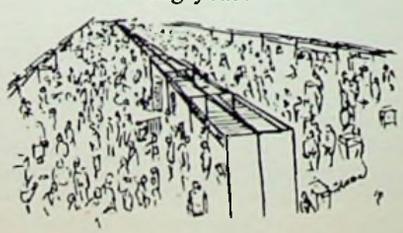
President of TRW since 1962, Shepard was directly involved in the company's decision to seek balanced diversification, which has resulted in a dramatic increase in sales and record earnings.

Company sales volume, after 51 years of operation, reached the quarter billion level in 1952. The half billion mark was reached in 1964, sales were $860 million in 1966 and a $1 billion volume is anticipated for this year.

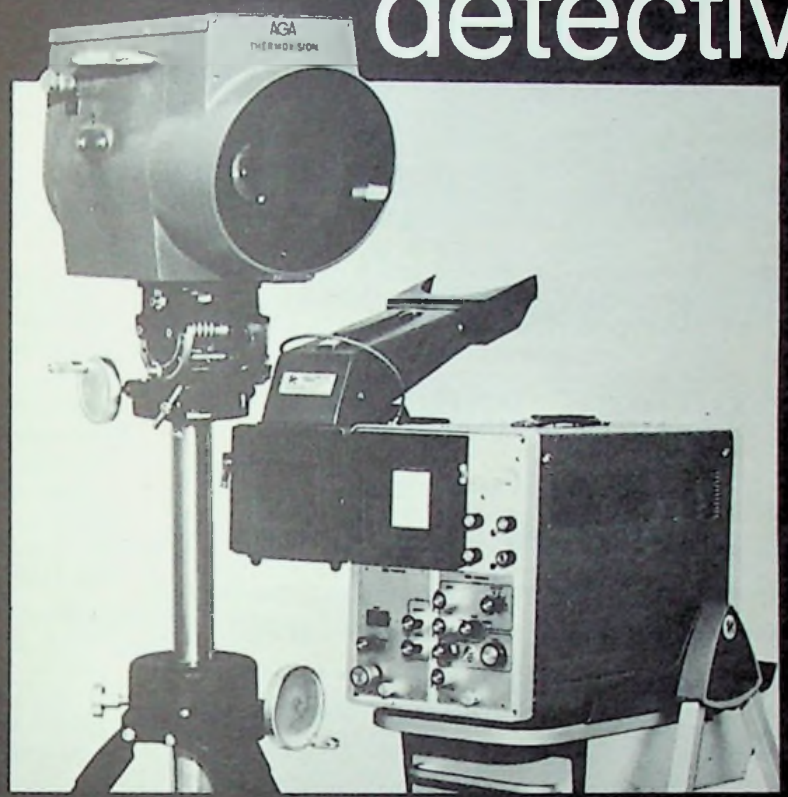
Following graduation from Auburn University with an aeronautical engineering degree in 1934, Shepard joined the Army Air Force. He was at one time the youngest general in the Air Force and on retirement in 1951 was director of procurement and engineering at AF headquarters, Pentagon.

Shepard joined the Cleveland-headquartered company in 1951 as vice president and assistant to the general manager and was elected a director in 1957. The following year, after the merger of Thompson Products Inc. and Rama-Wooldridge Corporation, he was named assistant to the chairman and general manager of the Thompson Products division.

He was appointed vice president and general manager of company-wide operations in 1961 and succeeded Dr. Dean E. Wooldridge as TRW president the following year.



How can you use an infra-red detective?



The AGA Corporation of Sweden has developed an infra-red scanner with real time image presentation for use in non-destructive testing and quality control. The unit is called Thermovision and its range of applications seems extremely far reaching.

Thermovision converts infra-red radiation into an electronic signal and an instantaneously visible thermal picture on a 5" oscilloscope screen. A TV-like image on a cathode ray tube corresponds in brightness with the temperature pattern. Temperature sensitivity is as low as 0.2°C.

Thermovision is highly mobile and flexible, consisting of a scanner and display unit with screen. A camera attachment provides permanent records of readings when desired.

The diversity of applications possible is indicated by the broad variety of current Thermovision uses. Some of these are:

- Preventive maintenance of electrical power systems by detecting overheating joints not discernible through normal testing.
- Medical diagnosis in oncology, obstetrics, gynecology, orthopedy, peripheral vascular diseases and other fields.
- Detection of insulation leaks, hydraulic leaks, heat from friction, faulty bondage in honeycomb structures, etc.

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Circle Inquiry Card No. 26

C. F. O'Donnell

Wescon67

PACKAGING SPEAKER

Cedric F. O'Donnell, who has directed research and development projects at Autonetics since 1963, will make the featured address at the 8th International Electronic Circuit Packaging Symposium on August 21 in San Francisco.

Symposium chairman E. J. Lorenz announced O'Donnell's acceptance of an invitation to address the symposium audience of more than 500 persons in the Imperial Ballroom of the San Francisco Hilton Hotel. The 8th IECP is being presented by WESCON as a concurrent activity.

At Autonetics division of North American Aviation, where he is senior vice president for research and engineering, he has served as chief of the digital computer section and of computers and data systems, and director of research and engineering programs.

He is the author of a book, "Applied Microelectronics," and of "Inertial Navigation, Analysis and Design." He is a graduate of McGill University and received his master's degree from Massachusetts Institute of Technology.

The two-day Packaging Symposium at the Hilton will be held August 21 and 22, and features six packaging technical sessions, plus three special workshop periods organized by the California Circuits Association. Advance registration is available through WESCON, and the registration fee is $30.

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You'll receive registration forms that let you arrange personal private interviews with us while you're in San Francisco the week of August 22nd through the 25th. If, by chance, you're not planning on being in San Francisco that important week, register anyway by sending the coupon. We'll see that you're considered for the very next CAREER CENTER in your vicinity.

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If you are not able to send in your data sheet application before you arrive in San Francisco, call (415) 692-2972 immediately upon arrival. Interviews will be held at the Thunderbolt Hotel, 101 Bayshore Freeway, Milbrae, California.

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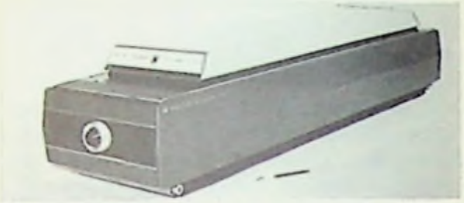
MORE INDUSTRIAL DESIGN

Sampler Reader, IBM/Systems Development Division, San Jose, Calif.; Donald H. Wood, Donald A. Moore, Eliot Noyes (consultant).

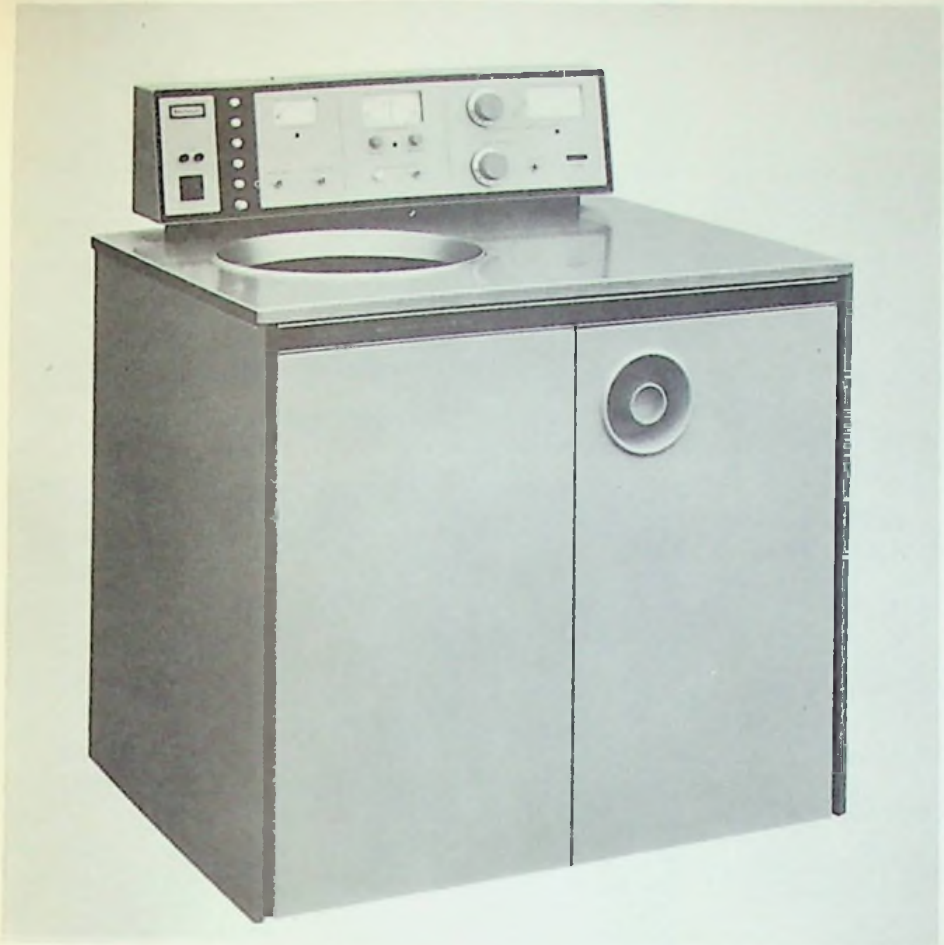


Induction Ion Laser, Spectra-Physics Inc., Mountain View, Calif.; Carl J. Clement.

Microspec Infrared Spectrophotometer, Beckman Instruments, Fullerton, Calif.; Robert L. Greene and Hugh O. Brown.

Circle Inquiry Card No. 29

Circle Inquiry Card No. 30



Ultracentrifuge, Beckman/Spinco Division, Palo Alto, Calif.; Charles W. Dodge.
(Continued on page 44)

SOUTHERN CALIFORNIA

Steven Noll, 14, Balboa Jr. High School, Ventura, "Planetary Analysis Module."

John Stephen Borjon, 17, Wasco Union High School, "Ultrasonic Doppler Motion Indicator."

William Albert Strack Jr., 17, of Santa Ana, Foothill High (Tustin), "Practical Application of Touch Tone (telephone) Signalling to Two-Way Communications."

Ronald Kenneth Evans, 13, Crest View School, Huntington Beach, "Typical Computer Circuits."

David King Frey, 17, Agoura High School, Agoura, "Beat Frequency Phenomenon."

Steven Jeffrey Jacobs, Audubon Jr. High School, Los Angeles, "Format Resonator Analog."

Richard Morris Katz, 14, John Burroughs Jr. High School, Los Angeles, "Corresponding Audio Representation of Visual Light Images and Reversion Process."

John Edward Lillig, of Pico Rivera, Don Bosco Technical High, South San Gabriel, "Detecting Elementary Particles with the Spark Chamber."

Craig William McCluskey, 17, Westchester High School, Los Angeles, "Project Artemis: Astronomical and Communicational Uses of Moon Reflection."

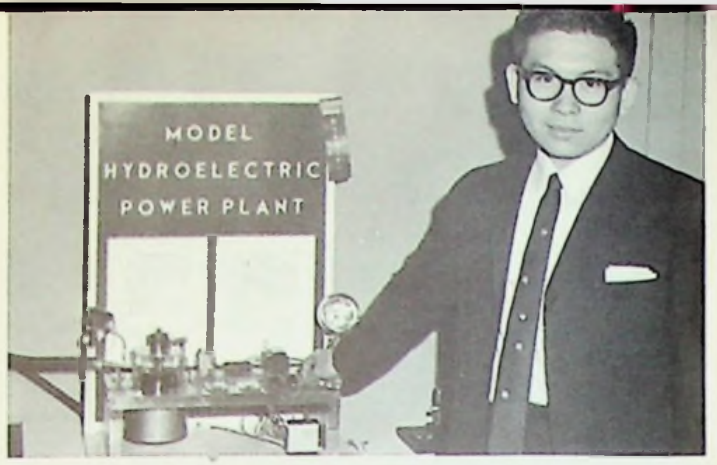
Thomas Allen Moshenrose, of South Gate, Don Bosco Technical High, "Electron Digital Desk Calculator."

Gary Lee Murray, of Chemawa Jr. High School, Riverside, "Analog Computer."

Eugene W. Warren, 17, Los Angeles High School, "Conic Parabla Equation Point Calculator."

William Pat Edwards and Jay M. Bernard, of Crawford High School, San Diego, "Linear Electron Accelerator."

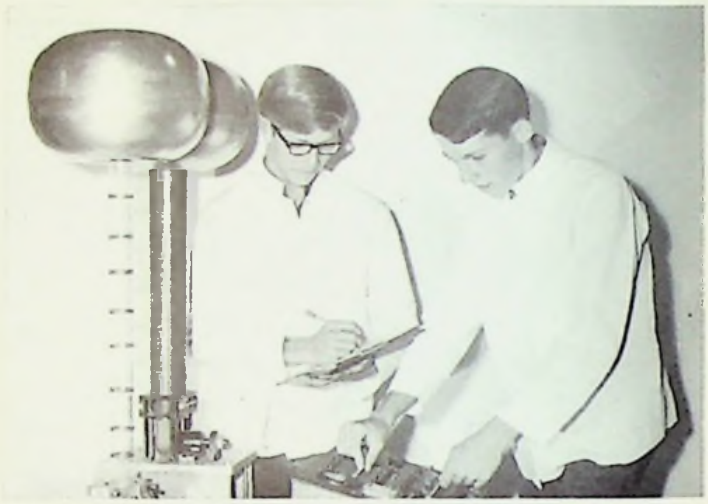
(Continued on page 40)



Tom Nozaki, Jr., Cubberley High School, Palo Alto, "Model Hydroelectric Power Plant."

Burton L. Johnson, Newark High School, Newark, "Construction of a He-Ne Gas Laser."

Richard Morris Katz, 14, John Burroughs Jr. High School, Los Angeles, "Corresponding Audio Representation of Visual Light Images and Reversion Process."



William Pat Edwards and Jay M. Bernard, of Crawford High School, San Diego, "Linear Electron Accelerator."

IDAHO

Gordon Lynn Brown, of Madison High School, Rexburg, "Fluctuations of the Zodiacal Cloud Related to Solar Prominence Activity."

NEW MEXICO

Tyrone Mitchell, of Cloudcroft High School, Sunspot, "Some Practical Applications Resulting from Development of AND, OR, NOR Logic Circuitry Interacting with a Universal Comparison Code."

Scott Alan Jenkins, of Alameda, Valley High School (Albuquerque), "Development of a Boundary Layer Disturbance Theory for Drag Reduction by Accoustical Interaction with Neutral Boundary Layer Disturbance Frequencies."

OREGON

Vance Bodhaine, Wilson High School, Portland, "Digital Computer."

UTAH

Gaylen Atkinson and Dean Malmstrom, of Hillcrest High School, Midvale, "A Balloon Telemetry."

WASHINGTON

Steven G. Morton, Inglemoor High School, Bothell, "Project Mcalpha."

Mark McKay, John R. Rogers High School, Spokane, "A New Solution to Amplifier Failure in Outdoor Music Systems."

John A. Esteb, Okanogan High School, Okanogan, "5 Ft. Telsa Coil."

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LOW-NOISE TRAVELING-WAVE AMPLIFIERS

Beginning with the first LNTWA offered to the microwave industry in early 1963, Watkins-Johnson has continued to produce amplifiers exhibiting lower noise figures and wider dynamic range. Shown in the tabulation are 26 typical units possessing the most commonly requested performance characteristics. Many versions of each are available on special order. Most of these amplifiers are packaged in the familiar Watkins-Johnson cylindrical housing, except the new SRPM units (illustrated). All amplifiers (except WJ-370) have self-contained solid-state power supplies that operate from 115 volts ac 48–420 Hz. All are completely adjustment-free and meet respective requirements of MIL-E-5400, Class 2 Specification. Watkins-Johnson's low-noise amplifiers provide users with lowest noise figure, lowest cost per operating hour, and highest field proven reliability. We deliver: some units available in less than a week, others in 30 days — any in 90 days.

Type	Freq. Range (GHz)	Noise Figure (dB)	S. S. Gain (dB)	Saturated Output (dBm)	Remarks
WJ–278	0.5–1.0	5.0	25	–10	Standard Package
WJ–397	0.5–2.1	6.5	25	+3	Double Octave
WJ–268	1.0–2.0	5.0	25	–10	Standard Package
WJ–294	1.0–2.0	8.0	25	+7	Compact Package
WJ–370	1.4–2.3	4.5	20	–13	Matched Gain, Phase
WJ–269	2.0–4.0	5.5	25	–10	Standard Package
WJ–295	2.0–4.0	8.5	25	+7	Compact Package
WJ–353	2.0–4.0	9.0	25	+5	Battery Operated
WJ–343	2.0–8.0	7.0	25	0	Double Octave
WJ–355	2.2–2.3	3.7	25	–10	Telemetry
WJ–381	2.6–5.2	9.5	25	+7	Straddle Band
WJ–271	4.0–8.0	6.5	25	–5	Standard Package
WJ–296	4.0–8.0	9.0	25	+7	Compact Package
WJ–349	4.5–6.5	5.0	25	–10	Lowest NF in C-band
WJ–345	8.0–12.0	7.0	25	–10	Standard Package
WJ–276	8.0–12.0	8.5	25	–5	Standard Package
WJ–384	8.0–12.0	8.5	25	+10	Standard Package
WJ–403	8.0–12.0	9.0	25	+13	SRPM
WJ–363	8.0–12.0	10.0	30	+13	Standard Package
WJ–287	8.0–12.0	10.0	35	–5	Standard Package
WJ–297	8.0–12.0	10.0	25	+7	Compact Package
WJ–399	8.0–12.0	11.0	25	+16	Highest Output in X-band
WJ–424	8.0–12.0	9.0	25	+13	SRPM
WJ–307	12.0–18.0	10.0	25	–5	WG Connectors
WJ–342	12.0–18.0	12.0	25	+7	Compact Package WG
WJ–393	18.0–26.5	13.0	25	0	Standard Package WG

YIG DEVICES

Watkins-Johnson has the widest selection of YIG devices offered anywhere. Units are available in a variety of packages covering the frequency range from 500 MHz to 18 GHz. Two-stage, dual two-stage, and four-stage electronically tuned YIG filters are available for both military and laboratory environments. A host of special YIG devices, including limiters, discriminators, YIG-tuned transistor amplifiers, YIG-tuned oscillators and harmonic generators, make up the extensive line of Watkins-Johnson YIG devices. The listing indicates a few of the devices currently being delivered; others are being developed each week. Write for details.

Type	Freq. Range (GHz)	Nominal Bandwidth @ 3 dB* (MHz)	Size (Inches)	Weight (Ounces)	Remarks
WJ–619	1.0–2.0	30 ± 5	1.4 x 1.4 x 1.4	12	Dual, 2-Stage Compact Filter
WJ–620	2.0–4.0	30 ± 5	1.4 x 1.4 x 1.4	12	
WJ–621	4.0–8.0	30 ± 5	1.4 x 1.4 x 1.4	12	
WJ–622	8.0–12.4	30 ± 4	2.4 x 2.5 x 2.8	30	
WJ–611	1.0–.20	30 ± 5	1.4 x 1.4 x 1.4	12	2-Stage Compact Filter
WJ–612	2.0–4.0	30 ± 5	1.4 x 1.4 x 1.4	12	
WJ–613	4.0–8.0	30 ± 5	1.4 x 1.4 x 1.4	12	
WJ–614	8.0–12.4	30 ± 5	2 x 2 x 2	30	
WJ–667	12.4–18.0	30 ± 5	2 x 2 x 2.25	30	
WJ–615	1.0–2.0	30 ± 5	1.4 x 1.4 x 1.4	12	4-Stage Compact Filter
WJ–616	2.0–4.0	30 ± 5	1.4 x 1.4 x 1.4	12	
WJ–617	4.0–8.0	30 ± 5	1.4 x 1.4 x 1.4	12	
WJ–618	8.0–12.4	30 ± 5	2 x 2 x 2	30	
WJ–634	1.0–2.0	30 ± 5	2.6 x 3.1 x 2.8	30	2-Stage Hybrid Filters
WJ–635	2.0–4.0	30 ± 5	2.6 x 3.1 x 2.8	30	
WJ–636	4.0–8.0	30 ± 5	2.6 x 3.1 x 2.8	30	
WJ–637	8.0–12.4	30 ± 5	2.6 x 3.1 x 2.8	30	
WJ–652	1.0–6.5	30 ± 5	0.75 x 0.75 x 0.75	1	Mechanically Tunable; 2-Stage Filter
WJ–569	1.0–2.0	n/a	1.4 x 1.4 x 1.4	12	15 mW YIG-Tuned Transistor Oscillator
WJ–623	2.0–12.4	45 ± 15	2 x 2 x 2	30	Multi-Octave Compact Filter

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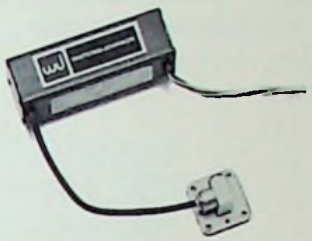
BACKWARD-WAVE OSCILLATORS

Type	Freq. Range (GHz)	Min. Power Output, mW	Max. Helix Voltage, V.	Max. Cathode Current, mA	Remarks
WWJ-2031-2° Δ	2.09–4.15	60	1500	14	
WWJ-2032-2Δ	3.0–6.0	10	2000	12	
WWJ-2005 Δ	4.0–8.0	40	2100	14	MILITARY,
WWJ-2033-2Δ	6.0–12.0	10	2000	12	
WWJ-2006 Δ	8.0–12.4	50	1600	12	MAGNETICALLY
WWJ-2004	9.5–13.0	10	800	10	SHIELDED
WWJ-2007 Δ	12.4–18.0	40	2000	12	
SSE-310	2.0–4.0	50	1350	12	
SSE-304	4.0–8.0	20	1800	12	
SSE-313	8.0–12.4	50	1600	12	
WWJ-2017 Δ	8.7–11.0	150	1500	12	MILITARY,
SSE-307	12.4–18.0	20	2100	12	COMPACT
SSE-308	14.0–17.0	10	800	12	
SSE-311	18.0–26.5	5	2000	12	
SSE-312	26.5–40.0	5	2000	10	
SSE-223	0.5–1.0	30	800	17	
SSE-214A	1.0–2.0	100	1485	17	
SSE-215A	2.0–4.0	75	2000	15	
WWJ-2015	4.0–8.0	60	2100	15	COMMERCIAL,
WWJ-2008	8.0–12.4	100	2100	15	STANDARD
SEE-2003	12.4–18.0	40	2100	12	
SEE-218	18.0–26.5	20	2000	10	
SEE-222	26.5–40.0	10	2000	8	
WJJ-2018 Δ	2.0–4.0	70	1800	14	
WJJ-2019 Δ	4.0–8.0	30	1850	12	COMMERCIAL,
WJJ-2034 Δ	4.0–8.0	60	2100	14	MAGNETICALLY
WJJ-2020 Δ	8.0–12.4	50	1600	12	SHIELDED
WJJ-2031 Δ	8.0–12.4	100	2100	14	
WJJ-2021 Δ	12.4–18.0	40	2100	12	
WJJ-2024	2.0–4.0	50	1300	12	
WJJ-2030	4.0–8.0	50	2150	12	COMMERCIAL,
WJJ-2027	8.0–12.4	50	1600	12	COMPACT
WJJ-2028	12.4–18.0	20	2100	12	

Partially magnetically shielded. Δ RFI shielded.



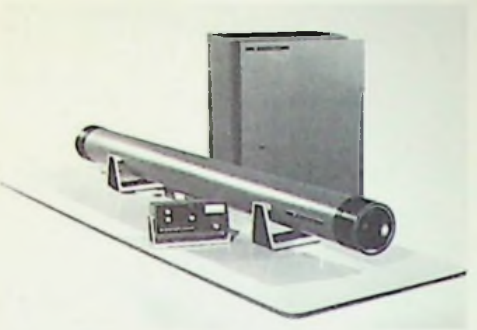
Watkins-Johnson continues to offer a wide selection of backward-wave oscillators for every military and commercial application. Units are available in standard, compact and magnetically shielded versions. RFI shielding is also available on most types. W-J BWOs cover the frequency range from 0.5 to 40 GHz with minimum power outputs from 5 to 400 milliwatts. All are packaged in familiar W-J "square" housings, some of which are as small as 1.25 inches square. Watkins-Johnson consistently produces BWOs that offer top performance and long life. The tabulated listing indicates some of the many units available now. Specially modified tubes or completely new designs can often be delivered in 90 days or less. There are more Watkins-Johnson BWOs in use today than all other makes combined.

MEDIUM-POWER PACKAGED TWT AMPLIFIERS

(With Integral Solid-State Power Supply)

Type	Freq. Range (GHz)	Output Power (W, CW)	Input Voltage (V dc)	Remarks
WJ-1014-1	2.2–2.4	20	28	NASA Qualified
WJ-1045	6.0–8.0	200	28	Space Qualified
WJ-1130	7.2–7.7	2.5	28	Space Qualified
WJ-1015	7.0–8.5	35	28	Space Qualified
WJ-3364	4.4–9.0	35	115	Ground Station
WJ-3364-5	8.0–12.5	35	115	Ground Station
WJ-11049	10.5–12.5	35	28	Airborne

Watkins-Johnson offers a number of medium-power packaged amplifiers with all solid-state integral power supplies. Some are designed for space environment; others are for ground station applications. These units are available in S- through X-bands. Space-qualified units are built to withstand extremes of shock, vibration, and temperature. They are designed to operate from 28 volt dc input voltage. Ground station amplifiers operate from 115 volt, 48-420 Hz input voltage. At left is a list of a few types of medium-power amplifier packages currently in production—others are under development. One of these amplifiers may already meet your requirements.

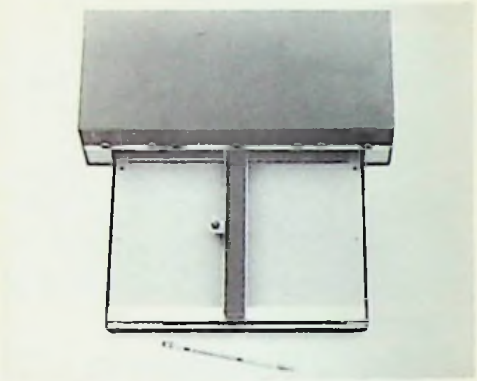


CO_2 Gas Laser System, Coherent Radiation Laboratories, Palo Alto, Calif.; W. Mefferd, R. Rorden, S. Jarett, C. Nunes; Gruye'-Vogt-Opperman Inc. (consultants).

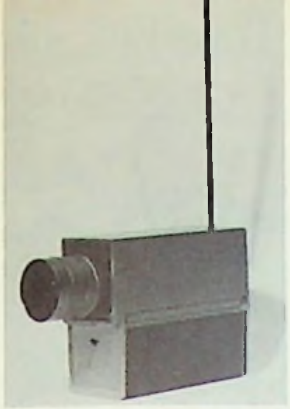
Video Tape Recorder, International Video Corp., Mountain View, Calif.; Gruye'-Vogt-Opperman Inc. (consultants).

(Continued on page 46)

Raynger Portable Infrared Thermometer, Raytek, Inc., Mountain View, Calif.; J. Budd Steinhilber, Tepper/Steinhilber Associates.



F100 S-Y Recorder, Varian, Palo Alto, Calif.; Anthony P. H. Chan.



Scope 3 Interferometer, Varian, Vacuum Products Division, Palo Alto, Calif.; Anthony P. H. Chan.

Microeye Television Camera, Teledyne Systems Company, El Segundo, Calif.; H. E. Shanks.

Portable Plumbicon Camera, Ampex Corp., Redwood City, Calif.; Gene Bozarth, F. T. Walsh.

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The 1003 covers a 67-kHz-to-80 MHz frequency range, and tuning this instrument is as much fun as it is convenient and fast. You can coarse-tune by motor over the main slide-rule dial to within 0.25% at a rate of about 7% per second, and fine-tune manually with a large control whose dial divisions correspond to 0.01% of the main scale. For greater resolution, a "ΔF" control provides electronic, backlash-free settability to 2 ppm. The motor-driven frequency control is fully utilized in the model containing the auto-control unit, which lets you preset frequencies. The preselected frequencies are useful either as limits for automatic sweeping or for programmed frequency selection (repeatable to 0.1%).

Frequency, incremental frequency, and automatic sweeping can all be programmed, as can output level and modulation-percentage. A crystal calibrator with 1-MHz, 200-kHz, and 50-kHz outputs is also supplied with the model containing the auto-control unit. This calibrator allows you to calibrate to within 0.002 percent.

The 1003 requires only 20 watts and delivers 180 milliwatts of leveled CW power into a 50-ohm load (6 volts behind 50 ohms). Envelope distortion is less than 2% at 70% a-m, with the modulating signal of 400 Hz or 1 kHz provided. Incidental phase modulation is less than 0.1 radian with 30% a-m. The highly accurate, 10-dB-per-step attenuator and a continuously adjustable carrier-level control give an over-all 155-dB dynamic range.

This instrument must be seen to be appreciated. A demonstration will show that very-narrow-bandwidth measurements can be made in 10 seconds with a 1003 signal generator and an oscilloscope. Try that with any other signal generator.

Price of the 1003 is $2995 ($2795 without the auto-control unit and crystal calibrator). For complete information, write General Radio Company, 22 Baker Avenue, W. Concord, Massachusetts 01781; telephone (617) 369-4400; TWX (710) 347-1051.

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