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.
There is no substitute for quality.

This applies to people, too. And, if you get creative, quality-oriented individuals and put them to work building quality products, you also build something else: a reputation. Western Microwave's reputation has made it one of the largest manufacturers of ferrite devices. Our continuing research and development has brought us further recognition in the field of semiconductor devices and integrated microwave packages.

Because of our emphasis on quality, our growth has been continuous and so is our need for "quality" individuals. If you are interested in exploring a career with a company that has an environment which promotes success, write: Mr. M. H. Edminster, Dept. G, 1045 DiGiulio Avenue, Santa Clara, Calif. An equal opportunity employer.

**Microwave Components:** Engineers and technicians needed with experience in passive devices, filters, mixers, switches, couplers, hybrids. Prior stripline, waveguide or coaxial background an advantage.

**Solid State Components:** Engineers and technicians with experience in RF circuitry, oscillators, harmonic generators, amplifiers, and component configurations.

**Research and Development:** Engineers and technicians with experience in thick films, instrumentation, digital/analog circuitry, power supplies, ferrite magnetics, and micro-integrated circuits.

**Integrated Products:** Seeking engineers with experience in either project or development engineering, RF circuitry, IF circuitry, amplifiers, transmitters, receivers, telemetry devices, or power sweeps.
Display & digital equipment engineers:

Tie your future to the growth of educational technology at RCA Instructional Systems in Palo Alto, California

Join RCA's full-scale entry into computer-based instruction and you'll expand your own career potential while helping solve problems created by enormous increases in student population, and in both volume and complexity of knowledge.

RCA Instructional Systems has the full responsibility and resources to carry out a broad mandate from RCA corporate management: to study, create, and test total educational systems designed to help teachers do a better job of imparting more knowledge and skills to more students—more effectively.

Here in the San Francisco Bay area, our highly competent nucleus staff is working closely with nationally-known educators—such as Stanford University's Dr. Patrick Suppes, a pioneer in computer-based instruction—in the first major joint undertaking of its kind by industry and education.

Key to systems already under development is RCA's Spectra 70, first computer family to utilize monolithic integrated circuitry and cross the threshold into the third generation. RCA's many other products, skills, and services in such areas as communications, switching, displays, publishing, and field services are also playing a key role in this corporate-wide development program.

If you are an engineer experienced in educational systems analysis, electronic display development, and/or computer systems design, we'd like to talk to you. Current efforts include: development of concepts for advanced computer-based instructional systems; design of advanced CRT displays and electronic data entry devices; and design of the elements of digital processing and communications systems for use with computer-based information. Areas of work are: digital circuits; digital logic design; packaging; human factors engineering; display devices design; and analog circuit design.

Send your resume to: A. J. Tasca, RCA Instructional Systems, 530 University Avenue, Palo Alto, Calif. 94301.

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RHG transmitter—receiver combinations are fully tested baseband to baseband and are intended for high resolution FM-TV transmission and reception.

For battlefield reconnaissance, a high resolution camera and all solid state RHG transmitter mounted in a drone aircraft is reliably linked to an RHG companion receiver and monitor which is mounted in a director aircraft, ship, or ground station miles away.

Complete links are available at UHF, and in L, S, C, or X bands and may also be obtained for standard 525 line monochrome or color TV. If higher power is required, a TWT booster can be added. Packaging options such as transit case or relay rack are standard along with choice of AC or DC powered models.

RHG can deliver a link designed to your specifications in 90 days—call Ron Hirsch at 516-694-3100.

Write for Catalog 67a and Facilities Brochure.

- 945 LINE — High Resolution TV
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- 12 MHz Baseband
- 1 Watt Power Output
- Airborne — Meets MIL-E-5400
- RFI Protected — Meets MIL-I-6181D
- Follows EIA & CCIR Recommendations
ENGINEERS.... it's okay to follow the crowd...

... up to a point!

* Are you one of the crowd? or are you that rare individual who stands alone? Who welcomes challenges, who demands creative freedom and recognition, who is seeking unlimited opportunity for advancement with a dynamic organization?

* Then WATKINS-JOHNSON, an established leader in the development and production of microwave devices, would like to talk to YOU. Our company is experiencing a continuing GROWTH—a growth you can share.

* At WATKINS-JOHNSON you will enjoy a professional atmosphere, superb working conditions, and employee benefits among the best in industry.

* Our progress transcends even that of an era marked by phenomenal scientific growth. To an important degree, our research and development activities are considered the basis of our success.

We are looking for such talented and resourceful engineers as:

DIGITAL ENGINEERS
Design and develop digital circuitry for control of digital reconnaissance receivers, data processing and display systems.
Requires MSEE or BSEE and 5 years experience in systems design.

RECEIVER ENGINEERS
Design microwave receivers or IF circuits for complex receiver systems.
Requires MSEE or BSEE and 3–5 years experience.

CIRCUIT DESIGN ENGINEERS
Design and build transistorized linear circuits and apply them to microwave integrated circuits.
Requires MSEE or BSEE and 2 years related experience.

APPLICATIONS ENGINEERS
Marketing, promotion, and sales of microwave devices and systems.
Requires BSEE; MBA preferred.

Please direct your confidential résumé to Mr. J.W. Waste.
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:

<table>
<thead>
<tr>
<th>Deflection Factor</th>
<th>Risetime</th>
<th>Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mV/div to 10 V/div</td>
<td>2.4 ns</td>
<td>DC to 150 MHz</td>
</tr>
<tr>
<td>10 mV/div</td>
<td>3.5 ns</td>
<td>DC to 100 MHz</td>
</tr>
<tr>
<td>5 mV/div</td>
<td>5.9 ns</td>
<td>DC to 60 MHz</td>
</tr>
</tbody>
</table>

*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 500-1 Scope-Mobile® Cart ............................................................... $ 60

U.S. Sales Prices FOB Beaverton, Oregon

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 2 kHz modulation signal horizontally (X). Straight vertical line is the unmodulated carrier. Multiple exposure.

Coordinated research, design and manufacturing

...part of the Tektronix commitment to progress in the measurement sciences
Wescon67

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 shirt-sleeve jobs.

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


Do you know one of these three men?

If you know one of these men, he'll appreciate your telling him about these challenging new opportunities at Magnavox Research Laboratories. (His wife and children will love you!) Our men are recognized as among the tops in their fields. We seek a few more like them.

- ADVANCED COMMUNICATIONS SYSTEMS ENGINEER. With training and experience necessary for research and development work in advanced; sophisticated anti-jam communications systems.

- SYSTEMS REQUIREMENTS ANALYST... MILITARY ELECTRONICS COMMUNICATIONS. Strong background in operational analysis.

- INFORMATION THEORY SPECIALIST. We'll tailor the job to the man's qualifications, if suitable for our activities in advanced communications.

WHAT DO WE DO?

Magnavox Research Laboratories is the research facility of the Magnavox Company, a part of the Government and Industrial Division of Magnavox. The Laboratories carry on research programs aimed at the development of new sophisticated communications equipment and high capacity information storage and retrieval systems for industry and the armed forces.

A few among our many achievements have been:

- The first field-operational, jam-resistant spread-spectrum communication system.
- The successful application of pseudo-noise modulation-demodulation techniques to satellite communication.
- The first field-operational anti-jam, pseudo-noise modulation-demodulation subsystem for tropo-scatter communication links.
- The first lightweight, low-power, coded correlation radar.
- The first true-noise receiver for collecting echoes data.
- Unique computer-controlled, unit record information storage and retrieval systems for graphic and digital data.
- A magneto-optic technique for rapid optical reading of digital data recorded in high density on magnetic tape.

If you’d like to know more about us, call or write to Fred Peters at our ultra-modern facilities in Torrance, California. If you’d like to chat in San Francisco during WESCON, call us collect now.

**Magnavox RESEARCH LABORATORIES**

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Torrance, California
Tel. (213) 328-0770
An equal opportunity employer

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**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:

<table>
<thead>
<tr>
<th>Departure Point</th>
<th>Starting Point</th>
<th>Frequency</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downtown Airline Bus Terminal</td>
<td>8:00 a.m.</td>
<td>Every 10 minutes</td>
<td>Cow Palace</td>
</tr>
<tr>
<td>Fairmont Hotel</td>
<td>7:45 a.m.</td>
<td>Every 15 minutes</td>
<td>Airline Bus Term.</td>
</tr>
<tr>
<td>Jack Tar Hotel</td>
<td>7:30 a.m.</td>
<td>Every 30 minutes</td>
<td>Airline Bus Term.</td>
</tr>
<tr>
<td>Townehouse Hotel</td>
<td>7:40 a.m.</td>
<td>Every 30 minutes</td>
<td>Airline Bus Term.</td>
</tr>
<tr>
<td>San Francisco International Airport</td>
<td>8:00 a.m.</td>
<td>Every 30 minutes</td>
<td>Cow Palace</td>
</tr>
</tbody>
</table>

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.)

**SPECIAL PENINSULAR BUS SERVICE**

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

<table>
<thead>
<tr>
<th>Departure Time</th>
<th>Hyatt House</th>
<th>Cow Palace</th>
<th>Hyatt House</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tuesday</strong></td>
<td>8:00 a.m.</td>
<td>9:15 a.m.</td>
<td>9:30 a.m.</td>
</tr>
<tr>
<td>Aug. 22</td>
<td>10:45 a.m.</td>
<td>11:45 a.m.</td>
<td>12:15 p.m.</td>
</tr>
<tr>
<td></td>
<td>1:30 p.m.</td>
<td>2:30 p.m.</td>
<td>5:00 p.m.</td>
</tr>
<tr>
<td><strong>Wednesday</strong></td>
<td>8:00 a.m.</td>
<td>9:15 a.m.</td>
<td>9:30 a.m.</td>
</tr>
<tr>
<td>Aug. 23</td>
<td>10:45 a.m.</td>
<td>11:45 a.m.</td>
<td>12:15 p.m.</td>
</tr>
<tr>
<td></td>
<td>1:30 p.m.</td>
<td>2:30 p.m.</td>
<td>4:00 p.m.</td>
</tr>
<tr>
<td></td>
<td>6:00 p.m.</td>
<td>7:00 p.m.</td>
<td>10:00 p.m.</td>
</tr>
</tbody>
</table>

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)
Wescon
Engineers

Knowledgeable engineers in any of the following technological areas are urged to respond.

- Broadband Microwave Antennas
- Phased Array Radar
- Phase and Frequency Scanners
- ECM Systems
- Avionics
- Surveillance Radar
- Signal Processing
- Data Handling and Displays

ADVANCED SYSTEMS R & D

We have a number of critical needs for creative engineers due to increased activity in both Company-Funded and Contract R & D programs.

Southern California opportunities exist at ITT Gilfillan, the world leader in advanced radar systems.

San Francisco interviews
To arrange for your appointment call Mr. Paul West (collect) (213) 386-3708 in Los Angeles.
In San Francisco, during the show, call Paul West at (415) 392-4933.

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Engineering Managers will be conducting evening and weekend interviews in all major cities. Of particular interest would be candidates with experience in the following areas:

- RF Communications
- Guidance & Controls
- Digital Circuits
- Analog Circuits
- Data Acquisition
- Spacecraft Structures
- Spacecraft Test
- Systems Integration
- Design Integration
- Packaging
- Manufacturing Engineering

Why not meet with our Engineering Managers to review, first hand, the many opportunities, growth potential, and unusual benefits of this new division? Start now and forward a copy of your resume or direct a letter to:

MR. JOSEPH A. VUKOVICH
Engineer & Manager,
Professional Placement

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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 2-6800), 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: IECF Press Conference, Tamalpais Room, Hilton
12:00 Noon - 2:00 PM: IECF Luncheon, Imperial Ballroom, Hilton
4:30 PM - 7:00 PM: IECF 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: IECF Symposium, Continental Ballroom 6, Hilton
9:00 AM - 5:30 PM: WESCON Press Room, Convention Hall, Cow Palace
9:00 AM - 5:30 PM: Women's Hospitality Suite, California Room, Fairmont
9:30 AM - 5:30 PM: WESCON Press Room, Convention Hall, Cow Palace
10:00 AM - 2:00 PM: WESCON Exhibits, Future Engineers Show, Industrial Design Exhibit, Cow Palace
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 - 6:00 PM: Exhibitors Meeting, Terman Hall, Cow Palace
6:00 PM - 9:00 PM: IECF 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: WESCON Press Room, Convention Hall, Cow Palace
9:30 AM - 9:30 PM: WESCON Board Meeting, Garden Room, Fairmont
10:00 AM - 12:30 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: WESCON Special Session A, De Forest Hall, Cow Palace
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 - 5:00 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: WESCON Exhibits, Future Engineers Show, Industrial Design Exhibit, Cow Palace
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)
We have some new and vacant bench chairs. We'd like to see them filled with engineers who receive pride and satisfaction from transmuting deskwork concepts into workbench models.

The engineers we need work best in a creative environment. They thrive on challenging assignments and stay with them from inception to completion. The rare individuals most likely to fill our vacant chairs have ambition, talent, imagination. They wish to invest these assets in a growing company filled by similar people.

Call the Growing One — we have many new chairs.

For technical interview appointment ask for:
Dr. John Grigsby, Vice President — Eng.
Dr. Forrest Fulton, Staff Scientist
Dr. David Leeson, Director of Microwave Laboratory
Mr. Charles Zumba, Director of Systems Engineering
Mr. John Arnold, Director of Advanced Techniques Engineering
Mr. John Atkins, Director of Equipment Development Engineering

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We are now offering you responsible assignments in a variety of nuclear research programs at our Livermore facility.

Our long-range programs include: industrial applications of nuclear explosives; radiation effects on the biosphere; development of controlled thermonuclear reactions; nuclear weapons for national defense; and reactors for power in space. Electronic Engineers at LRL are working on applied and developmental projects such as these:

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- Thin-film devices
- Investigation of electronic band structures of solids

Computer Technology
- Programs for computer-aided design
- Computer graphics
- Large time-shared computers
- On-line computers in physics, chemistry, biomedical research

Systems Design and Development
- Space research instrumentation
- Laser communications
- Nanosecond data acquisition systems

For more information, contact Mr. Dan McGee, Personnel Department,

Lawrence Radiation Laboratory
University of California
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Livermore, California 94550
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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 VSME 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 exhibitors 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

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 AM-4:00 PM</td>
<td>Science Film Theater, East Exhibit Hall, Cow Palace</td>
</tr>
<tr>
<td>12:00 Noon</td>
<td>Women's Luncheon and Tour, Sabella's Restaurant on Fisherman's Wharf</td>
</tr>
<tr>
<td>12:00 Noon-2:00 PM</td>
<td>Eta Kappa Nu Luncheon, Hunt Room, Fairmont</td>
</tr>
<tr>
<td>12:00 Noon-2:00 PM</td>
<td>FES Awards Luncheon, Bordeaux &amp; Burgundy Rooms, Hilton Inn, S.F. Airport</td>
</tr>
<tr>
<td>2:00 PM-4:30 PM</td>
<td>WESCON Special Session C, Edison Hall, Cow Palace</td>
</tr>
<tr>
<td>8:30 AM-11:30 AM</td>
<td>Women's Continental Breakfast, Fountain Room, Fairmont</td>
</tr>
<tr>
<td>9:00 AM-5:30 PM</td>
<td>Women's Hospitality Suite, California Room, Fairmont</td>
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<tr>
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<td>WESCON Technical Session No. 14, Du Bridge Hall, Cow Palace</td>
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<tr>
<td>10:00 AM-12:30 PM</td>
<td>WESCON Technical Session No. 15, Terman Hall, Cow Palace</td>
</tr>
<tr>
<td>10:00 AM-12:30 PM</td>
<td>WESCON Technical Session No. 16, De Forest Hall, Cow Palace</td>
</tr>
<tr>
<td>10:00 AM-4:00 PM</td>
<td>Science Film Theater, East Exhibit Hall, Cow Palace</td>
</tr>
<tr>
<td>11:30 AM</td>
<td>Women's Tour of WESCON, Cow Palace</td>
</tr>
<tr>
<td>2:00 PM-4:30 PM</td>
<td>WESCON Special Session D, Edison Hall, Cow Palace</td>
</tr>
</tbody>
</table>

FRIDAY, AUGUST 25

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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August 1967
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**Wescon67**

**QUICK-CHECK LIST OF IEEE, RELATED COMMITTEE MEETINGS**

**MONDAY, AUGUST 21**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM-12:00 Noon</td>
<td>EIA Hermetic Seal Meeting, Rosewood Room A, Hilton</td>
</tr>
<tr>
<td>8:00 AM-6:00 PM</td>
<td>IEEE Executive Committee Meeting, 20th Century Room, Fairmont</td>
</tr>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>IEEE GED Committee for International Electron Devices, Green Room, Hilton</td>
</tr>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>EIA MED-4.1 Physical Characterization Requirements, Diablo Room, Hilton</td>
</tr>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>EIA MED-4.2 Electrical Requirements, Shasta Room, Hilton</td>
</tr>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>EIA MED-4.3 Microelectronics Reliability Characterizations, Whitney Room, Hilton</td>
</tr>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>EIA JS Semiconductor Council, International Room, Fairmont</td>
</tr>
<tr>
<td>9:30 AM-4:30 PM</td>
<td>IEEE NT &amp; SAC Meeting, Far East Room, Fairmont</td>
</tr>
<tr>
<td>10:00 AM-3:00 PM</td>
<td>IEEE GED Committee, Empire Room, Fairmont</td>
</tr>
<tr>
<td>12:00 Noon-2:00 PM</td>
<td>IEEE Board of Directors Luncheon, State Room, Fairmont</td>
</tr>
<tr>
<td>6:00 PM-8:00 PM</td>
<td>IEEE Board of Directors Dinner, Hunt Room, Fairmont</td>
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**TUESDAY, AUGUST 22**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>8:00 AM-6:00 PM</td>
<td>IEEE Board of Directors' Meeting, Hunt Room, Fairmont</td>
</tr>
<tr>
<td>8:00 AM-12:30 PM</td>
<td>EIA Microelectronics Device Application, Rosewood Room, Hilton</td>
</tr>
<tr>
<td>8:30 AM-12:00 Noon</td>
<td>IEEE Administrative Committee of the Reliability Group, Hunt Room, Fairmont</td>
</tr>
<tr>
<td>9:00 AM-1:00 PM</td>
<td>IEEE Radar Committees, Empire Room, Fairmont</td>
</tr>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>EIA TC-47 Meeting, Teakwood Suite, Hilton</td>
</tr>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>EIA MED-3.3 Active Analog Circuits, Shasta Room, Hilton</td>
</tr>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>EIA C-83.2 RF Connectors Meeting, Whitney Room, Hilton</td>
</tr>
<tr>
<td>9:30 AM-5:00 PM</td>
<td>IEEE TAB Systems Council, International Room, Fairmont</td>
</tr>
<tr>
<td>12:00 Noon-2:00 PM</td>
<td>IEEE Board of Directors Luncheon, Florentine Room, Fairmont</td>
</tr>
<tr>
<td>12:00 Noon-1:30 PM</td>
<td>IEEE Administrative Committee of Reliability Group Luncheon, Garden Room, Fairmont</td>
</tr>
<tr>
<td>12:00 Noon-2:30 PM</td>
<td>IEEE TAB Systems Council Luncheon, Far East Room, Fairmont</td>
</tr>
<tr>
<td>1:00 PM-5:00 PM</td>
<td>IEEE Editorial Board Meeting, State Room, Fairmont</td>
</tr>
<tr>
<td>2:30 PM-6:00 PM</td>
<td>IEEE TAB Organization Committee Meeting, Frontier Room, Fairmont</td>
</tr>
<tr>
<td>6:30 PM-10:30 PM</td>
<td>IEEE Intersociety Relations Dinner Meeting, Florentine Room, Fairmont</td>
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**WEDNESDAY, AUGUST 23**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>8:00 AM-12:00 Noon</td>
<td>EIA Magnetic Tape Section, Lassen Room, Hilton</td>
</tr>
<tr>
<td>8:00 AM-1:00 PM</td>
<td>IEEE Sections Committee Meeting, Empire Room, Fairmont</td>
</tr>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>IEEE Publications Board Meeting, International Room, Fairmont</td>
</tr>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>EIA IT-42 Maintenance Ability Committee, California Room, Hilton</td>
</tr>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>EIA JS-14 Meeting, Teakwood Suite, Hilton</td>
</tr>
<tr>
<td>9:30 AM-5:00 PM</td>
<td>EIA MED-1, Shasta Room, Hilton</td>
</tr>
<tr>
<td>12:00 Noon-1:30 PM</td>
<td>IEEE TAB Operating Committee Meeting, Frontier Room, Fairmont</td>
</tr>
<tr>
<td>12:00 Noon-1:30 PM</td>
<td>IEEE TAB Committee Luncheon, State Room, Fairmont</td>
</tr>
<tr>
<td>1:00 PM-5:00 PM</td>
<td>IEEE Publications Board Luncheon, 20th Century Room, Fairmont</td>
</tr>
<tr>
<td>7:30 PM-9:30 PM</td>
<td>IEEE Forum for Section Chairmen, Crystal Room, Fairmont</td>
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**THURSDAY, AUGUST 24**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM-5:00 PM</td>
<td>IEEE 6th Region Committee Meeting, French Room, Fairmont</td>
</tr>
<tr>
<td>9:00 AM-12:00 Noon</td>
<td>IEEE Subcommittee on Cultural &amp; Scientific Changes, International Room, Fairmont</td>
</tr>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>IEEE Subcommittee 3.02A Electronic Power Conversion Meeting, Far East Room, Fairmont</td>
</tr>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>EIA JS-1 Rectifier Diodes, Whitney Room, Hilton</td>
</tr>
<tr>
<td>9:30 AM-5:00 PM</td>
<td>IEEE TAB Committee Meeting, Florentine Room, Fairmont</td>
</tr>
<tr>
<td>12:00 Noon-2:00 PM</td>
<td>IEEE TAB Luncheon, 20th Century Room, Fairmont</td>
</tr>
<tr>
<td>1:00 PM-5:00 PM</td>
<td>IEEE Electronic Devices ADCOM Meeting, Empire Room, Fairmont</td>
</tr>
<tr>
<td>1:30 PM-5:30 PM</td>
<td>IEEE Pulse Techniques Subcommittee Meeting, Green Room, Fairmont</td>
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**FRIDAY, AUGUST 25**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>IEEE Subcommittee 3.02A, Far East Room, Fairmont</td>
</tr>
<tr>
<td>9:00 AM-5:00 PM</td>
<td>IEEE Group 4 on Circuit Theory, International Room, Fairmont</td>
</tr>
</tbody>
</table>
Every New Discovery is Given a Name
We Call Ours.... PARAMETRIC POWER

If the inductance of a winding can be changed while a current is flowing through that winding, then energy can be transferred. If this change in inductance can be accomplished without the usual use of mutual inductance, then transient free energy transfer can be achieved. By inventing a technique for rhythmically varying the parameters of a magnetic circuit without relying on mutual inductance, Wanlass Electric has discovered an important new way to convert electrical energy. This we have named Parametric Power.

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An outstanding technical program and exhibit await you at the Cow Palace.

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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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 Fettly-Schoendue (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.
**SESSION 1**  
**Linear Integrated Circuits**

**SESSION 2**  
**Business Management: Engineer Becomes Manager**

**SESSION 3**  
**Radar Performance on Hypersonic Re-entry Vehicles**

**SESSION 4**  
**Varactor Tuning of Receivers**

**SPECIAL SESSION**  
**Electronics in Meteorology**

---

**SESSION 5**  
**Gas Laser Stabilization**

**SESSION 6**  
**Data Compression**

**SESSION 7**  
**Patient Monitoring Systems: Progress, Problems & Prospects**

**SESSION 8**  
**Designing Radio Frequency Circuits Using FETs**

**SPECIAL SESSION**  
**Large Scale Integration and Computer System**

---

**SESSION 9**  
**Recent Developments in Communications Systems**

**SESSION 10**  
**Digital Approach to Analog Functions**

**SESSION 11**  
**Progress in Fluidics Applications**

**SESSION 12**  
**High Density Recording Techniques**

**SPECIAL SESSION**  
**Spectrum Management**

---

**SESSION 13**  
**Solid State Imaging, An Evolving Technology**

**SESSION 14**  
**Future of Solid State Phased Arrays**

**SESSION 15**  
**Static Power Syst—Controls, Inverters, Rect., Power Systs.**

**SESSION 16**  
**Computer as a System Component**

**SPECIAL SESSION**  
**Electronic Controls of Natural Resources**

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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 of plasma shielding 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.
Varactor Tuning of Receivers

Tuesday, August 22, 2:43-3:30 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 and remote tuning capability with improved reliability and small size. These factors as well as many recent applications will be discussed.

Session Organizer: Geralld 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 EQUIPMENT. Dean Strat, Avco Electronics, Cincinnati, Ohio.
4/3 VOLTAGE VARIABLE CAPACITOR TUNING OF RADIO FREQUENCY AMPLIFIERS. Jorge E. Rosas, 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.

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.

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

Gas Laser Stabilization

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

Patient 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 measurement methods of obtaining them, and a proposed standard for patient-intensive care systems will be outlined.

Session Organizer and Chairman: Curtis F. Miller, M.D., Beckman Instruments, Fullerton, Calif.
7/1 Elliott Corday, M.D., Cedars-Sinai Hospital, Los Angeles, Calif.
7/2 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.)

Designing Radio Frequency Circuits Using FETS

Wednesday, August 23, 10 a.m.-12:30 p.m.
(DuBridge 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. Slang Ping Kwock, 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. Wolfsen, 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.

The WESCON show will be open from 9:30 a.m. to 5:30 p.m. on three of its four days. On Wednesday, Augus 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 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. Davidson, Hewlett-Packard, Palo Alto, California.
Session Coordinator: Kenneth J. Larkin, Lockheed Missiles & Space Co., Sunnyvale, California.

1. THE STATE OF LSI TECHNOLOGY. Richard Petritz, Texas Instruments.
2. PRESENT AND FUTURE COST FACTORS IN LSI. Gordon Moore, Fairchild, Palo Alto.
3. USE OF LSI IN FUTURE LARGE COMPUTER SYSTEMS. Gene S. Amazi, IBM Corp., San Jose.

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 Organizer: 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. Mattion, Defense Telecommunications Agency Establishment, Ottawa, Canada.
9.3 LIMITATIONS OF RADIO PROPAGATION MEDIA. Thomas Kaimal and Paul Shaht, SRI, Menlo Park, Calif.
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 Dikany, Electronic Design Magazine, N.Y.
Session Chairman: James F. Kaiser, Bell Telephone Labs, Murray Hill, N. J.
10.1 WHY USE DIGITAL IC'S FOR ANALOG FUNCTIONS. Donald Breslow, Itek Corporation, Lexington, Mass.

12 High Density Recording Techniques
Thursday, August 24, 10 a.m.-12:30 p.m. (DeForest Hall, Cow Palace)
Billion-hit 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 electronic 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 RELATED TO MANNED SPACECRAFT. Kermit Norris, Leach Corp.—Controls Div., Azusa, Calif.
12.4 ULTRA-HIGH DATA PACKING DENSITY RECORDING. 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, Fairon Elec­tronics, San Carlos, Calif.

22 — grid-bulletin
Solid State Imaging, an Evolving Technology

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.


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

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.

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

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

16/2 A THIRD GENERATION COMPUTER IN A NUCLEAR PHYSICS LABORATORY. Richard F. Au, John V. Kane, and Richard E. Merrell, 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 Brunes and Robert F. Maronde, USC, Los Angeles; Stanley Selberth, Los Angeles County Hospital, Los Angeles; and John C. Soutter, IBM, Los Angeles, Calif.

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.
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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?

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RECEIVER ENGINEERS
To design and evaluate receiver circuits such as low noise RF amplifiers and oscillators, IF and Video amplifiers, parametric upconverters, and waveform 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.

Contact: MARK ROSENFELD
P. O. Box 188-G
Mountain View, California
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-
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.”


NORTHERN CALIFORNIA

Philip W. Lee, Sacramento High School, “Diffusion Cloud Chamber.”

Ronald William Hunt, Clovis High School, “Electronic Binary Computer.”

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

Larry B. Sorensen, 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?”


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

Masaaki Yamato, Oakland High School, “Ion-Propelled Aircraft.”

(Continued on page 38)

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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.
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
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Circle Inquiry Card No. 23
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:


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.

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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Now, if all these “ifs” have evoked the proper response, write our initials on an envelope and enclose your resume. Attention Ron Fried.
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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:

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- 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.

Thermovision’s unique capabilities may be of use in your work. Visit the AGA Thermovision Booth 4703 for a demonstration and further information—or contact AGA Thermovision.

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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."


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


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


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

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

(Continued on page 40)
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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 Acoustical 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 Maelpha."
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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<thead>
<tr>
<th>Type</th>
<th>Freq. Range (GHz)</th>
<th>Noise Figure (dB)</th>
<th>S. S. Gain (dB)</th>
<th>Saturated Output (dBm)</th>
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<tr>
<td>WJ-384</td>
<td>8.0-12.0</td>
<td>9.0</td>
<td>25</td>
<td>+13</td>
<td>Standard Package</td>
</tr>
<tr>
<td>WJ-403</td>
<td>8.0-12.0</td>
<td>10.0</td>
<td>25</td>
<td>0</td>
<td>Standard Package</td>
</tr>
<tr>
<td>WJ-363</td>
<td>8.0-12.0</td>
<td>10.0</td>
<td>25</td>
<td>+5</td>
<td>Standard Package</td>
</tr>
<tr>
<td>WJ-287</td>
<td>12.0-12.0</td>
<td>9.0</td>
<td>25</td>
<td>+16</td>
<td>Highest Output in X-band</td>
</tr>
<tr>
<td>WJ-424</td>
<td>8.0-12.0</td>
<td>9.0</td>
<td>25</td>
<td>+13</td>
<td>SRPM</td>
</tr>
</tbody>
</table>

YIG Devices

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

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TRAVELING-WAVE TUBES and AMPLIFIERS
BACKWARD-WAVE OSCILLATORS • YIG DEVICES
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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.
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**BACKWARD-WAVE OSCILLATORS**

<table>
<thead>
<tr>
<th>Type</th>
<th>Freq. Range (GHz)</th>
<th>Min. Power Output, mW</th>
<th>Max. Helix Voltage, V</th>
<th>Max. Cathode Current, mA</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>WJ-2031-2</td>
<td>2.09-4.15</td>
<td>60</td>
<td>1500</td>
<td>14</td>
<td>MILITARY, MAGNETICALLY SHIELDED</td>
</tr>
<tr>
<td>WJ-2032-2a</td>
<td>3.0-6.0</td>
<td>10</td>
<td>2000</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>WJ-2005</td>
<td>4.0-8.0</td>
<td>40</td>
<td>2100</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>WJ-2033-2a</td>
<td>6.0-12.0</td>
<td>10</td>
<td>2000</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>WJ-2006</td>
<td>8.0-12.4</td>
<td>50</td>
<td>1600</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>WJ-2004</td>
<td>9.5-13.0</td>
<td>10</td>
<td>800</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>WJ-2007</td>
<td>12.4-18.0</td>
<td>40</td>
<td>2000</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

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)

<table>
<thead>
<tr>
<th>Type</th>
<th>Freq. Range (GHz)</th>
<th>Output Power (W, CW)</th>
<th>Input Voltage (V dc)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>WJ-1104-1</td>
<td>2.2-2.4</td>
<td>20</td>
<td>28</td>
<td>NASA Qualified</td>
</tr>
<tr>
<td>WJ-1105</td>
<td>6.0-8.0</td>
<td>200</td>
<td>28</td>
<td>Space Qualified</td>
</tr>
<tr>
<td>WJ-1130</td>
<td>7.2-7.7</td>
<td>2.5</td>
<td>28</td>
<td>Space Qualified</td>
</tr>
<tr>
<td>WJ-1105</td>
<td>7.0-8.5</td>
<td>35</td>
<td>28</td>
<td>Space Qualified</td>
</tr>
<tr>
<td>WJ-1364</td>
<td>4.4-9.0</td>
<td>35</td>
<td>115</td>
<td>Ground Station</td>
</tr>
<tr>
<td>WJ-5364-5</td>
<td>8.0-12.5</td>
<td>35</td>
<td>115</td>
<td>Ground Station</td>
</tr>
<tr>
<td>WJ-1104</td>
<td>10.5-12.5</td>
<td>35</td>
<td>28</td>
<td>Airborne</td>
</tr>
</tbody>
</table>

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.
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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 settable 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.

See the Type 1003 Standard-Signal Generator at WESCON, Booths No. 3015-3018.