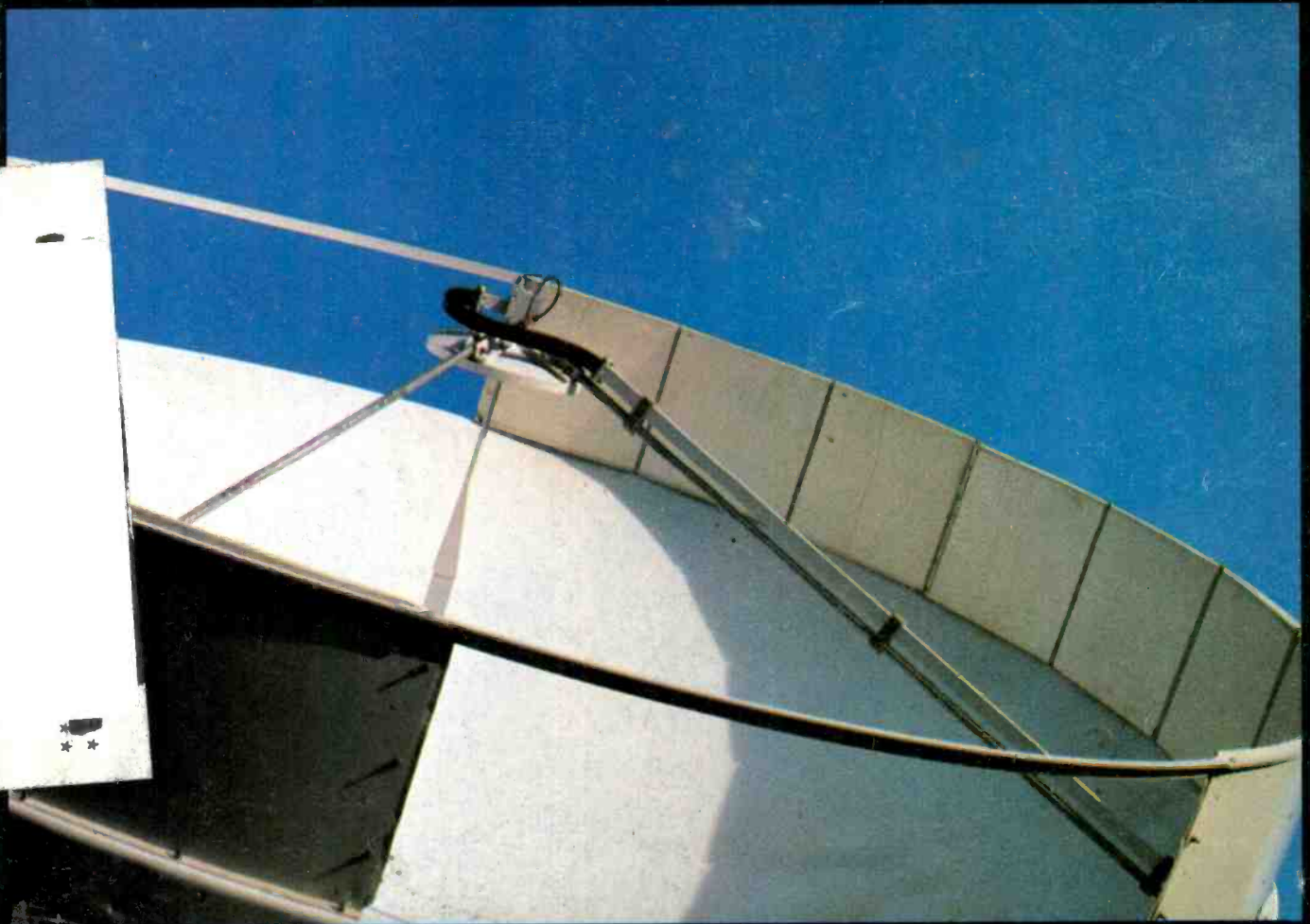


# BROADCAST<sup>®</sup> engineering

May, 1980/\$3.00



**Transmission Technology**

**NPR Conference**

**FM Transmitter Roundup**



HITACHI | HR-200

New  
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# A Colossal One-Inch Step

One-inch is the VTR format of the future. It's too important a step forward for a scaled-up 3/4" or a scaled-down 2" system. It deserves to be totally original, with every advance designed in. That's how we approached the new Hitachi HR-200, after almost 20 years of experience making quad machines. The result: a one-inch Type C VTR destined to establish new broadcast standards everywhere. In every department, the Hitachi HR-200 is miles ahead of the one-inch competition!

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# BROADCAST<sup>®</sup> engineering

The journal of broadcast technology

May, 1980 □ Volume 22 □ No. 5

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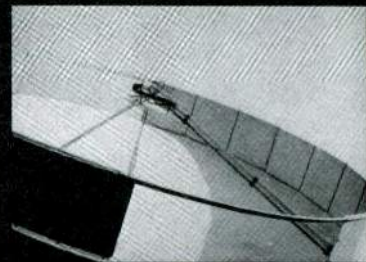
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Transmission Technology

NPR Conference

FM Transmitter Roundup

THE COVER this month shows a close-up view of the earth station transmit/receive antenna for KCUR-FM in Kansas City. KCUR is one of 17 uplinks in the National Public Radio network and was the second uplink to become certified.

Kansas City was the site for the recent NPR conference (see coverage beginning on p. 72). During this conference KCUR-FM initiated the first national broadcast on NPR to originate from Kansas City.

FCC chairman Charles Ferris and Harriet (Sis) Kaplan, president, National Radio Broadcasters Association, delivered major addresses at the NPR conference, and their presentations are found on pp. 60 and 70, respectively.

(Cover photo courtesy of Tim Fox, KCUR-FM.)

### June Issue

An in-depth coverage of the events and exhibits of the NAB-'80 Las Vegas convention—the most thorough coverage ever presented by **Broadcast Engineering**.



# HITACHI FP-60S

52dB and 600 lines for \$25,000. You can tell from just those three numbers that the Hitachi FP-60S is a pretty incredible camera. It gives you picture quality comparable to a broadcast studio camera costing \$70,000 to \$80,000. For a mere fraction of the cost.

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May 1980 *Broadcast Engineering* 3



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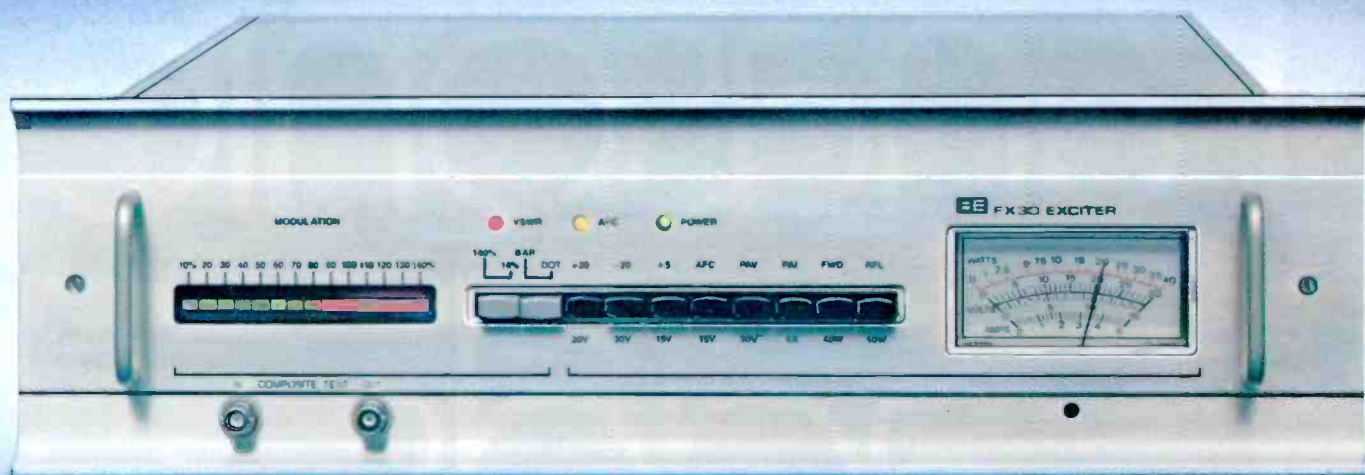
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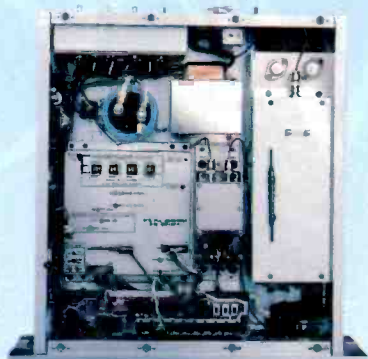
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There's also the EPA-500 tonearm system consisting of the EPA-501H, a titanium nitride tubular arm unit with dynamic damping for today's high-compliance cartridges. The EPA-B500 tonearm base with four-point gimbal suspension. And the SH-50P1 stylus pressure gauge, fully electronic and accurate to 1/10 of a gram. Also available are four other titanium nitride arm units with dynamic damping to match the mass and compliance of any cartridge.

**RAMSA** For remote broadcasts there's the Ramsa WR-130, an 8x2 portable mixer. It includes -70 dB attenuation for each input, high and low equalizers and a pre/post sub mixer. Plus pan pot, peak-overload indicators, and balanced mike inputs. While inputs 1-4 will accept turntables. There are also two auxiliary inputs. Outputs include high and low equalizers, a headphone output, echo send and receive, and record send.

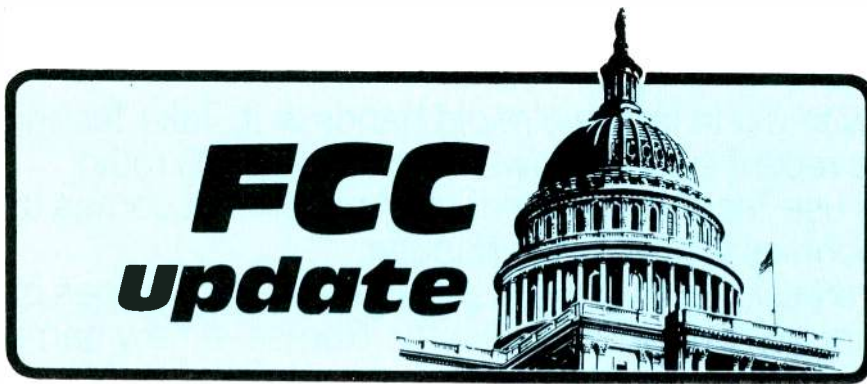
To complement the WR-130 mixer, use the Ramsa WP-9210 power amplifier. When you do, you'll get a clean 200 watts RMS per channel into 8 ohms from 20 Hz to 20 kHz with no more than 0.05% THD. You'll also get electronically balanced XLR inputs with continuous level adjustments, phone-jack inputs, as well as overload and short circuit protection.

To meet high performance standards there are three Ramsa hand-calibrated microphones. The WM-8000 and WM-8050 are designed for vocal use and include floating microphone capsules and triple wind screens to suppress shock and pop noise. For instrument miking there's the back electret condenser WM-8150 for improved high frequency and transient characteristics. It operates on batteries (not included) or connects to a phantom power source.

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PROFESSIONAL AUDIO DIVISION





May, 1980

**Ferris: Healthy public radio helpful**

The continued health of public radio's programming and its expansion into more markets help the FCC as it reviews its regulation of radio, Chairman Charles D. Ferris told the 1980 Public Radio Conference in Kansas City. He pledged his efforts to help public radio find additional outlets and his receptivity to innovative funding proposals that may require FCC approval.

Ferris noted the "funding crunch" projected for public radio and said perhaps the FCC should do more to help both public radio and television in their search for additional sources of financing. He reviewed a number of suggestions that have been made and described a recent FCC decision on the subject, involving public stations' use of satellite earth stations, as "pragmatic," in contrast to the traditional "narrow, moralistic" approach to fund-raising efforts by public stations.

"Public radio is vitally important to the success of many efforts now underway at the FCC," the chairman said, "efforts designed to increase radio program diversity while reducing government regulation."

**Brown: on congressional intervention**

FCC Commissioner Tyrone Brown, in discussing recent congressional actions that would halt pending FTC proceedings, said that such "unprecedented intervention in ongoing proceedings of the FTC cannot help but result in confusion within that agency over its mission, demoralization among its staff, and increased delay in reaching final decisions in its deliberations."

Speaking before the annual conference of Action for Children's Television in Washington, Brown made it clear that the independent regulatory agencies such as the FTC and FCC are "creatures of Congress, and exist only to carry out the will of Congress." He said that

"this fact is something that interest groups which press views before us sometimes forget; (but) it is a fact that we regulators can never afford to forget."

**Children's TV programming**

The Commission is still seeking public comment on five options for increasing the diversity of children's TV programming and also public comment and analysis of its Children's Television Task Force Report, presented to the Commission last October 30. The options are:

1. Repeal the 1974 Policy Statement and rely for children's programming on program sources other than advertiser-supported television.
2. Maintain or modify the Policy Statement and modify the TV license renewal form to obtain more comprehensive and precise information about licensee program practices for children.
3. Adopt interim mandatory programming rules for amount, scheduling and type of programming for children.
4. Adopt a TV license renewal processing guideline, under which license renewal applications would be reviewed by FCC staff to determine if they meet minimum guidelines for children's programming.
5. Increase both the number of advertiser-supported TV outlets in each market and the amount of for-pay video programming through cable, over-the-air subscription TV and/or direct satellite-to-home broadcasting, since with more outlets it is likely some will concentrate on the child audience.

The Commission hopes to adopt one of these options at the close of this proceeding, except that if it chooses the mandatory programming rule option, it will issue a further notice of proposed rule-making to outline the specific aspects of such a rule and allow for further comment on it.

(Comments June 2, replies August 1. Docket No. 19142, FCC 79-851.)

**Ascertainment checklist**

The FCC has rejected adding specific categories for "handicapped" or "gay" persons to its checklist of community elements all broadcasters must ascertain. Instead the Commission modified the "other" category on that checklist to ensure that all significant elements and institutions in any particular community are contacted by all commercial radio and TV renewal applicants and noncommercial TV applicants in ascertaining community needs.

**Increase in FM assignments**

The Commission has proposed modifying its FM broadcast station rules to increase significantly the availability of commercial FM broadcast assignments. Specifically, it proposed:

1. to allow stations with Class A facilities to operate on Class B-C channels if a Class A channel is not available;
2. to add two new classes of stations—Class B1 (an intermediate class between Classes A and B) with maximum facilities of 20kW effective radiated power (ERP) and antenna height of 92 meters above average terrain and Class C1 (an intermediate class between Classes B and C) with maximum facilities of 100kW ERP and 305 meters antenna height;
3. to permit Class B (including B1) facilities in Zone II (the whole country excluding the Northeast and most of California);
4. to require all existing Class B and C stations meet certain operating minimums for power and antenna height or be subject to reclassification to a lower class of channel. A similar requirement is also proposed for new Class C authorizations that would allow a new Class C assignment to start initially with Class C1 facilities; and
5. to adopt a new separation table to reflect the updated propagation curves.

(Comments due June 13 and replies August 13. BC Docket No. 80-90, FCC 80-108.)

**Broadcast stations totals**

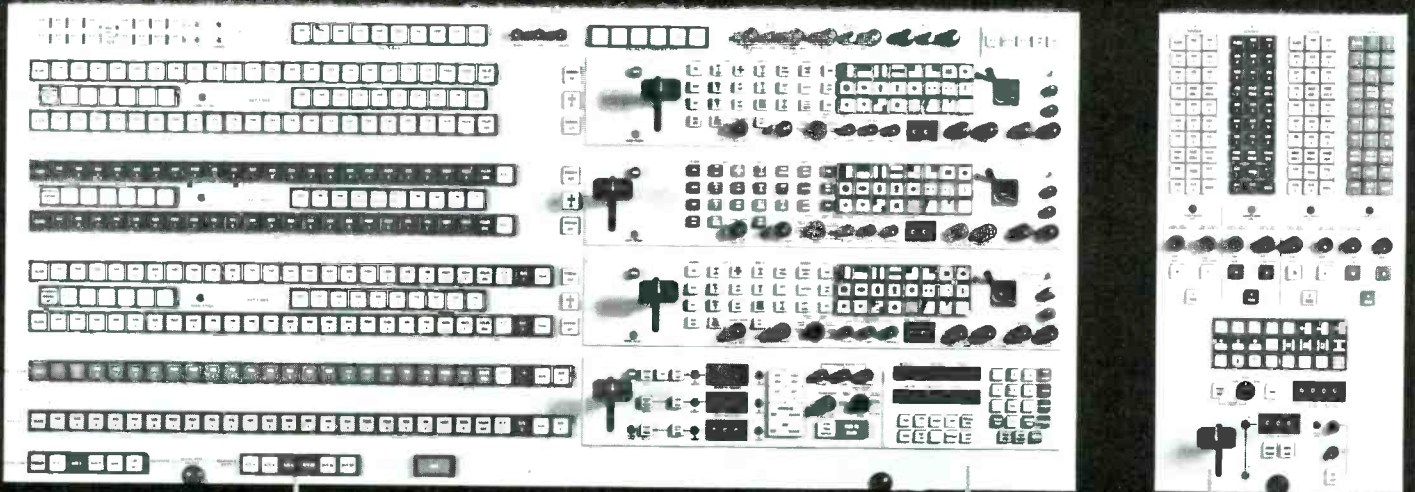
The Commission has announced the following totals for broadcast stations on the air as of February 29:

AM Radio . . . . .	4558
FM Radio . . . . .	3168
FM Educational . . . . .	1035
UHF TV (Commercial) . . . . .	229
VHF TV (Commercial) . . . . .	517
UHF TV (Educational) . . . . .	162
VHF TV (Educational) . . . . .	105



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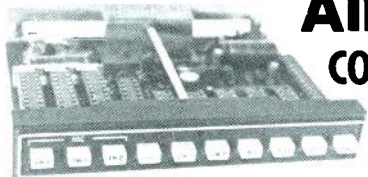
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10 Broadcast Engineering May 1980

## ATAS announces fourth annual student scholarship winners

The Academy of Television Arts & Sciences has announced the fourth annual awarding of five \$1000 scholarships to students enrolled in a broadcast curriculum for the 1980-81 year, according to Dr. Lynne Gross, chairperson of ATAS' Student Activities Committee.

Students were selected from more than 300 institutions across the country for their academic excellence and potential for contribution to the TV industry.

Scholarships have been awarded to Shelly Johnson, Art Center College of Design; Brett Henry, Los Angeles Valley College; Judith M. Goodwin, California State University, Long Beach; Karen Joy Bunn, San Bernardino Valley College; and Janice Arthur, University of Cincinnati.

Each college with a television curriculum was invited to select one student for the scholarship program, and those students were required to assemble a cassette, a paper detailing their objective in the industry, a resume, transcripts of their grades, and three letters of recommendation. This material was then viewed by the Student Activities Committee, who made the selections.

## INTELSAT reduces domestic satellite lease charges

INTELSAT will reduce by 20% its basic charges for satellite communications capacity leased to countries for domestic communications.

INTELSAT is the 102 member-country organization that owns and operates the telecommunications satellites used by countries around the world for international communications and by a number of countries, for domestic communications.

At present, 15 countries lease capacity from INTELSAT for communications within their countries.

INTELSAT currently provides these leases from spare capacity not being used for the provision of international services, on its 10 operational satellites, in orbit around the world.

The leases are provided on the condition that they can be preempted if—in an emergency—the capacity is required for international services.

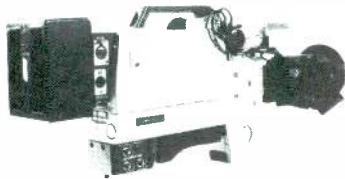
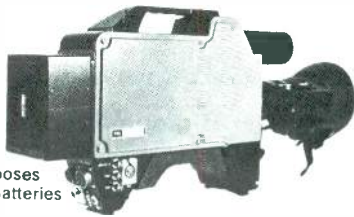
## INMARSAT issues request for proposals to lease satellite capacity

COMSAT announced that INMARSAT, the International Maritime Satellite Organization, has issued a request for proposals for lease of satellite capacity to establish its own global maritime communications service.

INMARSAT is a 29-member 'nation organization, which came into being last year. COMSAT is the US participant in INMARSAT, which is expected to begin operations in the early 1980s in a transition from the present MARISAT system, developed and managed by COMSAT General Corporation, COMSAT's wholly owned subsidiary. MARISAT, now in its fourth year, provides high-quality communications to the US Navy and the commercial shipping and offshore industries.

COMSAT was designated the US participant in INMARSAT under the provisions of the International Maritime Satellite Telecommunications Act of 1978, a role comparable to that which COMSAT has as the US participant in INTELSAT, which operates the 102-

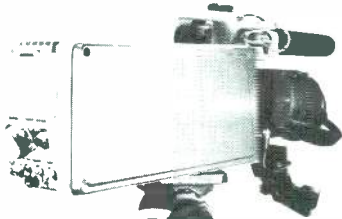
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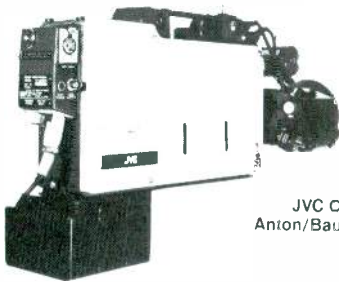
Hitachi Chooses  
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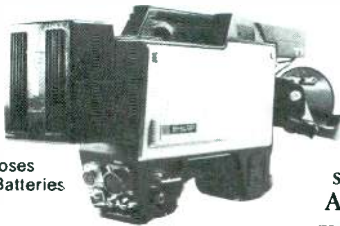
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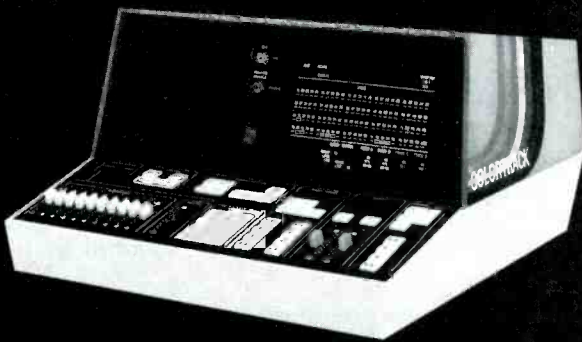
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BE580

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### Unique license and technology exchange agreement

Galileo Electro-Optics Corporation and the British Post Office announced the signing of a license and technology exchange agreement on February 27 that gives Galileo, and its wholly owned subsidiary, Galite, Inc., in Wallingford, CT, rights and know-how to advanced British Post Office optical communication technology. Manufacturing rights to unique double-crucible production methods for low-loss, high bandwidth, optical communication fiber and cable are included in this agreement.

These new processes were developed after extensive research by the Research and Development Laboratories of the British Post Office. The British Post Office is responsible for handling telecommunications in Britain, including telephone, telegraph, satellite and microwave communication, as well as, undersea cable in addition to the postal service.

### Smith appointed chairman

James A. Smith, manager of technical operations scheduling, NBC, Burbank, has been appointed to chair the Academy of Television Arts & Sciences Engineering Development Blue-Ribbon Panel. In announcing the appointment, ATAS president Hank Rieger said Smith would be responsible for supervising the Blue-Ribbon Panel's selection of the 1980 Emmy Award winner for Outstanding Achievement in Engineering Development.

### BIAS Conference

Vern Thompson, ABC, and Norfleet Turner, chairman, Data Communications Corporation (DDC), talked shop at the 9th Annual BIAS Conference in Memphis, TN March 16-18. Events this year included workshops on FCC Rulings and new equipment and discussions on media inventory, automatic switching and updates on the BIAS system.

More than 200 management and sales personnel from BIAS-affiliated stations nationwide attended the conference. To date the DDC Broadcast Division has fully automated the sales, traffic, operations and accounting functions of more than 250 radio and TV stations in the US and Canada.

### Battison to represent NPR at ARC

John Battison, director of engineering of Ohio State University's Telecommunication Center, (WOSU-AM-FM-TV-WPBO-TV Portsmouth), has been chosen by National Public Radio (NPR) to represent NPR's position at the Region Two Medium Wave Administrative Radio Conference (ARC) to be held in Buenos Aires, Argentina. Battison will be an official member of the U.S. Federal Communications Commission delegation which is headed by Commissioner Robert E. Lee. This conference will establish the ground rules for the operation of AM broadcast facilities on the North and South American continents and vicinity for the foreseeable future.

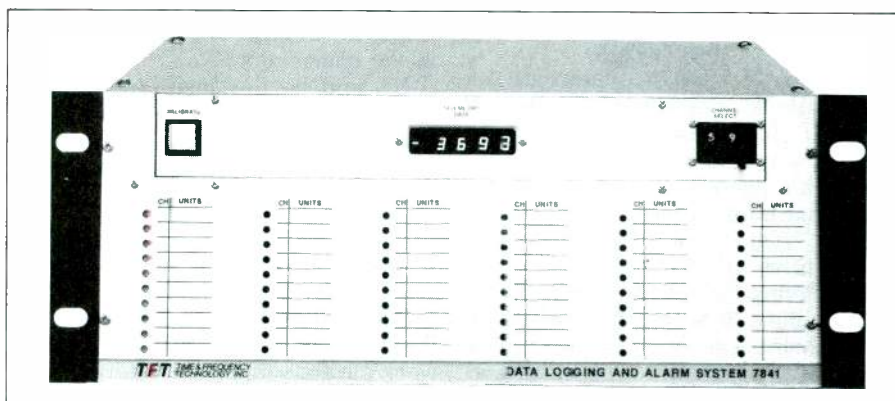
### Kodak receives Iris Award

The National Association of Television Program Executives (NATPE) honored Eastman Kodak Company with the TV organization's prestigious Iris Award during NATPE's annual conference.

The special Iris given to Kodak is only the second such award NATPE has made to a company, and it is the first time an Iris has been given to a nonbroadcast company. □

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It can log up to 60 channels, and displays a full 120. With the optional CRT it will display up to 30 channels per page in full alpha-numerics, and will notify you of an alarm condition on the screen, no matter what page you're viewing.

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- *Selective channel muting* to disable unused channels.
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- *Automatic computational ability* for up to 20 channels adds power and integrity to the system.

— *A keylock* prevents unauthorized usage.

The Model 7840 is capable of multi-site operation and can also operate an additional teletype or CRT at the studio.

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## National Association of Broadcasters

1771 N Street, NW  
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### Release of financial information harmful to broadcasters

Thomas E. Bolger, chairman of the National Association of Broadcasters' Joint Board of Directors, told a congressional subcommittee that the release of broadcasters' financial information to the general public "would result in substantial competitive injury."

Testifying before the House Communications Subcommittee, which is considering legislation to require the Federal Communications Commission

to make broadcasters' financial information available for public inspection, he said previous attempts to make this data available have been rejected by the FCC and the courts because of the competitive harm it would cause.

Bolger, president of WMTV, Madison, WI, said financial disclosure is neither fair nor necessary in our economic system. He said it "could bring about employee discontent, pervert union negotiations, increase station programming and operating expenses, reduce revenues, affect credit standing and serve to damage the station image in the community."

HE said he has been encouraged by recent Congressional attitudes about over-regulation at the federal level and termed the proposed legislation "a step backward."

### NAB Urges FCC to lessen radio regulations

Saying that the time has come for the substantial removal of paperwork burdens and government inter-

vention from radio broadcasting, the NAB urged the FCC to adopt a zero-based regulatory approach for all forms of radio regulation. It specifically recommended that regulations be dropped for formal ascertainment procedures, nonentertainment programming and commercial time guidelines, and program logging.

### Several titles elevated in NAB reorganization

The National Association of Broadcasters announced several title elevations as the first step toward full implementation of the association's reorganizational plan adopted by its Board at its semi-annual meeting this past January in Palm Springs, CA.

Named senior vice presidents are departmental heads George Bartlett for engineering, Shaun Sheehan for public affairs and Jerome Lansner, general manager of NAB's Code Authority. Previously, all were vice presidents.

The Station Services Department has been renamed the Broadcast De-

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This feature-packed, lightweight, portable instrument incorporates a single meter readout and an innovative state-of-the-art precision zero-center drift meter to track deviation from a device's true speed within a 5% range. Add to that an internal 3,150 Hz reference oscillator, self-contained switchable weighting filter, and an output jack for oscilloscope connection — packaged in an all-metal interlocked unit to assure immunity to EMI and RFI, and you understand why the Fidelipac Wow & Flutter Meter is simply the best price-performer you can buy.

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BE580

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TO : VIDEO TAPE EDITORS  
SUBJECT: Z 600 INTELLIGENT INTERFACE

Z6E/POST PRODUCTION AND Z 6M EDITING SYSTEMS TO BE DELIVERED WITH INTELLIGENT INTERFACES. THE INTELLIGENT INTERFACE WILL BE DESIGNATED THE "Z 600" AND WILL BE AVAILABLE WITH SEVERAL OPTIONS. OPTIONS INCLUDE Z 601 SMPTE TIME CODE READER (DIRECT READING OF SMPTE TIME CODE), Z 602 LOCAL CONTROL PANEL (WITH SHUTTLE ARM AND CRUISE), Z 603 SERIAL DATA TRANSMISSION SYSTEM (EXTENDED REMOTE OPERATING DISTANCES).

THE Z 600 IS A MICROPROCESSOR BASED DEVICE. THE PROGRAM ALLOWS THE Z 600 FULL TWO-WAY COMMUNICATIONS WITH THE Z 6 EDITING SYSTEM AND COMPLETELY REMOVES THE CONCERN OF WHAT TYPE MACHINES ARE BEING USED. ANY CAPSTAN SERVOED TAPE MACHINE CAPABLE OF REMOTE CONTROL CAN BE SERVICED BY THE Z 600. MACHINES (VTR/ATR) CAN BE MIXED OR INTERCHANGED.

THE Z 6 EDITING SYSTEMS WITH THE Z 600 INTELLIGENT INTERFACE DEFINITELY MAKES IT THE MOST POWERFUL EDITING SYSTEM IN THE WORLD

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partment and is headed by James Hulbert, senior vice president, broadcasting. Reporting to Hulbert are five vice presidents representing Departments for Radio, Television, Membership, Minority and Special Services, and Station Services, formerly Broadcast Management. Named vice president are Larry Tierney, membership; Dwight Ellis, minority and special services, and Ron Irion, station services. All three were previously directors of their respective departments. As before, Wayne Cornils and Jane Cohen remain the vice presidents for Radio and Television reporting to Hulbert.

The Board's reorganizational report also included recommended procedures for establishing Association priorities and will be phased-in over the coming months. The report is part of an ongoing process to measure association effectiveness.

In making the announcements, NAB President Vincent T. Wasilewski said, "I am proud that all these promotions came from within our organization and reflect the staff's competence and professionalism."

Bartlett joined NAB in 1955 and became departmental manager in 1961. He has more than 30 years ex-

perience as a broadcast engineer with stations, corporations and the Federal Communications Commission. He has been active in many of NAB's engineering projects including remote control, automatic logging, automatic transmission systems and videotape.

He has represented the United States at numerous international conferences including the Consultative Committee for International Radio, the European Broadcast Union, the Asian Pacific Broadcast Union and the World Administrative Radio Conference.

Sheehan joined NAB in January 1978, as department head from Daniel J. Edelman, Inc., an international public relations firm where he was a vice president and group manager. Before that he spent three years at the US Catholic Conference during which time he wrote and voiced *Guidelines*, formerly the Catholic Hour on the NBC radio network. He also executed the public relations program for the Campaign for Human Development—a fund-raising drive.

Lansner was with NBC in program standards from 1960-1963. He joined the Association's Code Authority from the network and has had various titles in both the Code's New York and Washington offices. He has headed the Code since June, 1977.

He is a member of the International Radio & TV Society and the National Academy of TV Arts and Sciences.

Tierney joined NAB as a regional manager in July 1978, and was named director of membership in April, 1979. Prior to his NAB position, he owned a variety store in Decorah, IA. From 1971 to 1975, he was an account executive with Orion Broadcasting Company's WMT-TV station in Cedar Rapids, IA. He worked as a staff announcer for KRVN Radio, Lexington, NE in 1969. Late that year he began selling KRVN locally and in six months was named western regional sales manager.

Ellis was appointed coordinator of NAB's Employment Clearinghouse in May 1978, and became director of the department of Community Affairs which was renamed the Minority and Special Services De-

partment. Irion joined NAB in May 1967, as assistant director of the broadcast management department and was named director in January 1970. He organizes NAB's annual Harvard management seminars for station general managers and sales managers and initiated the annual labor relations seminars for broadcasters.

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## New SIGNALYST™ Color Bar Generator

### Does practically all that NTSC generators do plus a lot more, for a much lower price!

If you thought you had to get NTSC equipment, think again. The new VIZ SIGNALYST, Color Bar Generator, gives you every color TV test signal you need. Use it to service TV sets, video recorders, CATV, MATV, CCTV, etc. Dimensions less than 4 x 8 x 6 in. Fits in your service kit. A price you can easily afford.

**Patterns supplied.** Superpulse; regular color bars; color bars with luminance; color bars less burst; red, green or blue primary color rasters; color trio; gray quad; hatchdots; dots—all with progressive or interlaced scanning and 4.5 megahertz sound carrier.

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# Bringing Back Tape You're Sure You Can Use Calls for a Tough, "Smart" Portable Recorder.



Finally, you can videotape remotely without compromising the considerations that apply to studio work. Because Ampex engineers went far beyond the usual definitions of portable acquisition when they designed the VPR-20 one-inch helical.

### Confidence Is Paramount.

On location, you have to know that you're capturing good material. So Ampex built a confidence feature into the VPR-20 that actually plays back the picture from the tape into the camera viewfinder during recording. When you see it in the viewfinder, you know it's on the tape. And you can have color playback in the field, thanks to the color stabilizer option, which mounts inside the VPR-20.

### Production Flexibility for All Situations.

When the assignment is commercial production in the field, your VPR-20 can backspace itself for a flawless assemble edit. And color framing is standard. The advanced cueing system allows you to go back and look at the last shot, and either go on from there or retake the shot and eliminate unwanted material. Right in the field. As simply as pushing the appropriate button.

### The Front End of a Special Effects Production.

Tapes recorded on a VPR-20 are fully compatible with every trick in the VPR-2 special effects book. Once you bring your material back to the studio, you can slow it down, speed it up or stop it on a selected frame with a VPR-2. And if you haven't seen the quality of VPR-2 special effects yet, you're in for a surprise.

### If You Can Take It, Your VPR-20 Can, Too.

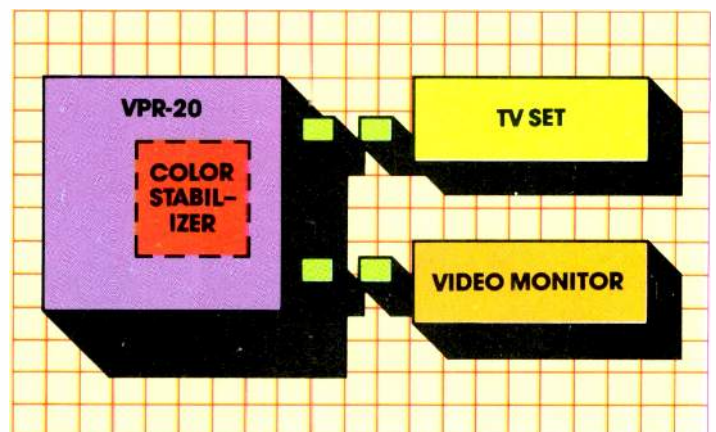
Environmentally, your VPR-20 can take nearly anything that your operator can. It shrugs off dust and sand in the air, tolerates a cloudburst, and stands up to heat and cold. Oblivious to the way it's held or positioned, the VPR-20 has an amazing resistance to the kind of gyroscopic conditions that go along with field recording. So you can take the VPR-20 for granted.

### Enough Power to Finish What You Start.

The VPR-20 battery pack has more than enough capacity to record and rewind a full hour of tape. Then, when you're ready for more shooting, the quick-change battery pack gives you quick-change power. There's even a battery/charger system that brings you up to full power again in less than an hour. You'll really value the VPR-20's power-down memory. It keeps the tape timer operational during battery or power changes for up to two days if need be. This is portability with a punch.

### If The Specs Don't Convince You, A Demo Will.

Somewhere within reach of your station, the tough, "smart" VPR-20 is turning the impossible into an everyday affair. Call us for the technical information, and then get your hands on a VPR-20. You won't want to let go.



## AMPEX MAKES IT EXCITING

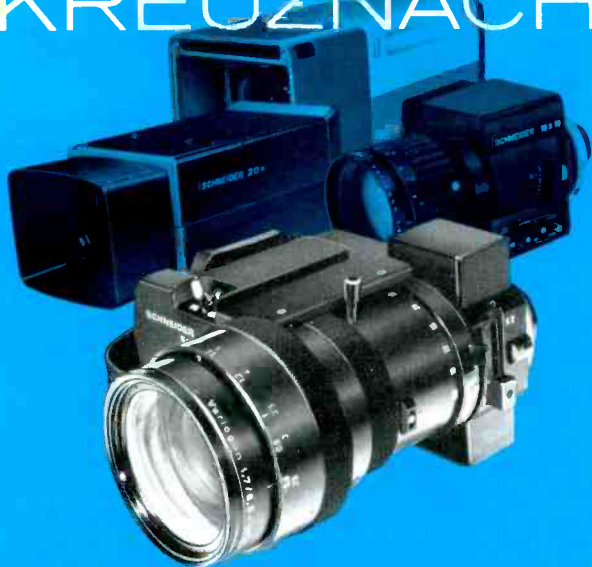
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May 1980 *Broadcast Engineering* 17



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The ideal lens for EFP work. Suitable for studio and field productions.

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The latest developments of the internationally known 30:1 lenses. Designed to increase EFP camera capabilities. All Lenses have complete range of operational accessories.

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TV-Lenses for cameras  
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30× Wide Angle	2.1/16–480
30× Standard	2.1/20–600
30× Tele/OB	2.1/33–1000

TV-Lenses for cameras  
 with 1" pick-up tubes

10× Studio	2 /17–170
20× Standard	2 /17–340
11× Studio	1.7/14–150
15× Wide Angle	1.7/12.5–190
30× Wide Angle	1.7/12.5–375
30× Standard	1.7/16–480
30× Tele/OB	1.7/26–800

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**NRBA**

National Radio Broadcasters' Association

1705 De Sales Street, NW  
 Washington, DC 20036

**Kaplan urges stronger NRBA/NPR ties**

"NRBA is totally committed to achieving the deregulation of radio. It is clear now more than ever before, that radio deregulation must come from Congress in the form of legislation," NRBA President Sis Kaplan told the National Public Radio Conference in Kansas City, MO.

Noting that non-commercial radio is equally plagued by over-regulation and needless bureaucracy, Kaplan said she was hopeful that NRBA and NPR would make a substantial effort to work together to achieve true radio deregulation.

"Commercial and non-commercial radio are both committed to serving the public interest. Though we have different programming goals, we are all attempting to focus on and program for the many sections of the population that have different needs and preferences," said Kaplan. "I'd like to see close cooperation between our organizations on a national basis and between our representative constituencies on a one-to-one basis in the community."

**Kaplan testifies at financial disclosure hearings**

Sis Kaplan testified last week against HR 5430, Rep. Ronald Mottl's bill which would require public disclosure of all financial data reported to the FCC on form 324.

"The marketplace dictates and should dictate a station's service to its community," Kaplan said. "The profitability of a station should not be inserted into the equation, unless a station makes claim that it cannot provide adequate service to its community of license because of lack of funds, in which case...the present system provides for making that station's financial information available."

"Making radio station's financial records public would also make those records available to a broadcaster's competitors, advertisers and employees, none of whom would use the records for any public interest purposes," Kaplan added.

**NRBA appoints Colburn state director**

The National Radio Broadcasters Association has appointed Ernest Colburn, vice president of Rau Radio Stations, the new NRBA State Director for Maryland.

Rau Radio Stations owns and operates WNAV-AM/FM, Annapolis and WARK-AM and WWGS-FM, Hagerstown, both in Maryland.

Colburn replaces Lloyd Smith who passed away last month after a long illness.

**NRBA files deregulations suggestions**

The National Radio Broadcasters Association filed comments last week largely supporting the FCC's Radio Deregulation proposals in BC Docket 79-219.

NRBA's comments suggested specific proposals designed to provide greater license stability, decrease the amount of paperwork, allow the marketplace to govern, provide public service assurances for citizens' groups as well as be acceptable to the Federal Courts.

# CO-AX

## DIGITAL REMOTE CONTROL

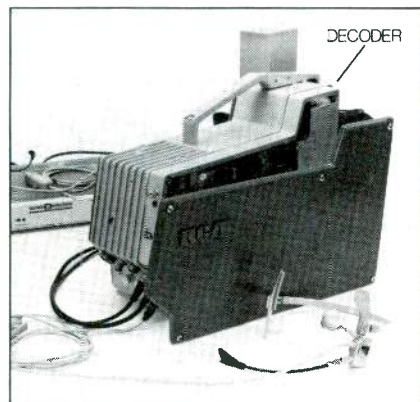
Our new and exciting co-ax digital remote control system provides dependable, studio-like remote control to ENG/EFP cameras in the field *at a fraction of the cost of other systems!*

It is the most affordable and reliable remote control system available on the market today. Easily interfacing with a full range of professional ENG/EFP video cameras currently in use, such as Ikegami HL-77 and HL-79A, RCA TK-76B, NEC MNC-71 cameras, and many more.

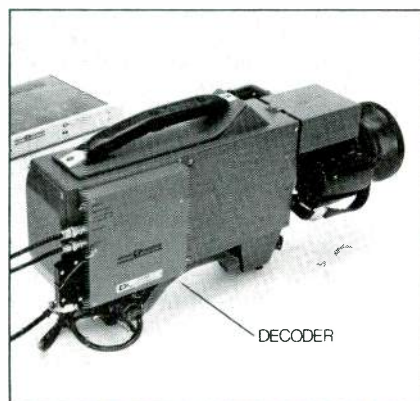


### Outstanding Features:

- System consists of mini-CCU, analog-to-digital encoder, and digital-to-analog decoder.
- Permits control of all functions normally required in OB van, including genlock.
- Digital encoder (19" rack-mounted) designed to accommodate *two* mini-CCU's to control *two* cameras (each equipped with its own decoder).
- Lightweight, camera-mounted decoder features intercom capability.
- Digitally encoded control data relayed to camera-mounted decoder through a simple, lightweight and reliable coaxial cable.
- Eliminates the need for expensive, bulkier, multi-core or triax camera cable, and reduces to a minimum the risks normally associated with the use of such camera cables.
- Low-cost coaxial cable allows complete remote control and camera set-up functions from greater distances with greater safety and utmost reliability.
- System is ideal for all extended shooting situations such as sports events, live concerts, political rallies, etc.



RCA TK-76B shown with decoder neatly "sandwiched" between camera body and door.



Ikegami HL-77 shown with side-mounted decoder.

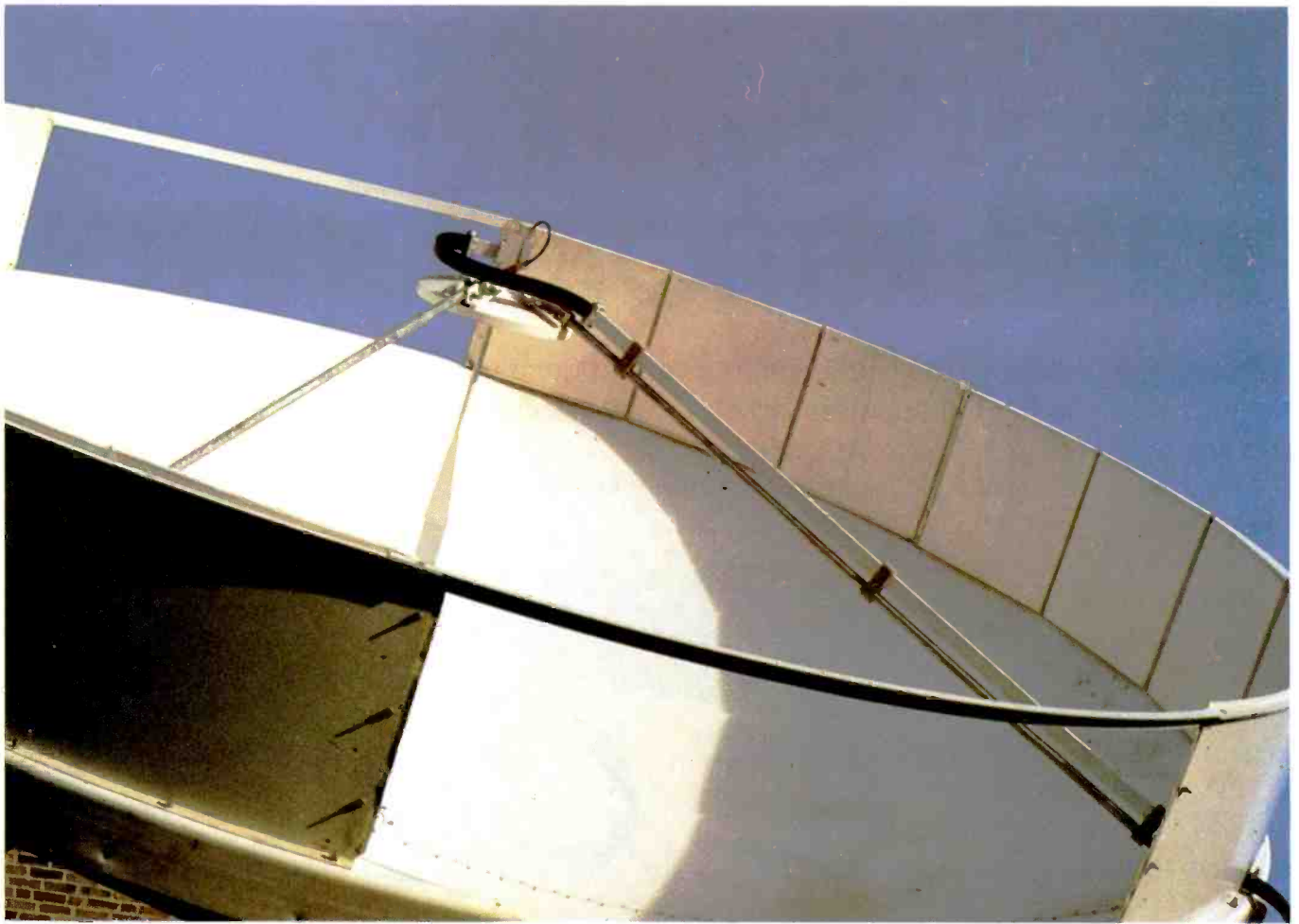
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# Transmission Technology: An Overview

By Bill Rhodes, editorial director

As this issue of **BE** goes to press, we and the entire industry are working feverishly on final details for attending NAB-'80/Las Vegas. We know in advance of developments scheduled for NAB in areas of transmission which cannot be covered until after this exciting convention. There will be new equipment and there will be decisions and proposals which may have far-reaching impact on broadcast transmissions. Consequently, much of what is new, dramatic and exciting for those concerned with the broadcast signal and its transmission will have to wait until the June issue of **BE**—and even beyond, depending on what decisions are rendered at NAB.

Thus, this special-emphasis issue on transmission technology should be viewed as a small segment of the

total picture, with the broader aspects of transmission technology being covered, as the year progresses, in follow-on articles devoted to radio and TV broadcasting.

Transmission technology, as a whole, can be subdivided into *Developing* (predominantly by innovative equipment manufacturers and allied electronic component breakthroughs); *Applying* (by stations and networks engineers); *Managing* (by station and network managers); and the *Influencing* (by Agencies and Organizations such as the FCC, SMPTE, NAB, NRBA, WARC, etc.). Each of these divisions warrant book-length coverage, which is clearly beyond the scope of these pages. However, these areas will be covered in future issues as significant developments occur, with ma-

ior emphasis in December being given to the future of broadcast technologies.

Transmission technologies covered in this issue include articles on (1) a new FM transmitter design which will be exhibited at NAB for the first time; (2) care of power tubes for maximum service; (3) an FM transmitter roundup, with updating to follow in the June issue after new NAB entries are uncovered; and (4) Region 2 developments and trends. In addition, the article on the NPR Conference touches on the satellite technology that markedly affects broadcasting and that involves many transmission factors to be explored in later issues.

While you're reading the following contributions, keep in mind that future issues of **BE** will report fully on new transmission technologies when they break. □

# Tektronix 1900 Digital Generator.



## Introducing the first all-digital generator.

### Plus These New Testing Capabilities.

With the new SMPTE Color Bars test signal, just three quick monitor adjustments take the aggravation out of matching color monitors. The 1900's SIN X/X signal provides an extremely flat, 4.5 MHz spectrum for fast and simple checking of the system frequency response and the multipulse

signal capability greatly simplifies the testing of group delay characteristics.

With every 1900 Digital Signal Generator you not only get the standard FCC or NTC7 test signals, you also get the unexcelled accuracy and stability of all digital circuitry.

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# Design Considerations in a New Single Tube 30kW FM Transmitter Utilizing a Folded Half Wave Cavity\*

By James A. Aurand, manager FM transmitter design, and Bill Harness, FM transmitter design section, Broadcast Electronics, Inc., Quincy, IL

A new approach to high-power cavity design employs a half-wave length folded coaxial transmission line\* as the anode tuning device. The resulting high gain amplifier has inherent second harmonic sup-

\*This detailed design article describes the engineering decisions behind one new transmitter scheduled for introduction at NAB '80/Las Vegas. It is included here for information purposes and does not imply an endorsement by Broadcast Engineering for its design or performance.

\*Patent Pending

pression and efficiently produces more than 30kW of output power from a solid-state driver. The elimination of all sliding contacts and high voltage blocking capacitors, in this 30kW cavity, should result in higher reliability, higher efficiency and lower maintenance.

The transmitter incorporates a microprocessor-based control system and a new synthesized 30W

exciter with extremely low IM distortion.

## Design considerations

In defining the performance requirements for a new high-powered FM transmitter, a key objective was that there should be no constraint from prior approaches.

To meet FM broadcasters' continuing desires for a lower antenna gain and higher transmitter power, the design objectives were: (a) only one tube should be used to provide the highest transmitter power possible; (b) the power amplifier should have the highest possible reliability, ie, a long MTBF consistent with the economics of commercial broadcast equipment; (c) a redundant driver should be employed so that failure of one or two devices would not take the transmitter off the air; (d) the exciter should have high signal-to-noise (S/N) ratio, high linearity and wide bandwidth for optimum stereo/SCA performance; and (e) the transmitter should have some intelligence so that it can respond to abnormal conditions without damage. It should also perform diagnostic checks to alert the operator should some condition require special attention.

Transmitter performance is determined by many parameters. Overall transmitter efficiency, simplicity of mechanical construction, the state-of-the-art, and even the number of equipment components involved must be prime considerations. A new 30kW FM broadcast transmitter employing these factors as the design base is reported here by Broadcast Electronics, and Figure 1 illustrates its major sections.

## Power amplifier

One major innovation with respect to the transmitter design is the power amplifier stage. All design parameters relating to the power amplifier proved to be essentially the same as the parameters used to determine the design of most half-wave power amplifiers.

For simplification, cost reduction, compact size, and PA stage efficiency, a folded half-wave cavity was chosen as the RF tank circuit. This design, as shown in Figure 2, eliminates the conventional blocking capacitor and the sliding contacts used in the full half-wave and the

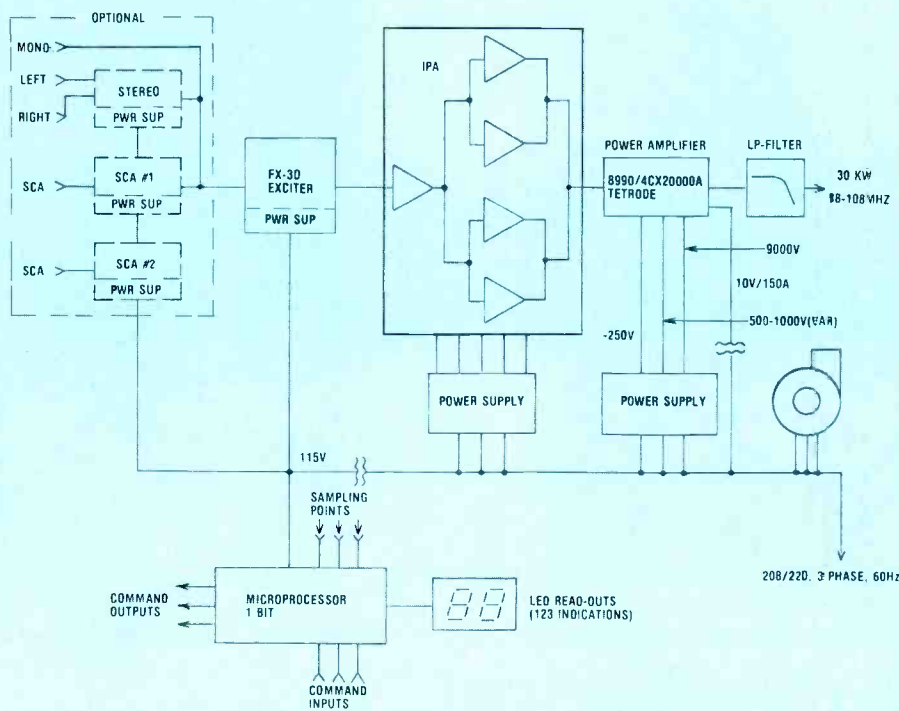


FIGURE 1. Block Diagram FM-30 30kW FM Transmitter

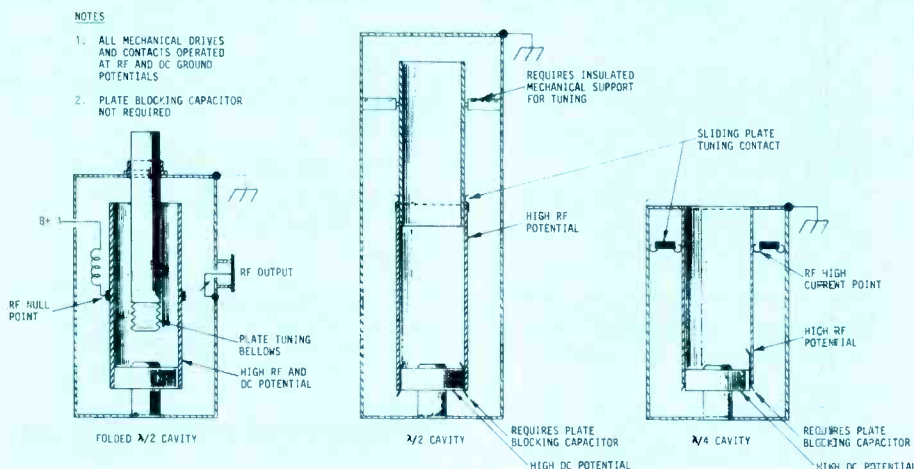


FIGURE 2. Comparison of plate tuning cavities

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quarter-wave cavity designs (also shown in Figure 2). Without the presence of sliding contacts, frictional drag on the lower portion of the plate tuning line is minimized; thus, no mechanical support other than the anode wipers are required to support the structure. Power tube removal and installation is very simple.

Anode voltage is applied to the lower portion of the plate line at the RF voltage null point. This RF voltage null point has proved to be reasonably consistent through the entire commercial FM broadcast band. The output loop that couples energy to the transmission line is electrically grounded to the cavity

wall. Output loading is mechanically controlled by changing the position of the loop in the field generated at the null point of the line structure. Multiple phosphor bronze leaves on the loading control allow mechanical movement without sliding contacts.

The second harmonic generated at this same point exhibits a high source impedance and high voltage, allowing suppression with a simple LC arrangement. This method provides about -50dB of suppression and tends to eliminate generation of the second harmonic with less power loss at the fundamental frequency resulting in enhanced PA efficiency.

### Power tube

Exhaustive tests indicated that the Eimac 8990/4CX20000A tetrode could be operated at more than 30kW RF power output at 108MHz with all tube operational parameters well within the Eimac published ratings. To take advantage of the true power gain capability of the 8990/4CX20000A, the system engineers designed a unique grid input

circuit to optimize the impedance transformation between the solid-state driver stage and the power tube grid.

### Solid-state IPA

The solid-state intermediate power amplifier (IPA) is composed of four modules and one identical pre-driver module. The IPA modules (see Figure 5) are operated in a conventional quadrature hybrid combiner/splitter arrangement, a design chosen for proven overall simplicity and ease of heat sinking unbalanced load resistors at the reject ports.

Each module uses a CTC BM-100-28 RF power transistor which is operated at one-half of the device's power output capability. Junction temperature is about one-half of normal rating. The collector voltages and currents are also well below the manufacturer's ratings. Each module has two BM-100-28 transistors operated in parallel. The design is such that even with the loss of one module only a 15% loss of transmitter power will occur. Should two modules fail, transmitter power will be reduced by 30 to 35%.

The supply voltage (28V, at 10A, for the driver modules) is short-circuit proof, has a safe-area protection circuit, and has an inhibit circuit.

Plate tuning approximately 2MHz in bandwidth is provided by mechanically expanding or contracting the physical length of the bellows on the end of the grounded portion of the plate line. The bellows are constructed of beryllium copper, providing high conductivity and long flex life. Coarse frequency adjustment is accomplished by presetting the depth of the top section of plate line into the tank cavity, and 10 step adjustments cover the entire commercial FM broadcast band.

A unique approach to second harmonic attenuation is used in this design to eliminate generation of the second harmonic in the power amplifier tank circuit. In conventional designs, a trap is usually employed in the transmission line to attenuate the second harmonic. The second harmonic suppression method used in the FM-30 is located within the cavity at the RF voltage null point of the fundamental frequency (see Figures 3, 4).

### Microprocessor control

All control and status requirements for the FM-30 transmitter are implemented by a microprocessor controller (see Figure 6). The microprocessor scans monitoring and control inputs to the control system

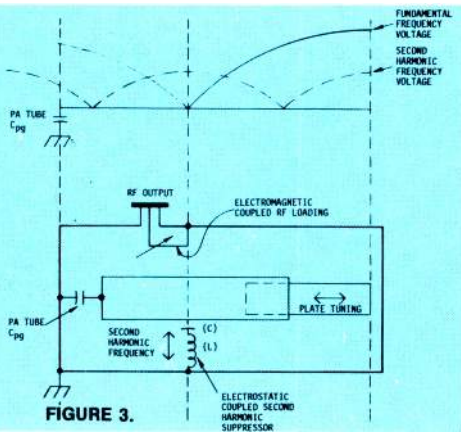
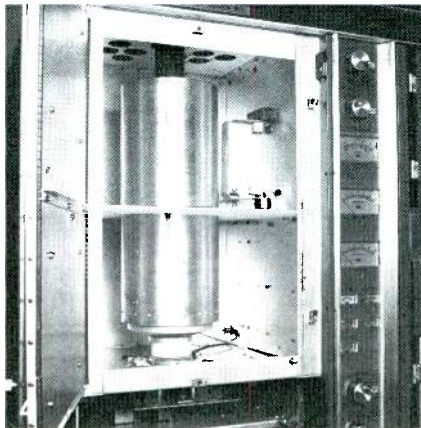
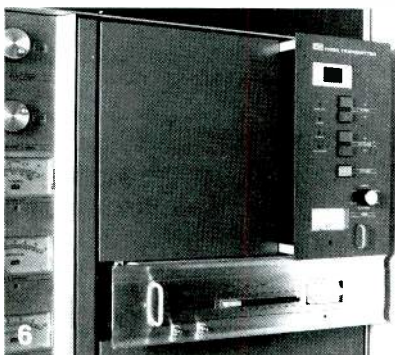


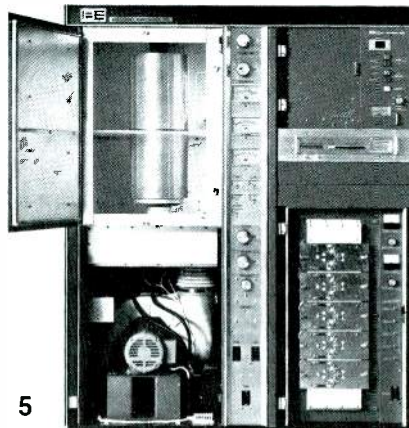
FIGURE 3.



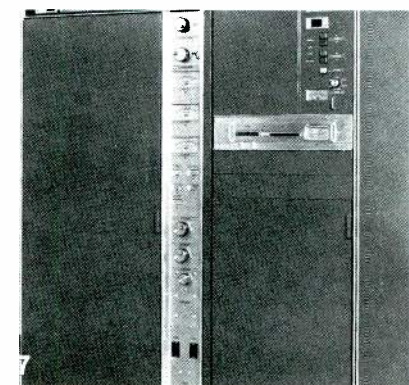
Power amplifier section, folded half-wave cavity of the model FM-30 one tube 30kW FM transmitter.



Microprocessor control assembly and FX-30 exciter; both slide out for accessibility service.



5 Front view, with doors open model FM-30, one tube 30kW FM transmitter. Upper left: power amplifier, folded half-wave cavity; Upper right: (panel door removed) microprocessor control assembly; Center right: model FX-30; Lower right: Solid-state IPA section (cover removed).



7 Front view model FM-30 one tube 30kW FM transmitter.





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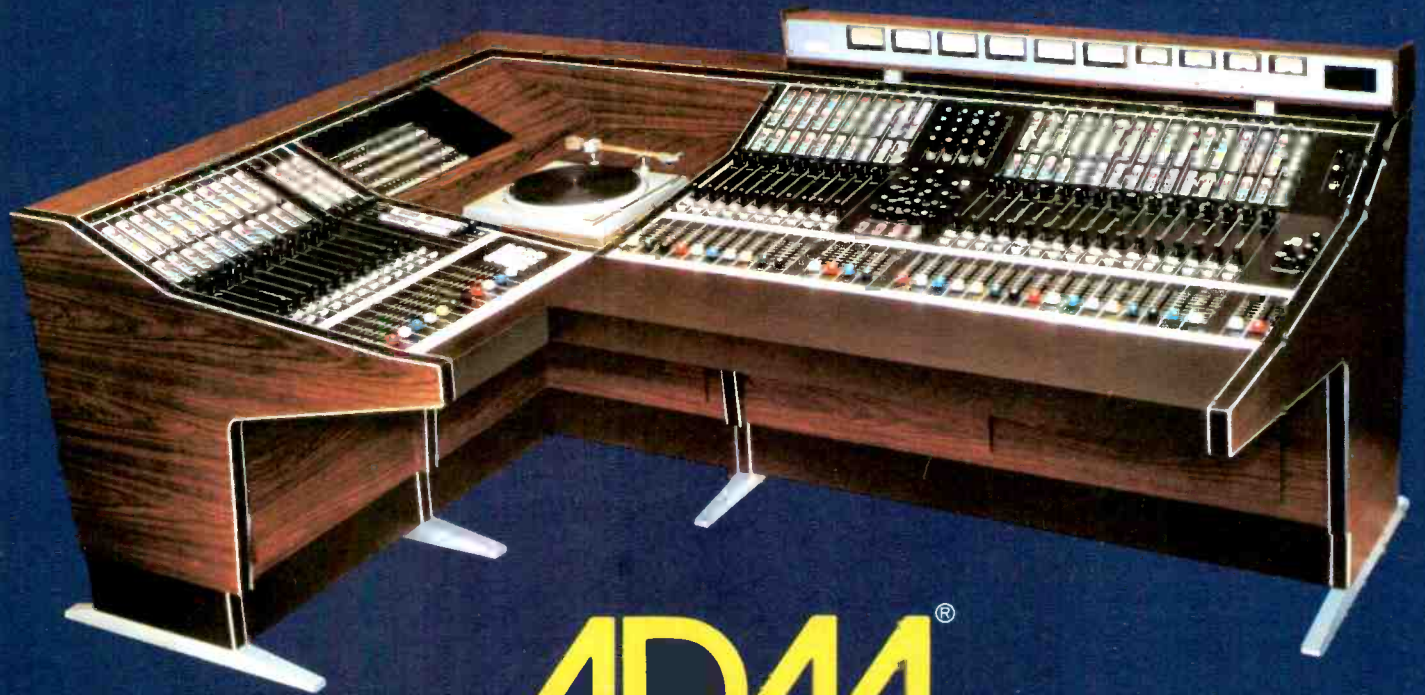


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and provides 127 different status indications. On the basis of these inputs, decisions are made to actuate/deactuate the various control relays, and the operator is informed of the transmitter status.

Because the transmitter monitoring points are so numerous, much information and aid is given to the operator when a fault occurs to assure a quicker analysis and return to the air.

A 1-bit industrial controller microprocessor is the control brain that monitors the transmitter parameters and controls and determines what control actions are necessary. In addition, it displays its findings in a coded form on the front of the transmitter using a 2-digit LED display. An erasable read-only memory is programmed at the factory with the control firmware for the microprocessor to give its operating characteristics. While the operator need not be a computer programmer to operate the transmitter, he has the advantage of an operating processor to aid in troubleshooting faults and day-to-day operation of the transmitter.

Operating parameters of the transmitter are sampled and stored in the dedicated non-volatile read/write memory, so that they can be

analyzed and displayed to the operator, even after a transmitter shut-down or a power failure. The microprocessor control also offers a remote indication of limits and faults through transmission of a parallel 8-bit BCD code to a remote device and allows the flexibility to add, delete, or change operational features through modifications to the program software.

#### Exciter

In an FM transmitter, the exciter originates the transmitted signal and determines most of the signal's technical characteristics. These include: S/N ratio, distortion, amplitude response, phase response, and frequency stability. Thus, a new high performance exciter to complement the transmitter performance was developed in a parallel design program.

This new exciter, the FX-30, incorporates a highly linear modulator, operating in conjunction with a bi-stable phase locked loop to achieve accurate reproduction of the composite baseband signal with maximum signal S/N ratio. In designing the FX-30 exciter, the theoretical as well as practical design parameters that result in modulation non-linearity were considered,

along with the effects of the resultant intermodulation distortion to the composite signal. The circuitry allows synthesis of more than 2000 channels with stability of 3PPM.)

Broadband RF amplifier circuits utilizing micro strip elements eliminate tuning adjustments throughout the 86MHz to 109MHz operating frequency range of the exciter. The broadband amplifier used in this exciter amplifies the output of the modulated oscillator from a power level of 10mW up to an output level of 30W.

#### Summary

Design characteristics of the Model FM-30 transmitter include the folded half-wave cavity, the broadband synthesized exciter with low IM distortion, the microprocessor-based control system, and the 30kW power output from one tube.

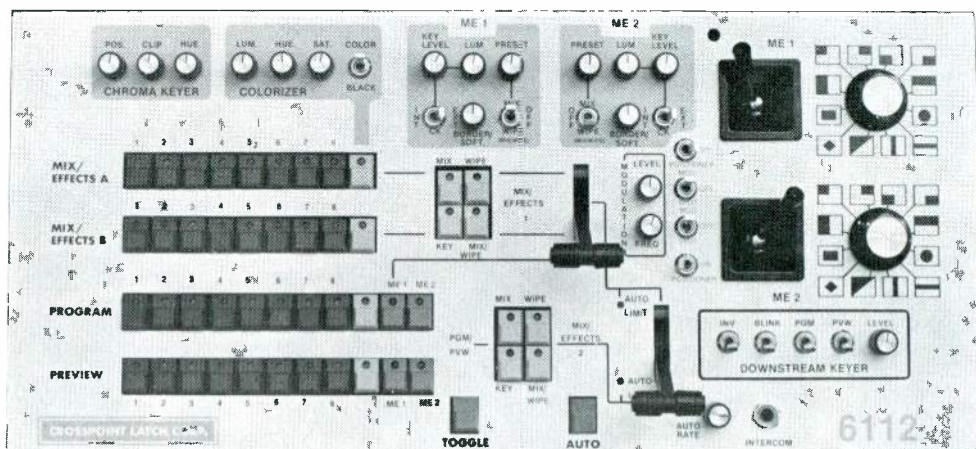
Designated as the Model FM-30 (see Figure 7), this 1-tube 30kW transmitter, as the high-power unit in a full line of 1-tube FM transmitters, uses the FX-30 Exciter which is adjustable in output power from a few watts to 30W. This adjustable power feature makes the FX-30 Exciter adaptable to a full range of 1-tube transmitters from 1.5kW to 30kW. □

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# FM Transmitter Roundup

By Donald L. Markley, consulting engineer and BE facilities editor and Bill Rhodes, editorial director

The following tables list the high-power transmitters currently available for use in the FM broadcast band in the US. All of these units are either type accepted or have the application for acceptance pending with the FCC.

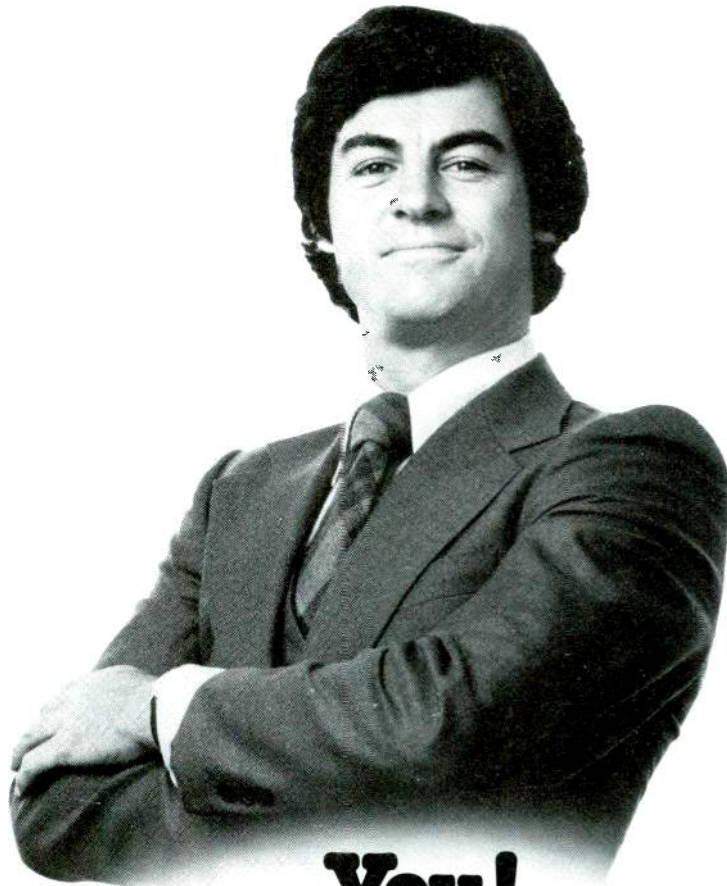
In this report, FM transmitters have been separated into three groups: those of 1000W transmitter power output or less; from over 1000W through 5.0kW., and over 5.0kW. (The transmitters for Class D operations of 10W output have not

been included. Essentially all of the manufacturers listed have a 10W unit available that basically consists of their exciter with necessary filtering and metering to comply with the Commission's regulations.)

## 5kW and above FM Transmitters

Manufacturer	Model Number	Power (kW)	Frequency Response (dB)	Harmonic Dist. (%)	IM Dist. (%)	Separation (dB)	Crosstalk (dB)	FM Noise (dB)	AM Noise (dB)	No. of Tubes	Power Used† (kW, max)	Inquiry Number*
Bayly/AEG	S3152	10	±0.2 (40Hz-43kHz)	<0.4	—	>40	>40	>64	>50	1	16	250
Broadcast Electronics	FM-30	15-30	±0.5	≤0.08	≤0.08	—	—	72	>50	1	50	251
CCA Electronics	FM-12,000E	7-13	±1.0	<0.5	<0.5	>35	>40	>60	>50	2	18	252
	FM-20,000E	-22	±0.5	1.0	—	>40	"	"	50	2	30	
	FM-25,000D/E	27.5	"	"	—	"	"	"	50	2	47.5	
	FM-27,500E	12.5-30	±1.0	<0.5	0.5	>35	"	"	>50	2	43.5	
	ST-25	25	"	"	—	"	"	"	"	1	—	
	FM-5500EP	25-60	"	"	<0.5	"	"	"	"	4	87	
CSI Electronics	FM-12000E	-13	±1.0 (30Hz-15kHz)	>0.5	—	>40	46	>68	>55	2	18.5	253
	T-20-F	-22	"	"	—	"	"	"	"	"	30.5	
	T-25-F	-27.5	"	"	—	"	"	"	"	3	36	
Harris	FM-10K	10	±0.5	≤0.4	0.4	≥40	45	≥65	≥50	2	17	254
	FM-20K	10-20	"	"	"	"	"	"	"	3	30	
	FM-25K	10-25	"	"	"	"	"	"	"	1	40	
McMartin Industries	BF-10M	5.5-15	±0.75	≤0.3	0.2	>40	>40	≥68	55	3	27	255
	BF-25M	10-27.5	"	"	"	"	"	"	"	3	38	
	BF-55M	30-55	"	"	"	"	"	"	"	6	98	
NEC	FBN-7150E	10	±0.3 (30Hz-53kHz)	0.5	0.4	>39	40	63	53	1	22	256
	FBN-7200F	20	"	"	"	"	"	"	"	1	35	

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## FM transmitters

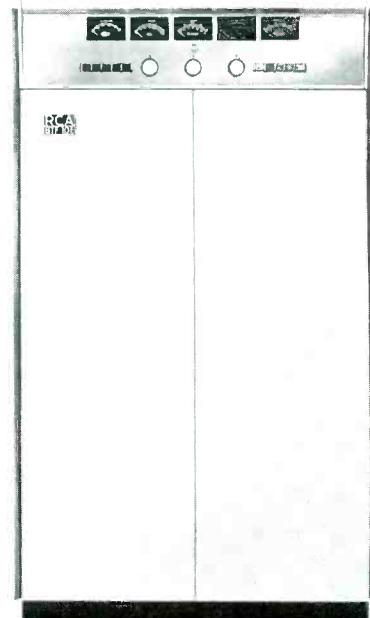
Tables of performance characteristics of 1kW or less FM transmitters will be concluded in the June issue.

It should be noted that the listing includes only some of the parameters that can be measured. While these should give a reasonable idea of the capabilities of the individual units, caution is recommended in making final judgments based on this listing. The parameter values are taken from manufacturer's published data. With all due respect to the excellent companies included in

this listing, occasionally literature may claim a level of performance which would not typically be found in production models of the equipment.

The parameters selected speak fairly well for themselves. However, the following explanations might be helpful.

**Power:** This states the ranges of powers for which the unit is type accepted, if available. If the value is preceeded by a dash, the value is the maximum for which type accep-



**RCA.** The BTF-10E is a 10kW FM broadcast transmitter designed for the 87.5-to-108MHz band, is specifically engineered to meet demanding requirements of stereo and multiplex service transmission, employs a new all-solid-state synthesized "direct-FM" exciter, is expandable to 20kW with dual units, and is ready for remote control.

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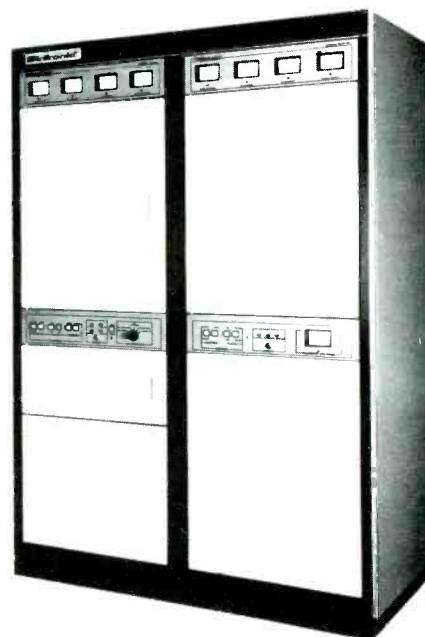
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Shown left to right: NV-A960 Controller, NV-9240 Recorder and NV-9600 Editing Recorder

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## Controller features:

8. Dial search control with lockable speeds.
9. 10 tape search speeds (5X, 2X, 1X, 1/5X, 1/20X—forward and reverse) plus PAUSE, all with picture.
10. Automatic instruction error diagnostics.
11. Address time indicator for hr./min./sec./frames.
12. Lap time indicator.
13. PREVIEW function.
14. RETURN to in point function.
15. REVIEW function.
16. GO TO out point function.
17. Independent reset of entry and exit points.

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26. Chroma level adjustment.
27. Time code capability (audio channel 1).

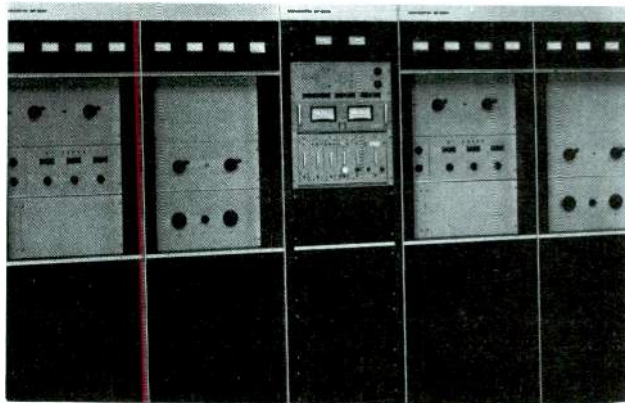
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For more information, write: Panasonic Company, Video Systems Division, One Panasonic Way, Secaucus, N.J. 07094. In Canada, Panasonic Video Systems Department, Mississauga, Ontario.

**Panasonic**  
VIDEO SYSTEMS DIVISION

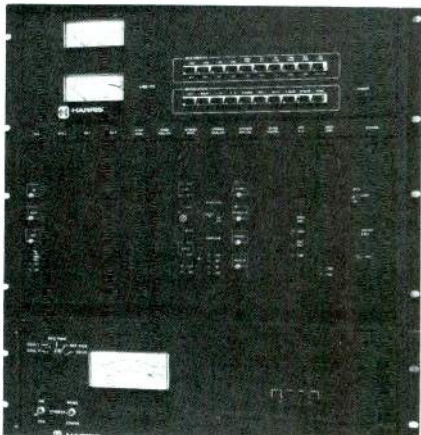


**Rockwell International.** The Rockwell-Collins 831G-2C FM transmitter, contained in a 3-bay cabinet, features automatic power output control, automatic filament voltage regulation, automatic overload recycling, and overload fault indicators. It is just one of a line of fourth-generation FM transmitters that claim low IM distortion, high stereo separation, and exceptional frequency stability...all backed up by readily-available field engineering services.

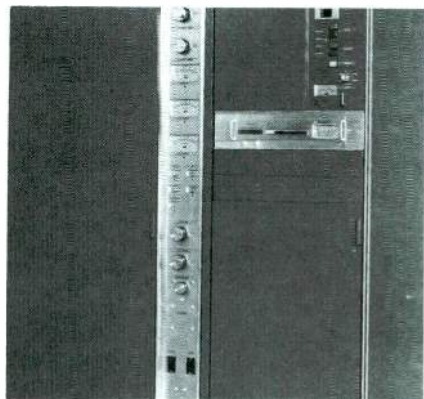


**McMartin Industries.** The BF-55M transmitter consists of a single exciter (center rack) driving two identical 27.5kW RF transmitter assemblies (the BF-25M racks on each side of center) which are combined to provide a single RF output power of 55kW.

# You'll get a charge out of our 3-PACK deal.

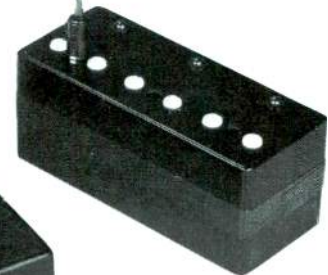


**Harris.** The FM-100K is available in two configurations: (1) the standard, complete transmitter (above) incorporating the solid state 100W broadband amplifier and high-performance MS-15 exciter and (2) the stand-alone 100W amplifier which can be driven by virtually any 10W exciter.



**Broadcast Electronics.** This FM-30 1-tube 30kW FM transmitter was previewed at NAB-'80 in Las Vegas and is described in a separate article in this issue.

Buy three Alexander BP20A-11 nickel-cadmium replacement batteries.



Get our battery charger free.

We know you'll find our replacement batteries superior to lead-acid type batteries. But — if you use your old charger (developed for lead-acid) to recharge nickel-cadmiums — you just won't get the performance you need in ENG/EFP. So here's our offer: Buy three BP20A-11 replacement batteries and get our 20-11 Charger free!

The batteries have a one-hour running time, fully charged, and we unconditionally guarantee them a full six months. And our new charger will bring three BP20A-11's back to full power, simultaneously, in ten hours or less.

How Can You Lose?

Three great batteries and a charger, for the price of the batteries alone!

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Alexander Manufacturing Co.  
Box 1645 — 1511 So. Garfield Pl  
Mason City, Iowa 50401  
Phone (515) 423-8955

Circle (26) on Reply Card

← Circle (25) on Reply Card

May 1980 *Broadcast Engineering* 37



5kW and above FM Transmitters *Continued from page 30*

Manufacturer	Model Number	Power (kW)	Frequency Response (dB)	Harmonic Dist. (%)	IM Dist. (%)	Separation (dB)	Crosstalk (dB)	FM Noise (dB)	AM Noise (dB)	No. of Tubes	Power Used† (kW, max)	Inquiry Number*
RCA	BTF-3/3ES1	1-6	±1.0	<0.3	—	—	50	68	50	4	12	257
	BTF-5/5ES1	5-10	"	"	—	—	"	"	"	"	20	
	BTF-5/5ES2	1-10	"	"	—	—	"	"	"	"	18	
	BTF-10ES1	5-10	"	"	—	—	"	65	"	2	19	
	BTF-10/10ES1	10-20	"	"	—	—	"	68	"	4	38	
	BTF-20ES1	10-21	"	"	—	—	"	65	"	3	36	
	BTF-40ES1	40	"	"	—	—	"	"	"	6	72	
Rockwell Int'l.	831F-2	10	±1.0	≤0.5	≤0.5	35	—	65	55	2	21	258
	831G-2	20	"	"	"	"	—	"	"	3	35	
	831G-2B	22.5	"	"	"	"	—	"	"	3	39	
	831H-2	40	"	"	"	"	—	"	"	6	70	
Sintronic	S1-F-15	15	±0.5	≤0.5	≤0.2	—	—	65	50	4	—	259
	S1-F-25	27.5	"	"	"	—	—	"	"	"	—	
Wilkinson Electronics	FM-7500E	7.5	±1.0	0.5	—	50	50	65	55	2	9.5	260
	FM-1000E	10	"	"	—	"	"	"	"	"	13	
	FM-20,000E	20-25	"	"	—	"	"	"	"	"	40	

†Power rating in some cases at nominal output rather than maximum output.

\*To obtain complete FM transmitter data from each manufacturer, use the reader service card and circle the appropriate inquiry number indicated.

1-5kW FM Transmitters

Manufacturer	Model Number	Power (kW)	Frequency Response (dB)	Harmonic Dist. (%)	IM Dist. (%)	Separation (dB)	Crosstalk (dB)	FM Noise (dB)	AM Noise (dB)	No. of Tubes	Power Used† (kW, max)	Inquiry Number*
Bayly/AEG	S3168	3	±0.2 (40Hz-43kHz)	<0.3	—	>40	>40	>64	>50	0	5.5	261
Broadcast Electronics	FM-3.5	1.5-3.0	±0.5 (30Hz-15kHz)	≤0.08	≤0.08	—	—	72	>50	1	6	262
CSI Electronics	FM-3000E	-3.5	±1.0 (30Hz-15kHz)	≤0.5	—	>40	46	>68	>55	2	6	263
	FM-5000E	-5.5	"	"	—	"	"	"	"	2	9	

1-5kW FM Transmitters *Continued on page 42*



## Computer set-up and triax too

Today, broadcasters are classing computer setup and triax as necessities. Ikegami offers you a choice of two such cameras. Both are proven in the studio and field.

- The HK-312, with 1¼-inch pickup tubes, is the only proven computer setup camera today. More than 100 are in service throughout the ABC Network, at WGBH, and at other major stations.
- The HK-357A with 1" diode gun pickup tubes offers the same high standard of performance along with the convenience of field capability.

Both are extremely stable cameras that can be operated manually. And both accept computer control for automatic setup for on-air readiness in 45 seconds.

Both cameras can be used with multi-core cable. With triax the cameras can be a mile from their base station.

Of course, in colorimetry, automatics, circuitry excellence, and range of options, both are incomparable. But seeing is believing. Experience a demonstration soon at Ikegami Electronics (USA) Inc., 37 Brook Avenue, Maywood, N.J. 07607; (201) 368-9171. West Coast: 19164 Van Ness Ave., Torrance, CA 90501 (213) 328-2814; Southwest: 330 North Belt East, Suite 228, Houston, TX 77060 (713) 445-0100; Southeast: 552 South Lee St., Americus, GA 31709 (912) 924-0061.



# Ikegami

Circle (28) on Reply Card



## FM transmitters

tance has been granted. Otherwise, the range over which the transmitter may be used is specified in the Rules and Regulations and/or type-acceptance data. In this area, as in all others, questions concerning individual pieces of equipment should be referred to the applicable manufacturer.

**Frequency Response:** Unless otherwise specified, refers to the response over the range from 50Hz to 15kHz with the standard 75 micro-

second curve as reference.

**Harmonic Distortion:** Unless otherwise specified, refers to the same range of frequencies as for the frequency response.

**IM Distortion:** Refers in all cases to the SMPTE standard tones and levels.

**Separation:** Minimum to be expected at any frequency between 50Hz and 15kHz.

**Crosstalk:** Refers to the worst case of subcarrier into the main

## Case History #437

Electronic News Gathering is one of the toughest environments a microphone will ever encounter. Every mike we've seen has compromised the demand for low handling noise, fine audio quality and virtual indestructibility.

Credit the NBC Electronic Journalism Department/Operations and Engineering in New York for putting the Electro-Voice DO56 shock-mounted omni in the field. Although originally designed as an on-camera entertainment and MC's microphone, NBC found the DO56 to be the microphone that provides an audio signal commensurate with video in real-life crisis situations. In these situations audio often takes a back seat to video,

### Electro-Voice DO56 Shock-Mounted Omnidirectional Microphone

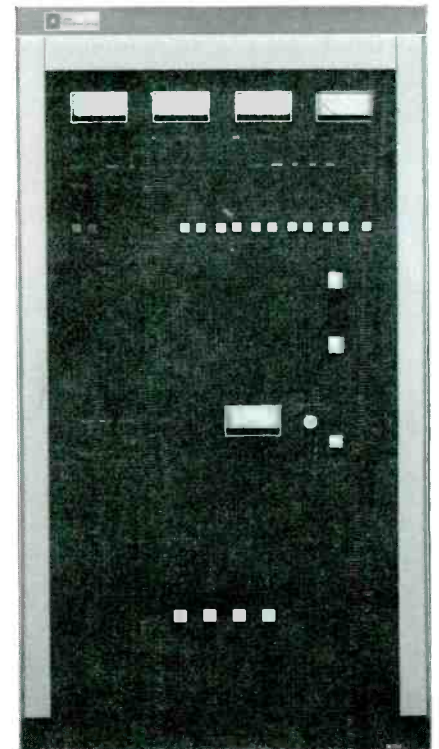
pushes, the shoves, the rubs and finger taps in stride. And when handling *really* gets rough, the DO56's unique internal shock mount virtually eliminates the bell-like clang transmitted by other shock-mounted mikes.

Congratulations to the NBC Electronic Journalism Department in New York. You found the solution - the DO56.

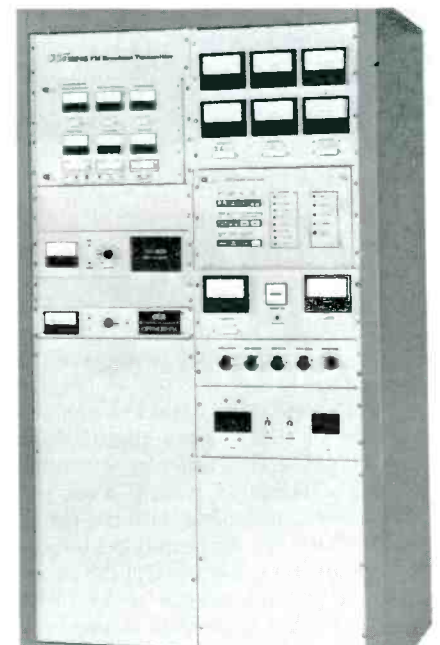
For an in-depth description of this and other case histories, get on the Electro-Voice "Mike Facts" mailing list. Write on your letterhead to Mike Facts, c/o Electro-Voice, 600 Cecil Street, Buchanan, MI 49107.

resulting in a final product that doesn't accurately reflect the broadcaster's professional standards. NBC discovered that the DO56 takes the

**Ev** Electro-Voice<sup>®</sup>  
a gulton company



**Cetec Broadcast.** Model 80-250 FM transmitter is the first of a series of new products featuring new industrial design.



**CCA Electronics.** The ST-25 was designed for operational economy. The use of a single power amplifier tube results in savings in both tube replacement costs and power consumption.

Circle (29) on Reply Card





# Beyond ENG

Born into ENG, the HL-79A adapts beautifully to EFP. The accepted leader in ENG, the HL-79A, reinforced its position as the preeminent portable camera at the 1980 Winter Olympics. Scores of HL-79As covered the ski slopes, the bobsled and luge runs and the skating rinks for the ABC Network. Their performance brilliantly etched into the world's visual memory, is history. But the industry already knows about the HL-79A's capability.

Today, more and more broadcasters are learning that the HL-79A is a superior EFP color camera. Options such as 4½-inch electronic viewfinder with return video, program and intercom audio plus genlock — among other features —

transform it into the ideal camera for sports and special events, commercials and high quality production. Triax equipped, it ranges nearly a mile from its base station. Near-darkness is its frequent habitat; but it has knee control for brilliantly lit scenes too.

Of course, you may need some of its ENG flexibility for EFP too — like its shoulder action shape, 11.2 pound weight, 6-hour clip-on battery.

The specs and automatic features of the HL-79A are equally outstanding. They're yours, along with an eye-opening demonstration, at your Ikegami distributor. Or contact Ikegami Electronics (USA) Inc., 37 Brook Avenue, Maywood,

N.J. 07607, (201) 368-9171. West Coast: 19164 Van Ness Ave., Torrance, CA 90501 (213) 328-2814; Southwest: 330 North Belt East, Suite 228, Houston, TX 77060 (713) 445-0100; Southeast: 552 So. Lee St., Americus, GA 31709 (912) 924-0061.



## Ikegami HL-79A

Circle (30) on Reply Card



1-5kW FM Transmitters *Continued from page 38*

Manufacturer	Model Number	Power (kW)	Frequency Response (dB)	Harmonic Dist. (%)	IM Dist. (%)	Separation (dB)	Crosstalk (dB)	FM Noise (dB)	AM Noise (dB)	No. of Tubes	Power Used† (kW, max)	Inquiry Number*
CCA Electronics	FM-2500E	3	±0.5	1.0	—	>40	>40	>60	>50	2	4	264
	FM-2500R	0.5-3	±1.0	<0.5	—	>35	>40	>65	>55	1	5 (Note 1)	
	FM-4000E	0.5-4.8	"	"	0.5	"	"	>60	>50	2	7.5	
	FM-5000E	0.5-5.6	"	"	"	"	"	"	"	2	9	
CETEC Broadcast Group	602A	2.5	±0.5	<0.25	<0.25	—	—	>65	>50	2	5.4	265
	603	-3.5	"	"	"	—	—	"	"	2	5.7	
	605B	-5.5	"	"	"	—	—	—	"	2	8.9	
Harris	FM-2.5K	0.8-2.5	±0.5	≤0.4	0.4	>40	45	≥65	≥50	2	4.8	266
	FM-5K	1-5.1	"	"	"	"	"	"	"	2	10	
McMartin Industries	BF-3.5M	2-3.5	±0.75	≤0.3	0.2	>40	>40	≥68	55	3	6.5	267
	BF-5M	3.5-5.5	"	"	"	"	"	"	"	3	11.25	
NEC America	FBN-7030E	3	±0.3 (30Hz-53kHz)	0.5	0.4	>39	40	63	53	1	7.0	268
	FBN-7050E	5	±0.3	"	"	"	"	"	"	1	11.0	
RCA	BTF-3ES1	0.5-3.0	±1.0	≤0.3	—	—	50	68	50	2	6.0	269
	BTF-5ES1	1-5	"	"	—	—	"	"	"	2	10.0	
Rockwell Int'l.	831D-2	2.5	±1.0	≤0.5	≤0.5	35	—	65	55	1	4.9	270
	831E-2	5.0	"	"	"	"	—	"	"	2	14	
Sintronic	S1-F-1	0.75-1.5	±0.5	≤0.5	≤0.2	—	—	65	55	3	3	271
	S1-F-3	2-3.5	"	"	"	—	—	"	"	3	7	
Wilkinson Electronics	FM-1500E	1.5	±0.5	0.5	—	50	50	70	60	1	3	272
	FM-2000SS	2.0	"	0.2	—	"	"	66	"	0	3	
	FM-2500E	2.8	"	0.5	—	"	"	65	55	1	4.25	
	FM-5000E	5	±1.0	"	—	"	"	"	"	2	9.5	

†Power rating in some cases at nominal output rather than maximum output.

\*To obtain complete FM transmitter data from each manufacturer, use the reader service card and circle the appropriate inquiry number indicated.

channel or the reverse at any point between 50Hz and 15kHz.

**FM Noise:** Refers to the ratio of signal-to-noise, FM modulated, referenced to ±75kHz modulation swing with a modulating signal of a 400Hz tone.

**AM Noise:** Refers to the incidental AM modulation of the signal referenced to the same full value of modulation with a 400Hz tone.

**NOTE:** Where available, the values selected were as follows:  
**FM Noise:** Stereo, unweighted value  
**AM Noise:** Stereo, unweighted, synchronous value.

**Power Consumption:** Published value for either the nominal power or, where stated, for a specific power output. This value should be taken very carefully as some manufacturers may not include necessary blowers in the total.

The following notes apply where found: Note #1: Maximum VSWR = 1.3:1; Note #2: Maximum VSWR = 1.2:1. No other VSWR limitations have been noted; either the data are not available, or the limit is in excess of 1.5:1.

As previously noted, this FM transmitter roundup will be continued in the June issue of **BE** and will include the table for the power range of 1kW or less. □

## Automatic Video Measurements



# The ANSWER™ is ready.

**F**or all your measurement questions, we've delivered the ANSWER: the 1980, an Automatic Video Measurement Set from Tektronix.

It answers your need to save time and your preference for digital accuracy. It answers the industry's demands for an automatic instrument that makes dozens of signal measurements many times faster than conventional techniques using analog devices.

Besides less drift and greater accuracy, the ANSWER set's digital circuitry radically reduces time-consuming maintenance and recalibration.

Think of the future.

We've made ANSWER programmable to meet a myriad of

future test requirements, including remote applications. ANSWER is designed and built to the same high standards of reliability you've come to expect from the world's acknowledged leader in television test and measurement equipment.

To get the answer to your measurement questions, call the Tektronix Field Office nearest you today or write for free literature. Or call toll free (800) 547-1512

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COMMITTED TO EXCELLENCE

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For the address of your nearest Tektronix Field Office, contact Tektronix, Inc.

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# Introducing the Ramko a new cart machine, but



Finally you can get your hands on a cart system with reel-to-reel performance.

A cart system that eliminates phase shift error once and for all. That sets new standards for low wow-and-flutter. That provides signal-to-noise, distortion and frequency response that are better than anything else

in the industry.

Finally, the PhaseMaster.

## **PhaseMaster: the cart machine, redefined.**

The new Ramko PhaseMaster has all the features you want, and some that never existed before.

It's built to take the

pounding you're going to give it, hit after hit, commercial after commercial, day after day.

The deck is a 5/8" casting for stability, with a stainless steel cover plate for wear resistance. The crystal-controlled dc servo motor ensures greater speed accuracy and lower heat

# PhaseMaster™ not just a whole new concept.

generation (15 ips, 7½ ips, 3¾ ips motor speeds field-selectable). The machined head stack is rock-stable, and we've included internal illumination for your periodic head inspections and cleaning. There are no micro-switches to break or jam—and never any start-up wow—because the motor is started by an optical sensor as you begin to insert the cart. And the cart hold-down presses on the edges for greater stability and exacting alignment, and pressing with roller contact for velvet smooth insertion and withdrawal.

lower track. On playback, the left channel signals from both tracks are compared, and any phase shift difference is corrected automatically by a continuously tracking electronic time delay.

Simple.

And it works—no more holes in your sound, and no more side-to-side spectrum shift.

## The ultimate cart system, mono and stereo

The Ramko PhaseMaster System, in mono and stereo, is available as a playback



tronic control center; two A and B cart decks; and a cassette deck.

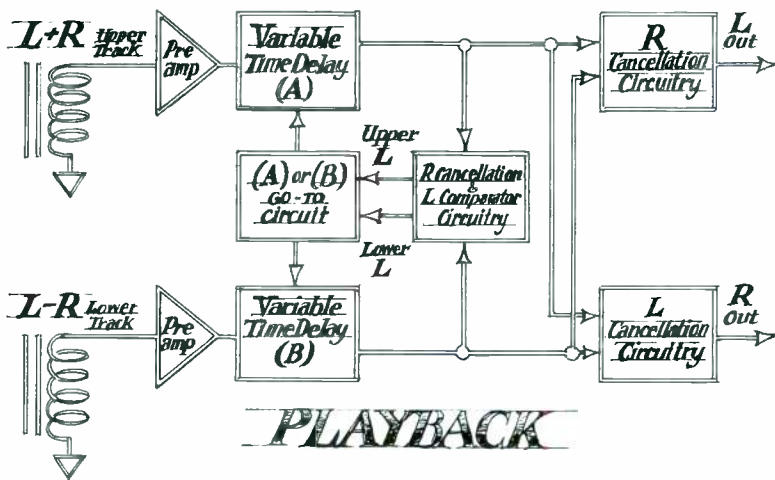
To record, you switch-select any of three inputs to record on any or all of the decks. When you play back, the control center determines whether your tape is mono or stereo, coded or uncoded, and automatically reproduces the correct outputs.

To dupe, you simply load tape (cart or cassette) and one or two blanks, then hit Record/Play and the control center puts the signal where it's supposed to be.

## Call collect for the full-featured brochure

Get the brochure. It covers the PhaseMaster System's convenience and ease of operation; the left, right and phase meters; the 4-digit timer; the three cue tones; the integral testing facilities; and everything that you were hoping would be in it.

Write Ramko Research, 11355 Folsom Blvd., Rancho Cordova, CA 95670. Or if you can't wait for the mail, contact your nearest rep or call (916) 635-3600 collect and arrange for a 2 week free trial.



## And no more stereo phase shift error

Phase shift doesn't much matter in mono, so when you're recording stereo, the PhaseMaster encodes a mono L + R signal on the upper track, L - R on the

unit or a record/playback deck.

It also comes as a complete reproduction center which duplicates—as well as plays and records—your mono and stereo carts and cassettes. This consists of four modules: an elec-

# RAMKO





This test set-up illustrates use of the digital storage oscilloscope (center) to permit the TV engineer to make accurate timing measurements. Supporting equipment being used in the rack on the left include: Unimedia color

monitor; Tektronix 1420 NTSC Vectorscope; Tektronix 1480R Waveform monitor; Tektronix 1478 Chrominance Level Corrector; and Grass Valley distribution amplifiers (lower left corner).

## Using a Digital Oscilloscope for Broadcast Timing Measurements

By Bruce Penney and Tom Dagostino, Tektronix, Inc., Beaverton, OR

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*A new digital scope, to be available soon, offers the advantages of digital technology. The paper describes some of its features and applications.*

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Obtaining accurate timing measurements to meet tight industry standards can be time consuming. Much of the test equipment available today falls short of meeting the exacting demands of critical measurements in the TV broadcast industry.

Tektronix's new 468 Digital Stor-

age Oscilloscope has all the test and measurement capability of a conventional oscilloscope while offering the advantages of digital storage. In the digital storage mode, waveforms are acquired and stored in memory, and digitized waveforms may be displayed on the CRT at any time for analysis or comparison.

TV engineers have commonly used two options in making timing measurements such as sync width and horizontal blanking. The fastest way is simply to read the measurement off a waveform monitor graticule. The second way involves comparison against an accurate reference. For example, the engineer could use a delayed trigger sweep to count subcarrier cycle increments between the leading edge and trailing edge of the pulse. The user needs to first set up the main sweep to the scope, then use a delayed trigger as a timing reference. The result is three signals



\*Scotch® is a registered trademark of 3M Company.

## IN A TEST OF ONE-INCH VIDEO TAPES, WE ACED OUT THE COMPETITION.

When we tested the top four brands under strict lab conditions, the overwhelming performance leader was Scotch 479 Master Broadcast Video Tape. In fact, we came out on top in all ten performance categories.

If that isn't reason enough to make us your choice, maybe this is. We're the only one-inch supplier that winds your tape onto a special cushioned flange reel to protect against shipping and handling damage. And we pack and ship our tape in a flame-retardant case to give you even more protection.

We're the people who pioneered the development of video tape 25 years ago. And according to the pros who know video tape best, we're still the best video tape. Give or take an inch.



# 3M

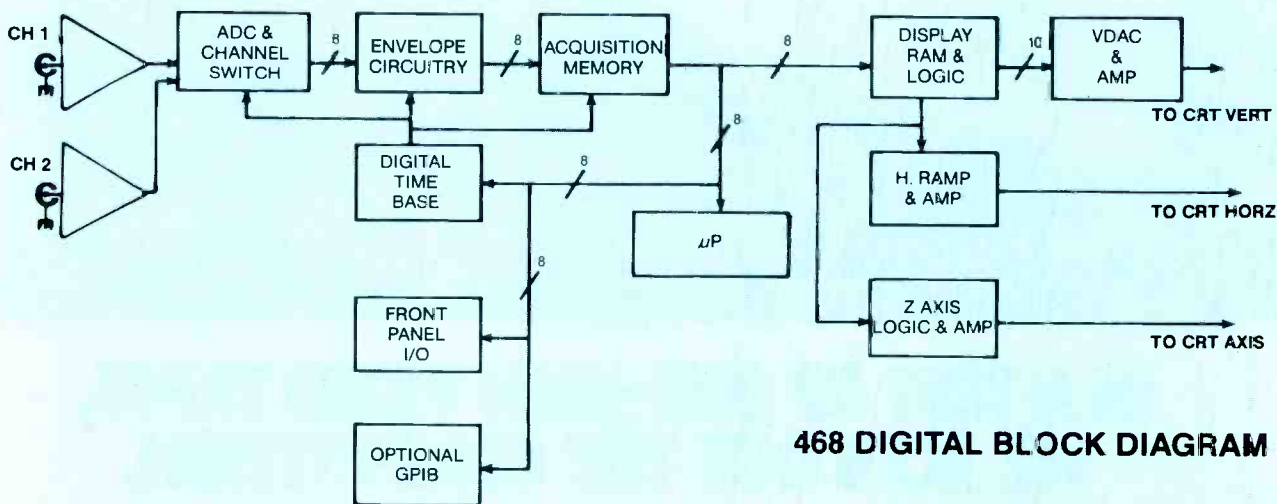
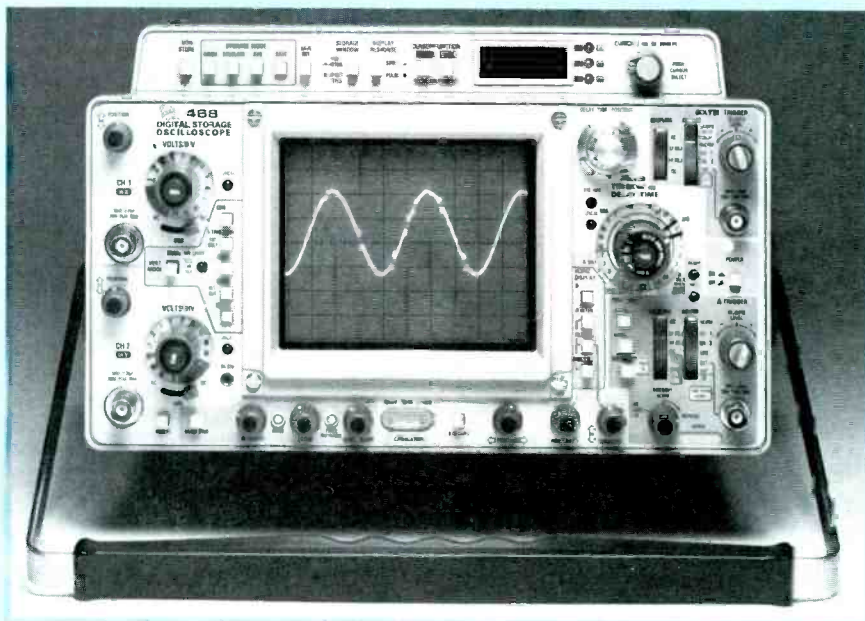


## The 468 Digital Storage Oscilloscope

Using state-of-the-art technology advances, the new Tektronix 468 Digital Storage Oscilloscope increases digital storage bandwidth limits, detects aliased signals, and corrects envelope error and display jitter—all problems which have plagued earlier digital storage efforts.

The 468 in the non-storage mode has all the capabilities of the standard 465B 100MHz Portable Oscilloscope. In the storage modes, the 468 continues to *drive* like a non-storage oscilloscope; its basic operation is just like a 465B. Storage mode is selected by simply pushing a button; waveforms are acquired and stored as easily as they are viewed in the non-storage mode.

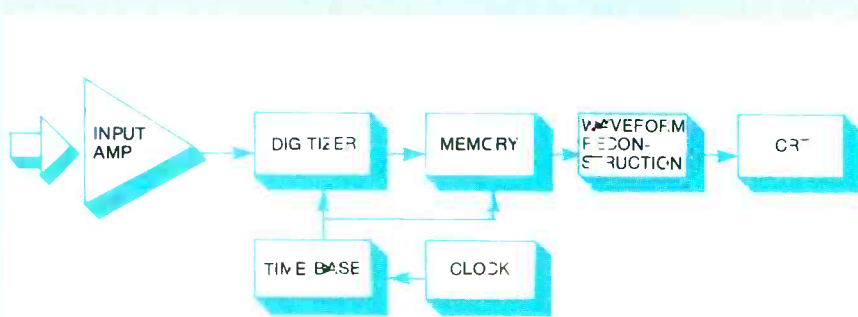
The 468 has a 25-MS/s 8-bit digitizer and uses a unique display inter-



polation technique to achieve a 10MHz useful storage bandwidth. This development allows the 468 to perform as a fast digital storage oscilloscope and increases the range of signal frequencies which can be stored and displayed.

The basic difference between conventional CRT storage oscilloscopes and digital storage oscilloscopes is the form of storage. Storage in analog oscilloscopes takes place in the CRT, either on a charged mesh or directly on a special screen phosphor. In digital storage, the analog voltage waveforms are converted to digital signals that can be stored indefinitely in a digital memory. The signal is first digitized, the data words are stored in memory and then converted back to analog values for display on a CRT.

Digital storage requires digitizing and reconstruction processes wherein digitizing consists of *sampling* and



Functional Diagram for ADC

*quantizing*. *Sampling* is the process of obtaining the value of an input signal at discrete points in time; *quantizing* transforms that value into a binary number by an analog-to-digital converter (ADC). The digitizing rate (sampling rate) is controlled by the

switch on the time base. In turn, the time base uses a precise digital clock to time the analog-to-digital (A/D) conversion and to store the data in digital memory. Once stored, the data can be read out at a fixed rate and reconstructed for display. ●

Facts from Fluke on low-cost DMM's

# Our new 4½-digit bench/portable: You've never seen anything like it.

Take a close look at the face of this instrument. Notice anything new? If you just realized you've never seen *words* on a low-cost DMM display before, you're on the right track.

This is the new 8050A from Fluke, the *lowest* priced 4½-digit multimeter available that uses microprocessor technology.

**The legends on the LCD are clues to what makes the 8050A unique.**

**dB:** You're right. The 8050A delivers direct readouts in dBm, referenced to any of 16 impedances. Use the "REF Z" button to scroll through the memory and locate the zero dBm reference you need,

then set it and forget it. No more tedious calculations or conversions.

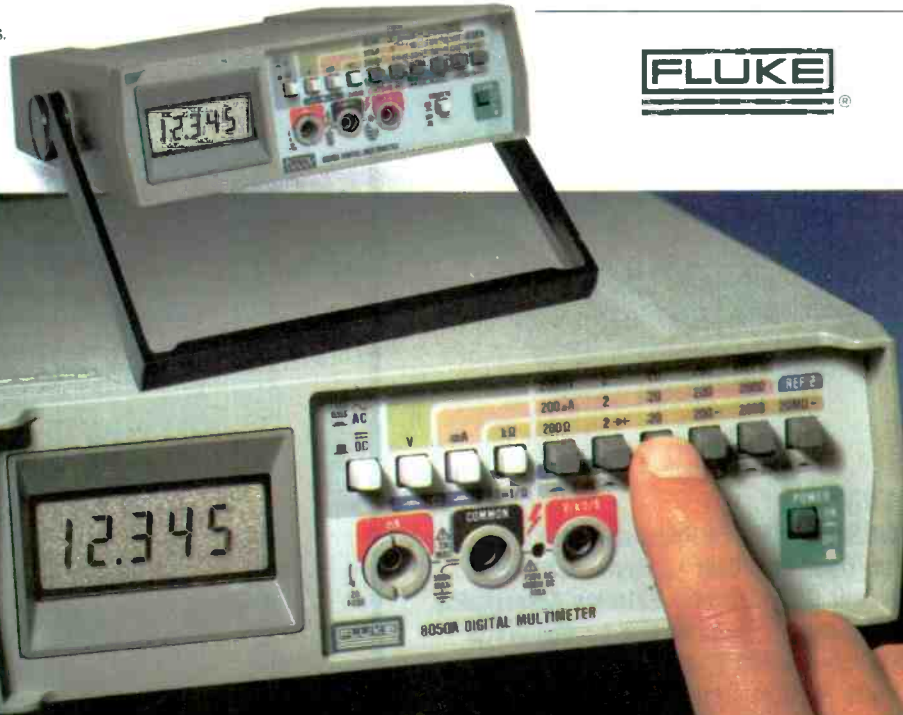
**REL:** For relative references in the dB mode or offset measurements in all other functions. Lets you store any input as a zero value against which all others are automatically displayed as the difference. Another timesaving convenience.

**HV:** Just a reminder when your input is over 40V, so you won't forget about safety while in the dB or relative modes.

Of course there's much more to the

8050A. True RMS measurements to 50 kHz. Conductance for measuring resistance to 100,000 Megohms and leakage in capacitors, pcb's, cables and insulators. Diode test, 0.03% basic dc accuracy and full input protection. Plus a large family of accessories. Just \$329 U.S.

For all the facts on the versatility and value of the new 8050A, call toll free **800-426-0361**; use the coupon below; or contact your Fluke stocking distributor, sales office or representative.



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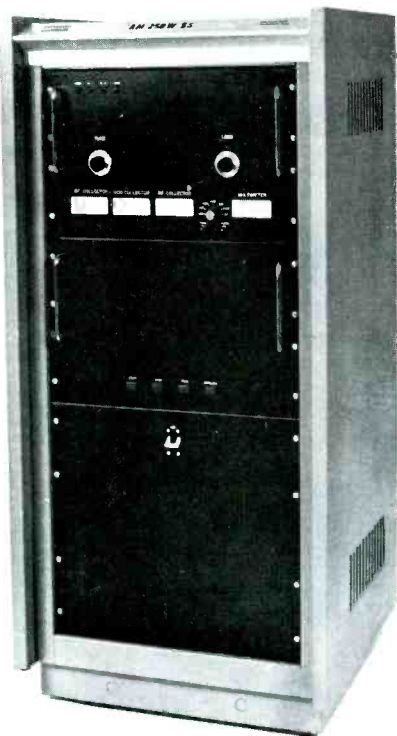
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The Wilkinson Electronics AM-250SS is an all solid state 250 watt Am transmitter housed in an attractive 24 inch cabinet, 52 inches in height. All components are mounted in two drawers for maximum accessibility and ease of maintenance. Space is available in the cabinet for a second transmitter making it possible to combine two 250 watt units to obtain 500 watts. It is also available at any power below 250 watts at a reduced price.

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to track: the main trigger signal, the delayed trigger signal, and the signal being measured. The advantage of this approach is accuracy comparable to the delayed trigger signal accuracy. However, it is time consuming and requires extra equipment.

With the 468 Digital Storage Oscilloscope, timing measurements like sync width, horizontal blanking and ratio of sync-to-equalizer pulse are made quickly, easily and accurately. The time cursors are positioned on the leading and trailing edge and the difference is read from the LED readout. Timing accuracy is

## Digital VS Analog Storage

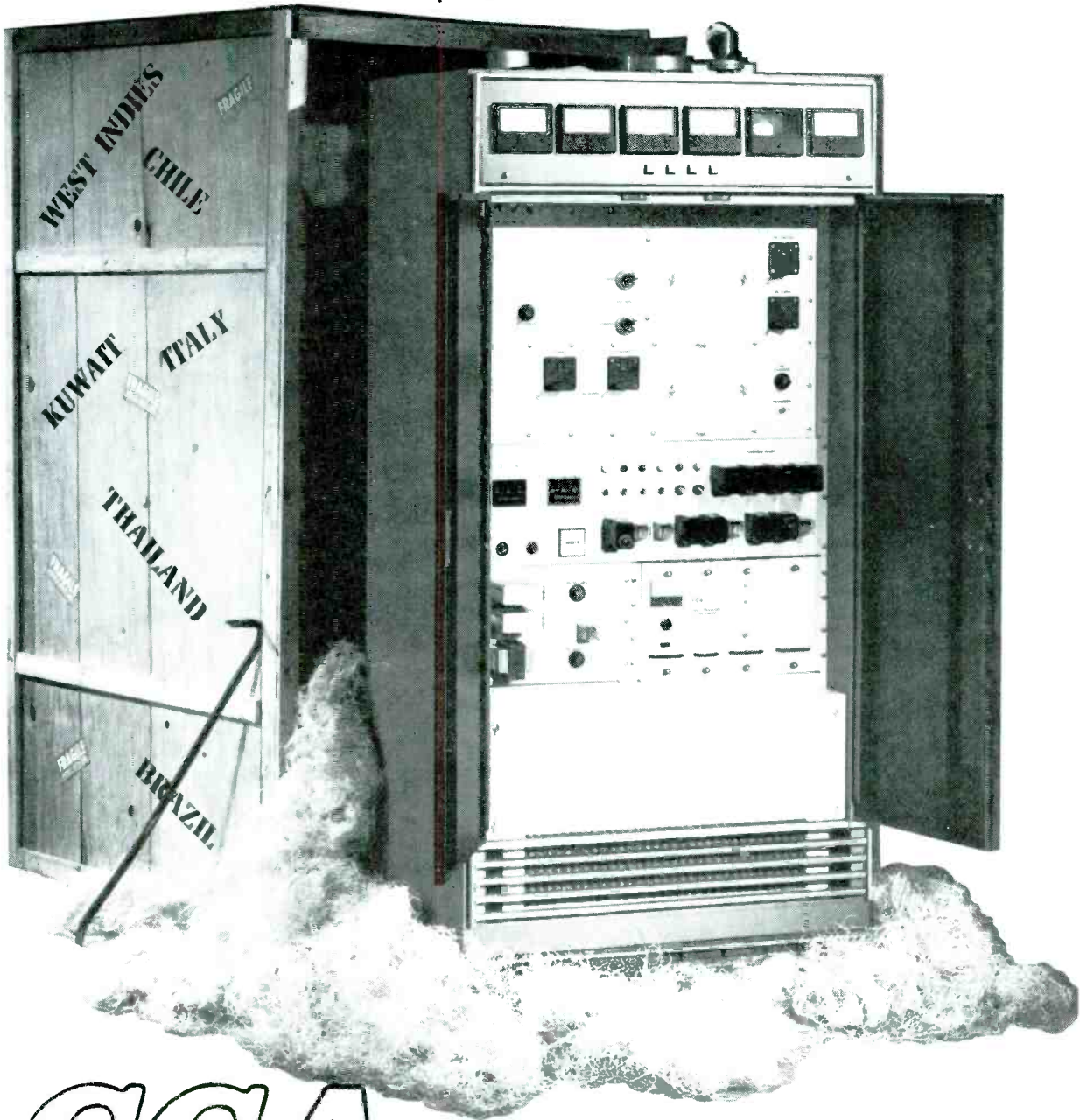
### CRT and Digital Storage Comparisons

	CRT STORAGE	DIGITAL STORAGE
STORAGE ABILITY	Trade off between signal amplitude and maximum stored frequency	Maximum stored frequency is independent of amplitude
	Difficulty in writing fast/slow transitions without blooming	No blooming
		Additionally, the envelope mode allows fast glitch catching at any sweep speed
BANDWIDTH	Fixed, as determined by the amplifier response and/or writing speed	Variable, as determined by the digitizing rate selected with the TIME/DIV switch; or fixed, with the envelope mode
PERFORMANCE BEYOND BANDWIDTH	Bandlimiting rolls off amplitude; high slew rate transitions will not be written	Aliasing creates false signals; narrow pulses will not be stored
RESOLUTION	Resolution is uniform: vertically, it is limited by spot profile; horizontally, by trace width	Quantized vertical resolution; horizontal resolution limited by memory size and display reconstruction type
MEASUREMENT ERRORS	Error characteristics are independent of the input signal; rolloff due to bandlimiting, linearity, etc. can be measured and used to improve measurement accuracy	Error characteristics are dependent on the timing relationship between the input signal and sample clock; maximum errors are on the same order as analog systems, but the error characteristics do not allow their use to improve accuracy

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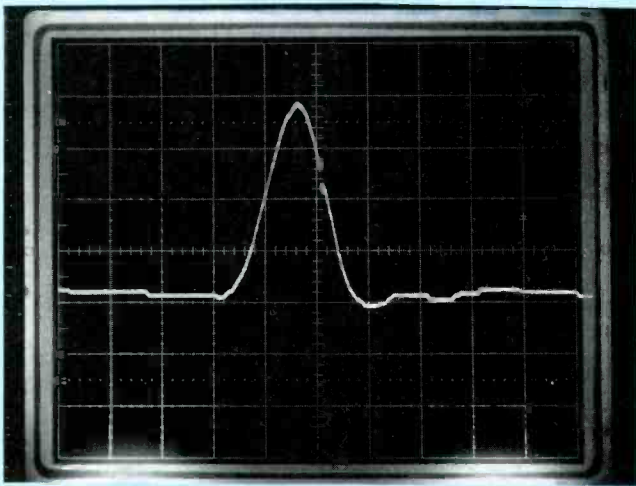
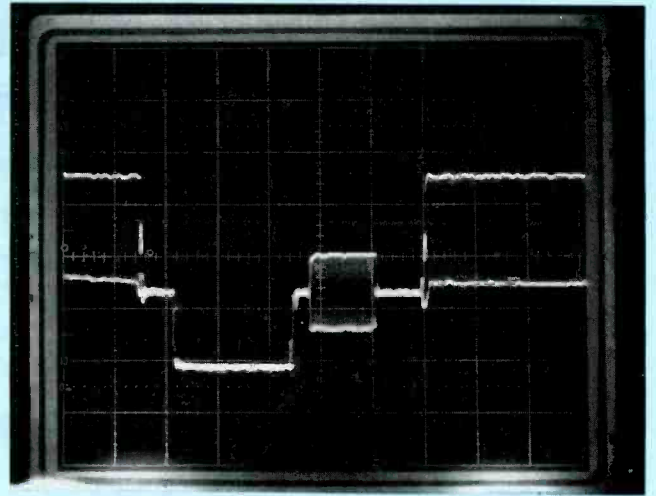
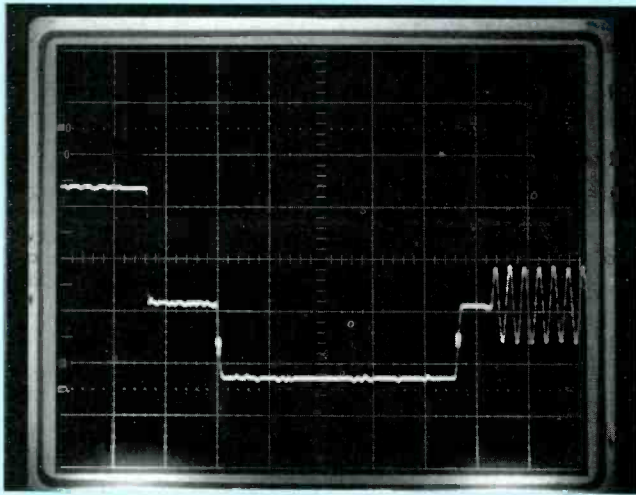


Figure 1. Typical measurements with the 468 Digital Storage Oscilloscope:

*Upper left:* sync width pulse measurements with the cursor defining the interval being measured.

*Above:* horizontal blanking measurements using the peak detection capability of the *Envelop Mode*.

*Left:* a 2T pulse from the composite VIT using the *Storage Mode* display.

improved due to the measurement being referenced to the 468 system clock (see Figure 1, upper left).

In addition, the 468's special envelope mode provides a convenience feature for making horizontal blanking measurements. The whitest and the blackest signals are stored, the cursors are set on the interval points, and the value is read off the LED display (see Figure 1, upper right).

The CRT display of the digital storage oscilloscope is bright and crisp, and traces won't fade or bloom positive; low repetition rate signals are easy to view and analyze.

In the digital storage modes, VIT signals which might be barely visible on a conventional CRT are bright and clearly visible in ambient light (see Figure 1, lower left).

The 468 incorporates several innovations that address the short-

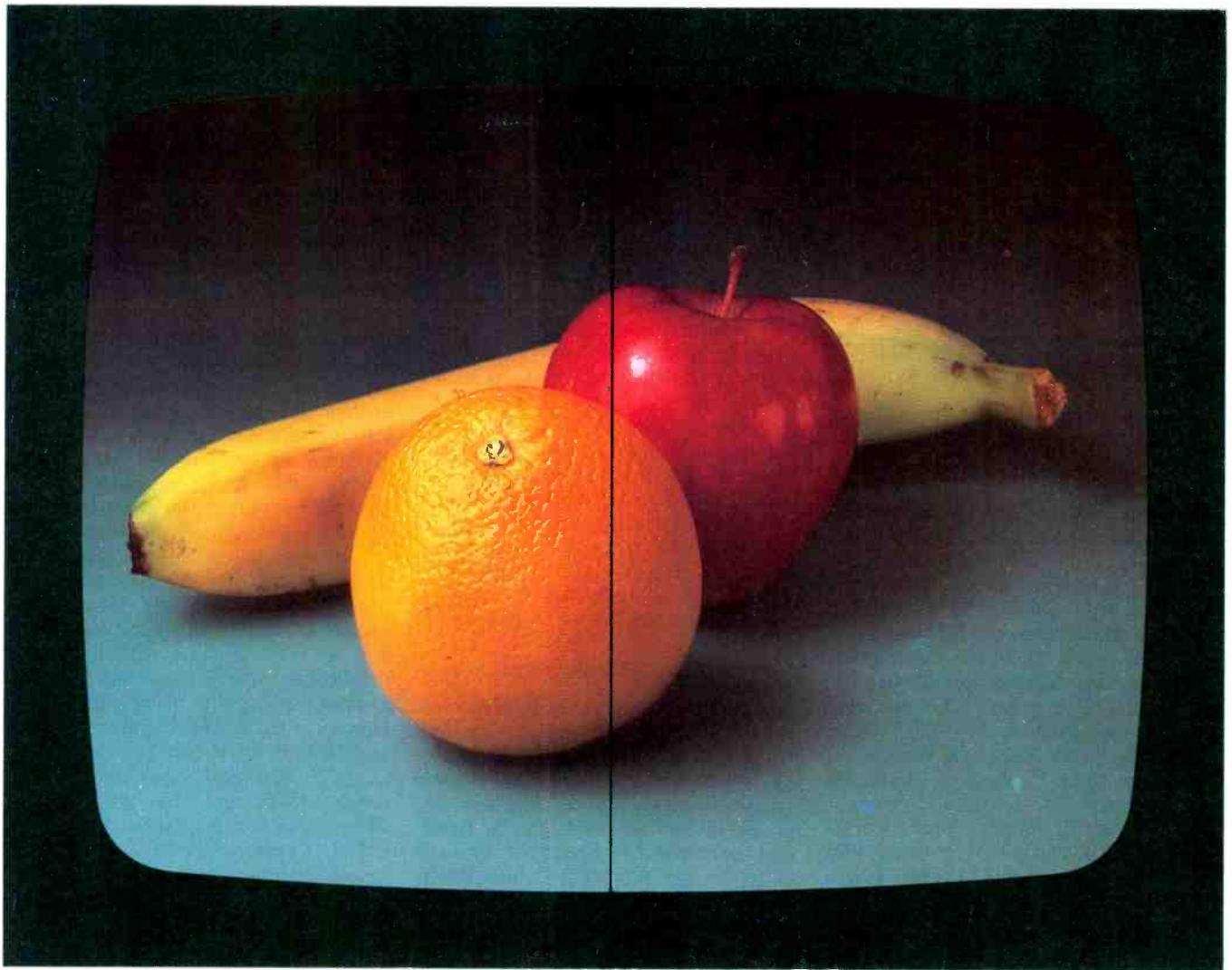
comings of earlier digital storage oscilloscopes: display interpolation improves the useful storage bandwidth possible at a given sample rate; the envelope mode detects aliasing and also catches glitches and other fast pulses; and jitter correction helps make the display useful even at low sample density.

The new 468 provides an alternate approach to measurements made in the TV broadcast facility. Still performing all the standard troubleshooting functions of a conventional oscilloscope, the 468 offers improved accuracy and ease of use. Pretrigger data—unavailable in a conventional oscilloscope—is stored in memory along with other data; the trigger serves only as a reference point. This pretrigger capability provides a means for viewing what caused the trigger and is useful in troubleshooting digital equipment.

High display brightness is another feature that can increase measurement efficiency. And a signal averaging option, useful for removing random noise, along with a TV sync separator add additional measurement capability. An optional General Purpose Interface Bus (GPIB) is also available for transmitting waveforms to a host computer for further processing or hard copy unit for permanent records. □

#### Final Note

The new 468 scope is scheduled for release in August. A detailed performance brochure describing it, titled *The Digital Storage Oscilloscope*, is available free from Tektronix. For a copy, call: 1-800-547-1512, a toll-free number.



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# 1980 Public Radio Conference

## Sound Thinking: Fine Tuning the Future

By Bill Rhodes, editorial director

- March 15-20, 1980
- Crown Center  
Kansas City, MO
- Record attendance,  
more than 800 registered

### KCUR-FM pioneers in KC

KCUR-FM, located on the campus of the University of Missouri—Kansas City near KC's famous Country Club Plaza, is a pioneer in the growing National Public Radio network. KCUR is one of the 17 uplinks planned for NPR and was the second to become certified. Centrally located, KCUR-FM serves a cluster of 16 midwest NPR member stations, each of which is outfitted with its own downlink facility.

KCUR-FM began receiving programs via satellite late last year, and began its uplink activities in January, 1980. To date, it has made some 40 satellite transmission ranging from news features and actualities for *All Things Considered* and *The Morning Edition* to full-length recorded and live programs. KCUR's first uplinked program, *New Letters on the Air*, is now broadcast regularly over 89 network stations.

To operate, KCUR-FM has transformed its parking lot into a satellite earth station. The satellite receiver/transmitter was activated in late November, 1979. KCUR receives network programs via satellite and

now sends programs to more than 200 other member stations of the NPR network.

Mark Morelli, KCUR production manager said, "The uplink allows local events to be heard all over the country in stereo. We can send up anything from a recital to a news event."

Before its satellite hook-up, KCUR received network programs on broadcast land lines. According to Sam Scott, director of broadcasting, "The satellite interconnect between stations has created many new programming possibilities. Until now, live broadcasts from the network have not been in stereo."

### First live national program

The first live national broadcast to originate from Kansas City via the KCUR-FM satellite uplink occurred at 8:30 p.m., Sunday, March 16. A *Prairie Home Companion*, produced by Minnesota Public Radio and performed as part of kick-off activities for the 1980 Public Radio Conference, originated from Crown Center Hotel, and was transmitted to the entire public radio network.

A *Prairie Home Companion* encompassed almost every sort of non-electric music—bluegrass, old-time jazz, ethnic folk music, classical music, and opera. For five years, Minnesota Public Radio has offered its listeners this variety

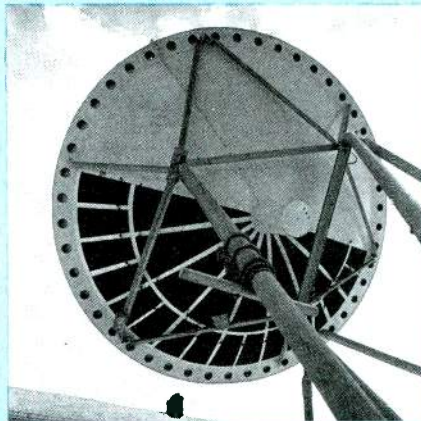
show of music and comedy broadcast live every Saturday night from the stage of The World Theatre in downtown St. Paul. The host and principal founder of the show, Garrison Keillor, is known also as a regular contributor to *The New Yorker*. Keillor weaves stories of the people and events in his mythical hometown, Lake Wobegon, into the variety format.

The 1980 Public Radio Conference (PRC) convened in Kansas City as the first conference of the satellite era for public radio. With its high-capacity, full-fidelity satellite system largely in place, National Public Radio (NPR) has turned its attention in 1980 to the technology which made it all possible and to the reason behind the organization's founding: radio programming.

The scope of the 1980 PRC covered virtually every aspect of programming, business operations, uplink management, and engineering for the NPR station/network. While the proceedings will not be published, highlights of the engineering topics are being prepared and are planned for a forthcoming issue of **BE**. Historical notes concerning NPR and the 1980 Public Radio Conference include:

- The 11-year-old NPR has now grown into a 229-member affiliate chain with a budget of more than \$17M.
- NPR became a bona fide network during the 1980 PRC by using its satellite to deliver President Carter's news conference live nationwide.
- The official number of uplinks in the NPR network is 17, including the Main Operating Terminal in Washington, DC.
- The local NPR affiliate, KCUR-FM (100 kW/Stereo 89.3) was one of the early uplink sites to be certified and played an active role in the 1980 PRC.
- National Public Radio and the Corporation for Public Broadcasting started planning the satellite network in 1976 and by June, 1980, every member station will have a satellite installation. The system has been paid for by the Corporation for Public Broadcasting.

The satellite antenna for the active KCUR-FM station is featured on this month's cover, and the station's activation is covered below. The conference also featured major addresses by Charles D. Ferris, chairman, FCC; Harriet (Sis) Kaplan, president, National Radio Broadcasters Association, and Robben W. Fleming, president, Corporation for Public Broadcasting. The Ferris and Kaplan speeches are printed in detail on pages 60 and 70



KCUR-FM in Kansas City is one of 17 uplinks in the NPR network. Their transmit/receive antenna, featured on this month's cover and shown above, was erected on a parking lot next to the converted duplex that houses the studios and offices. The control room (upper left) is temporarily equipped with two Studer Revox B-67 tape decks and a Tescam Model-10 mixing console. Les Appelt (lower left), KCUR-FM assistant production manager, verifies program information with NPR's main originating terminal in Washington, DC. When the verbal command to activate the uplink carrier is given, the feed begins.



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respectively. Because a follow-up article will cover engineering and technical topics of the 1980 PRC, the balance of the coverage here will concentrate on the KCUR-FM station and these major addresses.

### Kaplan: A new relationship

Harriet ("Sis") Kaplan, president of the National Radio Broadcasters Association, a membership organization representing more than 1500 commercial radio stations, also addressed the meeting. She said that she was pleased to be in the vanguard of forging a new relationship between commercial and non-commercial radio. "I grant you, many broadcast companies and individual broadcasters do not feel as I do about the need for an alliance. But I believe their views are short-sighted and unrealistic."

Kaplan, who, with her husband, owns three commercial radio stations in North Carolina and Florida, said the problems that confront radio are shared by commercial and noncommercial broadcasters alike.

"All of us hear forecasts of the communications business, and many of them are scary," Kaplan said. "Super stations, satellite transmission, home earth receivers, cable



**Charles D. Ferris:**  
"Public radio—a time for innovation."



**Harriet Kaplan:** "Non-commercial and commercial radio should have a close relationship."



**Robben Fleming:**  
"Money is the key."

TV, videodiscs, cassettes, and much more. Audience fragmentation and changing demographics are certainties we'll have to meet and live with. They are facts of life for radio, and they will intensify during the coming years."

### Ferris: Regulation, a new approach

In a major policy address at the 1980 PRC, FCC Chairman Charles D. Ferris recommended that the FCC "take a fresh look at public radio

and indeed at all of public broadcasting.

Referring to a recent FCC decision whereby PBS stations are now allowed to use their earth satellite receive terminals for private commercial video and message traffic, he said, "I can see no reason why this precedent should not logically apply to NPR stations as well.

"This decision, I believe, signals the beginning of the end of the FCC tradition of viewing public broadcasting in the most narrow, moralis-

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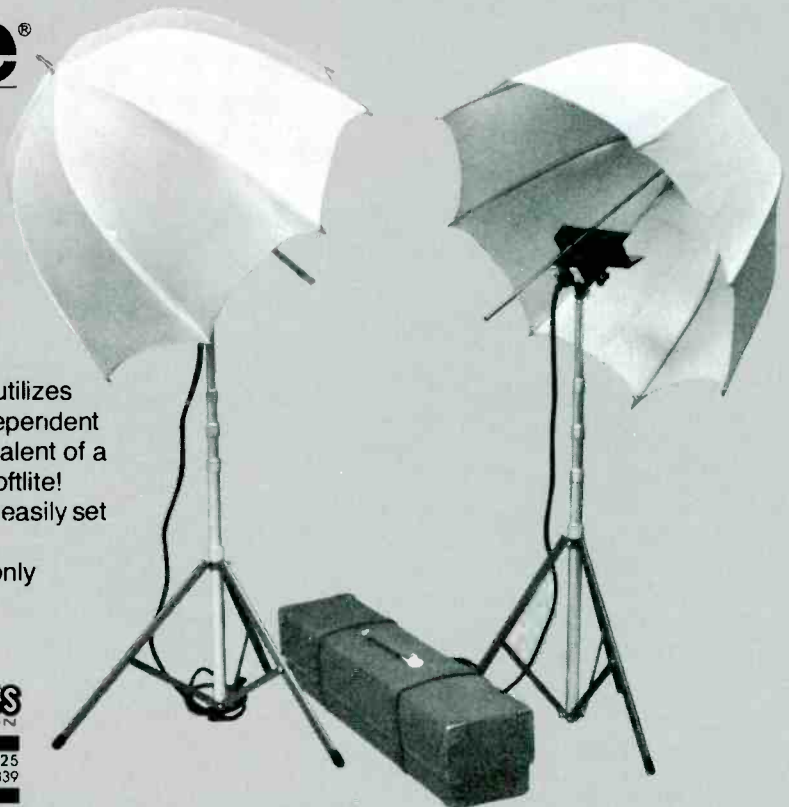
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The Model 80 is equipped with an Electro-Voice EV-671 mic capsule, and the Model 81 utilizes a Shure SM-58 capsule. Due to very low distortion and a flat transmitter-to-receiver frequency response of  $\pm 2$  dB from 40 Hz to 15 kHz ( $\pm 1$  dB 100 Hz to 12 kHz), the sound is as clear as you would expect from the best of conventional hard-wired microphones. Used with a Vega "Dynex" receiver, overall system dynamic range is better than 90 dB, eliminating the mixer gain control riding and distortion caused by compression and clipping. (The mics are available without Dynex for

compatibility with older Vega receivers or those of different manufacture.)

Both models use a standard 9V alkaline battery, offering from 7 to 9 hours continuous use, and a range of up to 1000 feet. Since operation is in the 150 to 216 MHz VHF range, there is no interference from CB radios or FM broadcast stations in normal use. An audio gain control on the bottom of the case lets the user adjust the mic's sensitivity. Optimum setup can be verified with an adjacent LED indicator that doubles as a battery monitor. The mics also include a Power On/Off switch, plus a separate Audio On/Off switch so you can keep the receiver quiet when you want to temporarily silence the mic.

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tic terms. Traditionally, the FCC has appeared to feel a strong responsibility not only to keep public broadcasting free of on-air commercials, but also to keep it incapable of raising funds effectively by other entrepreneurial initiatives. Our satellite earth station decision shows that the FCC can be pragmatic in approaching innovative ideas to bolster public radio and television's financial underpinnings."

Some of the ideas he mentioned include:

- Pay-as-you-go public television and public radio.
- Use of public radio station sub-

carriers to deliver home information services if current restrictions are lifted.

- The marketing of public radio programs in cassette form.

Ferris praised public radio's special contribution and leadership in its national programming activities and its local services. In the latter, he noted that the Congressional requirement that public radio stations have local community advisory boards, open board meetings and financial records ensure localism in a manner far more direct than the FCC's Ascertainment Primer.

Ferris also said that the FCC is

considering initiatives to fill the demand for new public radio outlets through potential reservation of "some or all of the expanded AM band achieved at last year's WARC for public radio," and through greater flexibility achieved by narrowing the spacing of FM channels to 9kHz.

Ferris cautioned that in "any fundamental re-examination of what we—and by we I mean both the FCC and the American public generally—expect from our reserved radio frequencies and their public licensees, the bottom line test, I expect, will be whether public radio can diversify its funding sources while still delivering what the advertiser-supported commercial marketplace cannot or will not supply."

In closing he noted that public radio should not lose sight of its basic mission. "I believe that you can be enterprising without being avaricious, and innovative without losing sight of your original purpose. This will be your challenge for the next decade, and you must meet it if you are to survive and prosper. I am confident that, based on your record to date, you will succeed."

#### Fleming: Money the Key

Robben Fleming, president of the Corporation for Public Broadcasting, told public radio broadcasters at the 1980 PRC that although "all the mood is upbeat for radio," federal funding will become increasingly difficult to obtain, and that public broadcasting can no longer rely on the government for the major portion of its financing.

Speaking before the assembled broadcasters at the 10th Annual Public Radio Conference, Fleming stated, "We must find increased alternative ways to bring money into public broadcasting," noting that inflation will overtake the projected increases in federal appropriations for public broadcasting for the next three years.

Fleming countered the rumor that President Carter's plan to balance next year's budget might cut into the CPB appropriation. He said he had just learned from the Office of Management and Budget that the public broadcasting appropriation is not among the scheduled cuts.

Fleming also enumerated some of the issues expected to be considered by Congress this fall at its appropriations hearings for the 1983 budget. Among them are a reexamination of the necessity for the Corporation for Public Broadcasting, and improved methods for dividing funding between public radio and television. □

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## Public Radio— A Time for Innovation?:

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By Charles D. Ferris, chairman,  
Federal Communications Commission  
An address before the  
1980 Public Radio Conference

I am pleased to join you in Kansas City to address your convention. An invitation from good friends must always be given high priority, and Frank Mankiewicz and Walda Roseman are good friends and two of the best professionals in Washington today. In fact, getting a Boston Irishman to spend St. Patrick's Day on a plane coming and going to Kansas City is a measure of my regard.

But even beyond the lure of their request, I was enthusiastic about your invitation primarily because of your medium, its message and its role. Public radio is vitally important to the success of many efforts now underway at the FCC, efforts designed to increase radio program diversity while reducing government regulation.

This is a critical time for public radio—a time when we at the FCC must develop a greater knowledge and understanding of your special needs. There is much good news about public radio, with audiences up and public identification of NPR growing. But the bad news is really old news: public broadcasting in this country—both radio and television—is still massively underfunded, especially compared to Europe, Canada and Japan.

And even with the Carnegie Commission's strong support for higher federal funding levels, and an administration sympathetic to those funding recommendations, federal budget-tightening is likely to continue to keep your appropriations below the necessary levels. To make matters worse, inflation has also hit public radio—like it has the rest of the nonprofit sector—much harder than commercial radio.

Today, I want to speak about why I think the FCC should take a fresh look at public radio—indeed at all of public broadcasting—in this changing economic environment.

We have already started a new approach to your needs. We recently reorganized our Broadcast Bu-

reau to widen the expertise in public broadcasting beyond a small branch. The first public broadcasting group to recognize and support our efforts was NPR. We appreciate this. Dick Shibben and his staff are preparing a comprehensive review of public broadcasting issues to avoid the *ad hoc* approaches of the past. The Bureau is also trying to expedite its processing of applications for new public radio stations and facilities.

We know the need for this expedited processing, since substantial opportunities for new public radio outlets have been created by our own recent actions and those of Congress. Recognizing that NPR stations reach only 65% of the U.S. population, Congress in 1978 set a priority for federal funding of new stations, especially those that were minority-controlled. It also gave the National Telecommunications and Information Administration authority to give planning grants to groups interested in starting new public radio stations, to supplement those that CPB provides.

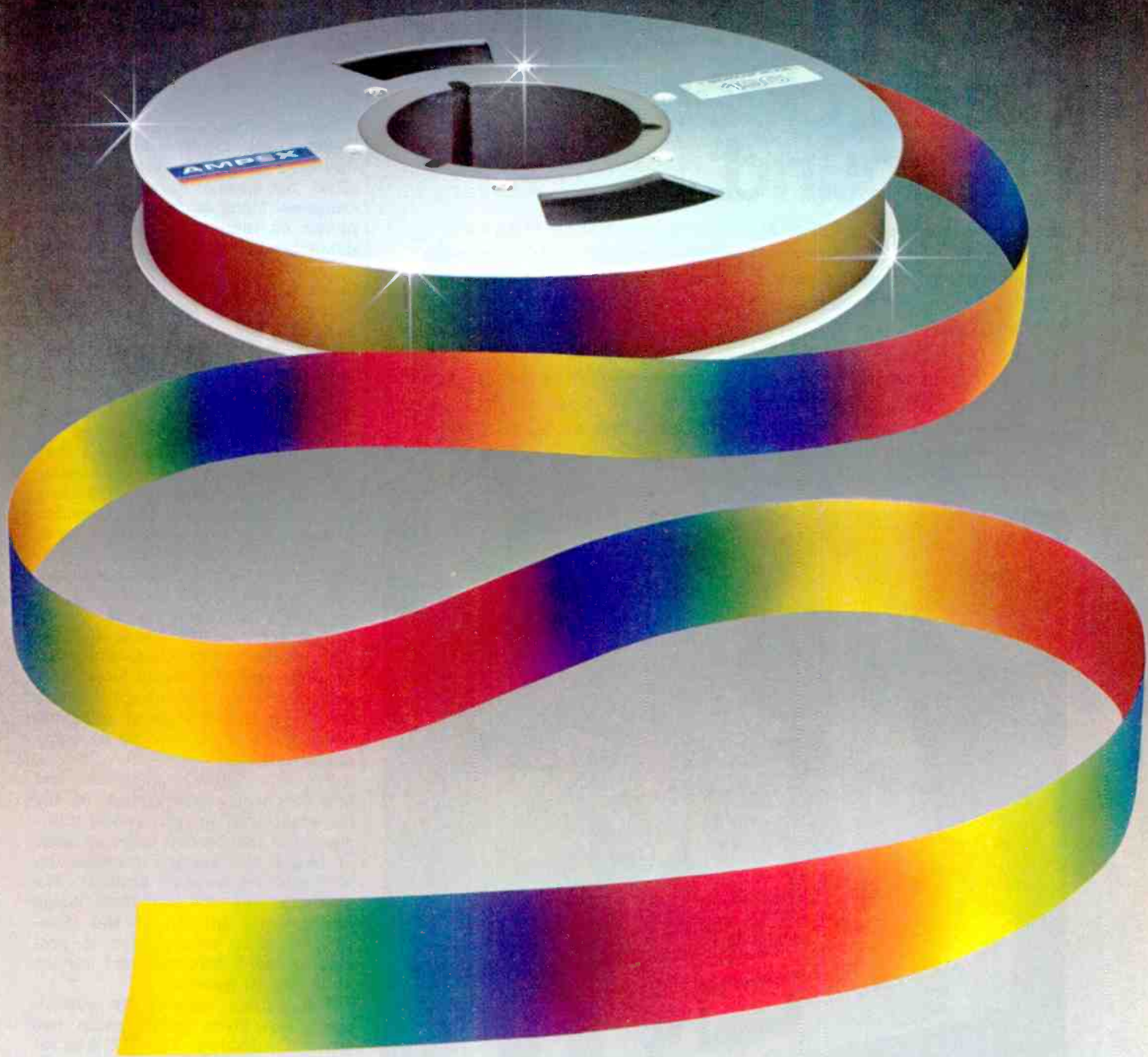
Your successful efforts to forge a nationwide satellite link, approved enthusiastically by the FCC, will also make it easier to establish new stations. It will lower their interconnection costs and increase the programming streams available to new public radio licensees.

We have tried to make room for some of these new stations by moving the 10W educational stations to the commercial FM band and by requiring all noncommercial stations to meet minimum operating schedules.

I have suggested on several occasions that we consider additional FCC initiatives to fill the demand for new public radio outlets. One of these might be to reserve some or all of the expanded AM band achieved at last year's WARC for public radio. There is no logical reason why public radio should be considered only an FM service. Indeed, NPR already has more than 20 AM members.

NPR has also strongly supported the FCC's position on changing the AM band from 10kHz spacing between stations to 9kHz. We appreciate this support for what is now the US government position, and our delegation is now in Buenos Aires seeking its implementation at the Region 2 ITU Conference. Public as well as commercial radio can benefit from the greater flexibility 9kHz spacing will provide.

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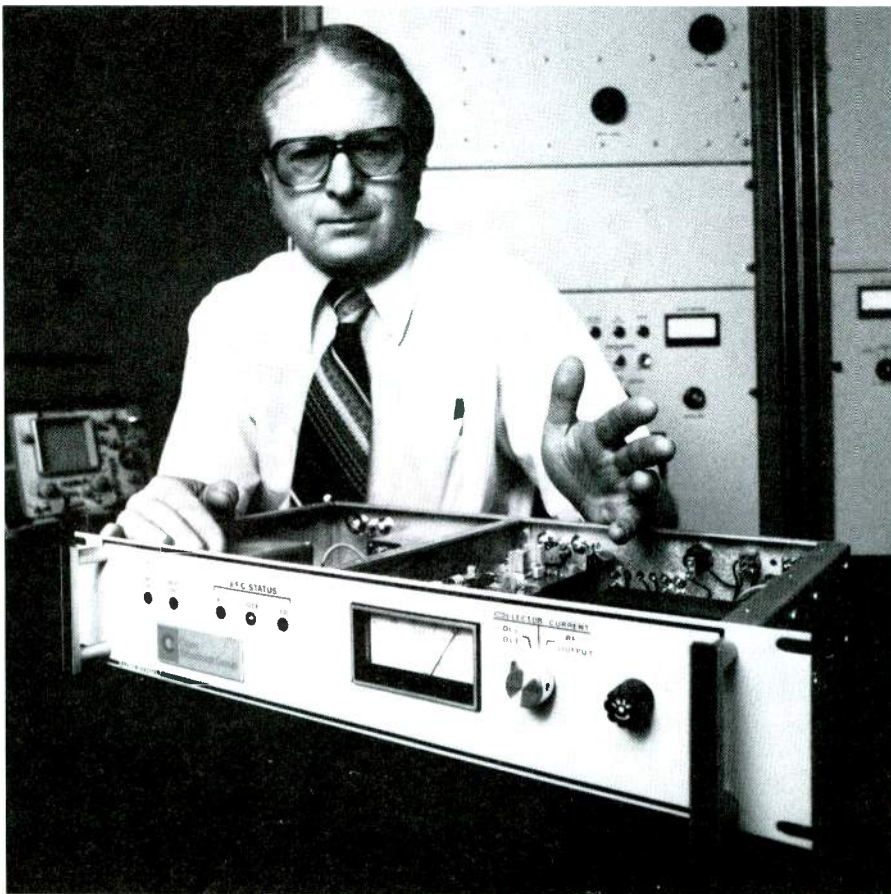
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experience in comparative hearings among commercial applicants. It could also help us meet Congress' desire to expand public radio service to all Americans, as expressed in the 1978 Public Telecommunications Act.

Before we take such actions, however, we should ask why we at the FCC should make a special effort for public radio? Why did Congress place such a strong emphasis on increasing the share of public broadcasting dollars to public radio? And why did the Carnegie Commission call strengthening public radio a "first priority" in public broadcasting?

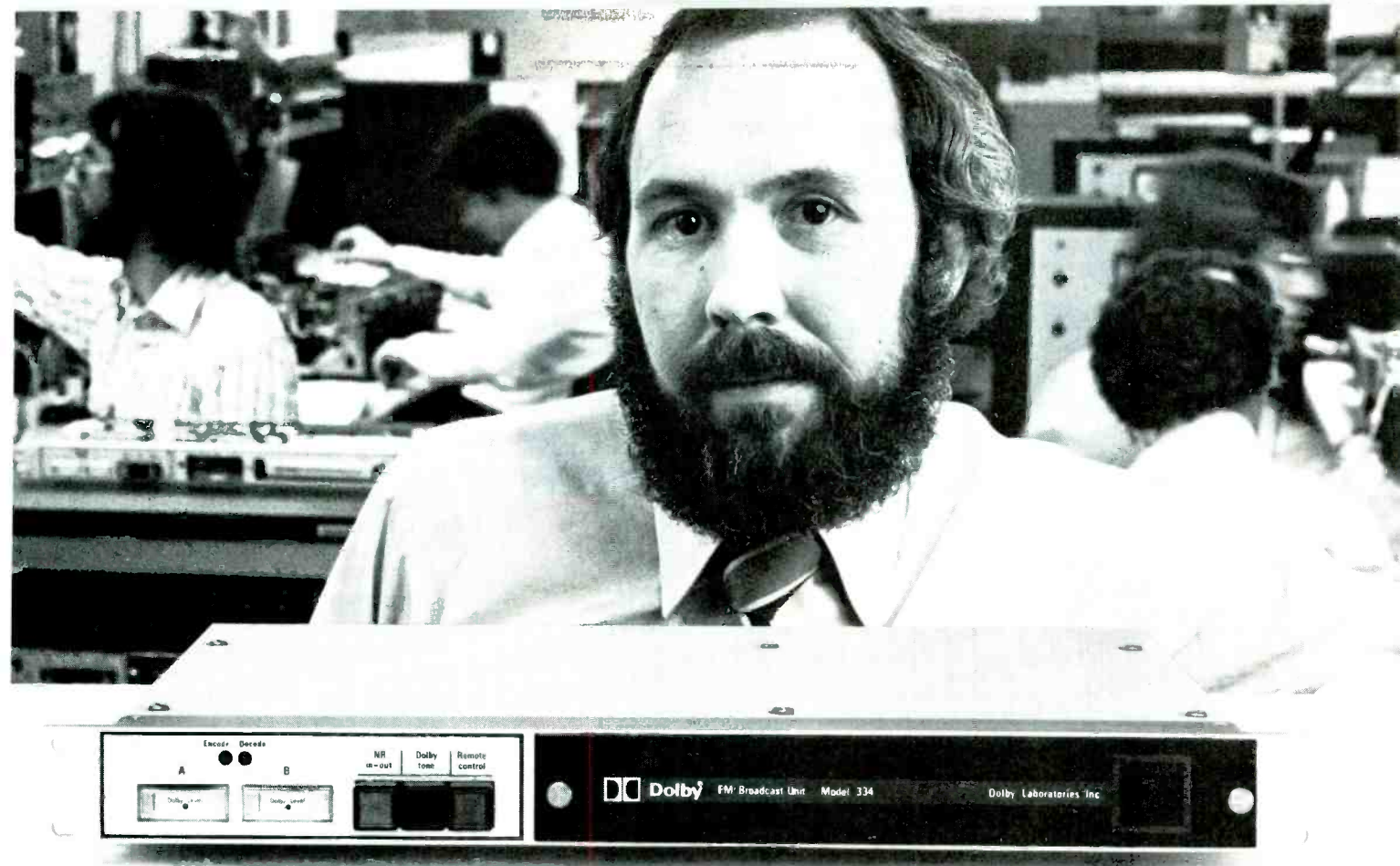
First, and perhaps most important, having public radio outlets in every community helps reduce the rationale for federal regulation of certain aspects of radio service.

For example, public radio has made its name and national reputation in large part by providing comprehensive news and extended coverage of public events in a depth unmatched by commercial radio. NPR's daily public affairs magazine, *All Things Considered*, and its coverage of the Panama Canal Treaty debates, the National Press Club luncheon addresses, and other hearings and live events have set a new standard in broadcast journalism. State and local event and issue coverage is equally active at many public stations.

For this reason, our notice last fall proposing deregulation of the informational programming minimums for commercial radio stressed at length the service provided by NPR and its member stations. We said this was one important hedge against the failure of the commercial radio marketplace to provide as much informational service as it does at present.

The public, through its government, has given public radio two types of subsidies. The FCC has set aside reserved frequencies for public radio and Congress has provided funds for public radio facilities and programming. As our radio deregulation notice noted, using these types of direct subsidy mechanisms in the future to increase available news and public affairs programming through public radio may be preferable to setting minimum quantitative requirements for informational programming by commercial radio licensees.

Another reason why public radio deserves priority status is that it helps reduce the rationale for federal intrusion in assuring delivery of specialized entertainment formats, such as classical, folk, and jazz music.



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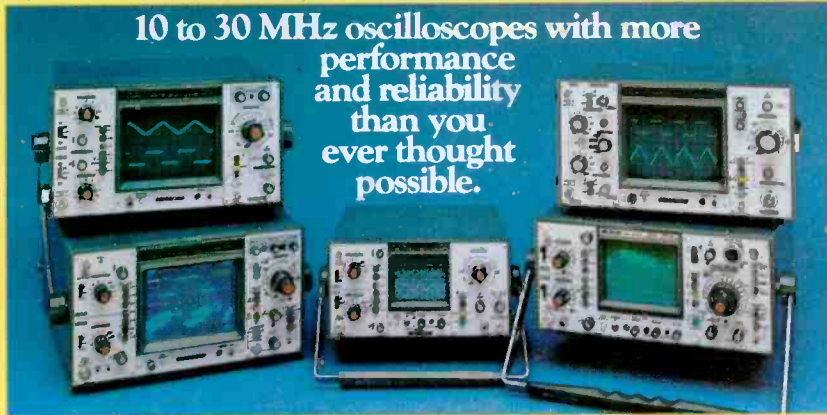
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The DC Circuit Court of Appeals has said that the FCC should hold hearings when stations with unique entertainment formats are proposed to be altered. The court is rightly concerned about the diversity of choice listeners have from the radio medium. I simply disagree with the efficiency of its remedy.

I would prefer to encourage expansion of public radio, which has proved it will program formats that may not make it in the advertiser supported marketplace, where numbers are all that usually count. A minority of listeners may care intensely about these formats and will therefore support them with direct subscription dollars.

For example, if classical music or rock music or any other contemporary format died in some commercial radio markets, I am confident that NPR stations in those markets would redirect their efforts to attract this audience. That would be an appropriate response—one fostered by marketplace forces, not dictated by the government. And this process permits the FCC to avoid the difficult, often subjective value judgments otherwise required when the loss of a unique format is threatened.

I should also underline the special contribution and leadership of public radio in its local service. The congressional requirement that each federally funded public radio station have a local community advisory board and open all their board meetings and financial records to the public are explicit statutory methods to insure localism. And they are far more direct than the FCC's Ascertainment Primer, proposed for elimination in our commercial radio deregulation notice.

The FCC is also interested in assuring that minority needs are served by the radio medium, and public radio is addressing the needs of minority citizens.

NPR's weekly half-hour Hispanic affairs program is the only nationally broadcast Spanish language news program on radio. *Horizons*, a weekly half-hour documentary series, ranges across many minority cultures. WGBH's upcoming series on Black composers is a musical example of this attention to our diverse heritage. Much more will be done, I predict, as more minority-controlled stations are funded by NTIA and linked with the rest of NPR by satellite.

Children's programming is another area where public radio is already far ahead of commercial radio.

NPR carries the award winning *Spider's Web*, a daily half-hour of

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stories and adventures for young children. *Saturday's Child* explores the music and customs of different countries. Two recent NPR Mr. Rogers specials showed the interactive power of radio. Young listeners could call in and tell Mr. Rogers their solutions to the "neighborhood dramas" he presented.

Added to this list are the contributions of the noncommercial Pacifica stations, who carry *Children's Radio Theatre*, a weekly assortment of plays and contests. I hope public radio makes this area an even higher priority in future years.

The handicapped are also served by public radio stations. More than 70 FM subcarriers, the majority of them linked to noncommercial stations, now present NPR's programming services for the visually impaired. These range from readings of newspapers and novels to specially produced programs for this audience.

Thus, public radio clearly provides a means to meet the special needs of substantial minority seg-

ments of our population. But there are minorities of taste as well as of age, race, language and disability. These, too, are often best served by public radio.

No FCC regulation could as successfully achieve the renaissance in serious radio drama and live music performance as that brought about in the past few years by public stations.

NPR's groundbreaking dramatic series, *Earplay*, is epitomized by the original work, *Wings*, since produced at the Kennedy Center and Broadway, whose author, Arthur Kopit, you honored yesterday. This spring, NPR will also air a new 8-part series of hour-long programs on the *World of F. Scott Fitzgerald*, combining documentary and short story elements.

You already bring us the best in live musical performances—from *Jazz Alive* to the White House Festivals, from the Minnesota Symphony to the Vienna Opera. And once the nation's sound stages and theaters are linked by the high

fidelity sound possible with satellite distribution, public radio will be able to bring us even greater enjoyment of such events.

You have also reached outside your system to tap new sources of creativity. As another innovative use of your satellite capacity, you have launched your *Extended Program Service* to allow independent producers as well as individual stations to use any of your 17 uplinks to audition and distribute their tapes to all NPR stations.

These and other alternative services you provide fully justify the special efforts the FCC has made, and the additional efforts we should make, to guarantee public radio enough frequencies to expand.

But, given public broadcasting's projected funding crunch, perhaps we should try to do more than simply ensure that you have sufficient frequencies. Perhaps we should be looking for ways to assist public radio—and public television as well—in your search for new ways to use most efficiently the



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"We have been televising with our new Harris TAC-6H circularly polarized antenna for quite a few months now, and have had plenty of time to gather and analyze results," continues Mr. Lass. "A comparison of ARB November 1978 to November 1979 showed average prime time homes up 23.4%! During this time CBS showed an increase of 9.9%—so our stronger signal was responsible for a ratings increase of 13.5%—and maybe more.

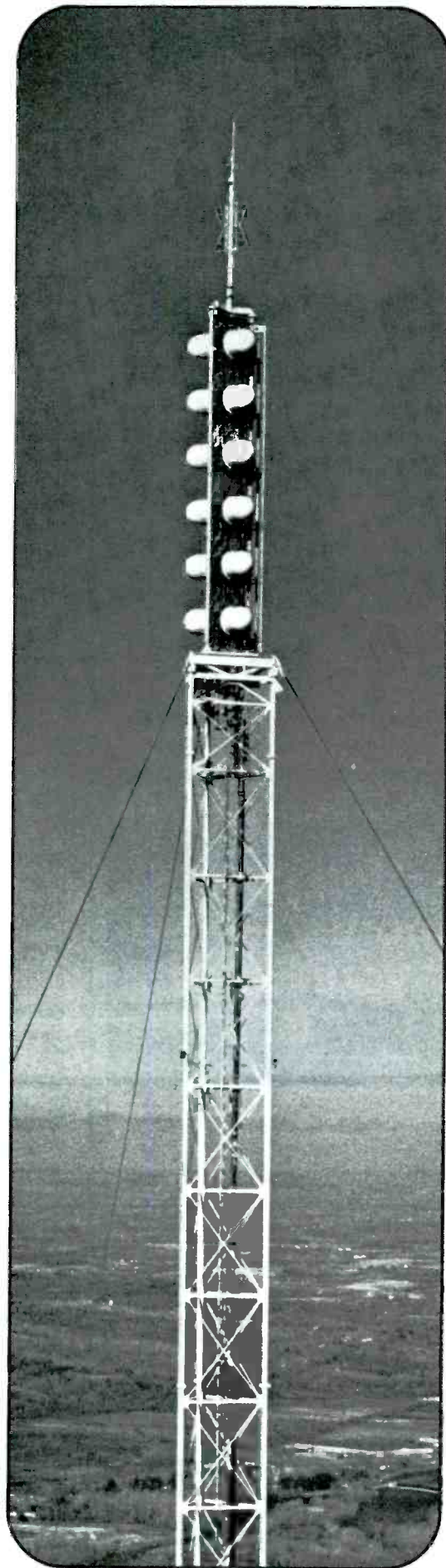
"Also, an overwhelming majority of viewers surveyed have reported improved reception," says Mr. Lass. "Needless to say, we are very happy with what CP has done for us."

For more information on what a Harris CP antenna can do for you, contact Harris Corporation, Broadcast Products Division, P.O. Box 4290, Quincy, Illinois 62301. 217-222-8200.

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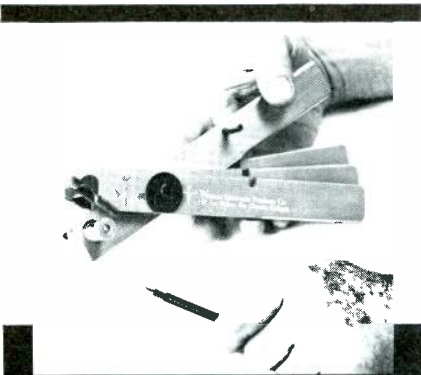


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We took one major step in this direction just last week. We approved use by PBS stations of their satellite earth stations for private commercial video and message traffic. At this point, I can see no reason why this precedent should not logically apply to NPR stations as well.

This decision, I believe, signals the beginning of the end of the FCC tradition of viewing public broadcasting in the most narrow, moralistic terms. Noncommercial broadcasting is, after all, not entirely noncommercial. Even today, we do allow on-air auctions, and underwriting credits, and fund-raising appeals.

But traditionally the FCC has appeared to feel a strong responsibility not only to keep public broadcasting free of on-air commercials, but also to keep it incapable of raising funds effectively by other entrepreneurial initiatives, even if such initiatives are permitted to nonprofit educational and cultural institutions by the Internal Revenue Service.

This approach ignores the fact that many of the most successful nonprofit educational institutions in our society not only charge directly for the services they render, but also benefit from ancillary income-producing ventures. Nonprofit colleges charge tuition, nonprofit museums and theatres charge admission, and nonprofit organization magazines charge for subscriptions.

In fact, one of the most successful institutions in public broadcasting today, Children's Television Workshop, producer of *Sesame Street*, the *Electric Company*, and *3-2-1 Contact*, owes much of its success to the profits from spin-off games, toys and other license fees plowed back into the growth of the nonprofit enterprise.

Our satellite earth station decision shows that the FCC can be pragmatic in approaching innovative ideas to bolster public radio and television's financial underpinnings. Such ideas are legion:

- Some say that we should authorize pay-as-you-go public TV or radio, using scrambled signals for all or part of the programming to ensure that those who want this service directly subsidize it. This would add real meaning to the concept of a membership pledge.
- Others point to public radio station subcarriers as a possible potential delivery system for this subscription programming and for

other home information services, if current FCC restrictions are lifted.

- Still others say that NPR and PBS should be encouraged to package and promote their programming aggressively in cassette form, to capture the home and car tape market.

Of course, there are risks to this approach. As public radio becomes more aggressive in seeking new funds through the pay, home tape and other marketplaces to support its services, it should expect that the federal contribution to public radio will be more specifically targeted for purposes that Congress believes should be available free to all citizens. It may also eventually erode the zeal of voluntary giving in other fund raising efforts—federal, state and local.

But I predict these trends will be at work in any event, no matter how sympathetic the nation's leadership is to your medium. If history is any guide, cultural services of all kinds will be among the first to be cut in a decade of belt-tightening by federal and state treasuries.

You must be careful, however, in beginning efforts to become more entrepreneurial not to lose sight of your basic mission.

You cannot, in this process, lose public radio's most unique quality—its direct relationship with its special listening constituencies. If, for example, allowing public stations to rent subcarrier space led to elimination of services for the handicapped, you would have to weigh your short term income gains against the loss of your current strong support from this important group.

In any fundamental reexamination of what we—and by we, I mean both the FCC and the American public generally—expect from our reserved radio frequencies and their public licensees, the bottom line test, I expect, will be whether public radio can diversify its funding sources while still delivering what the advertiser-supported commercial marketplace cannot or will not supply.

With these caveats, I still think that you have much to gain and little to lose by trying out new ideas for as many innovative uses of your facilities as you can conceive. I look forward to hearing about any of them that require FCC action.

I believe that you can be enterprising without being avaricious, and innovative without losing sight of your original purpose. This will be your challenge for the next decade, and you must meet it if you are to survive and prosper. I am confident that, based on your record to date, you will succeed. □



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Circle (53) on Reply Card

May 1980 *Broadcast Engineering* 69

May 1980 *Broadcast Engineering* 71



# Region 2 Administrative MF Broadcasting Conference

By Wallace Johnson, executive director,  
Association for Broadcast Engineering Standards.

The Region 2 Conference held in Buenos Aires, Argentina, which ended March 28, 1980, was extremely important for existing AM broadcasting stations and for potential new stations. During a 3-week period, 117 delegates representing 21 countries developed proposed technical criteria for all stations which operate in our hemisphere. These criteria included power limitations, classification of channels, interference criteria, and a large number of technical operational matters. They also considered using 9kHz channel spacing.

The conference was convened under the auspices of the International Telecommunication Union (ITU). The union has a unique and vital role in harmonizing the actions of administrations in the utilization of telecommunications in the interests of mankind. In June 1979, the ITU Administrative Council provided for the convening of the Region 2 Conference, the first session of which was to establish the basis for the preparation by the second session (scheduled for November 1981) of a Frequency Assignment Plan.

The Inter-American Telecommunications Conference (CITEL) initiated preparation for the Conference in 1975. A preparatory working group met six times and developed the proposed technical basis for the first session of the conference. The US took an active role in the working group, and, in many cases, the technical criteria proposed and adopted are similar to those in use in the US.

As stated in the adopted Report to the Second Session of the conference, "The plan shall be based on the principle of equal rights for all countries large or small. It should also make provision for the requirements of administrations as defined in Chapter 7 of this Report and ensure satisfactory reception conditions for all countries, allowing for the different situations which arise in the countries of Region 2".

The US delegation was comprised of 19 members from the US government and industry. The chief of the delegation was Commissioner Robert E. Lee.

The priority item for the US delegation was to seek consideration and possible agreement to use 9kHz

spacing for AM broadcast channels in lieu of the existing 10kHz spacing. This would provide for 12 additional channels in the band 540kHz to 1600kHz. It is also the channel spacing presently in use in the other two regions of the world. It was not possible to reach a consensus during the first session so the Conference decided to delay the decision to the second session pending further study by the International Frequency Registration Board (IFRB).

Following is a summary of various technical criteria adopted:

a. Three noise zones were identified for the Region. The 50 contiguous US states are in Zone 1. Puerto Rico and the Virgin Islands are in Zone 2. The field strength for contours to be protected from interference differ for each zone, but in Zone 1 are essentially the same as presently used in the US.

b. Maximum transmitter powers are as follows:

Class A: 100kW day, 50kW night

Class B: 50kW day and night

Class C: 1kW night for all zones  
1kW day for Zone 1  
5kW day for Zone 2  
10kW day for Zone 3

c. Protection ratios adopted were 26dB for co-channel and -29.5dB (1:30 ratio) for 2nd adjacent channel. 25uv/m contour overlap for stations separated by three channels is prohibited. Protection ratios for first adjacent channels will be determined when a decision is made on either 9kHz or 10kHz channel spacing, with -5dB for 9kHz separation and 0dB for 10kHz separation under consideration.

d. The US, Mexico, Canada, Greenland, and the French Departments of St. Pierre and Miquelon will use the 10% of the time interfering skywave signals, while all other countries will use the 50% of the time interfering signals in computing nighttime interference.

e. Class A (I-A and I-B in US) stations will be protected to their 0.5-50% nighttime skywave signals. Border protection will no longer be provided, but in special cases protection beyond the 0.5-50% contour will be possible on the basis of agreement with other administrations.

f. Groundwave propagation curves are similar to the present curves used in the US but they have been drawn in a metric format.

g. The Kirke method, which is

presently used in the US, will continue to be used over mixed ground paths.

h. Skywave signals will be computed using a method that extends the present FCC skywave propagation curves.

i. Frequency tolerance will be plus or minus 10Hz.

j. AM stereophonic transmissions will be permitted provided the energy level outside the necessary bandwidth does not exceed that expected in A3 type emission and is receivable by conventional receivers.

k. 10kHz will be the necessary bandwidth recognized in the plan. However, bandwidth of 20kHz will be permitted on the basis that countries adversely affected may require modification of the interfering stations emissions.

l. There will be two station inventories to be used in developing the assignment plan. The basic inventory will include existing stations and future station assignments through December 31, 1982. May 31, 1980, is the final submission date for the basic inventory. A 5-year period from January 1, 1983 through December 31, 1987, will be contained in a second inventory with the final date of May 31, 1981, as the submission date.

m. The IFRB will use the inventories supplied by all of the administrations to determine incompatibilities between assignments submitted by administrations and to develop a reassignment plan for stations with 9kHz channel spacing.

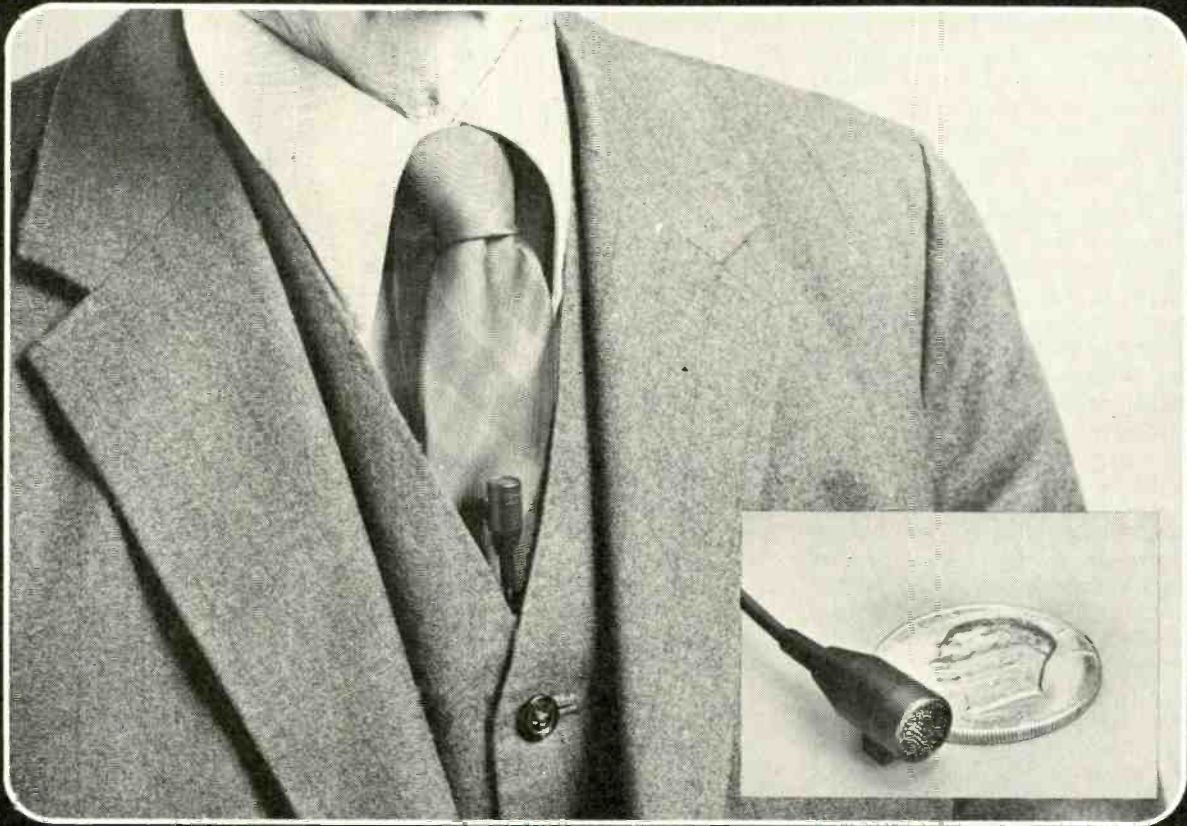
The Report to the Second Session of the Conference contains a great deal of technical data and instructions that should help administrations comply with the requirements of the final agreement. For instance, there are instructions on computing field strengths at given distances for different types of paths; detailed instructions for calculating directional antenna patterns, including a computer program for hand-held calculators; and instructions for making frequency searches for new assignments and determining permissible radiation.

A limited number of copies of the report of the first session were available at the commission. If interested in obtaining a copy, contact: Charles H. Breig in Room 8002, 2025 "M" Street N.W., Washington, D.C. 20554. □



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# TO PROCESS OR NOT TO PROCESS

By Brian Hayashi, president, Applied Technology Corp.

Not long ago the phrase *processing chain* involved taking the audio from the console, running it through an AGC or wideband leveling amplifier, then through a peak limiter and finally off to the transmitter. This is not true of the processing chain today where other equipment serves the same purpose, but more efficiently.

The words multiband, split band, discriminate and discrete all mean the same: a system that separates portions of the audio spectrum. Therefore, contents of the audio can be controlled in selected portions rather than by use of a piece of equipment that looks at the entire spectrum.

## Wideband systems

Using a wideband leveling system that processes the entire 20Hz-20kHz bandwidth has many limitations. Since it has no way of looking at separate portions of the audio spectrum, it sees all audio levels as one entity. Consider overall music at 0 level, horns at -5dB, cymbals at -12dB. Then, if suddenly the bass comes in at +5dB, the wideband leveling device adjusts itself accordingly to produce a 0dB level. Even though it has limited the output, it also has degraded the frequency response or tonal quality of what is broadcast. There has to be 5dB of gain reduction to maintain the output level. While the bass is limited so are the others—horns at -10dB and cymbals at -17dB.

Such a system tends to make the sound muddy through cancellation of high frequencies. This method also leads to pumping, holes and excessive compression. Also, a kick drum ends up sounding like a thud rather than a nice solid thump.

In the past there have been devices that attempt to overcome this problem. Some engineers have tried equalizers in the line to boost highs. This does not alleviate the problem since the leveling device still sees all inputs as one. There were also devices, such as presence boosters that did little more than boost the high frequencies, as did equalizers. Loudness controllers, also in the running, produce smog (muddies the sound). Most stations today set out

to gain loudness and tonal quality. These areas cannot be adequately met with wideband systems that end up with excessive compression, distortion, pumping, holes and muddiness.

Since there is a maximum limit on modulation set by the FCC, many stations have attempted to appear louder by increasing the midband of the audio content. This is harsh to the ear, but seems loud while the actual level may not be increased at all. Furthermore, the listener may become fatigued and switch stations.

## Multiband processing

The loudness and tonal quality can be controlled through the use of split-band processing. This method separates various audio bands and levels each one independently. Therefore, if the bass comes stomping in, the highs remain untouched. In effect, there has been no degradation of response—no muddiness, no pumping, no holes. This system also tends to raise the average level of modulation by keeping all energy level high in each spectrum. There does not have to be superficial mid-band concentration.

Split-band processing is not just for rock stations as many believe. Sure the rock stations want the added loudness, but this system may also be used for classical, middle of the road, or talk formats. It brightens up the audio and increases intelligibility.

An added benefit of this type of processing is that it can actually tailor the sound so that for AM, as an example, where the majority of listening may occur in cars, the sound is fantastic. It can make up for receiver pitfalls, and AM, FM and TV stationis can share the benefits.

## One approach

Here is how one discriminate audio processor allows extreme control of the broadcast signal. Audio enters the chamber and is split into three bands through an active filter network. These bands, preset at the factory, may be easily adjusted to the desired crossover point without changing components. The crossover sections are set at a 6dB-per-

octave slope, a setting sharp enough to separate the three bands yet broad enough as not to produce phasing problems.

Each portion thereof enters the leveling section. Limiting action is through a voltage controlled amplifier network that allows smooth, transparent action. Control is given to adjust the amount of gain, compression ratio, attack time, release time, and output for each band. The final section is an active combining network where all bands are channeled back into one source. The front panel controls allow the engineer to see the actual output level on each band, or the amount of gain reduction on each band, with a VU meter.

For transmitter proofs, the **in** system switch is turned to the **out** position. Potentiometers control the action of each limiter so that the system may be tailored to the station's desired format. Flexibility of the system allows maintenance of a high energy level at all times, and the program material may be kept untouched and as realistic and dynamic as it was recorded. Such a system permits a station to sound louder and cleaner with very little compression—as low as 2:1 ratio or as high as 30:1.

Excessive levels of gain reduction are not necessary. As little as 3dB is sufficient, but 20dB of gain reduction can be accomplished.

Modern circuitry provides high reliability, low noise and distortion, and top overall performance. Present manufacturers design their equipment with flexibility in mind, and broadcasters may follow with whatever peak limiter desired (if one is not built in). A modular unit may omit a built-in limiter for flexibility and to avoid obsolescence.

In the event AM stereo arrives, or where a stereo FM station uses such a system, two units may be paralleled to allow precise left-right channel tracking.

The multiband system offers many advantages, compared to a conventional wideband system, which can benefit radio and television stations. This type of processing is continuing to grow in industry acceptance to improve sound and to achieve that special sound. □

# The end of the endless loop.

## Eumig's new FL-1000 makes cassettes the broadcast medium.

The Eumig FL-1000, an extraordinary new cassette tape deck, has started a revolution in the world of broadcasting. We believe—and radio engineers agree—that it will soon make the cassette the standard tape format in the broadcast industry.

**The FL-1000 is the world's first computer-inter-faceable cassette recorder.** Up to sixteen FL-1000 decks can be controlled by any 8-bit computer. Some of the decks can be used for commercials; others for news and weather; still others for music and station ID's. And the location of every item on every cassette can be stored at the beginning of each tape and then in the computer, so *any* sequence can then be played back—automatically, with no human intervention, all day and all night long.

Watching a bank of FL-1000's working together

is an awesome experience. One deck is rewinding while another is playing, and still another is moving in fast-forward to locate the next selection. Meanwhile, other decks are copying from a network feed and recording an air check.

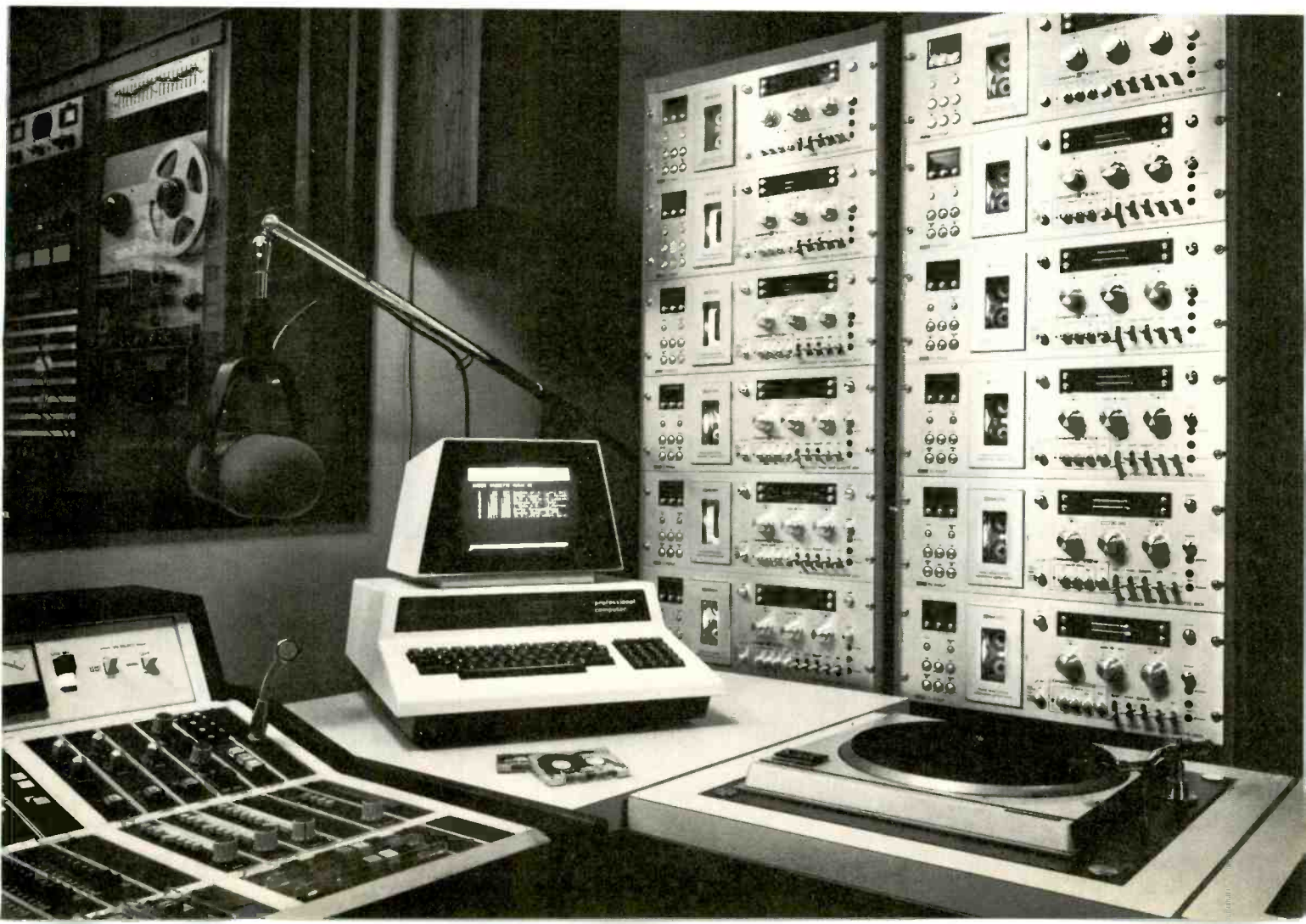
The technology of the FL-1000 is so advanced that half a dozen units can do the work of more than 100 individual cartridge players—plus several reel-to-reel recorders. And they do it better, at far less cost, with sound quality comparable to that of the finest open-reel equipment. And the Eumig FL-1000's have none of the mechanical problems that plague endless-loop broadcast cartridges.

To see the end of the endless loop, call Eumig about the new FL-1000. Once you see and hear this amazing new recorder in action you'll agree that this is the long-awaited deck that will make cassettes the standard medium in the broadcast industry.

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"We are very pleased with the performance of the Elcom wide band limiter. It is truly a superb unit and it has increased the effectiveness of our Class A signal to very competitive levels in our market"

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### Take 1...It's CAMMY time again!

If the best-laid plans come to fruition, mid-June should be a high point of the TV industry for 1980. The membership of the ASTVC and their guests will gather to honor the recipients of this year's CAMMY awards. Tentative plans include the following:

Nominated to receive the new and unique CAMMY are Dr. Vladimir K. Zworykin and David Brinkley. We believe that all of you are familiar with the name of one of NBC's most famous news personalities, but you should also be familiar with the name of the man who is to the development of TV what Edison was to the electric light or Bell to the development of the telephone. The ASTVC is pleased that both outstanding men have accepted.

There will be other awards given to individuals and organizations "...who have contributed significantly to the industry....in the area(s) of technological advancement and/or....entertainment and information." One award will be for excellence in documentaries, and we have received entries from the major networks as well as independent stations and producers.

For further information on this upcoming event, including tickets and reservations, please contact the ASTVC CAMMY AWARDS Committee, Box 296, Sparkill, NY 10976. We sincerely hope to see you all there.

**This year,  
heart disease  
and stroke  
will kill another  
200,000  
Americans  
before age 65.**



**American  
Heart  
Association**

WE'RE FIGHTING FOR YOUR LIFE



# AM STEREO - NOW!

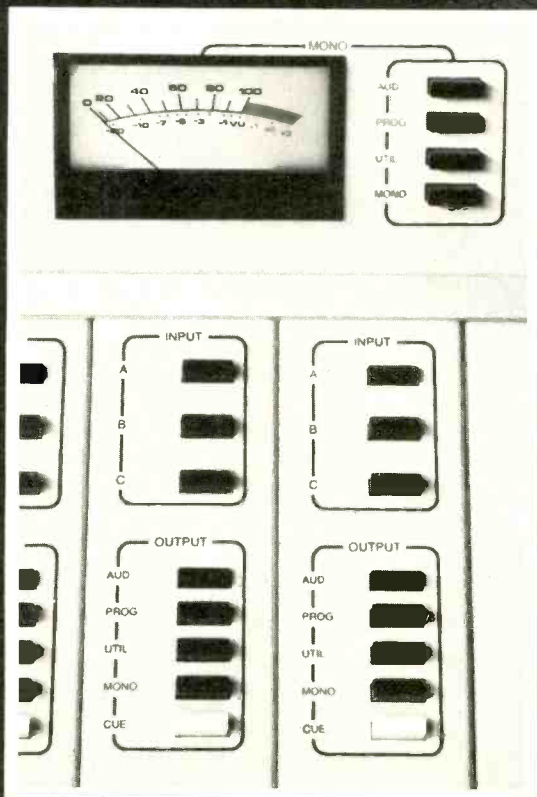
WHY WAIT? Our elegant stereo mixers have a metered mono output, so you can convert to stereo now, but continue to broadcast in monaural until FCC System Approval. In the meantime you'll be listening to shimmering stereo sound — imagine the impact on clients and staff!

Three expandable models are available, with as few as 6 mixers and as many as 16. Each version has a separate mono mixing buss *plus* stereo to mono summing. Base prices are \$6250 - 8650 and additional mixers are \$385 each. Delivery? Stock to 3 weeks.

WHY WAIT? Start using stereo now!

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Mono mixing buss *plus* stereo summing.

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## Accurate Field Strength Measurements Can Be Easy

With the Model FIM-21, electromagnetic field strengths can be measured to within 2% across the entire 535 to 1605 KHz AM band. And to intensity levels as low as 10  $\mu\text{V}/\text{m}$ . Its integral shielded antenna in the cover, front panel speaker, large illuminated mirrored meter, and ganged oscillator/receiver tuning, make it easy to operate in the field. An optional telescoping stand adds convenience. It's also a versatile instrument — use it as a tuned voltmeter for RF bridge measurements.

Contact us now for complete details on our line of field strength meters.



# POTOMAC INSTRUMENTS

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## ASSOCIATION FOR BROADCAST ENGINEERING STANDARDS, INC.

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### Region II Administrative MF Broadcasting Conference

Wally Johnson, executive director, was a member of the US delegation that met in Buenos Aires for a period of three weeks. This first Conference formulated the technical and operational criteria and planning methods to serve as a basis for the preparation by the second session of a frequency assignment plan for Region II for the band 535-1605. ABES is now evaluating the technical standards developed to determine the impact on existing station operations, potential modifications or new stations. They will also initiate, or join with others, in a detailed study of the impact of possible 9kHz channel spacing which will be considered at the second session scheduled for November 1981.

### AM Stereo

A decision may have been made on AM stereo by the FCC at the NAB Convention. However, we have been deeply involved in this proceeding in an attempt to help guide the commission into a sound, meaningful decision, which will enhance the development of AM stereo and not delay or prevent its availability to the public.

### FM

The Commission's Notice of Proposed Rule Making (Docket No. 80-90, FCC 80-108) to modify the FM rules to increase significantly the availability of commercial FM broadcast assignments is a very important matter for both existing and potential FM service. The matter is being very carefully studied so that meaningful comments will be submitted for consideration by the Commission by the comment due date of June 13.

ABES had a suite at the Frontier Hotel during the NAB Convention, that readers of this column will have stopped by to discuss serious technical matters and for visiting.

# It's tough to compare something in a class by itself.

We have taken a reliable, conservative design and updated it with the latest technology, to give you an FM Transmitter that will perform beyond your expectations.

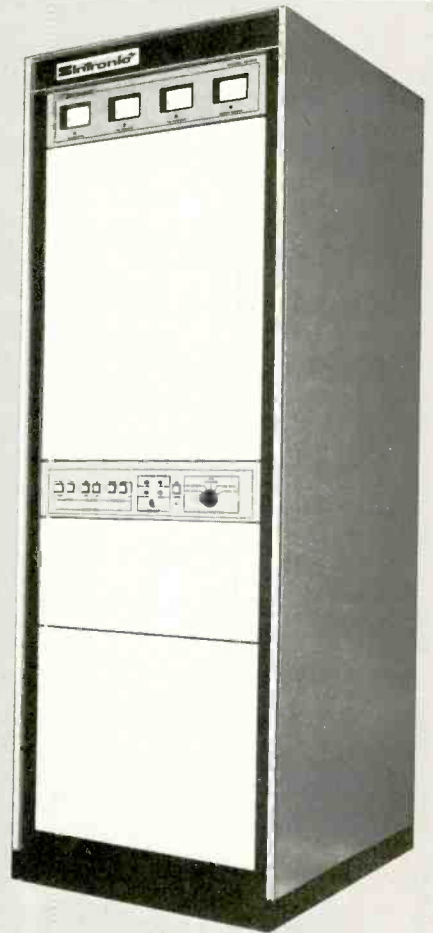
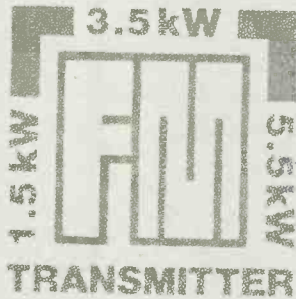
Our 1.5, 3.5, and 5.5 kW FM Transmitters feature a high efficiency, grounded-grid PA. You'll like their stability and trouble-free maintenance.

Our automatic power output control, auto recycling, and overload protection are standard features that assure your getting a transmitter that puts out the power you expect, without failure, day after day.

The modulation of our on-frequency, direct FM, solid-state exciter is varactor controlled. The possibility of frequency drift is eliminated by a crystal controlled reference oscillator.

A 12 pulse, 3-phase power supply adds to the reliability of these transmitters by reducing the number of failure prone components.

Such features let you know that this is a "class" product. But once you know that this is also the most attractively priced transmitter on the market, you will agree it almost defies comparison.

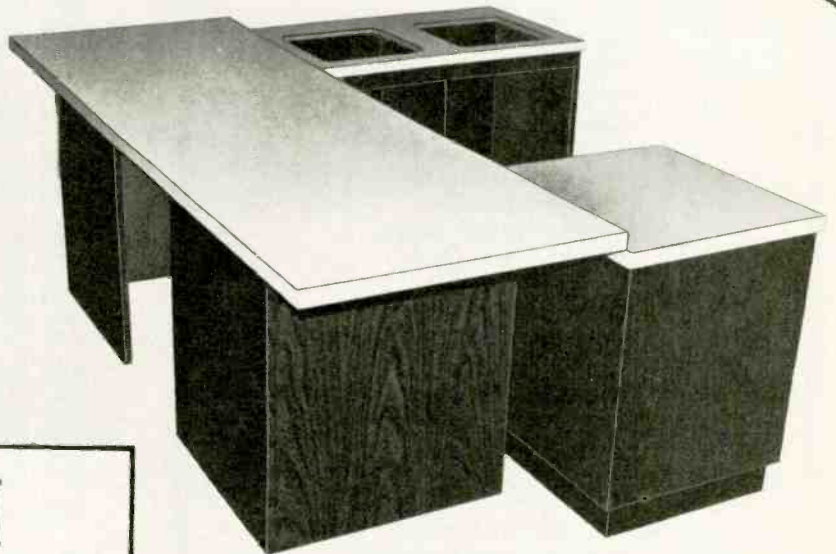


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## NEW BROADCAST STUDIO FURNITURE FROM RUSLANG



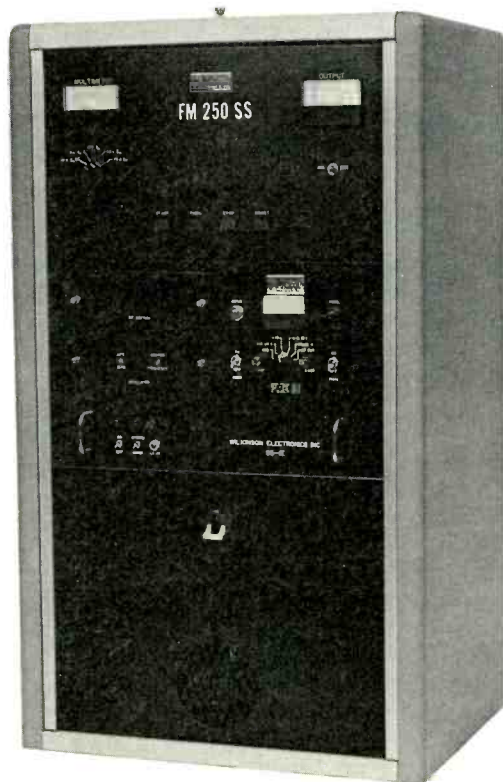
If you're building or remodeling, add the elegant look of expensive furniture for much less than you would expect. We build electronic racks in various heights, consoles for any size tape deck, and control stations that put you on top of things. All are constructed of quality materials, including high pressure laminates, making them sturdy as well as attractive. They are available in either wood grain finish or various solid colors. Send for literature showing dimensions, etc.

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WILKINSON ELECTRONICS  
**FM-250SS SOLID STATE  
250 WATT FM TRANSMITTER**



**FEATURES - Pure Perfect Sound**

- Proven High Quality Exciter -  
More than 300 In Service
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Requires Little Space
- Drawer Construction for  
Simple Maintenance
- Self-Testing Power Supplies
- All Solid State Including  
Timing Controls
- Safe - Reliable - Efficient
- Exceeds U.S. FCC Specifications

The Wilkinson Electronics FM-250SS all solid state FM broadcast transmitter is housed in a steel cabinet finished in a hard durable enamel finish. Only four square feet of floor space required and it is light enough for table mounting. All operating controls are on the front panel and access to the interior of the Power Amplifier is through the PA cubicle. A sliding drawer directly beneath the PA houses the power supplies and control ladder circuits. Overload indicators as well as overload reset controls are on the front panel of this slide-out drawer. All components of these circuits are completely accessible when the drawer is opened.

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**people  
in the news**

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## Radio/Television

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**William J. Rossini** has been named chief engineer of WSPD (AM) in Toledo. He was previously assistant chief engineer at WOOD (AM-FM) in Grand Rapids, MI.

**Robert Wussler**, former president of CBS Television, will join Turner Broadcasting System as executive vice president.

**Daniel F. Stiles** has been hired as director of WTCN-TV, Channel 11, Minneapolis-St. Paul. Previously, he was producer/director at WPGH-TV in Pittsburgh.

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## Manufacturers/Distributors

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**Harry Paston**, vice president and treasurer of Paston-Hunter, an independent electronics manufacturer's representative firm, is the recipient of the 1979 Hall of Fame Award, presented by the Electronics Representatives Association.

**Bernard Mitchell** has been appointed vice chairman and chief executive officer at Advent Corporation. William H. Anderson, company president, assumes the position of the chief operating officer.

**Robert Forrest** has been named western regional sales manager for the audio division of Akai America. Also at Akai, Roy Goldschmidt has been appointed eastern regional sales manager for the video division.

**Dave Stanley** has been promoted to manager of the Los Angeles district of Anixter-Prusan. Previously, he was vice president of Mid-West. Also at Anixter-Prusan, **Cal Edinger** has been promoted from sales manager in St. Louis, to manager of the St. Louis district.

**Myron A. Hyman** has been appointed vice president, business and administration, CBS Video Enterprises. Formerly, he was associate general counsel for CBS.

California Microwave has announced the appointment of two division vice presidents. **Thomas A. Michalski** has been appointed division vice president and general manager of Avionics Products. **Louis Casalino** has been appointed division vice president and general manager of California Microwave Digital Products.

**Steve Robinson** has taken the position of managing director of Pye TVT Limited, the Cambridge-based Concern center for Philips' Broadcast Equipment. Robinson previously was product director at MEL, the principal Philips UK defense equipment company.

**Henry Klerx** has been named managing director of RCA Jersey Ltd., with executive responsibility for the company's facilities on Jersey, Channel Islands. Previously, Klerx was manager of planning and marketing services for the RCA Commercial Communications Systems Division.

**Patricia Rooney** has been named advertising administrator for Scientific Atlantic's communications products group. In her new position, Rooney will direct the advertising and promotional campaigns for the company's cable communications, antenna, energy management and video products.

**David Nally** has been appointed vice president of operations for the Recordex Corporation of Atlanta, GA. In his new position, he will be responsible for all phases of plant operations for the full product line.

**John Lundin** has been named partner in the A.D. Ring & Associates firm.

**Joe Culp** has been named vice president and general manager of the Dallas-based Collins Transmission Sys-

tems Division of Rockwell International Corporation. Previously, Culp was marketing director of the division.

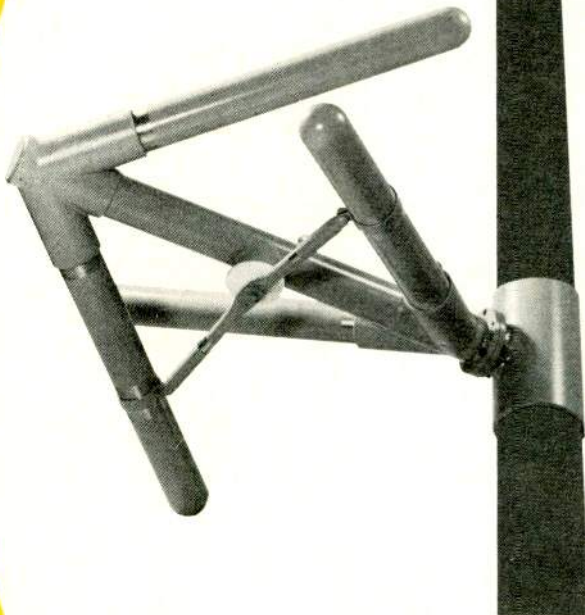
**Jerry Cohen** has been named manager of technical sales support for the Professional Products Department of Sharp Electronics Corporation. Cohen will be responsible for national service training and for providing technical assistance.

**Thomas Minter** has been appointed manager of broadcast products. His responsibilities will include broadcast marketing development.

**William Gautreau** has been named vice president of manufacturing at Switchcraft. Gautreau was previously director of materials. **Howard Cohen** has been named vice president of finance at Switchcraft. Previously, Cohen was division controller at Simpson Electric Company, Elgin, IL.

**Jim Conlon**, supervisor of tech operations at Trans-American Video, has been named to the SMPTE committee on Edit List Standards.

**David Seedall** has been named supervisor of field engineering at the Broadcast Electronic Systems Division of Toshiba International Corporation, Sunnyvale, CA. Previously, Seedall was with Video Equipment Corporation of America, San Diego, CA.



**MHCP-1**  
Super High Power Circular Polarized Antenna  
shown with 6 1/8" feedline

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Success is important to you. But no station can be really successful if it is not delivering the best possible signal to the people who count — **your listeners!**

McMartin introduces **FM antennas** that have the performance your listeners deserve and the stability and features you demand.

Models for every power and climate. Circularly polarized.

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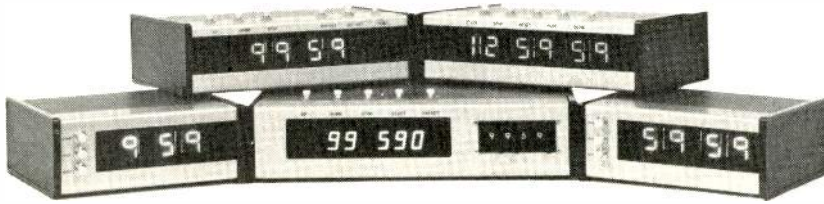
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**STANDARD OPTIONS AVAILABLE:** Kit; Slave; BCD Output; Remote Connector: 6' Remote Cable and Pushbutton Set; 220V A.C., 50Hz; 9" or 19" Front Panel 3 1/2" high; 3 Wire Cord and Molded Plug. Tenths of seconds are available on all timers. Relay Contact Closure at Zero and or Stop at Zero available on ES-301 and ES-302. Custom options and special orders available.



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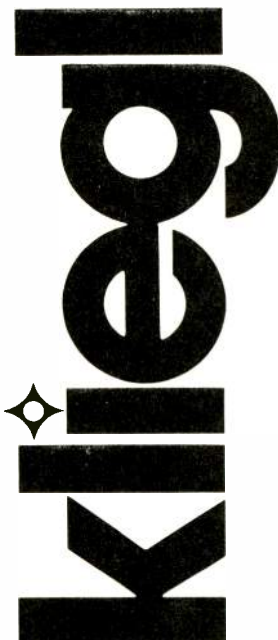
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Thanks to our experience in dealing with studio lighting, we have designed six standard TV lighting packages that meet normal needs for standard-sized studios. And since these are complete systems already engineered and in stock, ready to ship, they afford substantial savings.

At Kliegl, we have a team of seasoned engineers who can also design custom studio lighting systems to meet more exacting requirements.

So, if you don't want your viewers to change channels, turn to Kliegl. For complete information on our TV packages, please write or call.



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### Woodruff agrees to purchase radio station

An agreement in principle has been signed for the sale of Station KNCR in Fortuna, CA, to Woodruff Broadcasting Systems.

The AM station operates at 1090kHz, with 10,000W of non-directional power. Like one-third of the radio stations in the US, KNCR is a daytimer, signing off at sun-down. KNCR's frequency is a clear channel allocated to Mexico.

The Woodruff Organization is a full-service broadcast planning company providing aid to broadcasters in news, program, and technical areas. The organization is also involved in satellite implementation programs for distribution of network radio broadcasts, along with satellite sub-system management. The organization also operates its own network, distributing a nightly three-hour interview broadcast, coast-to-coast, along with other syndicated features.

### ABC chose "Scotch" 1-inch tape for Winter Olympics video coverage

ABC Sports selected "Scotch" 479 videotape for its nearly 40 1-inch helical scan recorders involved in coverage of the 1980 Winter Olympics at Lake Placid, NY.

Although a sizable portion of the network's more than 50 hours of programming was live coverage, videotape played an important part in reporting of non-prime time events. Telecasts were assembled at the ABC Sports Television Center with its two control rooms and banks of recorders fed by some 45 miles of buried cable.

The blank videotape was furnished in special shipper/storage cases developed by 3M to resist adverse weather and handling conditions—particularly at remote taping locations. The molded plastic itself can withstand below zero (F) temperatures. A flexible seal ring keeps moisture and dirt from the tape.

Inside the case, a special cushion flange reel and exclusive "Shock-Shield" discs allow the tape reel to rotate, preventing cinching and "windowing" in the tape pack.

All the cases were in a special white plastic, carrying ABC's Olympics logo.

## TDK asserts that total branded videocassette sales will break 17 million units in 1980

Based in part on 1979 sales of VCR units, the VCR forecast for 1980, and the average purchase of blank videocassettes that went with that hardware purchase, TDK Electronics is forecasting that total branded blank videocassette sales will break 17 million units in 1980.

"To some it may seem still too early to predict accurately," explained TDK video product manager, Ed Pessara, "but this is the figure we arrived at based on VCR sales and field sales reports from our dealers. If the forecast holds up, and we should know that conclusively in another three months, it will reinforce the long-range TDK forecast made during our December press conference for mid-decade total sales of 60-65 million units."

Pessara estimates that by the end of 1979 there were roughly 850,000 VCRs in American homes. Stressing that this is still a relatively small market penetration, when considered against the total number of American homes, Pessara pointed to the fact that, "the hardware forecast for 1980 is for an additional 550,000 units with 750,000 units predicted for 1981.

While these accelerated hardware sales will certainly generate a tremendous turnover in blank videocassettes, another important sales factor is that consumers are starting to save more and more programs.

"The average consumer is now buying three or four tapes with his initial purchase of the hardware," Pessara explained, "and an average of one tape per-month afterwards. With the advent of 6-hour VCR, consumers are now starting to buy various lengths of tape."

Specifically, Pessara noted that sales of 60- and 90-minute length tapes have risen dramatically in the last year. And this is because consumers are recording a specific show that will be kept.

Although he deferred comment on the effect the videodisc may have on these blank videocassette forecasts, Pessara did comment that, "it seems to me that prerecorded material would become stronger in the disc format. TDK is just completing its analysis on the overall effect the videodisc will have on blank videocassette sales, and I expect to comment on it in about a month. The tentative results, however, are very interesting."

In order to meet the growing demand for its own blank video-

cassettes, TDK announced last year that it had begun construction of a 50,000-square-foot full process video production facility in Georgia. Slated to begin production in early 1981, the facility will have the capability to produce one million videocassettes each month.

## Scientific-Atlanta forms division to pursue sale of antennas for satellite earth stations

Scientific-Atlanta has announced that it has formed an antenna products division to handle all phases of the design, manufacture and marketing of its satellite earth station antennas to the communications

industry.

Marvin Shoemake, formerly antenna product line manager, has been elevated to general manager for the antenna products division. He is responsible for the company's broad line of antenna products, which includes reflectors, feeds and mounts. The division recently moved into a new 115,000-square-foot facility in suburban Atlanta. Production at the new factory is now at a rate of more than 150 antennas per month. Antennas produced for satellite ground terminals include 3, 4.6, 5, 7, 10 and 11 meter diameter units for 4/6 GHz application and 5.5 and 7.7 meter diameter units for use at 12/14 GHz.

# STAINLESS AM/FM TOWERS...

## Right on Target for the 80's!

Zero in on STAINLESS for your best buy in radio towers for the '80's and beyond . . . when good investment performance will be more important than ever.

With Inflation undermining profits, every dollar spent on equipment *must* return maximum value — and that's where Stainless can help.

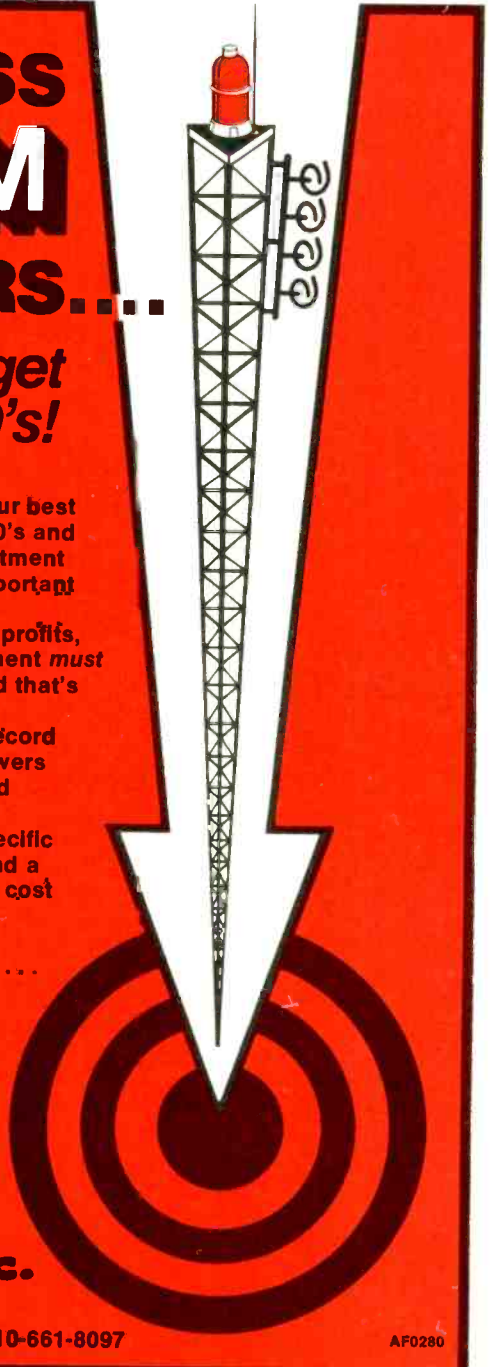
Our 30-year performance record assures proven results — towers designed and built to last and requiring minimum upkeep expense. We'll study your specific needs, offer expert advice and a quotation based on the latest, cost saving technology.

Tough, "custom-tailored" AM-FM towers from Stainless . . . the inflation fighters.



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May 1980 *Broadcast Engineering* 83



### Five new rep firms join Sony's pro audio division

Sony Industries' Professional Audio Division has signed five new rep firms to carry their extensive line-up of microphones, mixers and headphones, it was announced by Nick Morris, general manager.

The new firms are: Marketing & Sales Representing Manufacturers, 74 Catalpa Road, Wilton, CT 06897. Contact: Robert S. Blumberg; CHF Sales, Suite 104, 3955 Pleasantdale Road, Atlanta, GA 30340, Contact: Charles Mason; Sound Professionals, 5600 West 95th Street, P.O. Box 7012, Shawnee Mission, KS 66207, Contact: Chuck Levy or Sound Professionals, 632 C Coeur DeRoyale, St. Louis, MO 63141; Scowcroft & Associates, 4895 Joliet Street, Unit D, Denver, CO 80239, Contact: Bob Scowcroft; C & W Marketing Associates, 4116 Willowbrook Drive, Liverpool, NY 13088, Contact: Tom Walkerwicz or C & W Marketing Associates, Box 222, Ellenville, NY 12428, Contact: Marty Charles.

### Joint venture announced for STV system in Chicago

Oak Industries and Capital Cities

Communications announced they are forming a joint venture to purchase 49% of Chicago Television station WSNS-TV (Channel 44) and operate an over-the-air subscription TV (STV) service through the station's facilities.

The companies said they have reached an agreement in principle with Video 44, which owns and operates WSNS-TV. Video 44 is owned by principals of Harriscope Broadcast Corporation, represented by Burt I. Harris, and Essaness Theatre Corporation, headed by Alan Silverman.

Under the agreement, the present owners of Video 44 will maintain 51% ownership of WSNS-TV and will continue to operate the station, and will have a 50% interest in the STV operation. Oak and Capital Cities will share the remaining 50% STV interest equally. Transfer of the minority interest in the station ownership will require approval of the Federal Communications Commission.

### Kodak opens new marketing center in Virginia

Eastman Kodak has opened a new

marketing center for the Washington area in a move designed to improve customer service in the metropolitan District of Columbia as well as six surrounding states.

"By consolidating various functions into one centralized location with enlarged and improved facilities, we are able to more effectively respond to customer needs and improve our direct field support resources," said Thomas S. Foulkes, director of Kodak's eastern region, based in Rochester, NY. The 52,000-square-foot center, located at 1555 Wilson Boulevard, Arlington, VA, will house 150 full-time employees and serve as headquarters for 200 sales representatives and 125 service personnel.

### Gold and copper price increases will spur market for fiber optic connectors

The market for fiber optic connectors will grow 10-fold over the next decade, reaching more than \$30 million by the end of the 1980s. Growth rates in the early 1980s will average more than 30% per year, as high metal prices help accelerate the trend towards the use of fiber

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optics for communications, according to a new 103-page research report from International Resource Development Inc., a management consulting firm. The IRD report projects that the interconnection of computers and terminals will emerge as the primary market for fiber optic connectors; although telecommunications applications for fiber optics will consume more cable, the connectors used for telecommunications will be spaced far apart.

### Name change

Continental Specialties has changed its name to Global Specialties Corporation. They are no longer using Continental Specialties Corporation or CSC in any way.

### Corning sets new prices, new specs for optical fibers

Corning has published new price schedules for Corguide optical fibers that represent both pricing and performance benefits for users.

William L. Babcock, OEM sales manager for Corning's Telecommunications Product Department, said the new schedules incorporate the following:

1) Price decreases of as much as 33% for the series that Corning

formerly termed "standard-wavelength" products, now called "first-window fibers," or the Corguide FWF line.

2) Characterization of the FWF line at the source wavelength of 850nm instead of 820nm.

3) Introduction of "double-window fibers," or the DWF line, characterized at two source wavelengths—850nm and 1300nm.

4) Replacement of the series that Corning formerly termed "long-wavelength" products, characterized at 900nm, with the DWF line.

5) A change in attenuation measurement techniques from full flood to a restricted launch excitation technique that Corning terms "limited phase space."

### Change in name for two consulting engineering firms

Effective March 31, 1980, Silliman, Moffet & Kowalski, a Maryland partnership and Silliman, Moffet & Kowalski, P.C., a Virginia professional corporation changed their names.

The Maryland partnership became Silliman and Silliman. John A. Moffet, P.E., is withdrawing as a partner in this firm and Thomas B. Silliman, P.E., son of Robert M. Silliman is joining his father in the

partnership.

The Virginia Corporation will become Moffet, Ritch & Larson, P.C. Robert M. Silliman, P.E., has withdrawn as a stockholder and director of that firm. Marianna W. Cobb, P.E.; Daniel H. Smith, P.E., and Philip L. Rice, physicist, continue as consultants to Moffet, Ritch and Larson, P.C.

Carl L. Kowalski, P.E., a field engineering specialist, will continue as consultant with both firms.

### Audiotechniques expands into broadcast sales

Audiotechniques of Stamford, CT, has expanded to service the broadcast industry. As well as being the exclusive dealer for MCI recorders and consoles in the Northeast, Audiotechniques carries over 75 lines of professional audio equipment.

They have opened a toll-free sales line at 800-243-2598 which is open 9 am to 5 pm, Monday-Friday to answer questions and service needs. The address is 652 Glenbrook Rd., Stamford, CT 06906, (203) 359-2312.

### New address

Audio Unlimited of North America has moved to 11 Battleground Court,

## Armored Cable Assemblies



Armored Audio Cable Assembly

Armored Coax Cable Assembly

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\*Price subject to change without notice.

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Greensboro, NC 27408. Their mailing address and phone number remains P.O. Box 9225, Greensboro, NC 27408, (919) 274-4682.

### Purchase of small receiving antennas

United Press International has signed contingency orders for the mass purchase of small receiving antennas as part of its plan to deliver news by satellite to newspapers and broadcast stations in the US.

Roderick W. Beaton, president of the worldwide news agency, said the first "rooftop-type dishes" to be used in UPI's new communications program will be provided by the Satellite Communications Division of Harris, Melbourne, FL, and Farinon Video and Satellite, San Carlos, CA. Other manufacturers also will be utilized.

Ranging in size from six to 10 feet, the receivers will be installed across the country starting in July, predicated on final approval by the FCC on the satellite channel power required to use the 10-foot dish.

### Jenel moves

Jenel Corporation, Consultants

and Engineers moved its corporate headquarters to Dallas, TX, on March 15, 1980.

Elmer Smalling III, president and chief engineer, will head the new office at 10307 Bernardin, Dallas, TX 75243.

### Ampex increases prices on audio-video product line

Ampex increased prices 8 to 10% for its full line of professional audio and video equipment. "This increase, which meets federal pricing guidelines, is necessary in order to cover increases in labor and material costs and allow continuing support for new products," according to Donald V. Kleffman, vice president/general manager of the Ampex audio-video systems division.

The price increases for audio systems became effective in November. Price increases for Ampex video became effective January 1.

### Increased production capacity

Amperex has completed the investment of another \$1 million in its Slatersville, RI Electro-Optical manufacturing plant in order to provide increased production capacity for its 2/3-inch Plumbicon

TV camera tubes. With a production clean-room area of 13,000 square feet, the AmpereX E-O plant is the largest clean-room facility in the US. The facility employs 150 technical and production people working directly on Plumbicon TV camera tubes.

The decision to expand the Slatersville E-O plant is the result of AmpereX's continuing expansion in the ENG camera market. The increasing demand for 2/3-inch Plumbicon tubes for these cameras has led to the investment at this time. AmpereX does not see a saturation in the ENG market for some time to come.

### ATR-124 deliveries begin

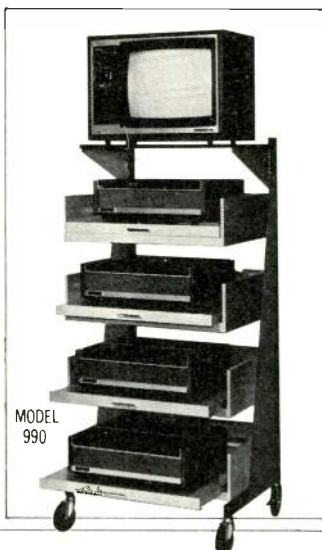
Ampex has begun deliveries of its new ATR-124 multi-track audio recorder, according to Lee Cochran, general manager of the Audio-Video Systems Division's audio products group.

The first delivery was made to Filmways/Heider Recording of Hollywood, "one of 23 units that have been ordered by customers in the US since the ATR-124's introduction in November," Cochran said.

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### Possible joint venture

COMSAT General Corporation and Sears, Roebuck and Co. confirmed that they are engaged in discussions regarding a possible joint venture for the purpose of providing satellite-to-home subscription television service. The proposed venture plans to offer high quality programming nationwide for a fee. Subscribers would receive the service by rooftop antennas. No agreement has yet been reached between the two companies. The new service would require approval by the Federal Communications Commission.

### Exclusive agreement

In an exclusive agreement between 3M and NEC, 3M has become the exclusive US and Canada sales and service outlet for the Model TT-7000 NEC/3M "C" Format helical videotape recorder.

### Woodruff Pacific Network

A new regional radio network has been developed on the Pacific Coast. Woodruff Pacific Network begins broadcasting on June 2, 1980, throughout California, Oregon and Washington. Jack Hayes, formerly

with NBC Radio, is president of the network. Norm Woodruff, formerly with CBS Radio, is chairman.

The Network is using Westar satellite, terrestrial microwave, and digital circuits for distribution of programming.

It has been more than 20 years since California or the Pacific States have been regularly linked by a regional radio network dedicated to serving the specific needs of the region. The Don Lee Network had been the major Pacific network until the late 50s, and CBS continued its Columbia Pacific Radio Network with limited regional feeds into the early 70s.

The new network will tailor programming specific regional needs of broadcasters in the Pacific states.

### JBL donates 4313 control monitors

James B. Lansing Sound has donated a pair of 4313 control monitor loudspeakers to Middle Tennessee State University for use in that institution's Recording Industry Management Program, it was announced by Ed Hart, JBL executive vice president for marketing. MTSU's 4-year degree program in-

cludes courses in record merchandising, music industry law, and audio engineering.

### RCA executive says commercial TV will remain strong

Commercial TV Broadcasting will remain a strong and vital business despite some audience loss to new home media in the 1980s, an RCA executive predicted.

Hebert S. Schlosser, RCA executive vice president, said the video disc, cable TV, pay TV and videotape are giving the viewer new program sources and more choices than ever before.

"The total impact of the new media will be to reduce commercial television's audience somewhat, to knock the corners off that audience. But those are big corners, and new business can thrive in them."

### ERRATA

Through an error of BE, the full-page ad for Digital Video Systems in our March issue carried the correct photograph of the DVS Digital Phaser but the incorrect text. Please consult page 23 of this issue for the correct information.

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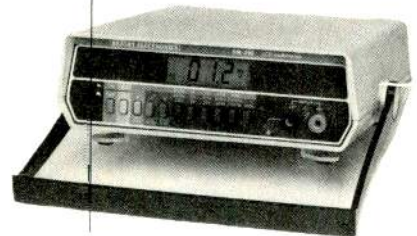
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### DM210 Digital Multimeter

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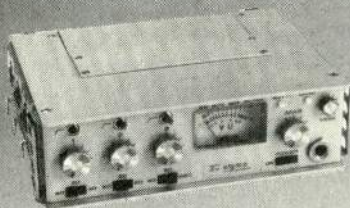
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May 1980 *Broadcast Engineering* 87

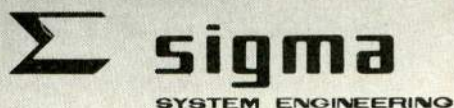


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## new literature

### Booklet

**GTE Lenkurt**—A new Microwave Radio Products booklet describes the company's broad line of microwave radio systems for the transmission of video, voice and data. The illustrated booklet provides a comprehensive description of the types 70F2, 79F1, 775 and 778 analog transmitter-receivers, the 79F1-D Digital Radio System and the 700F1 RF Repeater System. It also provides basic information on FCC and CCIR frequency bands, as well as fundamentals of heterodyne, baseband and RF repeater operation.

Circle (140) on Reply Card

### Data sheet

**TRW LSI Products**—An 8-page data sheet describes the MPY-8HJ TTL, unsigned magnitude multiplier, offering 45ns multiply time. The data sheet provides a block diagram of the multiplier, equivalent input and output schematics, specifications and a glossary of terms related to the operation of the device.

Circle (141) on Reply Card

### Voice frequency amplifier brochure

**ITI Electronics**—A new edition of its brochure on voice frequency amplifiers has been introduced. Ten different kinds of amplifiers, their applications, characteristics and equivalencies with other brands are discussed.

Circle (142) on Reply Card

### NC4 brochure

**LNR Communications**—A revised brochure on 4GHz Low Noise Amplifiers is available. This 8-page brochure provides technical information, applications data, and specifications for the complete series of NC4 Low Noise Amplifiers for LNR. Included is descriptive information for LNR's newest models NC4-51 and NC4-61 LNAs designed specifically for continuous operation in unattended terminals.

Circle (143) on Reply Card

### Literature on custom color slides

**Visual Horizons**—An 8-page illustrated brochure describes more than 200 new, creative custom slides available for TV broadcasters and producers of AV shows. It describes the AV services available, including custom title and art slides, slide duplication, computer typesetting, sales and training programs and videotape duplication.

Circle (144) on Reply Card

### Bulletin

**Andrew**—Bulletin 1080D provides detailed mechanical data for use in planning the shipment and installation of Andrew microwave antennas. Included are shipping weights and dimensions, windload data, environmental considerations, tower interface requirements, feed clearance measurements, and an antenna system planning worksheet to facilitate system design.

Circle (145) on Reply Card

### Color encoder/image enhancer

**Cohu**—Model 8500 Color Encoder/Image Enhancer is described in data sheet 6-705. The encoded color signal of the model 8500 meets all applicable NTSC, EIA, and FCC specifications, with models also available to meet PAL, B, G, H, I and M requirements.

Circle (146) on Reply Card

# new products

## On-the-air mixing console

A new stereo on-the-air mixing console offering increased flexibility for both on-the-air and production use has been announced by **Audi-tronics**. Model 110B with up to 18



input positions is a modular design using a motherboard into which a wide variety of standard input, signal processing and output modules may be installed.

Circle (100) on Reply Card

## Adapters

A new line of adapters for **Century Precision's** Arriflex bayonet lenses allows the Arriflex bayonet to mount to AATON, BOLEX, C-MOUNT, CP-16R and ECLAIR. These adapters are made of high quality



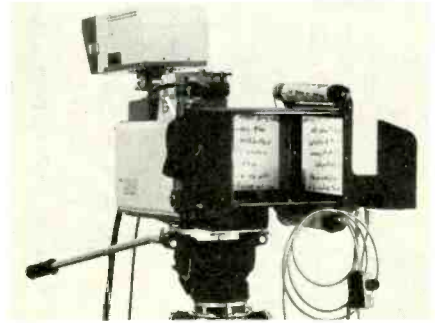
stainless steel and aluminum to resist corrosion and wear. They are calibrated to .0005 inch of accuracy to ensure uniform fit and they are hard black anodized. Special flat

interior paint minimizes internal reflection.

Circle (101) on Reply Card

## Camraprompter system

**Cinema Products** has announced the availability of Camraprompter, a low-cost, ultra-lightweight system that is easy to set up and simple to operate. The system utilizes a clear acrylic optical flat set at a 45° angle in front of the camera lens. The optical flat acts as a mirror reflecting the bright, easy-to-read



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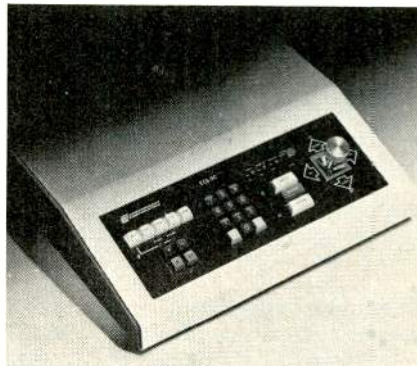
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script to the subject being photographed, with virtually no light loss to the lens, according to the manufacturer.

For information: Cinema Products, 2037 Granville Ave., Los Angeles, CA 90025.

### Videotape editing system

Convergence announced immediate availability of the ECS-90 videotape editing system. The ECS-90 is a microprocessor-based, plug-in videotape editing system designed for 1/2-inch and 3/4-inch videocassette recorders. The ECS-90 works with either control track or industry



standard SMPTE/EBU time code with the optional TCR-90, a new low-cost dual channel time code reader. It can program fades to and from black as well as generate "crystal" black with the optional Blade fader module. The ECS-90 can also accept a new low cost version of the Liplock audio pitch control option.

Circle (103) on Reply Card

### Sound powered communications systems

Sound (voice) powered communications systems that provide clear voice transmissions for miles, yet require no electricity, batteries or other power sources, are available from the **David Clark Company**. Ideal for all high noise areas without power sources and applications where portable communications systems are necessary, the system features noise attenuating headsets that can be worn with all kinds of safety head gear. The

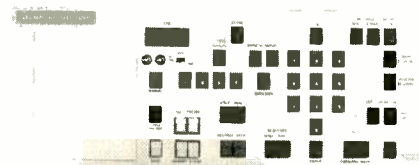


headsets come with an acoustic mic boom for hands-free operation or with a noise-reducing, shielded microphone with a push-to-talk switch for use in high noise level areas.

Circle (104) on Reply Card

### Auto drive

Crosspoint Latch has introduced the model 7200 Auto Drive. This unit is a computerized controller for the 6112 and 6142 video production switchers. The built-in computer produces continuous smooth transitions, performing operations such as simultaneously moving the patterns across the screen and changing the

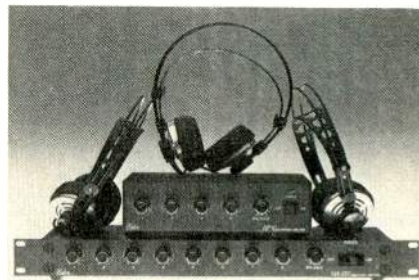


hue and size of the borders. This unit has a solid-state memory with the capacity for 256 events, with a maximum programmable duration of 99 minutes per event. Each event consists of the storage of the status of the control panel. Events can be grouped into sequences which may be randomly initiated.

Circle (105) on Reply Card

### Headphone amplifiers

Two new professional headphone amplifiers, the HA 100 eight stereo channel and AP 10 four stereo channel that can be used with any combination of 8 to 2000  $\Omega$  head-



phones have been introduced by **Eddcor**. These units, in addition to having a flat frequency response, have less than 0.1% THD and an A weighted S/N ratio of -101dB. Units can be desktop or rack mounted.

Circle (106) on Reply Card

### Enhancement system

A new concept in AM broadcast-ing provides 125% positive modula-





tion, free of typical clipping type distortion. This patent pending technique, Non-Symmetra-Mod enhancement system, allows the AM broadcaster to custom enhance his signal so as to increase coverage. The Non-Symmetra-Mod unit accomplishes this by producing a more fully modulated signal with a clean, low distortion sound, and with significantly purer sideband structure than produced when clippers are used. The system is compatible with normal audio processors.

Circle (107) on Reply Card

#### Microphone/line distribution amplifier

Modular Audio Products has introduced the self-powered rack mountable model 7823 microphone/line distribution amplifier. The model 7823 includes the model 4003 transformer coupled microphone preamplifier with adjustable gain to 65dB; and the model 4820 balanced output distribution amplifier which drives eight 600  $\Omega$  lines at +20dBm.



A separate line level transformer coupled uninterrupted output from the microphone preamplifier is always available. A source select switch enables the 7823 to be alternately used from a line level source through its balanced, bridging differential input, 80dB isolation between outputs with extremely low noise and distortion are achieved through the use of MAP Audio Op-Amps.

Circle (108) on Reply Card

#### Automated broadcast business system

A competitively-priced, automated broadcast business system, designed to provide small- to medium-sized radio and TV stations performance which was previously reserved only for large stations, has been developed by NIDUS Broadcast Systems. The NIDUS system handles detailed

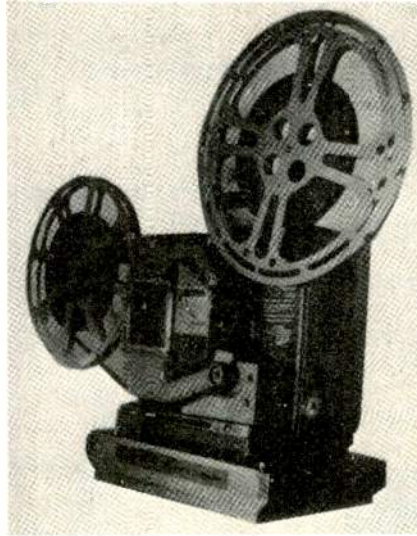


spot and program orders, rotation schedules, sales analysis, billing and reports on accounts payable and receivable.

Circle (109) on Reply Card

#### 16mm tele-cine projector

RADMAR has announced that it is entering the video products market with the introduction of its first model of a 16mm tele-cine projector. This type of projector (also called a vidicon film chain projector) is used to show 16mm motion picture films on broadcast or closed circuit TV.



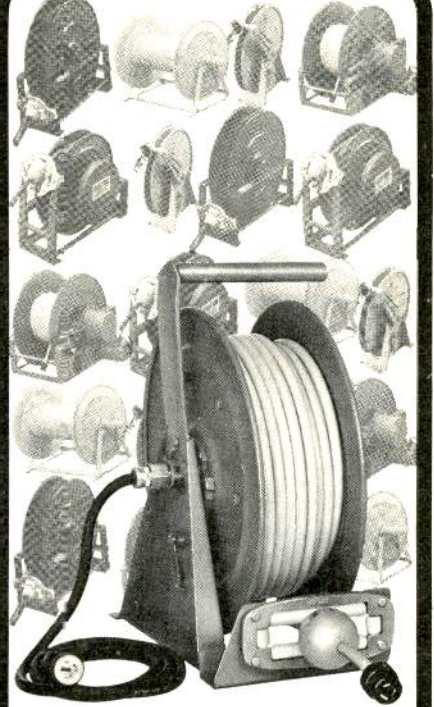
The projected film image is directed by way of transfer optics into a b&w or color television camera where it is focused on the face of the vidicon camera tube(s) and processed for distribution like any other picture from the television camera. The unit is called the model 1580-RVC 16mm Tele-Cine Projector.

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#### Near-field antenna analyzer

Scientific-Atlanta has introduced its model 2022 Spherical Near-Field Antenna Analyzer. This new fully automatic instrumentation package combines the power and convenience of the model 2021 antenna analyzer with near-field measurement capability. The use of a spherical near-field software package enables tests to be made on a

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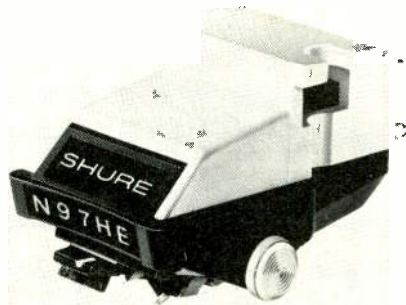


shorter test range. As a result, significant savings can be realized in facilities costs as well as increased testing efficiencies resulting from indoor operation. The model 2022 will automatically collect near-field antenna test data and transform it to any measurement distance, including infinity.

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#### Phono cartridge

Shure has introduced the M97 Era IV Series phono cartridge, equipped with N97HE stylus assembly (as



indicated on stylus grip). M97 Series phono cartridges are available with

any one of five different and interchangeable stylus assemblies.

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#### Armored cable assemblies

Trompeter Electronics has developed new armored coax, audio and electro optic cable assemblies. Intended for abusive environments

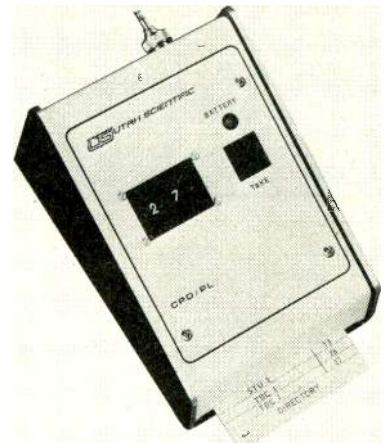


such as television electronic news gathering, these cables withstand pull loads well in excess of 150 pounds and are unaffected by crush loads associated with heavy automotive and industrial traffic.

Circle (113) on Reply Card

#### Desktop control panel

A desktop control panel, model



CPD/PL, has been introduced by Utah Scientific for control of its routing switcher matrices. The panel features party line operation where connection to the matrix is made via a single coaxial cable. Power is supplied by an internal transistor radio battery. Power consumption is limited to a few milliseconds each time the Take button is depressed, while a combination of CMOS and low-power TTL circuitry further minimizes battery drain to the point that batteries will typically last for their shelf life. Two front-panel LEDs give assurance of proper data transmission and of adequate reserve battery power. A slide-out directory card is provided which gives a source name/matrix input cross-reference to permit the operator to preset the correct data in the lever switch readouts prior to depressing the Take button.

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## Electric Rain Gauge

Now you can report minute-by-minute rainfall amounts and not get wet! This new, low cost, remote-reading gauge shows announcer rainfall accumulations in 1/100-inch increments. Transmitter can be located several hundred feet away and is completely automatic — needs no service or attention. Ask for free Spec. Sheet, Model 525 Rain Gauge.



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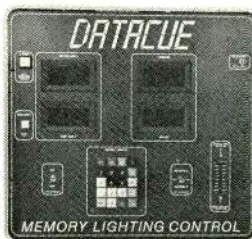
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**TE-2 mic cable tester**  
**Wireworks**, manufacturer of professional audio cabling systems, has announced the TE-2 mic cable tester. The unit combines all the feature of its predecessor TE-1 plus an additional test mode and direct plugging of a second connector type. The TE-2's additional test mode checks for conductors shorted to the case of XLR-3 type connectors. This feature exposes the ground-to-case shorts often the cause of ground-loop problems. TE-2 also incorporates 1/4-inch phone connectors which expands its capabilities to directly plug and test phone-to-phone cables and any combination of XLR/3-to-phone cable arrangements.

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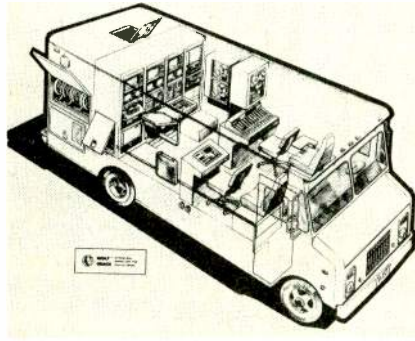
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#### "Bread Truck"

video production unit

A custom engineered video pro-

duction unit enclosed in a maneuverable "bread truck" body has been introduced by **Wolf Coach**. The HIPPO video production unit is a complete mobile body that permits quick response to any out of studio recording and production need.

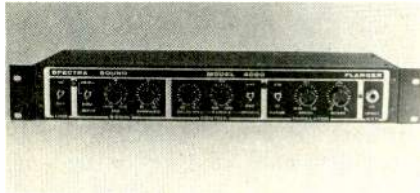


Accommodating a crew of six, it incorporates a 1-inch videotape system, stereo tape recorder, 12 input audio console, full effects video switcher, character generator, three to four cameras, and power generators.

Circle (116) on Reply Card

#### Professional audioflanger

**Spectra Sound**, a wholly owned subsidiary of Spectra Sonics, has introduced a professional audio flanger designated as the model 4000. The unit was designed to create effects such as positive and negative flanging, double tracking,



and speaker rotation simulation. In addition to these effects, chorus, vibrato, and tube echo effects can be achieved. The model 4000 produces over five octaves of flanging without input aliasing, output quantization noise, or the introduction of any high frequency clock components.

Circle (117) on Reply Card

#### Solid-state CCD video camera

A high-resolution, monochrome solid-state video camera using an LSI charge-coupled device (CCD) is available from the electronic components division of **Panasonic**. Designated as BS-701, the new camera offers very high resolution of 280 TV lines (horizontal) and 350 TV lines (vertical). The 512x383 element CCD



image sensor that is at the heart of the new camera is also available from the company separately.

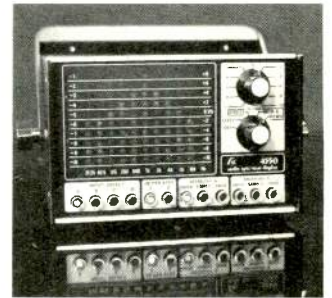
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**Benchtop frequency counter**  
**Global Specialties** has announced a 650MHz benchtop frequency counter, model 6001, which is slated for early second quarter delivery. The 6001 permits extremely accurate measurement of fre-



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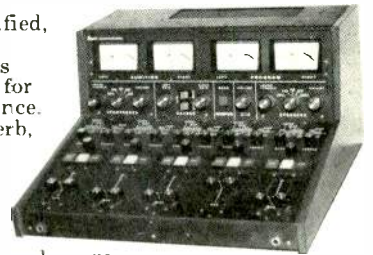
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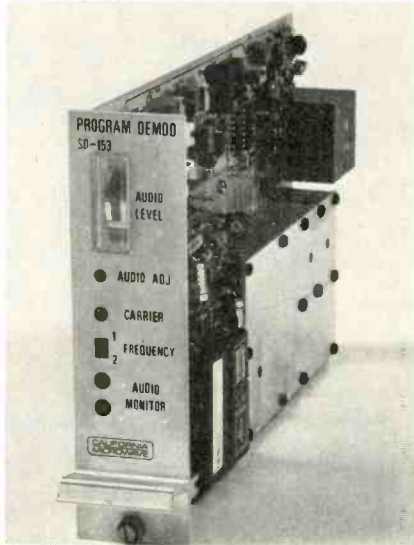
94 Broadcast Engineering May 1980

quency from 5Hz through 650MHz plus exceptional flexibility in a general purpose laboratory and test bench frequency counter.

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### SD series program demodulator

The SD series program demodulator from California Microwave provides a high performance program audio output for radio stations in satellite broadcast networks. The unit plugs into the demodulator shelf



of the company's small aperture earth terminal (SAT) and provides optional audio bandwidths of 3.4, 5, 7.5 and 15kHz. Its consistent phase and amplitude characteristics are ideal for 15kHz FM stereo or 7.5kHz AM stereo.

Circle (120) on Reply Card

### Mounted telescopic towers

Aluma Tower is manufacturing five styles of mobile van roof mounted telescopic towers. These towers will crank up on the heavier



duty model to 60 feet, if required. They are manufactured for easy mounting on a van ladder rack, so they can be cranked up easily when needed for use, and cranked down easily for storage.

Circle (121) on Reply Card

### RF load resistor

A low cost 80,000W RF load resistor that provides several features is being introduced by Bird Electronics. Econoload model 8790 is



designed for matched termination of a 50 Ω system during off-air testing, maintenance or alignment of high-power transmitters to 80kW from audio through the UHF-TV bands.

Circle (122) on Reply Card

### Cassette cleaner and evaluator

The Video Products Division of Chyron is introduced the CCE model U-1A which completely cleans, evaluates and rewinds ¾-inch videocassette tapes at 10 times

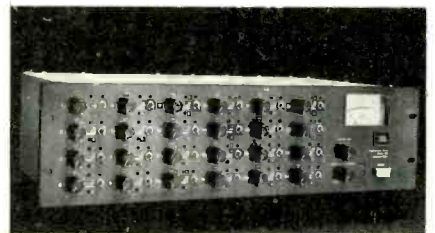


the speed of normal playback, without altering recording signal. Compact and completely self-contained, the U-1A is simple to use and fully automatic.

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### Automatic microphone mixer

James B. Lansing Sound has announced the model 7510 automatic microphone mixer, which comes standard as a four-input module and is expandable to 24-input capacity. Particularly suited for installation in public meeting facilities, the 7510 can also be a useful tool in recording studio,



broadcast and sound reinforcement applications. The 7510 features automatic mic turn-on/turn-off and output level correction that allows considerable gain without feedback.

Circle (124) on Reply Card

#### Video recorder case

**K and H Products** has designed a protective carrying case for the new 1-inch helical-scan portable video recorders, the Sony BVH-500 and the RCA TH-50. The Porta-Brace model number C-500 is a polyethylene foam-padded, heavyweight Cordura nylon recorder case. It pro-



vides access to all controls and cable openings, and is designed to permit tape removal while the deck remains in the recorder case. The unit includes the HB-20 heavy-duty shoulder strap, which features a felt-lined, leather shoulder pad.

Circle (125) on Reply Card

#### Video production mobility

A Wheelit video production cart is available from **Gruber Products**. The Wheelit has been designated EFP-17 representing Electronic Field Production 17. The new design incorporates large inflatable pneumatic tires that absorb more shock and vibration, and actually makes basic dolly moves possible while taping. A separate monitor shelf has



been designed into the EFP-17 for operator convenience. The monitor platform is positioned forward so that the recorder controls are at the fingertips of the camera operator, while operating the camera.

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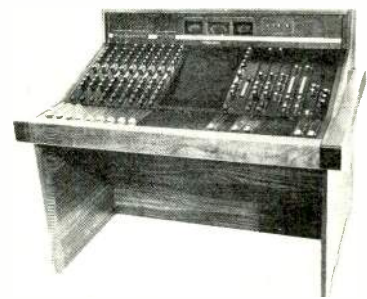
#### Weather receiver

The model CRW from **Gorman-Redlich** is a rack-mounted fully re-rotatable weather receiver. The rear terminal block provides a set of terminals with 600Ω output, continuous audio, as well as, 600Ω output gated audio that is activated during an alert. An internal relay provides a contact closure across another set of rear terminals when an alert takes place. The contact closure can be used to start a tape recorder, or set off a buzzer or a light at a remote location from the receiver. The double conversion crystal controlled receiver is equipped with all three weather service frequencies.

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#### Broadcast Mixer

**Maldwyn Bowden International** has introduced the Series 24A broadcast mixer. It is expandable

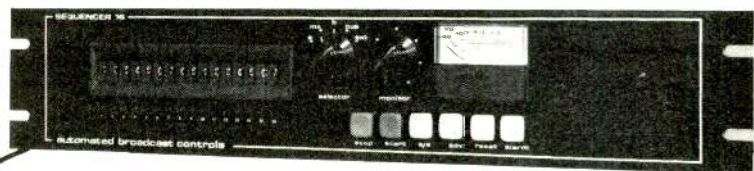


with bolt-on sub frames and is fully modular. It has been ergonomically designed.

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#### Memory unit

A random access character generator memory unit with a unique mode that allows pre-programming of up to 100 program steps has been announced by **3M's Mincom Division**. The 3M D-4500 mini-floppy storage device is intended to be used with the company's D-2000, D-2500, D-3000 and D-3016 character generators. It stores up to 400 pages of text, and a subtitle mode allows storage and random access for as many as 4000 individual lines of titling. The program mode may also control the time each page is displayed, the



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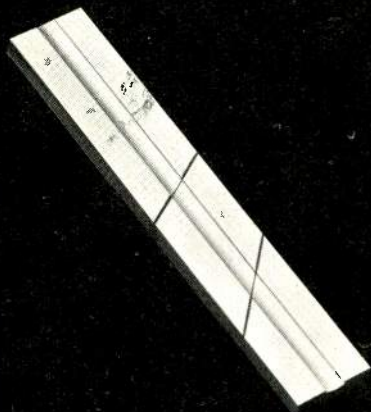


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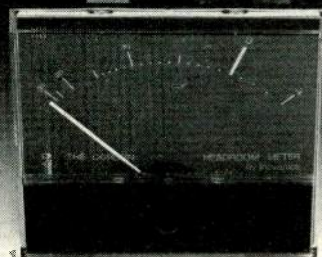
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playback speed and many other functions. Programs may also be placed on the floppy disk for permanent storage and recall.

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### Wireless mic transmitter

A low cost professional wireless microphone transmitter has been produced by **Nady Systems**. The Nasty Cordless Black Microphone Transmitter is tunable, operating on clear channels in the FM band, 88-



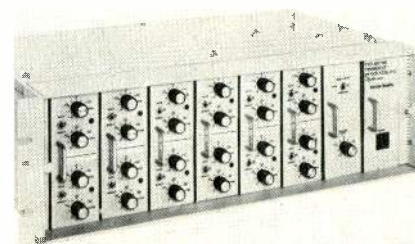
108MHz. This assures clear channel accessibility and interference-free operations in any locale. Additionally, this microphone has a 250-foot range and a frequency response of 20-20,000 Hz  $\pm 3$ dB. The transmitter can be used with any microphone.

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### Mic mixer

The model DE-4013 Voice-matic Microphone Mixer from **Industrial Research Products** restores gain loss caused by adding microphones to reduce the howl of feedback by automatically attenuating inactive microphones. As much gain is generated as in a single microphone system yet without the howl of feedback. Background noise and other room ambient noises are eliminated from the system.

Modular method of construction allows a choice of 2, 4, 6, 8, 10 or



12 channel units depending on the requirements of a facility. Standard features are sensitivity and attenuation controls for each channel, an auxiliary output, chairman override, and front panel LED status indicators. The Voice-matic fits into a standard 19-inch equipment rack.

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### ENG hand trucks

**Rack Techniques** has introduced its new line of electronic equipment news gathering hand trucks for the professional broadcast and video market. The Series 2003 ENG hand



truck can hold 1/2-inch VHS/Beta or 3/4-inch portable units and up to a 9-inch TV monitor. A Shure mixer can be mounted on top where the camera is sitting. Optional tripod mountings are available upon request.

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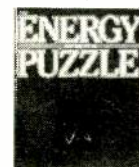
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## WANTED

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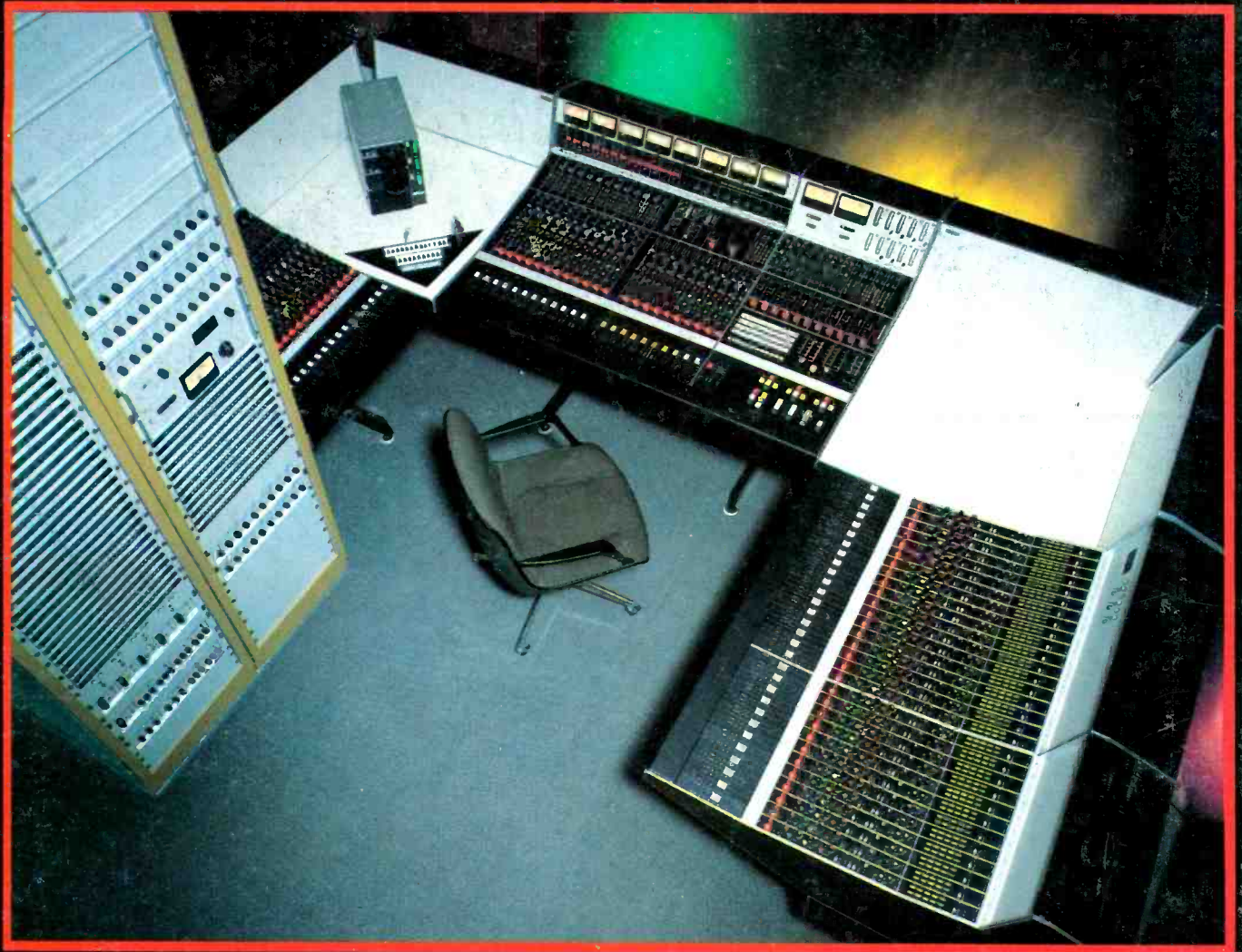


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