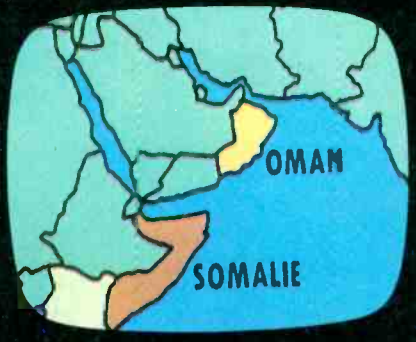
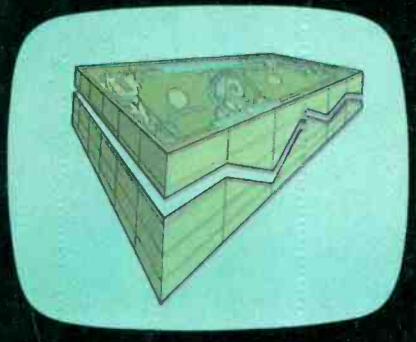
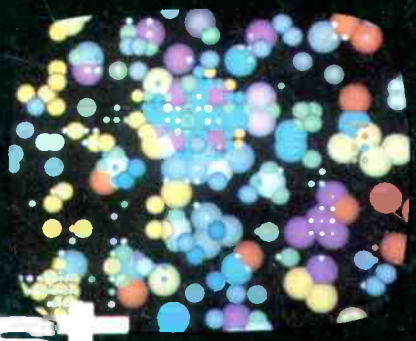
BROADCAST® engineering

December 1980/$3







Broadcast Technology:

Update 1981

- ABC/Barnathan
- CBS/Green
- FCC/Ferris
- NAB/Wasilewski & Payne
- NBC/Silverman
- NPR/Cassidy & Kean

New from Hitachi

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!

Fast, sure, easy operation

Hitachi one-inch VTR's are loaded with features—many of them Hitachi exclusives. Like the brake release for easier threading. Both video and audio confidence. A "B-wrap" configuration, for reduced dropout. A *precision* moveable tape guide for easy loading, with an incredible 1-micron tolerance that's accurate for up to 2 million threadings! Plus a sloped design and easier-to-see top mounted drum for still easier threading.

Dazzling performance extras

Imagine shuttling a 1-hour tape end-to-end in just 80 seconds! It's possible, only on the Hitachi HR-200, because an internal air compressor injects a column of air into the tape guides to reduce friction and increase acceleration. The same air compressor provides air for the non-contact air drum, cushioning the tape when in the standby or fast shuttle modes. For fumble-free shuttling and jogging and fast editing, a single knob controls both. There is audio spot erase capability. And a Hall-Effect head on the third channel reads the time code more accurately, regardless of tape speed.

A microprocessor makes the built-in editor the most advanced you'll find today. And, just as important: it can be re-programmed to interface with editing systems of the future. Serial or parallel logic for remote control? Both have advantages, so Hitachi gives you both. Built-in cable compensation boosts the signal so you can use cable up to 300 feet.

Uniquely simple service

Serviceable components have been human-engineered for easy access and replacement. The PC modules are front-mounted and can be removed in an instant. The six heads come as a pre-aligned drum assembly that snaps out and snaps back in minutes.

HR-100 Portable Model

The HR-200 is available as a console, or for tabletop use or 19" rack mounting. Best of all, it costs no more than ordinary 1-inch VTR's!

Smallest Type C portable ever!

The HR-100 portable model has many of the HR-200 features, yet it's the smallest Type C portable in the world. And the most serviceable too, with plug-in PC modules. Die-cast uniblock construction makes the HR-100 durable yet extremely light. And like the HR-200, it has a non-dropout tape path. Plus an extended tape path for less edge wear, an auto back space assemble editor, and 3-way power with built-in battery pack, AC adapter or external DC.

Take a big one-inch step. See the New Hitachi 1" VTR's...today.

Hitachi...Tomorrow's technology today.

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BROADCAST ENGINEERING
The journal of broadcast technology

December 1980 ☐ Volume 22 ☐ No. 12

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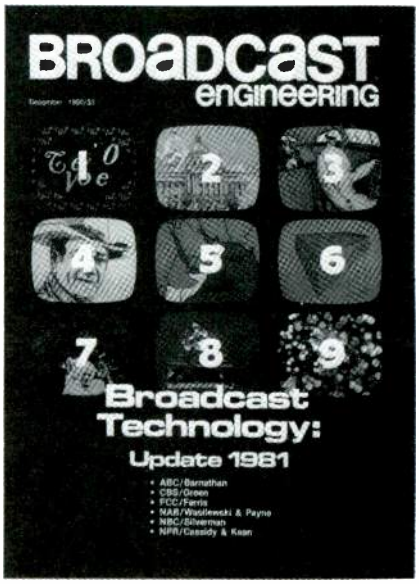

THE COVER this month was created on the Ampex Video Art (AVA) system introduced by Ampex at NAB—'80/Las Vegas.
The following artists created the cover graphics on AVA:
Ampex Corp.
Picture 1
Canadian Broadcasting Corp.
Picture 3: Mino Bonan
Picture 5: Maxime Del Campo
KGO-TV San Francisco
Pictures 4, 6, 8: Wiley Schmidt
Picture 2: Jim Schewring
KTVU-TV San Francisco
Pictures 7, 9: Jim Minton
One of the first major applications of the AVA system was by CBS in New York for use in conjunction with presidential election-night coverage in November.

The cover art was provided courtesy of Ampex Corp., Redwood City, CA, and symbolizes, through electronic imagery, aspects of "Broadcast Technology: Update 1981," in broadcasting. This topic is the theme of our December issue, and coverage is outlined in the contents at the left.

January 1981
(**BE** enters its 23rd year of broadcast engineering coverage.)
The January issue will emphasize electronic news gathering in radio and television, including World Series and other sports coverage. Also to be included is show coverage of the NRBA and SMPTE conferences.

Embarrassing questions to ask audio console salespeople

Sometimes it pays to ask questions. If the subject is audio consoles, asking difficult questions can be very revealing in comparing one console to another. Here are some of the questions that make most console salespeople squirm.

Is the console "human engineered"? Does the console have an esthetically "professional" appearance? Is the layout well defined and uncluttered? Are controls large? Do they fit the hand? Are they well labelled and lighted? Do they provide adequate visual feedback to affirm the position of the control? Is console nomenclature permanently engraved?

Easy to service? Are all components readily accessible and isolated for individual servicing? Are op-amps in plug-in sockets? Are there service loops in the wiring harness? Are extender boards provided? Are all wires uniquely numbered and referenced to your system documentation?

How responsive is the service department? Can they provide a history of fast, efficient customer service? Are they confident enough to furnish a complete list of customers for you to call?

How easy is installation? Is the console completely assembled and ready to install? Are installation points readily accessible? Are all program inputs and outputs uniquely transformer isolated?

How about specifications? Are the manufacturers' published specifications consistent and easily understandable or mired in the game called "specsmanship"?

How good is reliability? Do all modules receive three levels of testing? Does the total system receive 4 levels of performance verification? Do both the modules and system receive extensive burn-in?

Is the console backed by a 5-year, all-inclusive warranty? (*Only* ADM answers "yes" to that one.)

ADM and only ADM answers all of these questions with a full, no weaseling, resounding "YES"! The only question remaining is, when would you like to talk to us about a new audio console?

Contact ADM Technology, Inc., 16005 Sturgeon, Roseville, Michigan 48066. Phone (313) 778-8400. TLX 23-1114. West Central Sales Representative, Gordon Peters, (817) 467-2990

ADM 1600 Audio Console –Modest but mighty.

ADM® The Audio Company

If we had set out to give you only the features our competition gives you, this is where we'd be today.

Most VTR units give you only a fraction of the features you might want from a video tape recorder. So we didn't stop where our competition did. We kept on adding features. Until we developed the most versatile 1" machine on the market.

Compare the 3M TT-7000 VTR and NTC-10 Time Base Corrector to the competition. Nobody puts together more of the features you want than 3M. And once you see our unit, we think you'll agree that buying anything else is like getting half a machine.

The 3M TT-7000 Video Tape Recorder gives you:

- Auto track following (ATF) ¼ reverse through 2x forward (optional).
- Video and sync confidence heads.
- Three channel audio confidence heads.
- Video sync channel.
- All DC motor and servo tape transport.
- 19" rack mountable with full dust cover.
- Front panel plug-in modules.
- Frame accurate insert and assemble editing.
- Dual tape timer with zero memory.
- Tape speed override on front panel.
- Stop tone and cue-up (0, 3, 5, 7 sec. preroll).
- Contact closure and TTL external interface.
- Variable speed forward/reverse shuttle.
- Still frame jog.
- Autochroma and color framing.
- Audio 3 record in play mode (built-in speaker).
- Instant stop action from play or slo-mo (with ATF option).
- Instant audio bias level adjust.
- Video level calibrate marker.
- Preset/Manual tracking select on front panel.
- Fixed precision rabbited drum tape guide.
- And low RF, high temperature and low voltage alarms.

Our Time Base Corrector comes complete with its own list of standard features:

- Sixteen line correction window.
- Ten bit quantizing.
- Four times subcarrier sampling.
- 65 dB signal-to-noise ratio.
- Velocity compensation.
- Digital one line drop out compensator.
- Compact size (8¾" high by 17½" deep by 18½" wide).
- 45 pounds total weight.
- Portable cabinet or rack mountable.
- And front panel plug-in modules.

Add it all up, and you've got the most complete VTR/TBC package on the market. For a free demonstration, call (612) 733-7914 or write 3M/Mincom Division-Video Products, 223-5E 3M Center, St. Paul, MN 55144. In Canada contact 3M Canada, Inc., P.O. Box 5757, London, Ontario, N6A-4T1. In Alaska contact 3M Company, 5331 Minnesota Drive, Anchorage, AK 99502.

Get the complete picture.

3M

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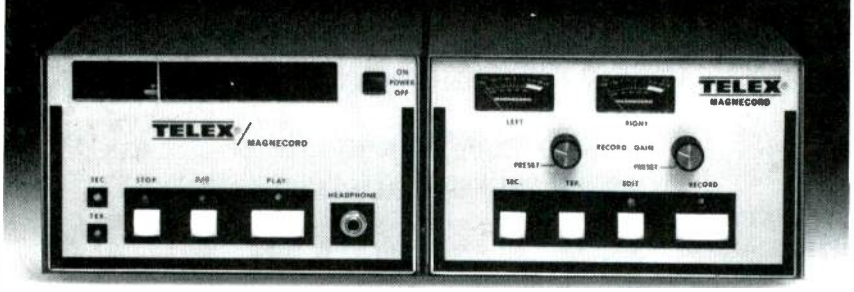

Of course, it's Telex/Magnecord

Telex Magnecord broadcast cart machines run cool and steady. So cool no ventilation is required, so steady not even voltage or frequency fluctuations will alter their speed. Thanks to our dc servo flutter-filter drive. Completely immune to RFI and EMI, it meets or exceeds all NAB standards and is suited for local or remote/automated operation.

Standard features at no extra cost.

- An edit pushbutton to add stop cues in playback and omit stop cues in record
- LED indicators show end of tape, status and secondary/tertiary cue tones
- Front panel headphone jack
- VU meters for each channel

Convenient, Flexible

MC-Series is field convertible from mono to stereo, or play to record. Optional remote controls simply plug in.

Four broadcast cart machines to choose from in the Telex/Magnecord MC-Series - all made in U.S.A. and affordable. Write for detailed information.

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CANADA: Telak Electronics, Ltd., 100 Midwest Road, Scarborough, Ontario M1P3BI, Telephone: 416-752-8575

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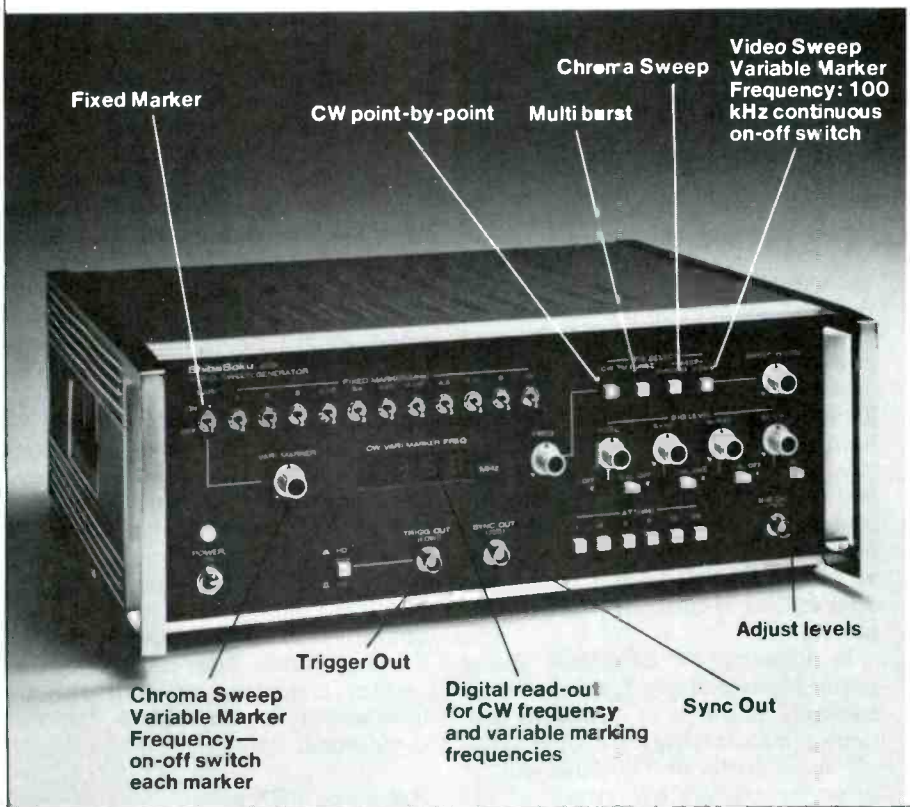

AND MAINTAIN IT!! Measures frequency response on TVs, VTRs and other video equipment.

The Asaca Video Sweep Generator 205 contains a built-in standard color sync signal generator. The color burst can be switched on and off so the 205 is ideal for oscillator comparisons to measure frequency response of color equipment.

There is a selection of output signals: video sweep (0.1 - 10 MHz), chroma sweep (sub carrier ±2MHz), CW and multi-burst.

Also, the 205 features facilities for composite sync signal outputs and trigger pulse outputs (H. D/V. D. Selectable) and so it can be used for oscilloscope triggering. Digital read out for CW frequency and variable marking.

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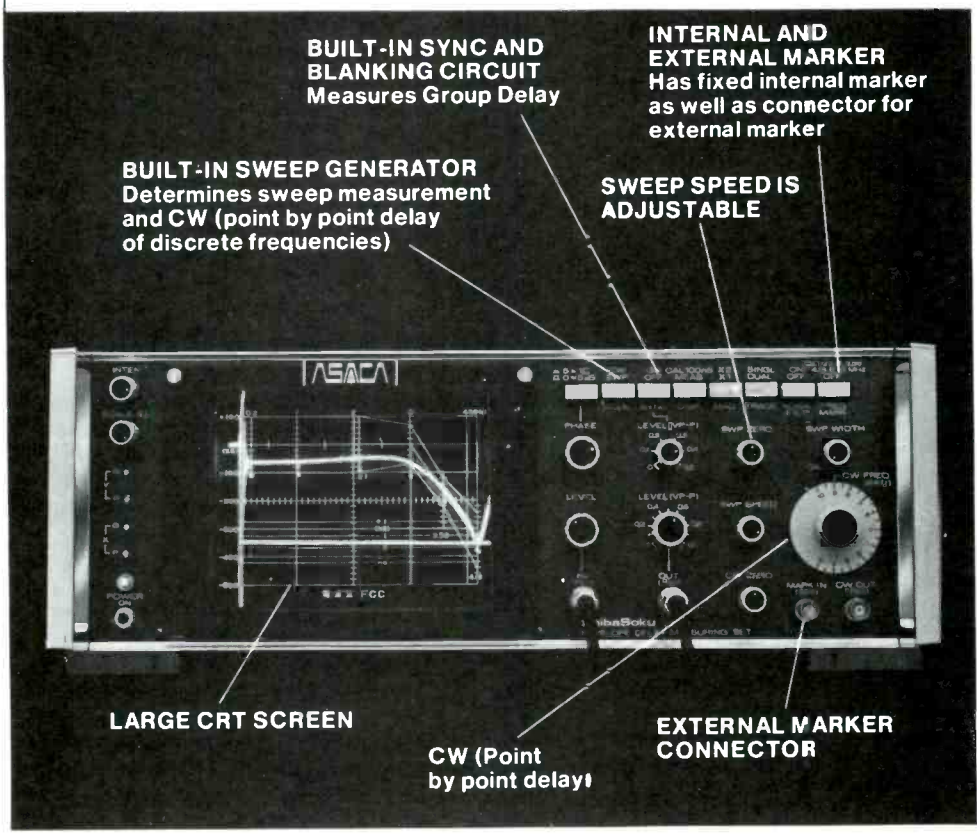

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Region 2 action

The General Services Administration (GSA) has approved a charter amendment for the Advisory Committee on AM Broadcasting in Region 2. The changes were made in response to a petition to the commission from several organizations in the radio broadcast industry. The responsibilities of the committee are increased and the name changed to "Advisory Committee on Radio Broadcasting."

There are two new informal subgroups, titled "Subgroup on Radio Spectrum Allocations" and "Subgroup on Technical Matters." In addition to advising the commission staff on preparation for the Region 2 Administrative Radio Conference on AM Broadcasting, the committee, as revised, will study and advise the commission on appropriate allocations objectives and technical standards of AM and FM broadcast stations.

To make it possible for the committee and its subgroups to provide timely advice and information, it is important that the membership be ready to begin work as soon as possible. The commission invites parties interested in participating in the work of the committee or its subgroups to notify Henry L. Baumann, chairman, Advisory Committee on Radio Broadcasting, Federal Communications Commission, Washington, DC 20554, and to participate in meetings of the committee and subgroups. The commission encourages a balanced representation of diverse interests, views and experiences in the radio broadcast field, including minorities and women.

TV transmitter output power

The Broadcast Bureau has clarified the commission's rules regarding the output power capability of TV broadcast transmitters.

The commission's UHF Comparability Task Force found this clarification necessary during its examination of techniques broadcasters could use to transmit television signals more efficiently.

Specifically, Sections 73.663(b)(3) and 73.663(c)(3) of the rules require that the power output meters for the visual transmitter and the aural transmitter (if the *direct* method of determination is used for sound transmissions) be calibrated at 80%, 100% and 110% of authorized power.

However, if the transmitter is incapable of operating at 110% of authorized power, the calibration may be made at a power output between 100% and 110% of authorized output power. These rules do not require that the licensee demonstrate that the transmitter will operate at 110% of authorized power.

In adjusting TV broadcast transmitters (particularly Klystron transmitters), there is a trade-off between maximizing the operating efficiency (ratio of TV signal output power to the electric power input) and the reserve capacity to adjust the output power to values exceeding the authorized power.

Maintaining a television broadcast transmitter so that it has the capability to operate at 110% of authorized power results in wasted energy, particularly for UHF stations, according to the Broadcast Bureau.

Although stations are required to be capable of operating at 100% of authorized power during all periods of regular program operation—except at times of technical emergencies beyond the licensee's control—no useful purpose is served by requiring that transmitters (particularly Klystron transmitters) be adjusted for less efficient operation solely to provide the unnecessary reserve capability of operating at 110% of authorized power, the Broadcast Bureau emphasized.

Direct satellite-to-home broadcasting

The FCC is seeking comment on recommendations made in a commission staff report presented on October 2, 1980—recommendations that could form the basis for regulation of Direct Broadcast Service (DBS) in the 1980s.

The staff report indicated that there is no need for the commission to apply traditional types of regulation to DBS. The report stated that any decision concerning the regulation of a new service should be in keeping with the deregulatory trend of recent commission actions.

The staff recommended creation of a hybrid service, recognizing that video programming services such as DBS have characteristics of both broadcast and point-to-point services. The staff felt that such a service could then be distinguished from broadcast and common carrier services, and thus could be free of traditional types of regulation.

DBS systems may provide services which the public will desire that are not presently being met by conventional broadcast services. A DBS service will probably offer several channels of video programming on a subscription basis, which will enter the home via a special antenna attached to a typical television set.

The commission cannot establish final regulations concerning DBS until after the 1983 Regional Administrative Conference of the International Telecommunications Union. In the meantime, the commission is seeking comments on staff recommendations in preparation for the conference.

Amending UHF rules

The commission has begun a proceeding to amend the rules that govern UHF television (channels 14-83), and is seeking comment on recommendations by the UHF Comparability Task Force.

Based on suggestions by the task force to improve UHF, the FCC has begun a rulemaking to:

- Exclude UHF channels 70 to 83 from the FCC's all-channel television receiver requirements (these channels have been reallocated to the land mobile radio services),
- Require that tuning and reception aids such as coaxial input connectors and shielded cable be included in the UHF portion of a television receiver if they are included in the VHF portion,
- Consolidate present channel selector rules to achieve more accurate tuning and better labeling of UHF channel numbers for a few types of receivers which have been meeting less stringent requirements,
- Clarify existing rules to say that television station transmitters need not be capable of operating at 110% of their authorized power, since a reduction in this margin can save power costs for the UHF station.

The commission is also seeking comments from the public for task force recommendations for helping UHF television attain comparability with VHF television. □

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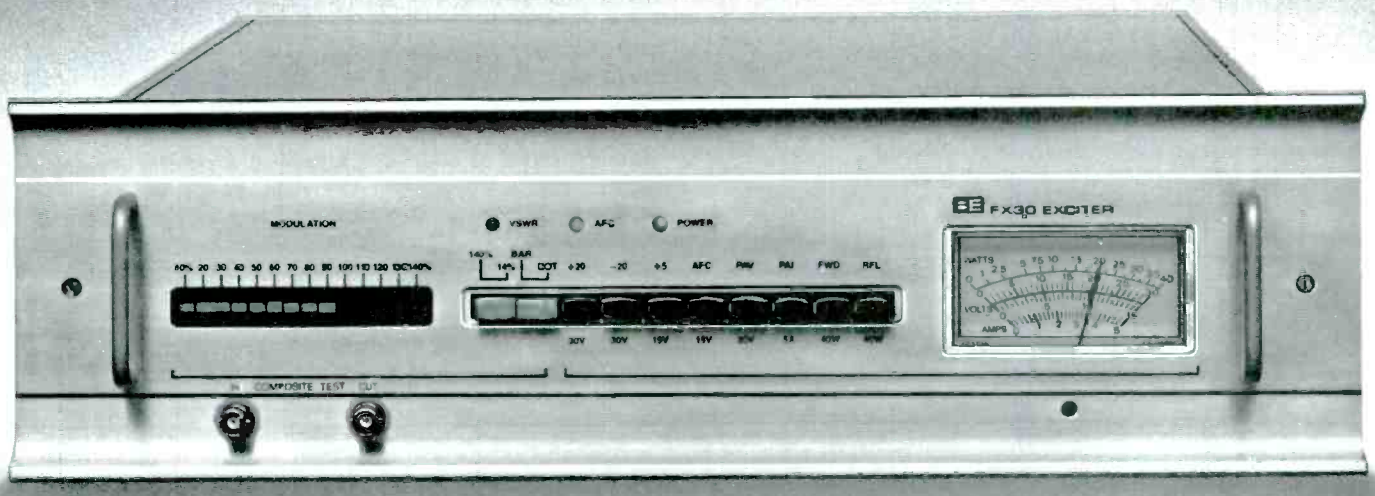


Broadcast Electronics introduces a new FM Exciter —the FX 30—with superior performance that rivals the best hi-fidelity tuners available.

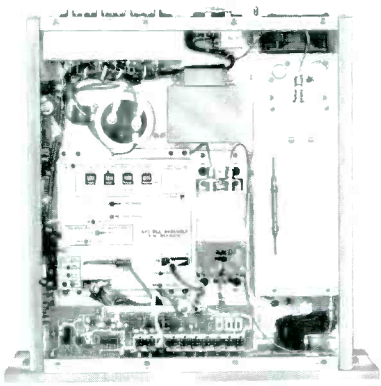
For the Purist, Purest Sound.
The FX-30 has the lowest distortion, with THD and IMD less than 0.08%. And, it's the first exciter to specify Transient Intermodulation Distortion (TIM) at less than 0.1%.

Loud, yet Quiet.
The FX-30 is loud and sparkling clean with your programming, yet it's the quietest exciter of all, with a typical S/N ratio of 78 dB.

Broadband and Synthesized.
Advanced dual speed phase locked loop puts more than 2000 channels at your fingertips.

Set It and Forget It.
Automatic control circuits eliminate adjustments after initial setup. Exciter output is automatically stabilized and fully protected. Set it and forget it.

The Perfect Retrofit.
RF power output is adjustable up to 30 watts. The FX-30 will improve the performance of any transmitter and will fit directly in place of your present exciter.



Styling Elegance.
Elegant in styling as well as in performance, the new look in FM is the elegant look of the FX-30.

For more information on the FX-30 Exciter and BE's exciting new FM transmitters, call or write Joe Engle at: 217-224-9600

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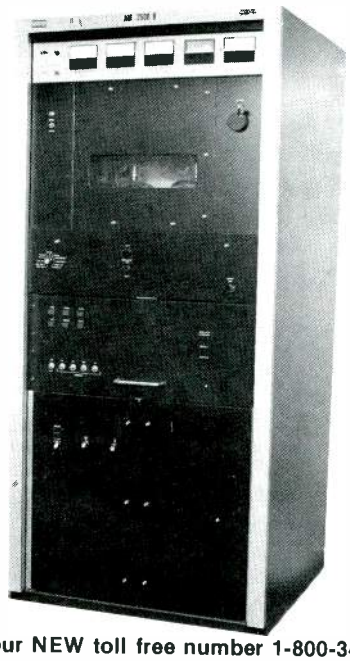

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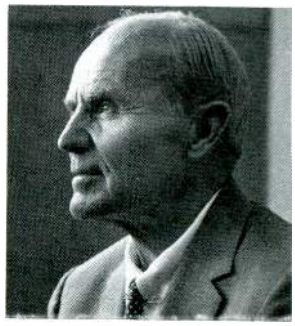
industry news

Poniatoff dead at age 88



Alexander M. Poniatoff, whose boyhood fascination with a locomotive eventually led to the founding of Ampex Corporation and two major technological breakthroughs, died October 24, at the age of 88. He founded Ampex in 1944 and served as president until 1955, when he was elected chairman of the board.

The first breakthrough occurred in 1947 when Ampex, down to eight employees in a post-World War II recession, introduced the first practical magnetic audio recorder in the United States. The technical milestone helped launch a multi-billion dollar industry and set Ampex's future course of development.

That development was followed by introduction of the first practical videotape recorder in 1956, an invention that revolutionized the television broadcast industry and gave Ampex a worldwide reputation for technical innovation. The company's name comes from Poniatoff's initials, together with EX for excellence.

Poniatoff was born in Kazan, Russia, on March 25, 1892. During an interview when he was 84, Poniatoff recalled that he saw his first horseless vehicle, a locomotive, when he was seven. "I decided right then that I would build these locomotives," he told the interviewer.

He attended the Unviersity of Kazan, the Imperial College in Moscow, and the Technical College, Karlsruhe, Germany, obtaining degrees in mechanical and electrical engineering.

He was a pilot in the Imperial Russian Navy during World War I, and then in the White Russian Forces that were defeated during the revolution. He escaped to Shanghai, China, in 1920 and worked as an assistant engineer for the Shanghai Power Company until 1927, when he immigrated to the US. He became an American citizen in 1932.

He is survived by his wife, Hazel, and a niece, Mrs. Peter (Anna) Kashkadanmoff, of San Francisco.

Gill proposes 'do-it-yourself' CP

California broadcast pioneer Cliff Gill, a radio station owner and consultant from Marina del Rey, has proposed what he calls "do-it-yourself construction permits" to speed up processing of applications by the Federal Communications Commission.

Under his plan the engineering review of applications would be performed by private professional engineers rather than FCC staff members.

Once two qualified private engineers had agreed that a new or higher powered station would not interfere with any existing station, an applicant would only have to file a "Notice of Intent to Construct" with the FCC and after a 60- to 90-day waiting period for potential protests had passed the broadcaster could proceed with construction at his own risk. If unforeseen interference should develop, it would be the responsibility of the new station owner to correct the problem, or in the ultimate case, go off the air.

Gill says he has not received a single negative

reaction from dozens of broadcasters and engineers and members of the public with whom he has discussed his plan. "Everyone says it's a great idea but it's so logical the government probably won't approve it," he said. "But I have discussed it with several high level FCC and NTIA staff members and they thought it was a good idea, too. We'll have to see what the commissioners themselves say."

There is a precedent for use of private engineers for processing applications, according to Gill. He says that the FCC hired private practitioners to help them break the log-jam of applications that had built up during World War II.

"I'm proposing a similar concept, but this time the broadcasters pay for it," he says.

"I favor a plan whereby the broadcast applicant shoulders the entire cost of preparing and checking applications, relieving the taxpayer of the cost of staff which can be replaced by private practitioners," he said in a pleading filed with the FCC.

He says that even though engineering fees may be higher, broadcasters will actually save money because they will be able to get into operation sooner. The public will benefit from new or improved service that they now have to wait years for, he said.

Fire interrupts KCMO broadcasting

Because of a fire that originated in its Harris MW-50 transmitter, KCMO radio in suburban Kansas City was knocked off the air at 6:02pm on October 22. After a downtime of only 7½ hours, station personnel were able to restore full operation using auxiliary standby transmitters. Damage to the transmitter building, north of Kansas City, was minor, limited mainly to that caused by water and smoke.

Wold handles links for marathon

Wold Communications, new operating division of Los Angeles-based Robert Wold Company, handled terrestrial and satellite interconnection for the 11th annual New York Marathon, broadcast live from Central Park on Sunday, October 26.

16,000 runners, representing 42 countries, participated in the event, regarded by those athletes boycotting the 1980 summer Olympic Games in Moscow as "the next best thing."

Archives acquires rare TV equipment

Three rare television receivers from the 1930s have been donated to the Academy of Television Arts and Sciences/UCLA Television Archives by Harry Lubcke, who directed development of Los Angeles's first electronic television station, W6XAO. Two of the receivers, 12-inch, were designed and built by the W6XAO staff in 1937 and 1938. The third receiver, a TRK-12, was manufactured by RCA in 1939 and is one of the earliest receivers to be sold publicly.

The archives has also acquired a TK-10 studio camera from television station KTLA, Los Angeles. Built by RCA, the TK-10 was the first production camera to be sold in quantity, beginning in 1946. It was the primary camera used during the phenomenal post-war growth of television programming.

RCA Satcom I sends live coverage from Voyager I

Six hours of live TV coverage showing closeup views of Saturn made by NASA's Voyager I was carried on Showtime transponders during November via RCA Americom's SATCOM I satellite.

The telecasts took place November 11, 12 and 13 when the spacecraft passed the planet. □

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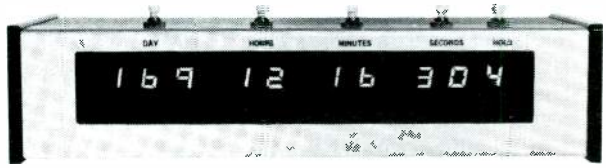

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National Association of Broadcasters
1771 N Street, NW
Washington, DC 20036

NAB not in complete support of FM assignment plans

The NAB, although supporting the FCC's proposal to streamline its FM assignment process, told the agency it is not in complete support of the overall plan.

In its filing, the NAB said it was disturbed by the FCC's apparent view that smaller communities now have enough FM service and that the commission's proper future course is to assign new stations primarily to large urban areas. It also emphasized the commission's statutory obligation to assure a "fair, efficient and equitable distribution of radio service" throughout the country. NAB said it was essential that "parties proposing an assignment which will provide a greater degree of local service not be defeated by procedures which, on their face, are designed only to reduce expense and delay."

The NAB recommended that the commission study the issues in the larger context of FM and AM service taken together through its new Advisory Committee on Radio Broadcasting.

FCC told to study 9kHz

The NAB said the FCC must conduct thorough studies on the effect of its proposal to reduce AM channel spacing from 10kHz to 9kHz before it may knowledgeably or responsibly make a decision. It also said the proposal should be studied by the FCC's Advisory Committee on Radio Broadcasting especially before the Region 2 conference.

The NAB also urged the FCC to give high priority to existing daytime-only AM stations desiring full-time service. "These daytime-only broadcasters long have labored under severe operational restrictions in their efforts to provide local service and, as such, appear deserving of a portion of any potential benefits from 9kHz channel spacing."

The association emphasized that it never has taken a position favoring or disfavoring a reduction to 9kHz but has asked for a thorough review of the effects.

In its filing, the NAB said it is concerned about the possibility of the elimination of threshold requirements on the acceptability of applications and opposes any such action. It said this would operate to the detriment of localism and in disregard of the commission's basic statutory requirements.

FCC accused of 'cart before horse' approach

A "cart before the horse" approach is being used by the FCC in examining possible use of the satellite spectrum, the National Association of Broadcasters has charged.

The FCC recently issued a Notice of Inquiry in preparation for the 1983 Region 2 World Administrative Radio Conference that will allocate use of the satellite spectrum. The NAB pointed out that the United States has not yet sorted out the demand for satellite communications and is in no position to now comment on "the panoply of technical issues to be passed on at the 1983 conference."

The NAB suggested the commission first form an advisory committee to translate the US interests into a flexible but sound position for the conference. Specifically, the association proposed maintaining flexible options for division of spectrum space for fixed satellite service and for broadcast satellite service as well as for individual reception and community reception.

Kops named chairman, Broadcast Rating Council Board

Daniel W. Kops, president, Kops-Monahan Communications (WAVZ), (WKCI-FM), New Haven CT, was elected chairman of the Broadcasting Rating Council's Board of Directors at its annual meeting. Kops replaces Peter Kizer, vice president for broadcast operations, Detroit Evening News Association, Detroit, MI, who held that position for the previous five years.

The Broadcast Rating Council is headquartered in New York City and is an independent organization which monitors the procedures and performance of accredited broadcast rating services to assure the credibility of broadcast audience measurements.

Schulte, Davenport named to posts

Jerome Lansner, NAB's senior vice president and general manager of the Code Authority, announced the appointment of two staff members to new positions. William E. Schulte, assistant manager of the New York Code office, will become Lansner's assistant, and Kittie Davenport, senior editor, will succeed Schulte. Both appointments are effective immediately.

Schulte joined the Code Authority in 1966, served in a number of editorial positions and was senior staff assistant. He has been assistant manager for the past seven years. He was a continuity and copy writer at WCPO, Cincinnati, and did layouts for print advertising for the Reuben H. Donnelley Corp.

Davenport joined the Code Authority in 1974 as a science editor and two years later was named science supervisor. In 1978 she joined the Research Testing Laboratories as clinical research associate and returned to NAB in 1979 as senior editor. Her past experience includes research assistantships at New York Medical College and The Rockefeller University.

NRBA
National Radio Broadcasters' Association
1705 De Sales Street, NW
Washington, DC 20036

9kHz move could cost $20 million

According to a $250,000 engineering report for the FCC by Moffet, Ritch & Larson (formerly Sillman, Moffet and Kowalski), the proposed 9kHz move may cost as much as $19,836,119.49. Depending on the facility, individual station costs could range from $1600 to $60,000. The figures are based on "a realistic minimum cost" and do not include money loss due to down time.

The final total cost results are as follows:

Nondirectional	$4,641,334.75
*DA-D & DA-1	$3,958,479.96
*DA-N	$4,555,296.57
DA-2	$4,886,619.75
DA-3	$ 32,402.01
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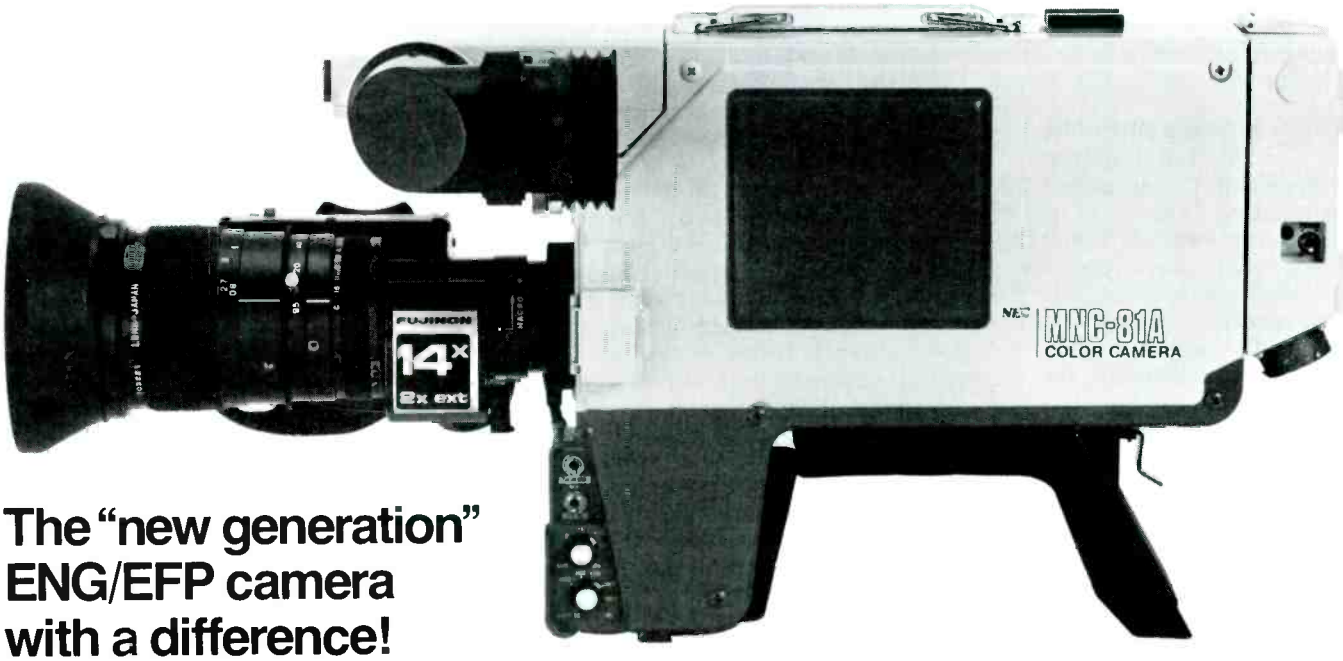
Introducing NEC's all-new MNC-81A



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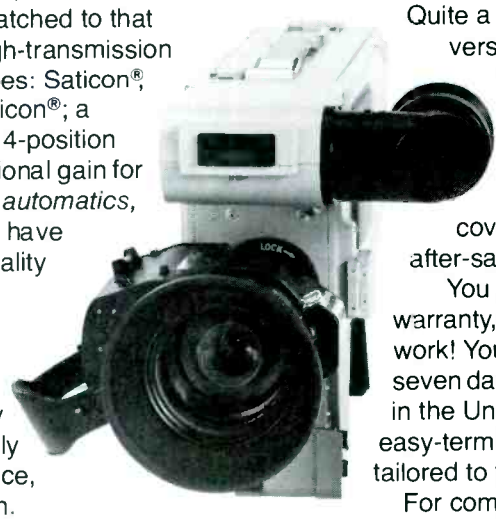
Designed to meet today's more stringent requirements for highest-fidelity color reproduction, the MNC-81A features outstanding colorimetry matched to that of broadcast cameras; with f/1.4 high-transmission prism optics; a choice of pickup tubes: Saticon®, Plumbicon®, or Diode Gun™ Plumbicon®; a signal-to-noise ratio of 54 (±2) dB; 4-position gain control with up to +18 dB additional gain for low light level operation; plus all the *automatics*, built-in indicators and features that have become standard for broadcast-quality video cameras. And more.



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Extensive use of LSI hybrid microcircuits developed uniquely by NEC makes the MNC-81A extremely stable in registration and performance, and ultra-reliable in circuit operation.

Low-profile and ultra-lightweight — camera head (without lens, but including 1.5" viewfinder) weighs *less than 11 lbs.* and measures approximately 10¼" × 4" × 13½"— the MNC-81A handles with the ease of a compact 16mm newsfilm camera.

It is well balanced on the shoulder, with a form-fitting adjustable base. And its 1.5" viewfinder telescopes for convenient left or right eye viewing.

Best of all, the MNC-81A is a multi-purpose camera with the widest range of options for studio and field operation. Its sophisticated optional remote control capabilities include a co-ax digital remote control system for distances up to 5000 feet, as well as fiber optics module and cable adapter for fiber optics video transmission from distances up to 9000 feet.

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Association News

Critical Arrays	$ 529,568.53
Other Stations	0
GRAND TOTAL	**$19,836,119.49**

**DA-Directional Array*

These figures assume that changing to 9kHz spacing would cause no station to move more ±4kHz, the plan currently favored by the United States.

Privacy protection for broadcasters

President Carter signed into law on Monday, October 13, the Privacy Protection Act of 1980 (*Stanford Daily Law*) which prohibits unannounced police searches. The law also requires authorities to obtain a subpoena, which provides stations with the opportunity for a court hearing.

The law was introduced following the police search of the *Stanford Daily* newspaper offices.

Lisa Friede appointed vice president

Lisa Friede, formerly NRBA's director of operations, has been appointed vice president by the NRBA Board of Directors. Friede joined NRBA in 1977 as projects manager and held the positions of administrative director and director of operations before being appointed vice president.

NRBA board meets in Los Angeles

On October 4 the NRBA Board of Directors elected officers for the coming year, charted an expansion of NRBA's activities and instructed the staff and legal counsel to prepare drafts of comments to be filed on radio issues pending at the FCC.

As a result of the expansion of NRBA regions from nine to 15, the NRBA board now totals 36 board members: 15 regional directors, 20 directors-at-large and an elected president. Nearly one-third of the current NRBA board is first-time board members elected by popular vote in their regions.

Officers elected were: Sis Kaplan, president, WAYS/WROQ, Charlotte, NC; Robert Herpe, board chairman, General Communications Corporation, New Haven, CT; Stephen Trivers, vice president, East, Fairfield Broadcasting; Lynn Christian, vice president, Midwest, Century Broadcasting, Chicago, IL; Bill Clark, vice president, West, KABL, San Francisco; Bernard Mann, secretary, Mann Media, High Point, NC; and Ted Dorf, treasurer, WGAY AM/FM, Silver Spring.

The board overruled a previous decision of the executive committee and voted to hold to long-scheduled September-October dates for NRBA conventions in future years.

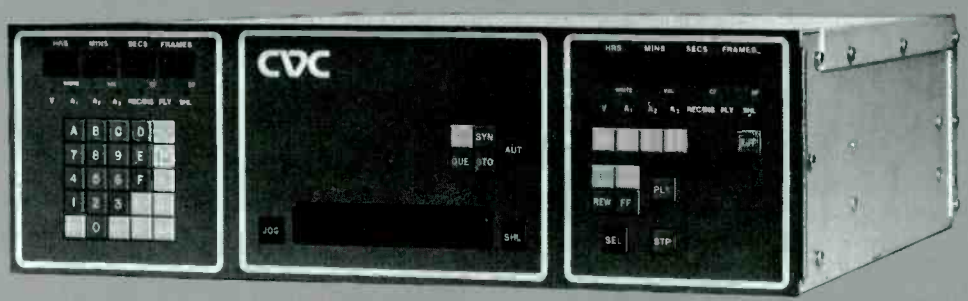
The board voted to reconstitute all association committees and to integrate the work of these committees into the planning and decision-making procedures.

The state directors organization will be reorganized to operate under the association's three regional vice presidents and the regional directors.

The board instructed the executive committee to form a new legal committee that will couple at least one NRBA member to each member of the new Congress that will convene in 1981.

The staff was directed to prepare a schedule of local and regional seminars and workshops to be held throughout the United States during the coming year. Sales, management and programming are to be the main subjects covered.

General counsel was instructed to prepare for board approval a draft of comments, opposing, in general,



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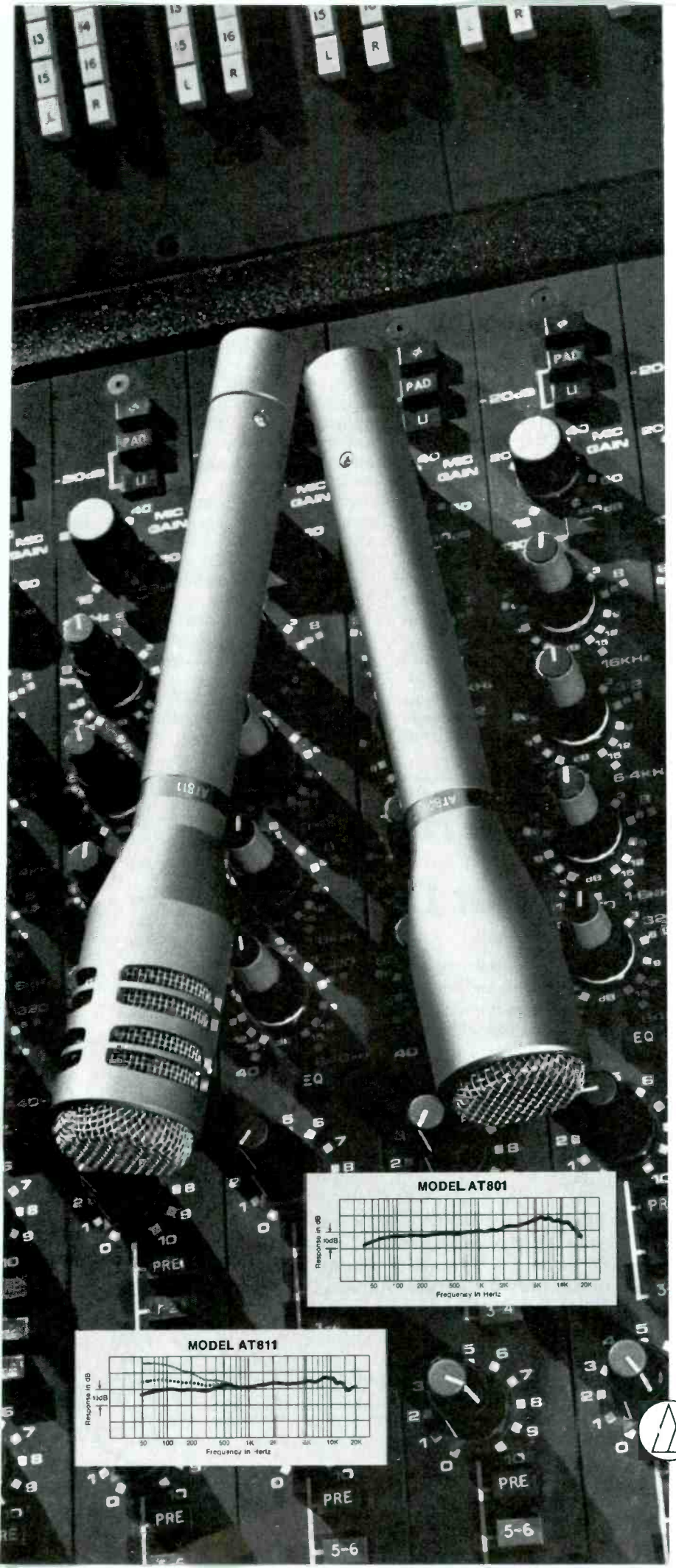

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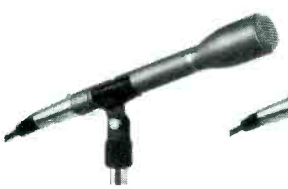

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the FCC's proposed "postcard license renewal."

The board voted to support an NRBA proposal to eliminate the FCC's requirement for submission of 324 financial reporting forms and referred to the Legal Committee for study and submission of recommended actions the FCC's proposal to end 1st Class Radio Operator's license requirements.

It was decided that the winter meeting of the board would be held in mid-February, 1981.

The board heard reports from staff members on the association's all-time high in membership and on the record-breaking annual convention held in Los Angeles.

NRBA elects directors-at-large

The NRBA board has elected nine directors-at-large to serve two year terms. Several of the directors-at-large will be serving their first terms. The new directors are: Kent Burkhart, president, Burkhart/Abrams/Michaels/Douglas, Atlanta, GA; Ted Dorf, general manager, WGAY AM/FM, Silver Spring, MD; New Latto, president and general manager, WAKX, Duluth, MN; Stephen Trivers, president, Fairfield Broadcasting, Kalamazoo, MI; Thurman Worthington, general manager, WKEZ, Norfolk, VA; Jim Connor, vice president, WWSH Radio, Bala Cynwyd, PA; Tom Hoyt, president, Heftel Broadcasting, Chicago, IL; Dave Raven, president and general manager, WIFC/WSAU, Wausau, WI; Gary Worth, president, Wold Communications, Arlington, VA.

Karl Eller leaves Charter

After a brief union Charter Co. and Karl Eller jointly agreed to dissolve their venture, Charter Media Co., which made up both Eller's and Charter's media holdings. Eller says the decision to split was because of the "demands on my personal time, present economic conditions and the long-term interest of several properties involved."

According to the settlement agreement, Eller will retain ownership of K101-FM, San Francisco, the Philadelphia Bulletin and the New York Advertising Company. Charter has agreed to buy back Eller's interest in Charter Media and will withdraw its application to the FCC to shift the radio licenses to Charter Media.

Pending stockholder approval, Charter will reorganize its media properties back into Chartcom. Fred Denneman will remain with Charter and move up to become Chartcom's chairman; James P. Smith will become president. Both Charter and Eller have expressed interest in retaining John Bayliss, previous president of Charter Media's Radio Division.

NRBA questions FM station increases

In its comments filed in BC Docket No. 80-90, the NRBA questioned the proposal to form two new classes of FM stations, which would create an undetermined number of FM stations. The NRBA has "significant reservations about the commission's approach to this proceeding, which apparently sets proliferation of FM stations as the quid pro quo for radio deregulation." The NRBA further pointed out that it appears the commission has prejudged the instant proposal is in the public interest, "because it will lead to an increase in the number of available FM stations."

The NRBA recommended the whole matter be referred to the newly established Government-Industry Committee on AM and FM broadcasting, which was created to deal with such far-reaching allocation proposals. □

Dane Jubera On Harris Broadband Phasor Design

Dane Jubera, Lead Engineer, Antenna and Medium Wave Network Product Development

"Harris engineering has been instrumental in promoting excellence in broadband phasor design. This is especially important as the industry prepares for AM Stereo. Our custom broadband designs provide low envelope distortion levels and wider frequency response, without compromising stability and adjustability. At Harris, we combine the talents of a select professional engineering staff with the technology of computer-assisted design techniques. Consequently, our product delivers improved performance in directional as well as non-directional modes."

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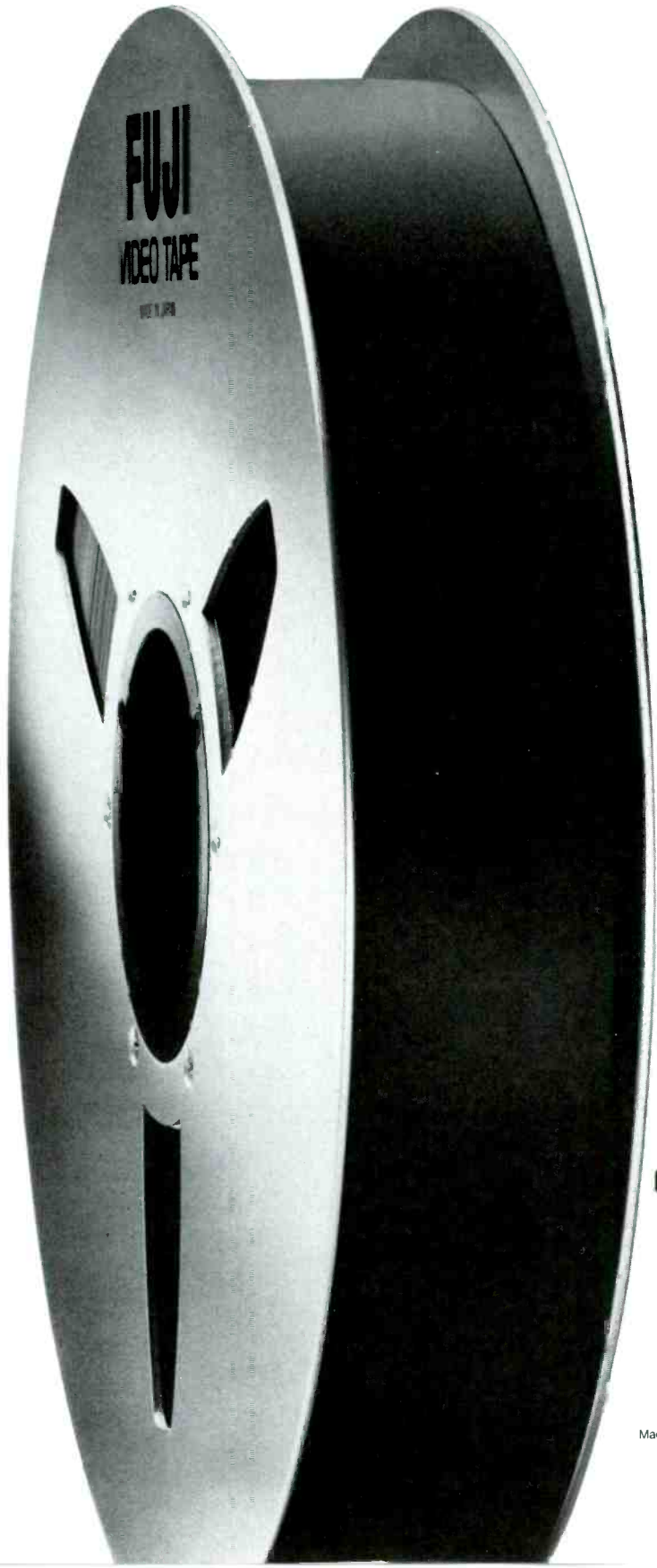

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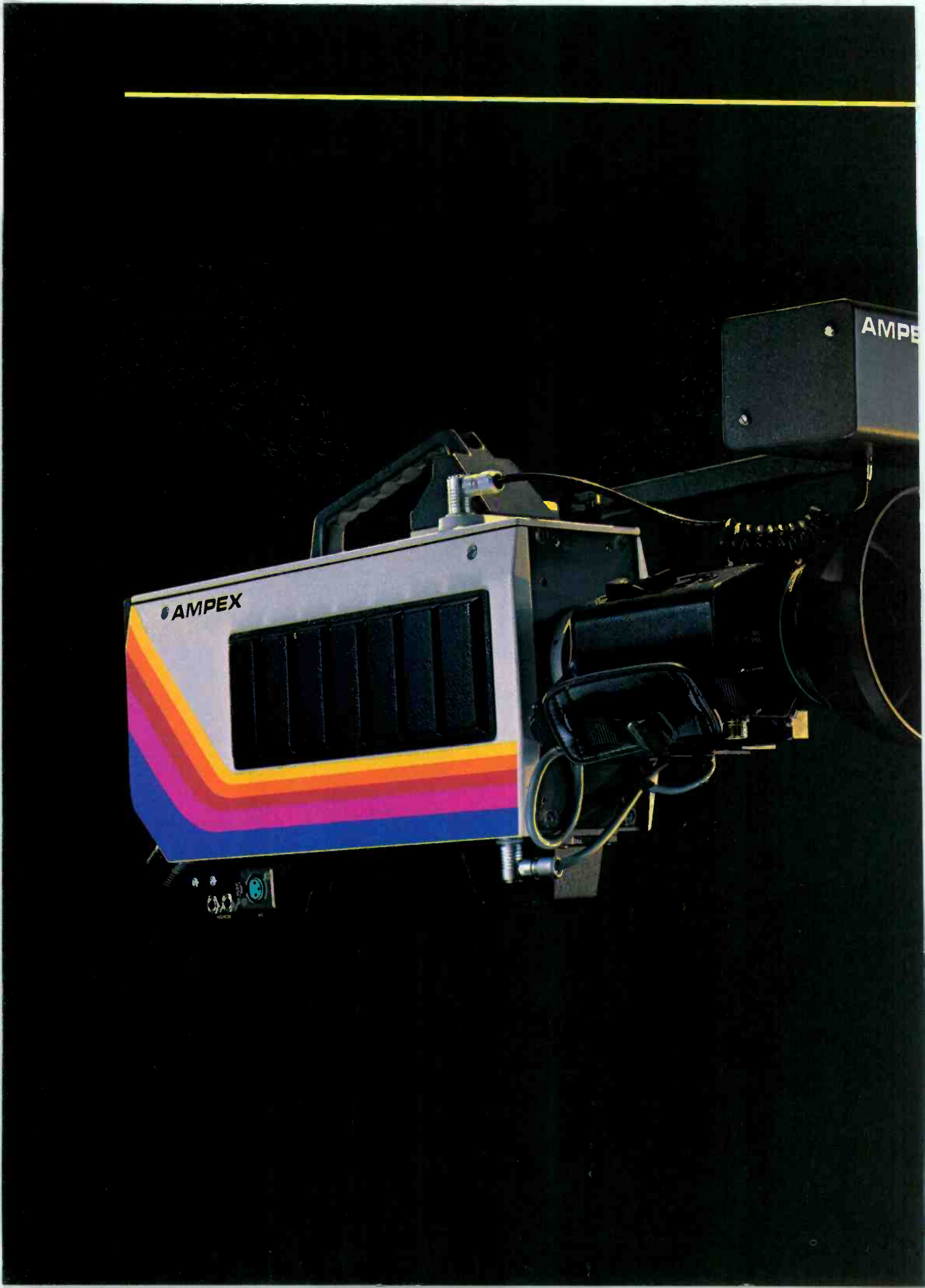
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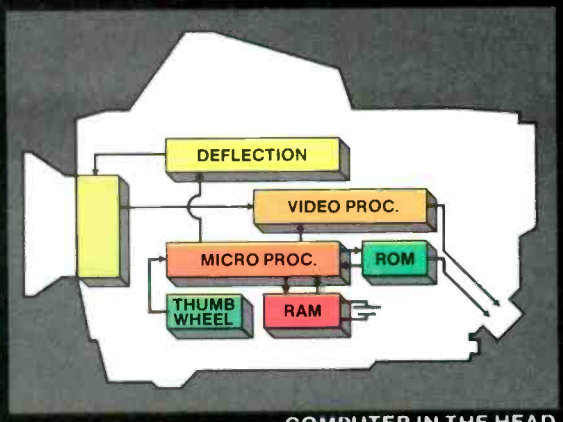

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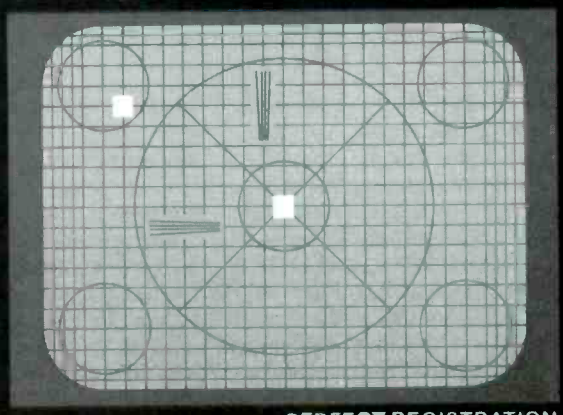

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Broadcast Technology: Update 1981

By Bill Rhodes, editorial director

We are barely launched into the 1980s, but already the decade is marked with controversial issues in broadcasting—even in the face of exceptional industry prosperity.

Take a look at 1980: NAB '80 in Las Vegas was a record-setting event; the same was true for NRBA '80 in Los Angeles and for SMPTE '80 in New York. All these major industry shows set attendance and exhibitor registration records this year, breaking last year's records—and that speaks well for advances in broadcasting.

Take a look at new equipment: the three major shows—NAB, NRBA and SMPTE—all featured new equipment to help every facet of broadcasting. And manufacturers are already alerting us to look for their new products emerging from R&D that will be introduced at NAB '81 in Las Vegas.

Take a look at the issues and opportunities: AM stereo that may go to the marketplace; the 9kHz problem that will peak in 1981; expanded satellite usage; the First Class License requirements; stereo TV; the clear channel pressures; continued deregulation; teletext; videodisc; accelerated usage of 1-inch VTRs, captioning for the deaf, and continued pressure to reduce the FCC backlog. There seems to be no end to the issues and growth-related problems—but that is also a part of the picture of prosperity for broadcasters. Thus, as 1980 draws to a close, broadcasters find themselves in an active industry surging ahead into a young decade.

Last December we posed the following questions: "*And what will this new decade bring forth? AM Stereo? Of course; it's already here, but far greater progress is steamrolling ahead. Digital video? Of course; but don't be too anxious. Experts agree that video standards are years away—mid 1980s at least.*" There have been notable advances this year, but major changes are still progressing slowly.

Last year our December issue contained five separate articles in which broadcasters peered ahead to see what factors would shape our industry's future. This year we repeat this theme of *What's Ahead* and have asked leading broadcasting authorities to talk about changes they anticipate as we move ahead in the 1980s. An article on this theme also appeared last month as a report from NRBA. That article, by Karl Eller, begins on page 72 of the November issue and gives a resounding acclaim for the bright future of radio. This article, by rights, should be considered in conjunction with this issue to round out the topic of *What's Ahead*.

Broadcast Engineering takes this opportunity to wish you happy reading and a prosperous new decade. □

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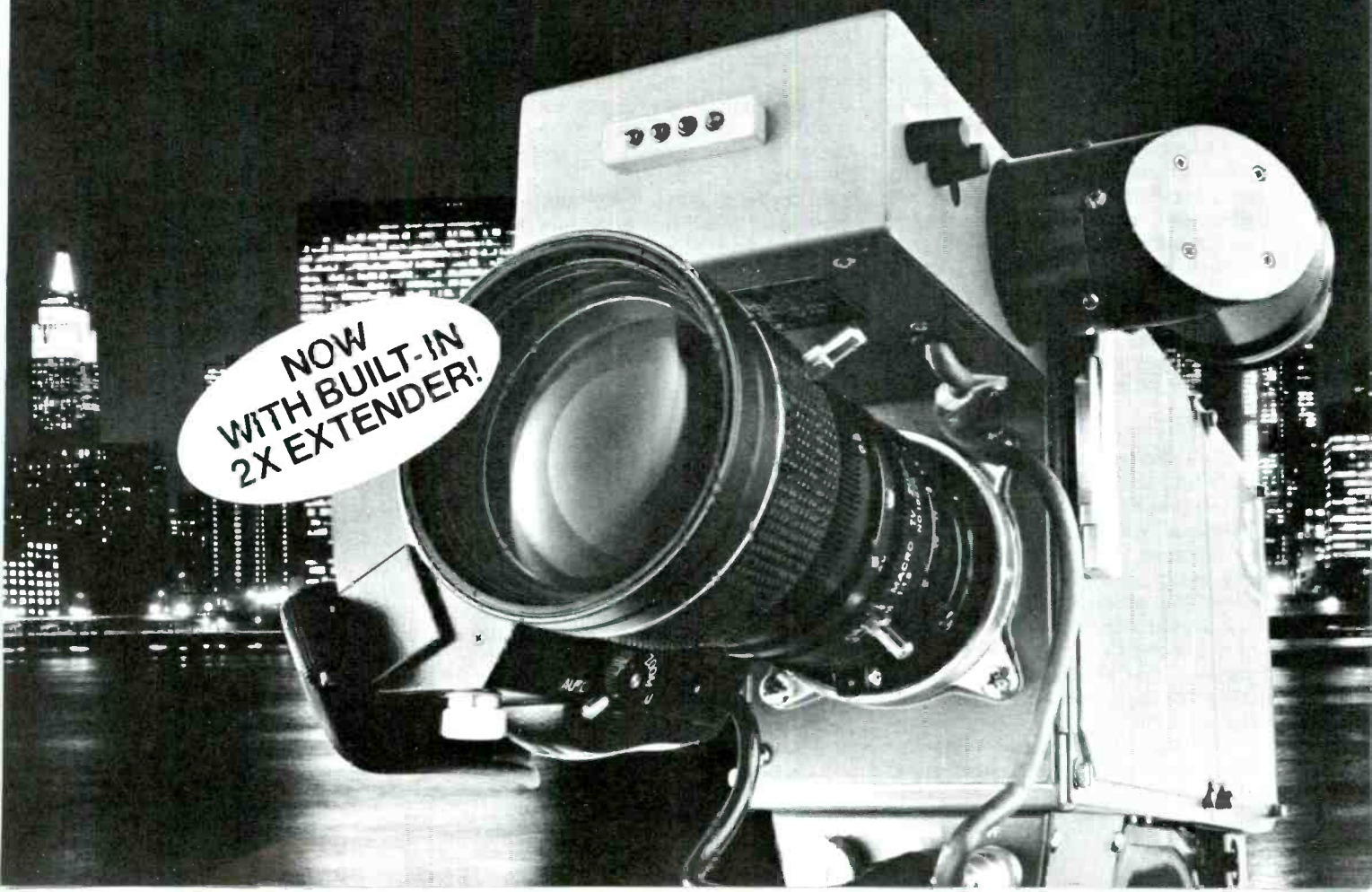

Broadcast Technology: Update 1981

Barnathan: ABC's coverage of the Winter Olympics involved extensive engineering planning and the latest in broadcast equipment.

The impact of digital technology

By Julius Barnathan, president
Broadcast Operations and Engineering, ABC, New York

Digital television recording and transmission are destined for future use. This use will take advantage of computer technology and solid-state advances. This will mean increased quality of transmission and could reduce tape or program storage requirements for space and size.

Developments in computer technology are moving so swiftly that it is premature to consider standards for digital television. Consider that five years ago a computer chip held 1000 bits. Today that figure has climbed to 64,000 bits, but within five years, it is conceivable that a memory chip suitable for television could hold 512,000 bits. The implications of digital television go beyond improvements in transmission and affect storage of pictures for editing and future use. A digital system will ultimately mean a new technological structure for the industry. Although this change won't seem as dramatic to the viewer as some of the new video systems for home use, the improvements in our technological capabilities will be dramatic from an engineering perspective.

Digital improvements

Putting aside the critical question of standards, here's how digital television will change the industry as we know it. The place to begin is the easily distorted analog voltage waveform produced by the conventional television camera. The quality of the viewer's picture depends on the accurate reproduction and stability of that waveform. Digitizing the camera signal, which means converting the light signal variations into numbers (or digits) instead of analog voltages, begins the process of improving the picture.

Degradations of the television analog signal and image tend to build up as the signal moves along the transmission path through the studio facilities, recording, editing and, finally, to the home receiver. One example is signal nonlinearity in which each repetition produces a greater loss of intermediate ranges of contrast. Any wideband system contends with the cumulative problem of phase distortion, and this is especially a problem with high resolution television systems. The result is *fringing* because of unequal delay (or phase shifting) of different frequency components within the signal passing through the different impedance elements.

In trying to solve these and other problems, television engineers have often found that resolving one problem makes another one worse. Even with the most sophisticated gear, impairments caused by phase distortion and modulation products continue to cause picture distortions. Digital handling of signals will reduce distortions caused by transmission links and do so without possibility of introducing new distortions.

Digital vs. analog

At this point, it may be helpful to underline the basic difference between analog and digital systems. Analog devices operate with continuous data; digital devices deal with discrete or stepped data. The resolution of any analog device relates to the exactness of the analogy that is used and could depend on the estimating (artistic) skills of the operator. The resolution possible with a digital device depends exclusively on the number of significant figures or samples. The accuracy of a readout from a digital device is not dependent on an operator's estimate.

One of the most significant questions in the development of digital television relates to how many digits or samples will be used. Making the decision on how many samples to be used involves bandwidth, electronic complexity and money.The 8th International Broadcasting Convention in England held in September considered different proposed digital transmission standards. The European Broadcasting Union has conducted tests on 12MHz for luminance and 4MHz for the two color difference channels. This is known as the 12:4:4 standard. One of the reports found that this proposed standard did not produce acceptable quality in chroma-key when the chroma-key function was performed after the original taping. This feature, which gives fair to poor results with current analog equipment and tape recorders, is one of the possibilities for improvement in the digital system.

Cost vs. performance

Cost and performance trade-offs must be made in establishing new digital standards. New innovations versus conventional operation must be studied to see what impact they have on the standard.

Any decisions at this stage may serve to impede the future sophistication of digital equipment. What is evident is that no changes are being

continued

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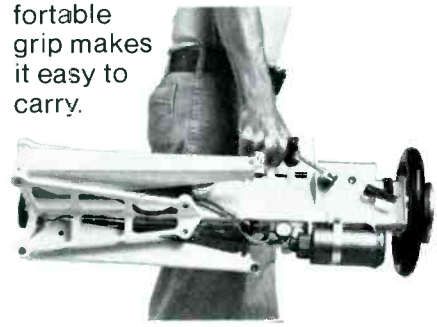

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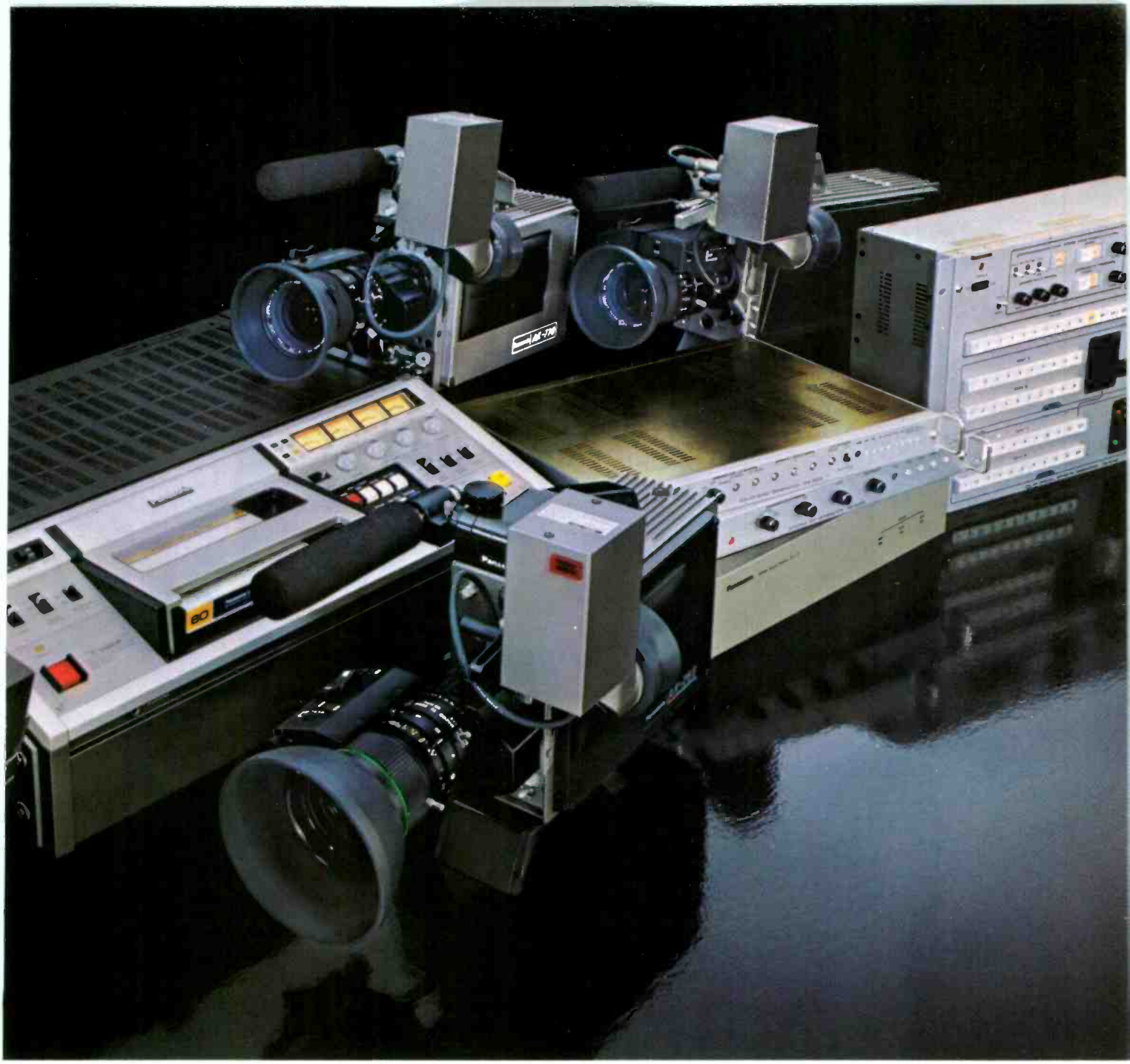

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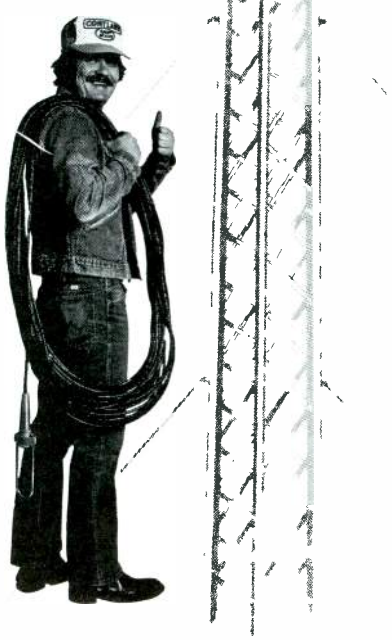

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Coverage of the Winter Olympics provided a proving ground for the latest in video and audio equipment for broadcasting—field experience valuable in planning for the '80s.

ABC: digital

planned or contemplated in the conventional home receiver because of the sizeable investment already made by the public. What will happen during the coming decade is the increasing use of digital techniques to increase performance and/or reduce the cost at various points in the system.

Computerized graphics

At ABC, computer technology has already changed the presentation of graphics. Use of the Quantel 5000 Plus digital manipulator began at the Lake Placid Winter Olympics and continued with election coverage. This is the most recently developed unit for providing digital video effects through five separate framestores. The Vital Squeezoom was also used. Another digital device used was the Ampex Electronic Still Store (ESS-2), which is capable of storing 1600 individual TV frames or pictures and enables many of the television show elements to be prepared in post-production form.

Graphics are a *natural* for digital technology. Television graphics have progressed from the use of a camera to take a picture of a hand-produced art card to sophisticated computer graphics. What the computer can produce and store in terms of graphics gives a hint of how much computer technology can do for the entire television system. By using digital technology in the generation, manipulation, recording and transmission of television images, many of the problems experienced by engineers would be solved or greatly reduced. There would be expanded possibilities in the accuracy of transmission and the enhancement of picture quality.

Much has been written in recent months about the video revolution in the home, and new technology is going to affect the types of delivery systems that will ultimately be used for the television screen. Computer technology, if given room to grow, is going to alter the behind-the-scenes system at every stage from the camera to the picture transmitted to the home set. The technical differences between analog and digital will ultimately be so dramatic that our current system may seem as antiquated as Matthew Brady's system of developing photographs does in our age of instantly developing film. But ultimately the quality of television depends not only on the resolution of the picture but on what's in front of the camera. □

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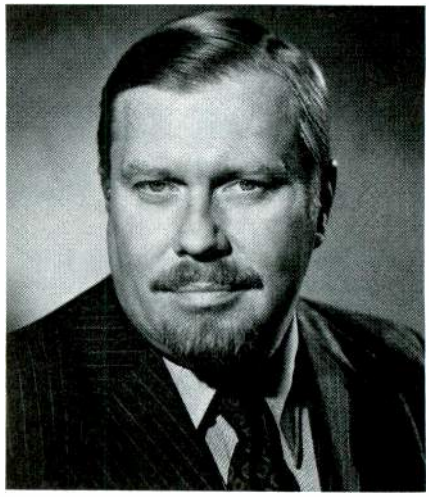
Broadcast Technology: Update 1981

Radio: responding to a challenging future

An interview with Ralph Green, vice president, engineering, CBS Radio, New York



Ralph Green

In the following interview conducted by **Broadcast Engineering**, Ralph Green takes a look at what effect advancing technology has had on changes at CBS Radio.

BE: *How do you see the 9kHz decisions affecting broadcasting, both technically and economically?*

Green: First of all, let me stress that we at CBS Radio are not against 9kHz per se. And I don't believe that most of the industry is either, except for the people concerned about increased competition from another few hundred stations coming on the air.

But I don't think that is the main concern. The real concern is that the FCC and the NTIA have not really studied the impact of these changes in sufficient detail to form a reasonable conclusion. They really don't know what the impact of reduced channel spacing is going to be, particularly on service areas.

There is the adjacent channel interference problem, and that interference is probably going to increase in most cases. One of the things that the commission has suggested is to consider limiting the occupied bandwidth for each station and channel—that tends to defect AM stereo. If you're going to have AM stereo, you need a reasonable fidelity, which implies reasonable bandwidth. Restricting the bandwidth of the transmitter signal would have a negative impact on AM stereo.

Another thing that hasn't been talked about too much, but was a very serious proposal at the Buenos Aires (WARC Region 2) conference, is the use of nighttime interference curves based on 50% of the time as opposed to the 10% curves used in this country. If the ITU treaty recognizes 50% curves as standard, that means that the interference coming from foreign stations is going to increase rather dramatically, and the real impact will be felt in the Southeastern states.

However, even though the overall treaty may recognize the 50% curves, it may be that multilateral treaties with neighboring countries would recognize, for the purposes in this particular part of the world, a 10% curve. It is a possibility, but right now the 50% standards are a serious matter.

Both at CBS Radio and in the NAB Allocations Task Force it is thought that these kinds of studies really have to be completed before the next session, which is in November of next year. In fact, they should be completed, if you look at the FCC timetable, by the end of this year, which really doesn't give them enough time.

At CBS we really think that it is incumbent upon the government, either the FCC or NTIA, to do their studies and in sufficient depth so that they can have enough data on which to form a reasonable conclusion. What we fear is that the commission is rushing forward into this thing without full regard as to what its impact will be on the present system. Basically, what we're talking about here is the potential for loss vs. gain of service. If the balance swings toward more loss than more gain, it's the wrong way to go. So, we are not against 9kHz per se, but we just think that nobody really knows enough to push forward on this issue at the present time. Until the studies are done where we can really make an informed judgment, we as a nation ought not be pushing forward so quickly.

Another factor is the shift itself—4kHz as originally suggested by the United States or 9kHz recommended by the Canadians. The Canadian shift offers the advantage of clustering the stations together, which helps somewhat on the adjacent channel interference problem, and it may open up some channels in the larger markets. Neither systems' costs have been adequately explored. Right now at CBS we are doing a cost study on a station-by-station basis to see how much it will cost us, but the results are not completed.

In short, we're saying that the studies to determine the gains and losses and total impacts on the present system have not been done. We think it should be done thoroughly, and we think that the government is the one to do it because it is very expensive—probably a couple of hundred thousand dollars.

Technologically, from the equipment standpoint, the switch to 9kHz is not formidable. There's probably enough tolerance in components to adjust transmitters without major replacements. Hardware is not the problem. The high costs will be in consultant help (for most stations) to achieve the shift, and for partial proof of performance measurements in directional arrays, loss of air time and costs of staff traveling.

But in considering economics, don't overlook the receivers—about a million synthesized receivers are operating now, mostly in higher-priced automobiles. If 9kHz is implemented, those receivers will be obsolete. Owners will be able to

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CBS: radio's future

tune the channels that happen to remain right on the 10kHz basic frequency, but that's probably less than half the channels. So what do manufacturers do, knowing that once the public becomes aware of this change it will be reluctant to buy an old receiver?

BE: *How do you see the cancellation of the First Class License requirements affecting broadcasters?*

Green: I've held a First Class License for more than 30 years, so I have some emotional attachment. But I've got to agree with the commission (FCC). The thing really has not worked. They cite the Georgia Tech study that the present examination and procedures do not really ensure that the applicant is technically competent. So it hasn't worked, and at CBS Radio we feel that the commission should do away with this whole licensing procedure.

Now under the Communications Act you must have some sort of permit / certificate / license — and that's why they're going down to the Restricted Operator's Permit right now. And until the statute is changed, they'll have to continue that way—but that's a no-license, no-examination program.

Basically, we think that the station licensee should have freedom to exercise his judgment as to the qualifications of technical personnel just as he does for the program director, the sales manager and everybody else on the staff. Why should the technical department be any different, requiring some kind of government license?

Another aspect is that maybe if the commission decides that there ought to be some kind of license for adjustment, maintenance and repair of the equipment, it could come up with a series of tests that could realistically demonstrate an applicant's qualifications. If they could administer such a test, they could issue a technician's license, which would be a meaningful title and imply what it meant.

Our practice at CBS Radio is to tell an applicant that he must have a First Class License only for legal, practical reasons. We're union, and when a union technician goes on a break at a remote control point, he's got to be replaced with a licensed person or you've got a problem. So we require a license, but that's where the consideration stops. Beyond that we look extensively to determine if the person is really qualified.

BE: *Do you see the FCC as having the capability to formulate a meaningful exam and provide a meaningful certificate of some sort?*

Green: I don't know why they can't if they really wanted to. After all, the Society of Broadcast Engineers (SBE) has a certification program that has a very meaningful series of examinations, and they have been able to keep it from being compromised.

BE: *If the FCC could not develop an examination program, could the SBE or NAB step into the gap and fill the need?*

Green: I don't think there should be any exam, but I would be bothered by a private organization determining who could or could not work in this industry. Because of my conservative thinking, I think if there is going to be an examination and any kind of certification, it really should be by a government entity.

BE: *How will the advancing technology in digital affect radio broadcasting?*

Green: Well, digital audio is very good for master recording in a recording studio because you can make many generations with essentially no degradation of the material. But it's not on the immediate horizon for radio broadcasting. First of all, the cost has to come way, way down. It's very expensive right now. So I don't see a big change within the next few years.

The real impact of digital, I think, in radio broadcasting is going to come in distribution, as far as networks are concerned.

BE: *How will satellites affect the future of radio broadcasting?*

Green: At our affiliates convention in Phoenix, in October, we announced a study presently under way to identify current distribution systems and our future requirements in the next 10 years or so. This study will develop technical and functional specifications so that a system will do all the things that we envision, that we might want to do realistically. It will come up with a clear set of specifications so that we can approach the various satellite carriers and say, "Here's what we want, can you do it and how much will it cost."

Basically, we are interested only in end-to-end systems. We do not want to own earth stations and we really don't want to get involved in any of the satellite system operations. What we want to be able to do is hand programs to the carrier

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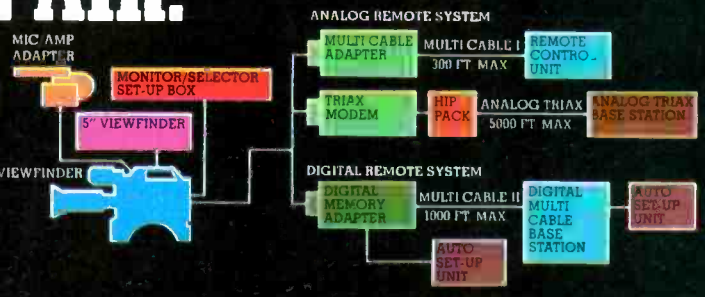

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CBS: radio's future

and have him hand them back to our affiliates.

When this study is complete, we will have a good understanding of the cost vs. benefit equation, and when those two curves cross we will probably get into satellite distribution.

Now, going back to the earlier question on digital, the only real way to go is digital in my opinion, because with digital you can use time division multiplexing. If you do that you can do a lot of neat things over and above just carrying the audio signal.

BE: *Do you see broadcasters taking advantage of computers?*

Green: Well, we certainly are. We are presently installing a new central control switching system that's 100 input by 20 outputs. It's a dual-computer base system with the dual on-line computers tied into a data center that is the whole corporate data center. Basically the concept starts out with availabilities that the salesmen use: Once they sell, all the contractual information goes into the big IBM computers. Then the data necessary for machine assignment and switching is dumped into the on-line switching computers, and those computers then actually run the switcher. (There's two of them because we use redundancy to avert failure.)

My feeling is that the system is going to be almost too complex to operate manually. It has some manual capabilities as far as the hardware is concerned, but I am not sure that people will be able to keep up with it. The computers look ahead for the next 20 invents on 20 buses, and they do that every second. Any changes are updated every second. I never really thought I would have a time problem with a computer for switching, but it got down to whether or not the computer could do everything it had to do every second.

BE: *What about station automation?*

Green: Six of our seven FM stations were program-automated in the early '70s. The system used was the IGM 770, which we at CBS Radio worked very closely with IGM to develop. I think that system, even today, is still one of the most sophisticated and flexible systems available. Initially our criterion was that the system had to be able to accommodate any foreseeable program format, except "all news," where you're constantly updating your news product. But before any other program format envisioned was to be accommodated, and over the last seven or eight years that has pretty well held true. We have not really had anything asked of the system that it hasn't been able to handle.

The reason for this early effort was that at that time we were just beginning to develop the FM station's programming, management and sales staffing and station upgrading. At the same time we were also trying to hold costs down. We decided to automate, but with a sophisticated system. The initial cost of those systems was rather high, but they paid for themselves in the saving of technician labor within the first 15 to 18 months. After that, we were ahead of the game.

Then in early 1979, our contract became effective, whereby we now have combo rights in FM. So, in most cases, we are not fully automated in the strict sense of the term because we now have a live jock, but the jock is using the automation system as an operator assist. Thus, all the commercials and announcements are still on the system; it is still doing the logging functions, except he's running the system rather than the system running him.

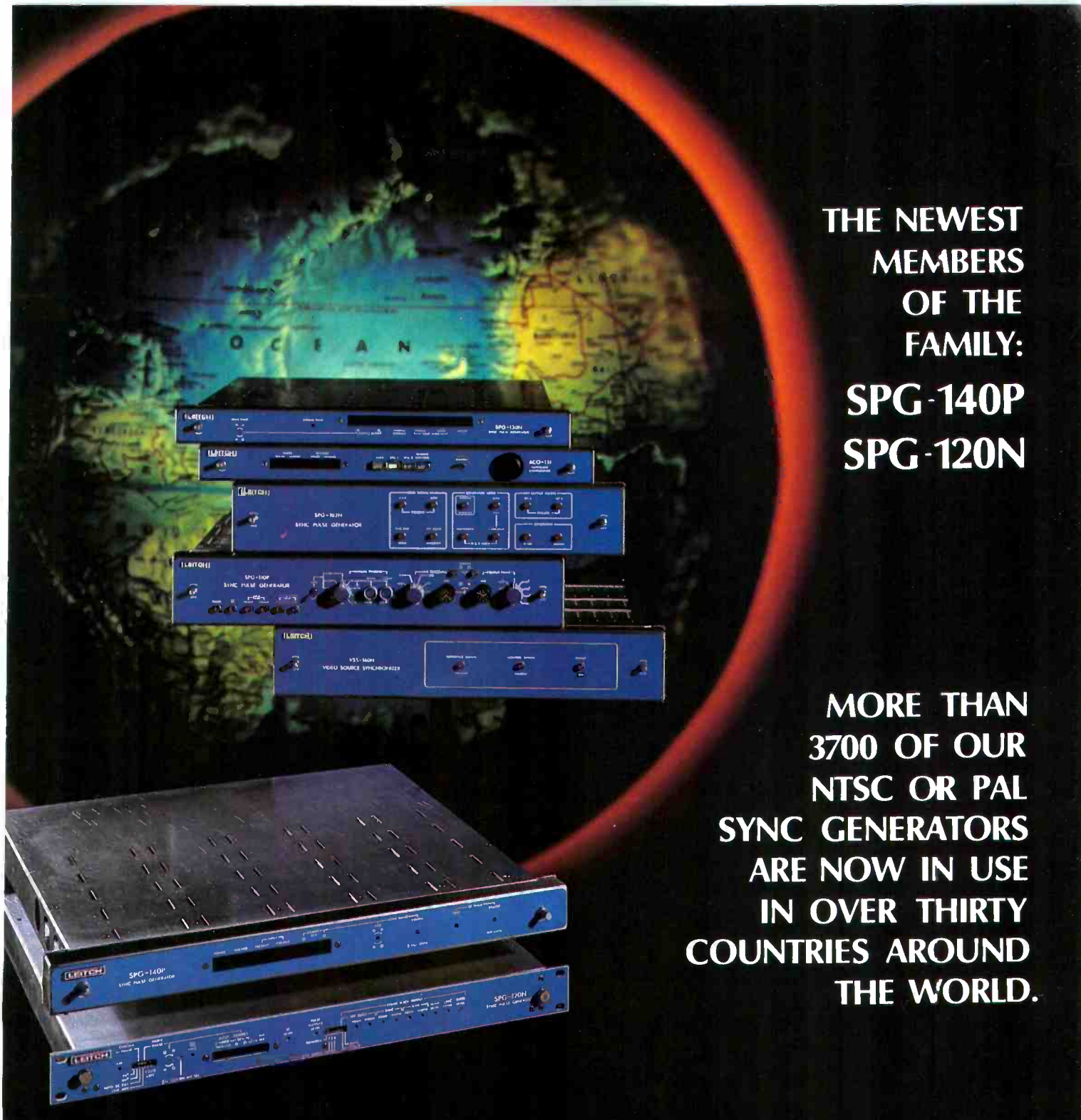
This system was set up initially so that it could do that—or could be just a straight automation system will all the fades and everything else programmed into the computer, and it would run strictly in automation. Then it was set up whereby we could put a live jock in the studio and the system would run him: A light came on when his mic came on, and it was programmed to give him so many seconds to talk. It was also programmed such that he could use a hold button to put the system in a hold mode. When he finished talking he released the button and based the system to automation. Now the system can run the jock or the jock can run the system.

BE: *How much effort is being devoted to station upgrading, even in the face of rising costs?*

Green: First of all, let me say that at CBS Radio our prime concern is with performance and reliability in equipment and operations. That means that budgets must be detailed, money must be invested wisely and schedules must be well planned.

One of my responsibilities is capital forecasting every year for all facilities in this division, and this goes back more than 11 years. At

continued



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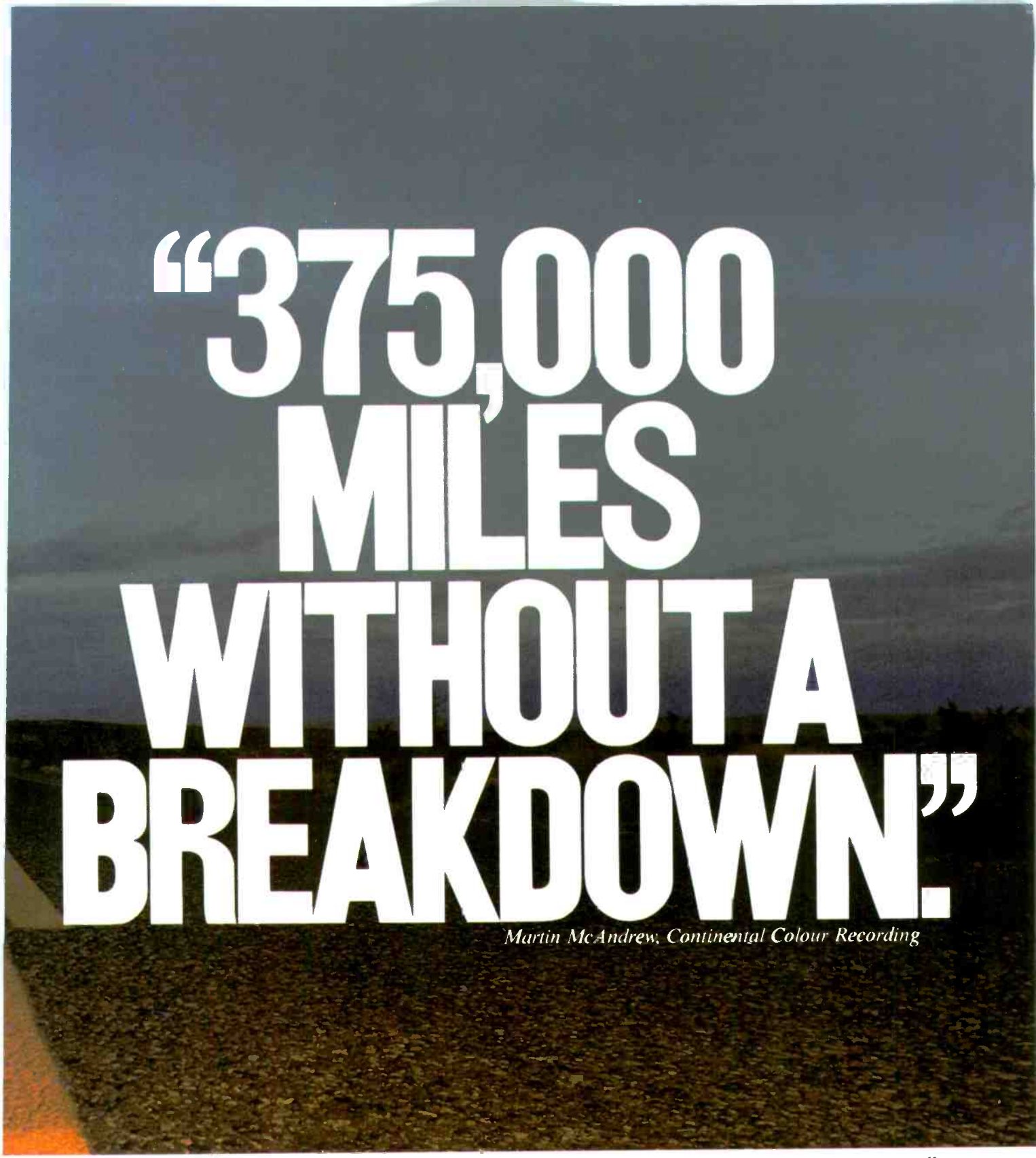

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CBS: radio's future

continued

that time we embarked on a program in San Francisco of moving into the Embarcadero Center. But, basically, our first major, long-term program was to develop the FM systems—and that meant developing an automation system, building offices, staffing stations, upgrading of transmitter facilities, getting all the transmitters up to maximum power allowed by the FCC, new transmission lines and new antennas—all circularly polarized.

That transition in San Francisco took a couple of years. At the end of that program, we began to upgrade all the AM transmitter plants, some of which were pretty old. For instance, in 1978 we put in a new transmitter in Philadelphia to replace an RCA 50E that went on the air in the summer of 1941; yet it was operating well, doing a fantastic job. In this program we have two stations tó go, with the Los Angeles one now under way. Next summer we will do a job in Boston on our antenna system; the following year we will do a new transmitter here in New York and that will complete the program.

We've also been looking at satellites for distribution for the network and at installing a large switching system at the radio network. It's been a *phased* operation because of money allocations each year, job priorities and the objective to get the entire facilities up to date. When these present programs are completed, we will probably start the cycle again.

BE: *Do you anticipate an increased emphasis on audio processing?*

Green: At the radio network we do use audio processors basically for programmed leveling, and we use the dynamic presence equalizer to give us a little more presence. They're used very conservatively. In general, audio processing at our stations is a subjective program department judgment. Our position is that we will not permit baseband clipping in FM. I think its very wrong. Once you start that, and if you go along with what the FCC has said just to prevent overmodulation, it never stops there. People want to push, push, push—and the next thing you know you're doing all kinds of bad things.

I repeat, at CBS Radio, the topic of processing is one of programming judgment—strictly subjective. Basically, I tell our people that if you're interested in some black box we'll give you a clean, sanitary system. Then, if you want to open the system and insert a black box to give an effect, fine; just don't violate any FCC rules as far as overmodulation is concerned and you can do anything you want. You're the programming guy. If the programming doesn't produce the audience response needed, you're the guy that has to explain it. Of course, engineering does get into other things—like evaluating hardware for quality performance, but otherwise we don't get deeply involved in audio processing.

BE: *What are your views on CP antennas?*

Green: For FM, circularly polarized antennas are the only way to go.

But I have other thoughts on FM antennas as far as receiving antennas are concerned, particularly in automobiles. We feel that manufacturers ought to put two antennas on the car front and rear. Then in the receiver put in a comparator and have a diversity receiving antenna. Such a system would probably improve the FM signal reception—as far as dropouts are concerned—substantially. □

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Broadcast Technology: Update 1981

Home video delivery systems in the 1980s

By Charles D. Ferris, chairman,
Federal Communications Commission, Washington, DC

Charles D. Ferris

In the past the only way to deliver video programming to the home was through the local television station. Even now, broadcasting is the only system universally available throughout the country for home delivery of live video programming. Prerecorded videotapes are here but, being a physical delivery medium, cannot provide live, real-time programming. For that, an electronic communication system is required.

This situation, however, is rapidly changing. Several electronic delivery systems are emerging that may provide alternatives to broadcasting. These include cable, multipoint distribution service and direct broadcasting satellites. Like broadcasting, each of these systems is potentially capable of delivering multiple channels of video programming, live and prerecorded, directly to the home, with an acceptable quality and at a cost most people can afford.

What role will each of these systems, including conventional broadcasting, play in the video marketplace in the 1980s? No one can say for certain. But the more thought given to the future in the context of present trends, the more likely certain outcomes appear.

Probably the most significant recent trend that may indicate a direction for the future is the rapid growth of cable as a distribution technology. Cable now reaches 40% of all television homes in the United States; that number is predicted to reach almost 60% by 1985. Much of the recent growth has been in urban areas where viewers have long received a relatively large number of off-the-air program channels. Because monthly charges generally range from $12 to $25, this growth shows that consumers find something of value not presently available over the air.

Three attributes of cable make it particularly attractive to urban viewers: superior picture quality; elimination of troublesome receiving antennas; and a wider selection of programs, including premium pay programming without commercials. Apparently, a number of urban viewers consider these benefits to be significant and, if the past is any indicator, it is possible that cable will continue to expand to the point that it reaches a large percentage of urban and suburban homes.

Regulation a factor

Two forces that could intervene in this process are regulation and the introduction of alternative distribution systems. Some effects of regulation are discussed later. But first, look at the characteristics of the other video systems that may provide alternatives to cable.

One potential alternative to cable would be an augmented broadcasting system. Recent FCC proposals to permit the use of low power UHF and VHF stations and additional VHF assignments could significantly increase the number of broadcasting channels available in a given area. These developments, coupled with increased use of broadcasting systems for pay television service—STV—can greatly expand the diversity of video programming provided to the home via broadcasting-type systems. Whether such expanded use of broadcasting will reduce the potential market for cable remains to be seen.

Broadcasting does have one seemingly inherent disadvantage relative to cable—the home receiving antenna. Consumers generally lack the skill, and possibly the desire, to install and maintain antenna systems capable of making full use of signals available from broadcast stations. This difficulty is further compounded by local zoning ordinances that prohibit outside antennas in some areas, transient propagation anomalies, and other environmental effects that create ghosting and other picture distortions in even the best antenna systems.

A further problem arises from the noncollocation of TV stations in some areas, which makes proper antenna orientation more difficult. These factors create what may be a serious signal reception handicap for broadcasting relative to cable. This handicap might be reduced somewhat if viewers had more information to assist them in the selection, installation and maintenance of receiving antenna systems. The government may have an important role to play in providing information concerning antennas to consumers. Broadcasters also have a large stake in this activity. These services perhaps could be included in the service package provided by STV operators, whose viability depends on a clear off-the-air signal. Whether that is economically viable, or just how important this signal quality factor may ultimately be in the marketplace, is difficult to assess.

Another alternative video distribution system recently introduced is multipoint distribution service (MDS). MDS is operationally close to broadcasting except that it transmits at microwave frequencies (around 2GHz), which necessitates the use of a receiving antenna system separate from that required for broadcast reception and special electronic equipment to down-convert the signal to an unused UHF or VHF TV channel.

Because of the extra receiving equipment required and the higher frequencies used, MDS would appear to suffer somewhat of a disadvantage relative to broadcasting in delivering video services over a wide area to single family dwellings. However, this disadvantage might be offset to some degree by the use of more efficient receiving antenna systems possible in this frequency range, which could avoid some of the signal reception prob-

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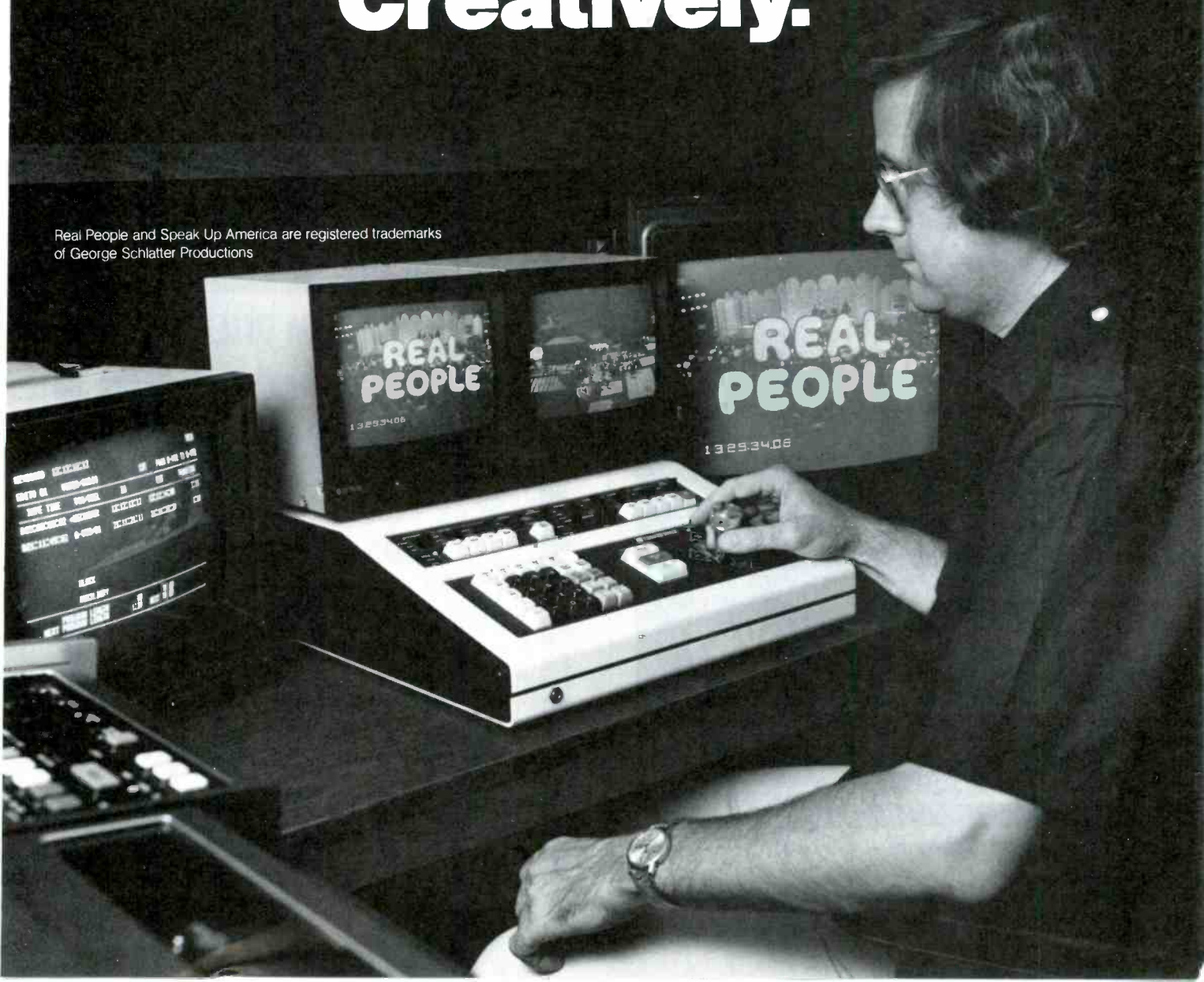

FCC: home delivery

lems associated with broadcasting.

However, MDS, and for that matter broadcasting, may have one distinct advantage over cable in entering certain markets: they require a smaller initial capital investment per channel for a small number of channels. The first MDS (or broadcasting) channel in an area requires about the same capital as the second, third, fourth, etc. A single channel cable system, however, would cost almost as much as one with 20 channels. Thus, in markets in which most of the demand can be satisfied with a few channels, the entry barrier caused by capital costs tends to favor MDS or broadcasting as a distribution medium while a demand for a large number of channels would favor cable. Where the crossover point occurs would depend on many factors—including the geographical distribution of viewers, with denser populations favoring cable, less dense favoring MDS or broadcasting.

Direct broadcast satellites

Another potential alternative system for video distribution to homes is direct broadcasting satellites, (DBS)* This technology is still on the drawing board in the United States, but such a system could become operational during the next few years, as it is in Japan. Like the other distribution systems discussed, DBS could potentially provide multiple channels of video programming for direct home reception. The distinction of DBS, however, is its ability to reach essentially the entire continental population from a few transmitter points located in geostationary orbit.

The initial capital investment required to construct and launch a multi-channel DBS transmission system would probably be very high compared with the start-up costs of alternative systems. However, because the cost of the space segment of a DBS system could be spread out over a potentially very large population of subscribers, it is probably not the critical cost element in the system. More significant is the cost of the earth receiving equipment, which must be duplicated at each dwelling. The projected price range of DBS receiving systems manufactured in large volume has been estimated to run between $200 and $400.

*Current terminology is still evolving. DBS is also defined as Direct Broadcast Service.

What kind of a market there may be for DBS will depend not only on costs but on what other systems are in place at the time it arrives on the scene. Looking three to five years ahead, which is the time frame often projected for DBS availability, there is a good possibility that cable, MDS or an expanded broadcasting system, including proposed low power VHF and UHF stations and VHF drop-ins, will be available to a majority of US homes.

The potential market for DBS might consist of viewers who could be attracted away from cable or other systems and those not adequately served by such systems (it's questionable whether a given home would subscribe to more than one pay system). Perhaps a more likely market for DBS would be viewers in rural areas not fully served by the other systems. Another possibility for DBS would be to provide high resolution or otherwise technically superior television service, which would distinguish it from other systems in the marketplace.

Another means of video distribution, although not an electronic communication system per se, is the use of prerecorded tapes and videodiscs. A rapid growth in the use of videotape recorders (VTRs) or disc

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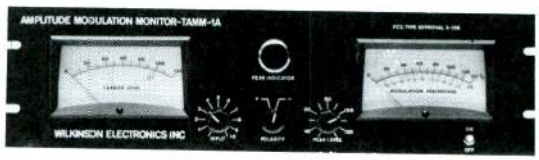

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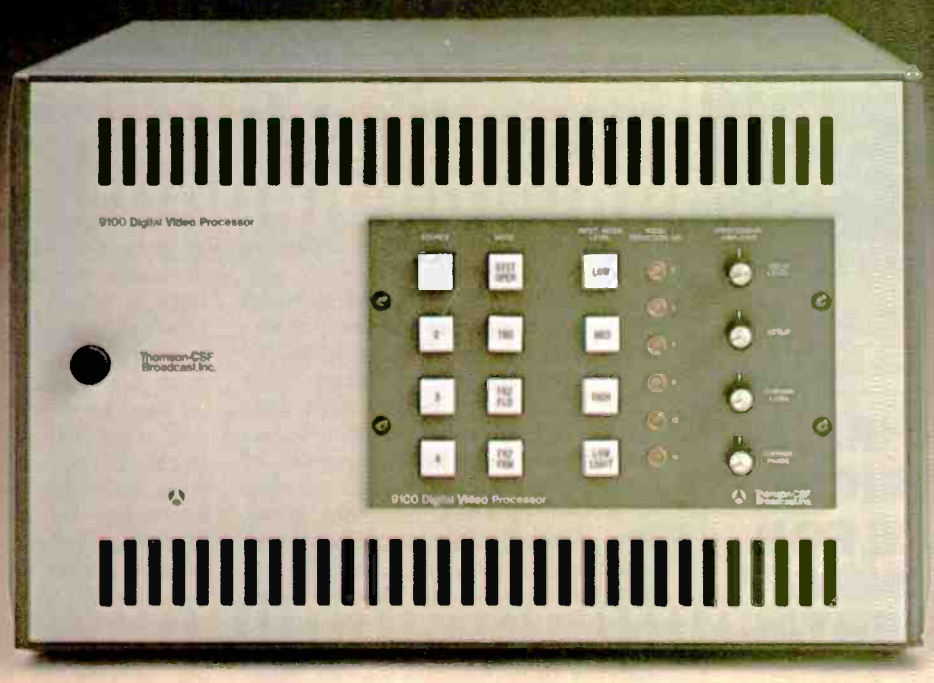

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players could affect the ultimate choice that the market makes among cable, DBS, MDS or broadcasting. For example, if a large number of viewers in a market were equipped with VTRs, program diversity for those viewers could be expanded dramatically with no addition of channel capacity. Programs could be transmitted and recorded at any time of the day or night for viewing at the convenience of the consumer. Each broadcast station would then become a potential source of prime-time programming 24 hours a day. Assuming this transmission capacity was fully utilized, VTR-equipped viewers in a 10-station market would be able to select each day's viewing from up to 240 one-hour programs or 480 half-hour programs. Currently, viewers in a 10 station market have only 10 programming choices at any given time. Expansion of programming diversity from existing broadcasting stations might provide an alternative to the use of other distribution systems offering a large capacity.

Videodiscs also hold the promise of greatly expanded program diversity for viewers. Discs appeal to consumers who wish to build home video libraries, as is now done with LP records. One can envision videodisc stores carrying thousands of highly specialized programs catering to diverse personal interests. However, although discs are cheaper to manufacture than prerecorded tape, they may not be the cheapest way to deliver programs that are viewed only once. For this, electronic delivery of a program viewed when received or recorded by a home VTR for later viewing is more efficient.

Regulatory impact

Local and federal regulations can affect the consumer's choice of DBS, MDS, broadcasting and cable for home video delivery. Broadcasting, MDS and DBS all depend on an available supply of spectrum. How much and how quickly spectrum is allocated by the FCC for these systems will affect how fast they enter the market based on their cost and capabilities relative to each other, and relative to cable, which does not require the use of spectrum.

Of the three delivery systems requiring spectrum, broadcasting has the most generous allocation: 402MHz in the VHF and UHF bands, which provides 67 channels, each channel 6MHz wide. However, all of these channels cannot be used in each area because of potential mutual interference and FCC rules designed to apportion available channels equitably among the states and communities. Thus, there are at most 21 broadcasting channels available in any given market. This number could increase, however, if the commission adopts the proposals allowing low power VHF and UHF stations at closer geographical spacings than now permitted for full power facilities. Still, broadcasting will not have the channel capacity of cable systems, which can currently deliver as many as 50 channels to the home and can expand even further without the need for spectrum.

Spectrum allocation for DBS, although also seemingly large, may not afford as many channels in a market as is available over terrestrial broadcasting. 400MHz of spectrum is presently allocated for DBS in the 12.3-12.7GHz range (it may possibly receive another 100-to-200MHz). If channels are to be approximately 20MHz wide, as is now under discussion, only 25 channels are likely to be available from a single orbital position. Depending upon the selectivity of receivers, adjacent channel interference may allow only half of these to be used in any geographical area.

It must be noted that the orbit/spectrum resource must be shared with neighboring countries. The allocation for DBS in the United States will not be made final until after the 1983 Regional Administrative Radio Conference, which will plan the use of the spectrum allocated to the broadcasting satellite service in North and South America. What spectrum and orbit allocations are ultimately made available to DBS in the United States will also determine DBS system design options among conventional, high resolution or other enhanced video services.

MDS has the most limited spectrum allocation of the three radio-based video distribution systems. Operating in the 2150-2162MHz band, MDS is now limited to only one or two channels per area. In a recent rulemaking proceeding, however, the FCC has proposed opening additional channels for MDS type systems in the 2500-2690MHz band. These channels would be shared with other types of systems. The question of adjacent channel operation in the same area is unresolved. Thus, it is difficult to say how many additional channels would be available for MDS in a given area as the result of this action. Unless a large

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number of channels became available for MDS type systems, it is unlikely they would be developed as a full alternative to cable or broadcasting.

In addition to spectrum allocation policies, the authorization processes used by regulatory bodies—local and FCC—will affect the speed and manner in which new video distribution systems enter the marketplace. Operators of cable systems, for example, are subject to local franchising, which can delay entry and add costs. MDS, DBS and broadcasting operators, while not subject to local franchising, are subject to FCC licensing and channel authorization procedures. If there are more applicants than channels available, a comparative hearing may be necessary to decide who gets the assignment. Such hearings add costs and delay the entry of these systems into the marketplace. The FCC is considering auctions and lotteries as quicker, cheaper procedures to select among competing applicants.

The regulatory structures imposed on the operators of the various video distribution systems will also be an important factor in determining their success. Although each system either provides or is capable of delivering essentially identical software, each one is subject to a different regulatory structure. Cable has essentially been deregulated by the FCC, although still heavily regulated at the local level. MDS is regulated by the FCC as a common carrier service. Broadcasting has its own unique set of regulations. And DBS may be regulated as neither broadcasting nor common carrier, but as a hybrid with altogether different requirements.

Imposing widely differing regulatory approaches on systems that serve essentially identical functions impairs the ability of users to select from among those systems the one that may be most efficient and economical in each application. All these systems are essentially pipelines that can carry video and other information to the home. However, each has special characteristics that may make it the best choice in a particular application. One type of system may be well adapted to urban areas; another is best suited to rural coverage. One may be optimum in markets where there is demand for a large number of channels, another for areas that can support only a small number. One may be particularly well suited where low costs are the primary concern, while another may be best for special, high quality services.

It is becoming increasingly apparent that the US video consumer market is anything but homogeneous. In light of new technology, programming with a wide range of content, and with varying technical quality and costs, will be available to meet consumer demand. Efficiency is served when program suppliers and distributors have freedom to choose the distribution system that provides the most cost-effective means of delivering their product to the market segment they wish to serve.

Ideally, how the programs are paid for by the consumer—either directly, through advertising or by other means—should in no way restrict the choice of delivery systems available to the supplier. Nor should the choice of delivery systems be restricted by the manner in which a supplier wants to pay for his delivery service; for example, whether the supplier purchases the system for his private use or rents time on a system owned by someone else. Regulations that restrict the use of the various video distribution systems—broadcasting, MDS, DBS or cable—to only certain service or payment arrangements prevent suppliers from choosing the optimum system for their market and raises costs to both suppliers and consumers of video products.

A more efficient regulatory approach might be one that permits any of these video delivery systems to be used for any type of video service and to be privately owned, shared or operated in a common carrier mode. Thus, a microwave multipoint one-way delivery system (such as now used for MDS) could be operated as a common carrier or privately owned, could carry video, voice or data of whatever quality the market demands. The same reasoning applies to VHF and UHF broadcasting systems, DBS systems and cable systems.

The question of how these services should be regulated in the future is not settled. Each service delivered through these systems should be subject only to as much regulation as the public interest may require. For example, traditional "broadcast" type regulations with provisions for fairness or equal opportunity, could be applied to entities that provide the kind of service for which such regulation is appropriate. The removal of needless regulatory restrictions on video delivery systems would reduce costs and broaden service choices to consumers. □

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Broadcast Technology: Update 1981

Challenging transitions in television and radio

Vincent T. Wasilewski Chris Payne

By Vincent T. Wasilewski, president, and Chris Payne, assistant to the senior vice president for engineering, National Association of Broadcasters, Washington, DC

If 1980 is any indication, the balance of this decade will be a time of intense cooperation between managers and technical experts. At NAB the big issues largely are technical, and there is no change in sight. Managers, who in the past left technology to the technicians, are often finding themselves in a huddle with their technical advisors, trying to come up with business plans based on rapidly developing technology.

The scope of concern has expanded from our own backyard, to the satellite in the sky, to other countries of the region, and to the whole world. In late 1979 we learned of the outcome of the World Administrative Radio Conference. The results included 110kHz additional spectrum in Region 2 for the AM broadcast band. The conversion of this spectrum from its present inhabitants to broadcasting will begin with a planning conference in 1985 that will determine how the various segments will make the change. When the plan takes effect, 1605-1625kHz will become exclusively broadcasting.

Sometime after July 1, 1987, the 1625-1655kHz band will become allocated to broadcasting as a primary service, and sometime after July 1, 1990, 1665-1705kHz converts over with broadcasting as a primary service. If the Senate ratifies the WARC treaty and the FCC completes a domestic rulemaking, we can expect broadcasting stations to be on the air on some of these new frequencies in the 1980s.

Although the US government viewed the outcome of the WARC as *substantially a success*, one of the major US attempts, land mobile sharing in these bands, will be subject to an agreement with border countries and a domestic rulemaking.

DBS

Direct-satellite-to-home broadcasting (DBS) is definitely a 1980s issue. At the 1979 WARC, a final decision on the entire 11.7-12.7GHz band was not reached. 11.7-12.3GHz was allocated to the fixed satellite service, and 12.1-12.7GHz was allocated to the broadcasting satellite service, resulting in the 12.1 to 12.3GHz overlap. This conflict is expected to be resolved in the 1983 Region 2 satellite conference, which also will develop a plan for satellite broadcasting in Region 2.

Comsat has announced plans to create a direct-satellite-to-home service. The FCC has asked for comments on DBS in a Notice of Inquiry concerning planning for the 1983 conference. At a meeting of the NAB Board of Directors in September, a resolution was passed stating that DBS poses a host of fundamental policy questions that must be resolved by Congress. DBS should not be authorized unless Congress first approves this mode of program transmission and determines the terms and conditions under which it may become operational.

The board also stated that DBS is inconsistent with the locally based system of television and radio broadcasting. While urging that Congress make the rules for DBS, the NAB board encouraged the Department of State to seek the allocation of sufficient frequencies and orbital slots to assure the fullest potential technology resource available to the American people. Because the technology is already here (Comsat, the FCC and others are showing a strong interest), DBS is one of those big issues hotly discussed between managers and engineers.

Program and information delivery to the home TV set continue to expand. The TV screen that used to be VHF only and in black and white will be loaded with choices. The channel selector now contains VHF and UHF and some have cable super bands and subbands, all in color. Teletext, the generic title for text and graphic information transmitted in the TV vertical interval, is also expected to be an '80s innovation. Hundreds of pages of information can be transmitted and stored in the TV receiver for ready access at any time by the viewer. Together with telephone interfacing, the system becomes interactive with commands and input generated by the viewer from a personal keyboard and the response conveyed back via the television station's *teletext* transmissions. In the 1980s, the TV set becomes a *terminal*. The NAB Board of Directors in September also urged the FCC to initiate a rulemaking looking toward adoption of technical standards for a teletext service in the United States.

The TV terminal will not only be a source of facts, figures and information but also a new source of pleasant entertainment. The '80s will bring stereo sound to television. Already, fixed satellites and the existing nationwide terrestrial TV relay system can distribute stereophonic sound along with the color picture. An industry committee is

continued

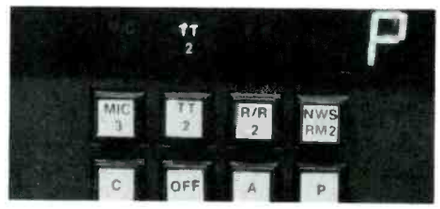
DC control and th

Introduced by Ramko in early 1975, DC control of all audio attenuation and switching has since proven itself so superior to conventional methods of audio control that most manufacturers of consoles are still trying to catch up.

The three major advantages are:

1. The DC controlled console exhibits far less susceptibility to RF pickup and external interference than conventional consoles that control audio directly. The conventional console must route all of its audio from the inputs to the various controlling elements (mixers, switches, etc.) and then finally to the console output. The DC controlled console, on the other hand, eliminates all of this audio wiring and thus reduces the pickup of outside interference.
2. It is also less prone to be affected by mechanical malfunctions or problems such as those from scratchy pots or noisy switches.
3. Since all audio switching is done through DC control (+6V or −6V), all internal and external functions (mute, on air lights, remote equip. start/stop) are programmed by simply setting internally located switches. Only one pot is needed to control both left & right channel audio simultaneously (stereo); thus the tracking error normally associated with dual ganged pots is eliminated.

No soldering or internal wiring is necessary to set up or change the "ON AIR" light relay, muting, or AUX MUTE relay. All of these functions are programmed through internally located switches, which can be changed at any time.



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The large LED output mode display has two separate functions. The lighted decimal point, which lights whenever that mixer is potted down into CUE, is also a blinking warning light whenever this channel has a live microphone activated. The second function of this display tells the operator whether he is in the Program (P), Audition (A), Cue (C) or Off (blank) mode. It is important to note here that the operator has 2 separate means of initiating the Cue mode. One in the normal fashion of potting down and one via the output mode select switch (C). Thus he may go directly to Cue by pushing (C) without having to change the mixer setting.

The exclusive patch panel for selecting input gain offers extraordinary flexibility. At any time, any input can be made to accept anything from a mic level through a line level signal. Not just mic or line level but anywhere in between. Thus on our 10 mixer model you have a minimum of 4,194,304 combinations of mic through line level inputs. And you can accommodate mics and high level inputs or the same mixer simultaneously. You simply plug in the prescribed resistor(s), which are included with your console, and that's it.

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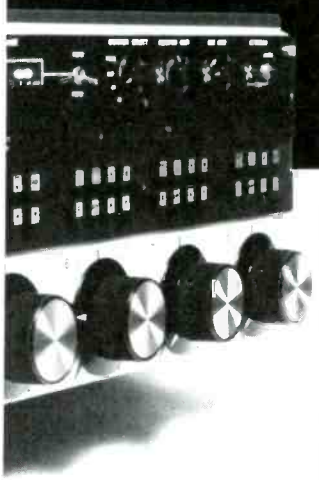
superior console.



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tary feedback with partially actuated switches.

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SECOND, our solid-state devices exhibit far less distortion and flatter response than even the finest transformer available today.

THIRD, since the solid-state devices are purely resistive they are much less susceptible to hum, RF and other external interference.

A FOURTH and very large consideration is the LED "VU" meter. This solid-state meter (SSM) has an exceptionally fast response and you can actually see overmodulation peaks. With a mechanical meter you can't. Couple this with the electronic circuit that gives the SSM "VU" ballistics on the decay and you end up with a tighter, cleaner sound than ever before. At the same time, your normal audio power level is still maintained. In addition, the bright red and yellow LED display is legible up to 30 feet away.

Although the mono DC-38's have a meter for each output, we took the stereo versions a step farther. In addition to the left meter and the right meter (switchable, Aud. or Prog.), we included a third to monitor the stereo mix (mono) output.

By throwing a switch located next to it, this meter is converted to a phase check meter and may be used to check the stereo phasing of any and all of the console input sources.

Reliability particulars.

All of the LED's and lamps have a life expectancy of 11 years. The push-button select switches are spec'd by the manufacturer at 20,000,000 operations (1 actuation every 30 seconds, 24 hours a day for over 19 years). The mixer pots are a custom design using glass-hard, conductive plastic. The mechanical construction of these pots is so sturdy that they tolerate even the heaviest handed operator.

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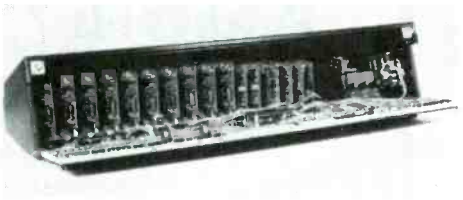

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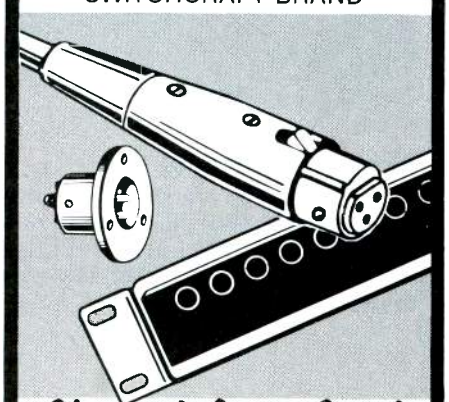

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NAB: transitions

continued

now performing laboratory and over-the-air testing of several systems of TV stereo. The conversion of the television stations and the availability of new TV receivers with stereo will occur rapidly after FCC approval.

Change and excitement in radio

Meanwhile, radio, the *mature medium*, is about to go through a reincarnation. As was mentioned, the WARC spawned 110kHz of new spectrum for AM. The FCC is busily grouping and regrouping the position on the US proposal to change the AM channel spacing to 9kHz. The NAB has not opposed conversion to 9kHz but has recommended a careful study before any final decision. After several months of correspondence with the FCC, NAB finally convinced the commission to create a government/industry advisory committee on radio. The commission just recently amended the charter of the previous advisory committee to become the Advisory Committee on Radio Broadcasting.

At this time, the commission is not sure whether the US proposal contemplates a maximum frequency shift of 4kHz or 9kHz if the conversion of 9kHz spacing is made. The International Frequency Registration Board (IFRB) needs to know what the proposal is so it can make the study promised for the November 1981 meeting of the Region 2 Administrative Radio Conference. At this point 9kHz for Region 2 is uncertain.

9kHz or not, stereophonic transmission for AM broadcasting is compatible. NAB has been a strong supporter of AM stereo for a number of years and recently adopted a position in favor of adopting a single technical standard instead of a marketplace choice. We have offered to coordinate the latest round of tests required by the commission to provide uniform data for the commission to analyze and help reach a final decision. We think we can see the light at the end of the tunnel for AM stereo and hope it isn't another train.

FM radio is anything but stagnant. Because of its phenomenal growth in listenership, FM is now formidable competition for AM. The FCC is also looking for ways to increase the number of FM stations through changes in the technical rules. The technique includes Class A's on B and C channels, reduced mileage spacing and new classes: B1 and C1. Also, the National Telecommunications and Information Administration has suggested the use of terrain shielding and directional antennas for FM, as well as reduced frequency spacing and standards for receivers. Whether you look at these ideas as a threat or an opportunity, the 1980s will be a period of controversy.

And FM quad? The commission has a pending rulemaking looking toward adopting the 4-4-4/4-3-4 methods of transmitting discrete quad and toward a hands-off position on matrix quad. It is likely that this proceeding will be final within a year.

For both AM and FM radio, the '80s will bring a strong involvement with satellites. Because of the general equating of high quality sound with stereo, expect a full conversion of the major networks and several new networks to high fidelity stereo sound. Since the beginning of television, radio networks have changed from full entertainment to almost exclusively news and information. In the '80s, however, the satellite full fidelity stereo capability will naturally inspire music networks much like the syndicated programming now bicycled by tape. Expect to see beautiful music, country, rock and classical music stereo networks. Markets that cannot now support a full-time locally programmed classical music station would easily be able to adopt the format through affiliation with a satellite network. Live broadcasts of music festivals, rock concerts and other special performances and events from around the world will be heard in stereo and quad. Networks will use transportable uplinks at the originating location and the majority of radio stations will have satellite earth terminals permanently set up for their network connection. Radio in the '80s will be an exciting and dynamic entertainment form.

The excitement in our industry continues to be inspired by the work of the scientists, engineers and technicians who are continually inventing, designing and implementing new methods of communicating with large numbers of people. And regardless of the other forms of electronic mass communication that may be born, both radio and television continue to be vital and exciting to the people in our own industry and to the millions of people around the world who depend on us for information and entertainment in their daily lives. □

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Broadcast Technology: Update 1981

Network TV: The main mass-audience medium

By Fred Silverman, president and chief executive officer, NBC, New York

Fred Silverman

Excerpted from remarks presented to the Hollywood Radio and Television Society, September 9. Used with permission of NBC.

Leaders of the production community share a common goal, to supply television with information, education and entertainment—the best programs combine all three.

We do have much in common. Sometimes it takes adversity, like the screen actors' strike, to remind us just how much we do share.

The strike has been hard on all of us, the negotiation tough. But it turns on something we've all seen before here in Hollywood.

In the current strike, the artists are thinking of money—the money they think will flow from the millions of people who will see their work in the new arenas opening in our business—cable, pay television, videocassettes, videodiscs. They are thinking of more money for more exposure. Theirs is a simple, but mistaken, premise.

Home video

Like so many people in the industry, they see a bottomless pot of gold at the end of the rainbow that's called the home video revolution.

Rainbows with pots of gold are make-believe. Make-believe is much of our business. But, for the sake of long and prosperous lives ahead for all of us, make-believe is not, and cannot be, the way we do business.

I want to shed more light on that rainbow. As rainbows must, it will fade away, along with this assumption about the so-called home video revolution: that it will open up vast new markets for programming and production and that this will make the studios and soundstages less and less dependent on broadcast and network television for their business.

For all of our sakes, I want to be very clear about the double strands of that assumption. So let me repeat them. One: the expansion of video markets will yield endless access to infinite wealth and programming opportunities. Two: studios and producers will need broadcast and network television less and less—less, in fact, than the broadcasters need the Hollywood suppliers; it will be a seller's market.

Quite simply, the two assumptions are false.

First, there are very real limits to the opportunities for wealth for most producers from the new video markets, be they cable, pay television, videocassettes or videodiscs.

And second, broadcast television, especially the networks, will continue to be your major customer and the primary outlet for original programming. There will be change. But there is no revolution. There is no rainbow. There is no bottomless pot of gold.

The realities

Instead of chasing fantasy, we would all be better served by learning how to work together in the new reality of our industry.

What is the new reality? Well, it is not quite what some of the Jeremiahs of journalism would have us believe with their gloom-and-doom predictions for broadcast television and the networks. In fact, the new reality is a lot like the old reality.

NBC's own corporate planners, as well as many people in the cable business, believe that the new video delivery systems will not replace free broadcast television. They will complement it. Broadcast television, especially the networks, will continue as the leading home entertainment service.

However, with the increased availability of satellite distribution, increased financial investment by major companies and the FCC's deregulation of cable, there is no question the new video delivery systems will enjoy larger slices of the home video pie. And more power to them.

The point is that the pie is growing larger and larger all the time. And the largest slice of that pie will continue to belong to broadcast television—at least for the next decade and likely longer. In absolute numbers, our audience will be larger than it is today. Between now and 1990 television homes will grow by about 20%, and total network viewing hours will increase by about 8%. Network television will remain the mass audience medium.

This growth that we see ahead for network television is not blue sky or wishful thinking. It's sound analysis. Indeed, we've made some highly optimistic projections for our competitors over the next decade—total cable penetration at 50%, pay cable at 35%, subscription television at 8%, videocassette at 17%, videodiscs at 28%.

Even with these assumptions, the effect on network television's market share will be slight. Network television will continue to be as it is today, the largest deliverer of mass national audience by far. We will still be the only home video medium capable of reaching 100% of the viewing public day in and day out

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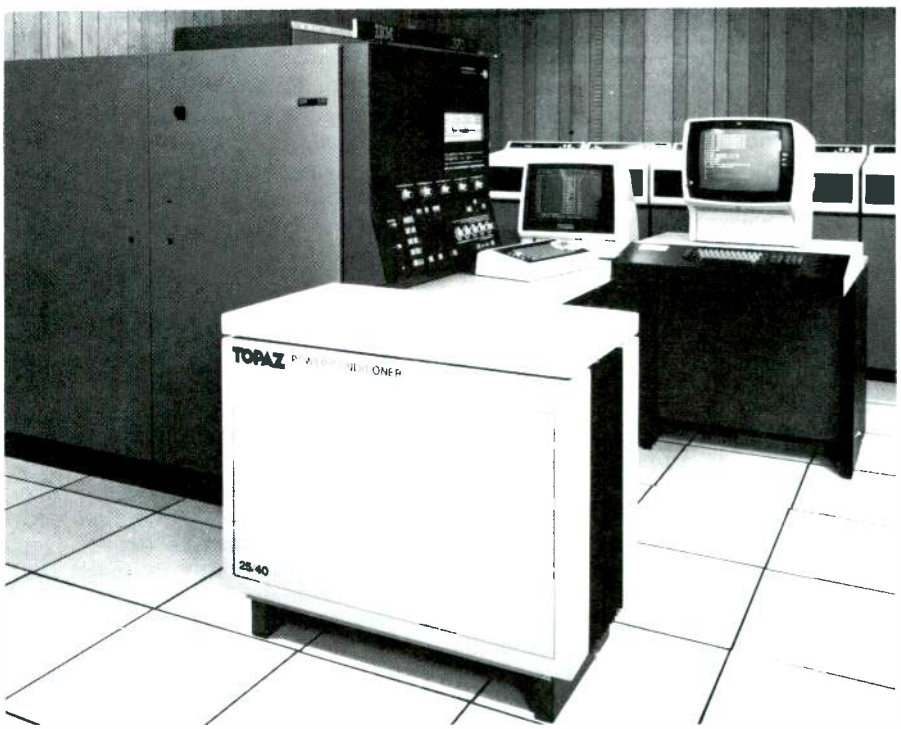
1. *U.S. Department of Commerce, "The Effects of Electrical Power Variation Upon Computers: an Overview."*
2. *George W. Allen and Donald Segall, IBM Systems Development Div., "Monitoring of Computer Installations for Power Line Disturbances," presented to the IEEE Power Engineering Society.*



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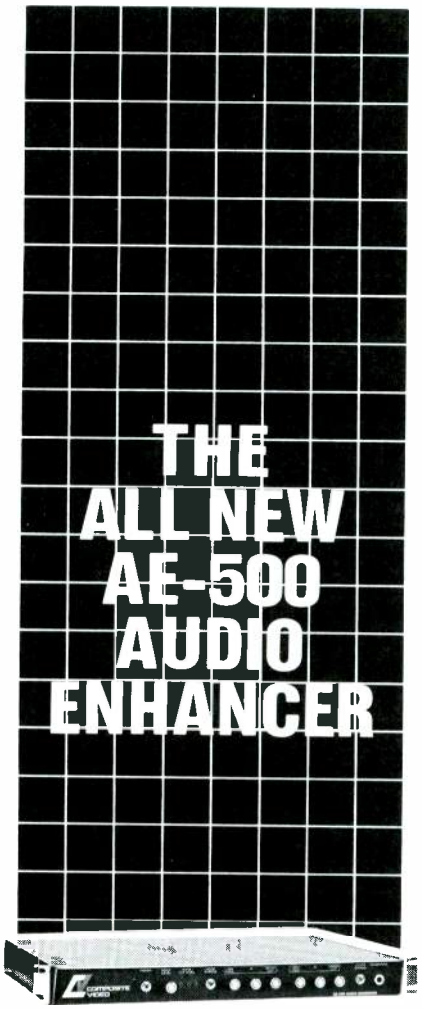

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NBC: network TV

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I am not suggesting that some of the other video services won't have substantial revenues from monthly subscription charges, and in the case of videodisc and cassette, from the direct sale of their products. I am suggesting, however, that the dollars they will spend with you on the kinds of programs you produce will be small in comparison to what network television will spend on programming. Let me explain way.

Many of the new services are designed to serve highly targeted audiences and will add diversity to the medium. However, those audiences will clearly not yield the volume revenues which support your kind of mass appeal programming. A few of the new services, of course, will try to program for larger audiences, some of pay cable and videodiscs, for example. Their ability to tap those larger audiences will be constrained, however, by the number of homes they can reach.

Penetration isn't the only problem. Most of the new services also have problems because of the way they must commit their revenues. By and large, the new delivery systems are either hardware intensive industries or have heavy overhead costs. The bulk of their revenues must be spent on equipment purchase, installation and maintenance, customer billing and transmission costs. Videodisc and videocassette have manufacturing and marketing costs to contend with. All of these factors will further reduce the dollars they have available for original program purchases.

These new systems simply will not have the 60% of their revenues available to spend on original programming—as the networks do. Basic cable, for example, as a group will be able to spend only 10% of their revenues on original programming. Even the pay cable operators, who will have the largest relative program budgets of these new services, as a group should have available only one-sixth the dollars which all commercial television will have to spend in 1990.

The revenues that will be flowing to the production community from the new distribution systems will not be all new dollars. What is added to your revenues from the new systems may be subtracted from the amount of revenue you receive from broadcasters.

For example, pay cable has built itself almost entirely as a medium for premium movies. The movie producers' dream is to greatly augment revenues from those movies by licensing them first to pay cable, and then to the networks. But with the growth of pay cable, the potential network audience for those movies will be continually reduced. And the networks are not going to continue to pay top dollar for those films when they come around to us. Producers reaching into this particular *pot of gold* may very quickly scrape their knuckles. Sports promoters who try to sell to both cable and commercial television will face the same problem. You cannot rob Peter to pay Paul.

The bottom line

The bottom line on all this reads clear to me: the absolute amount of broadcast television viewing will be increasing over the next decade, and so will our advertising revenues, which are directed mainly into programming. The new distribution services will continue to increase their penetration levels, but not enough to match network television's delivery of the mass audience. And the bulk of revenues gained by the many new services will be directed largely into overhead costs, not into programming.

It all comes down to one single hard fact—taking new television vs. established television as buyers of programs, ABC, CBS and NBC will still be your best customers.

Our projections show that by 1990 network and other sectors of broadcast television will be spending nearly twice as much on programming as all the major new services combined.

The three commercial television networks with their broad-appeal programming will continue to be the major player on the video scene for a long time to come.

It is likely that you will continue to supply the entertainment programming we need and that our audience has come to expect from us. And we are the only outlet that can consistently support your kind of $600,000-an-hour series programming. But there's one hook. In this marriage of true minds, we better learn to live with each other.

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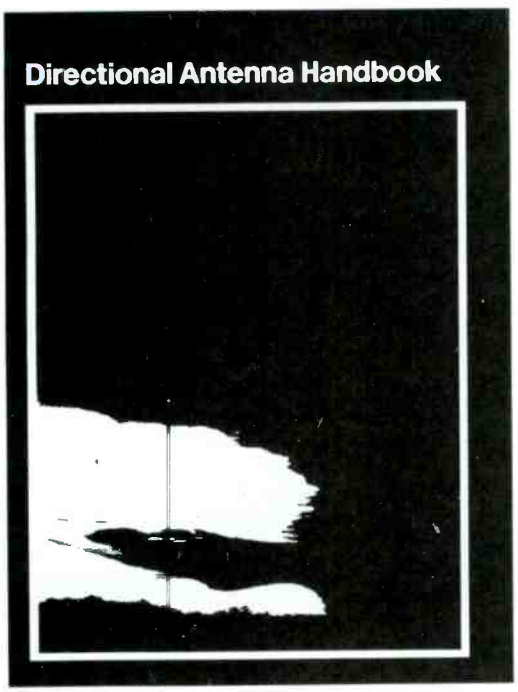

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sion of the issues before us. I am arguing that there is no rainbow, no pot of gold, not even much revolution in the so-called video technology revolution. It's really business as usual in the face of some new realities.

If wealth has its limits in the new services—and it does—I assure you that there is also no bottomless pot of gold in the commercial networks. This is no leprechaun talking to you. I am a corporate manager of a profit center—I repeat—profit center for a major corporation. The same thing is true of my counterparts at the other networks. Unquestionably, our first responsibility in this business is to the public. But we cannot serve the public without maintaining our profit margins.

Those profit margins are now being seriously threatened by the inordinate escalation of program production costs. While our revenues are increasing, and will continue to increase over the next 10 years, our program licensing costs have been rising at a much faster rate.

Between 1975 and 1978, program licensing costs for the three networks have been escalating at a compound annual rate of over 24%, outstripping the growth of our revenues. And this is occurring at a time when the competition for audiences by new distribution services is just beginning to have a measurable impact.

The problem is a little like the one we used to have in high school algebra. You remember, if train A leaves the station traveling 30 miles an hour and train B leaves three hours later traveling 60 miles an hour, how long will it take before train B catches train A.

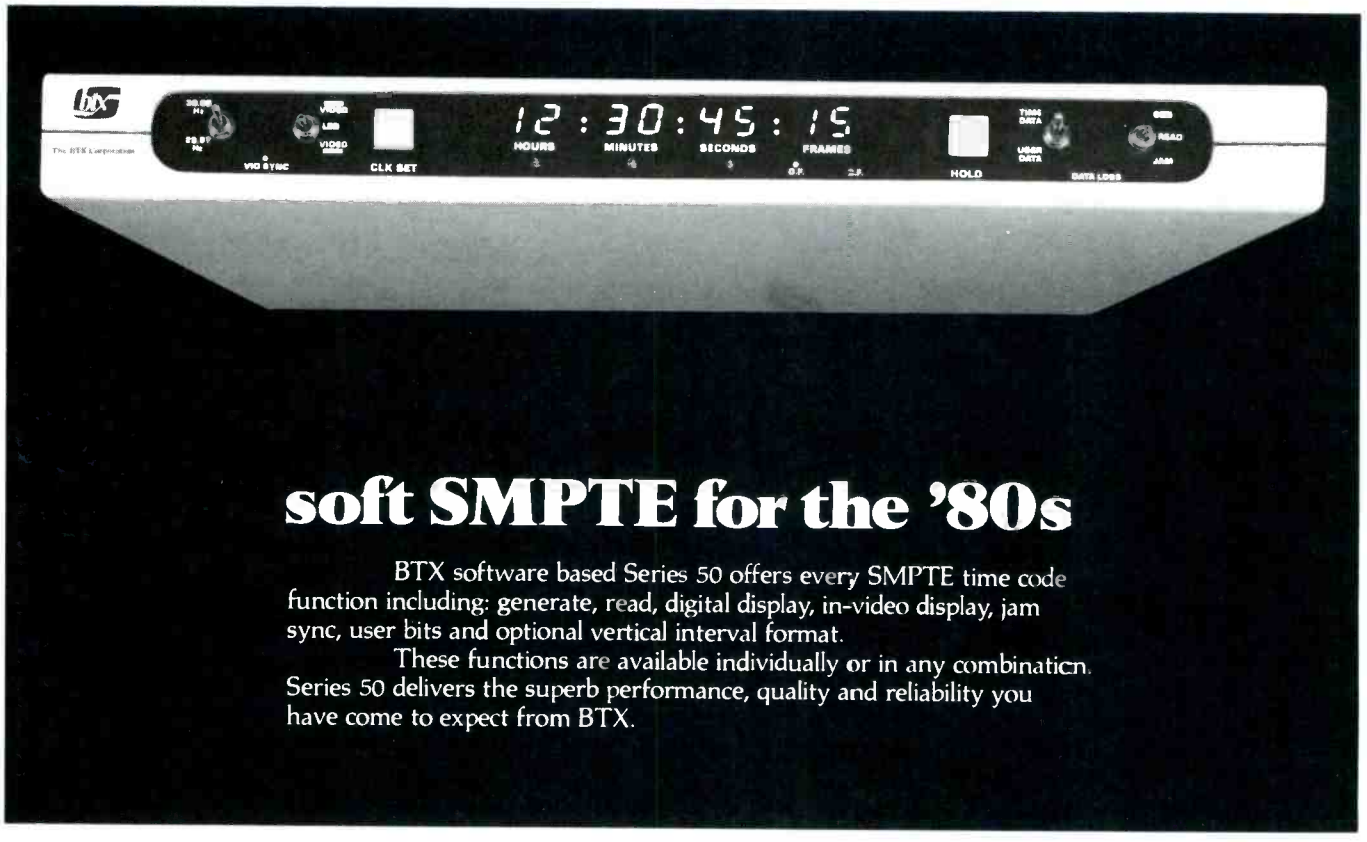
The problem for us is that our trains—revenues and costs—are on a rear-end collision course. I assure you, I am no Casey Jones. If costs don't slow down, we'll be forced to switch to another track. Despite the speculation in the press, I am not suicidal. And I don't really think you are either.

You and I can read a ledger as well as a script. We both know that program costs simply cannot keep rising at the current rate without seriously damaging profitability. We know, too, there is a limit to what the advertisers who support commercial television will pay. And, finally, we know that pretty much all we have is each other. If we at the networks have trouble supporting these cost increases, there is no way in the world that the new video outlets, with their lesser programming budgets, can support them.

I would like us to stay together. I don't relish being put in the position of looking for alternative forms of programming simply because some other kind of producer is better at taking care of business. I really don't want us at the networks to have to substitute economy model programming for your quality work. We do not want to cut corners that would cheat our audiences.

I am confident, though, that we will not have to make those choices. I have faith that the men and women of the production community are wise enough, shrewd enough, efficient enough to bring costs under reasonable control, like any other business in this country.

There is gold in television, plenty enough gold for all of us, whether we're in broadcast, cable, pay television, cassette, disc or in program supply. But it's not gold we will find at the end of a rainbow. It is gold we will earn by work, imagination, energy and, perhaps most crucially, by mutual concern and support. That's how it must be done. That's how we will do it—together. □



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Broadcast Technology: Update 1981

National Public Radio: surging ahead

By Richard Cassidy, director of engineering, and
John Kean, senior engineer, National Public Radio, Washington, DC

Broadcast technology is undergoing dramatic growth, and National Public Radio (NPR) is especially interested in applying this technology in support of diversified, high-quality radio that will be of maximum benefit to the public. Discussed here is some of the new technology, but more important, its value to information, entertainment, cultural and special-interest programs in the public radio system will be demonstrated.

NPR's satellite interconnect

The greatest technical development in public radio in recent years is the satellite interconnection system. This multi-channel network of 17 regional uplinks and 219 downlinks is increasing specialized and regional distribution of programs, is allowing more public radio stations to become members and is making significant improvements in program audio quality delivered to the listening public.

Since the early planning phase of the public radio satellite system, it was expected that the system of earth terminals and satellite channels would be used to distribute programs produced by stations, independent producers and syndicators, and offered directly to public radio stations for their own selection.

17 satellite uplinks make up the NPR interconnection system, including NPR's Main Origination Terminal in Washington, DC. They are associated with these stations in the following cities:

KUOW Seattle
KCUR Kansas City, MO
WBEZ Chicago
KSJN St. Paul
WNYC New York
WABE Atlanta
KUSC Los Angeles
KQED San Francisco
KCFR Denver
WGUC Cincinnati
WOI Ames, IA
WKAR East Lansing, MI
WLTR Columbia, SC
WGBH Boston
KUT Austin
WFSU Tallahassee.

Each uplink is capable of transmitting at least two high-fidelity audio channels to all other stations in the system, making these regional uplinks individual networks. This is a big change from the days of NPR's land-line interconnect, when programs of a timely nature had to compete for the time and equipment of a single 5kHz audio circuit.

Public benefits

What does regional uplinking mean for the listening public? It means increased variety and technical quality of programs. For example, many live pickups of news events, concerts and music or drama festivals are carried regularly via satellite. A number of stations have built sophisticated production studio complexes, and some have built remote vans to go on location for live broadcasts. We can expect to see the number of high-quality remote facilities grow as producers take advantage of the national distribution capabilities of the satellite system.

In the past year alone the introduction of many national cultural events via network radio, including the San Francisco Opera, Minnesota Orchestra, Vienna State Opera and the Cincinnati Symphony, among others, have occurred. International live stereo broadcasts included ones from London's Royal Albert Hall and from Brussels.

Although the technical quality of cultural and entertainment transmissions has been high, it has often been limited by the performance of terrestrial interconnections from the remote location to the nearest NPR uplink. To resolve these problems, some NPR stations use Dolby A or dbx compandors to improve the signal-to-noise ratio of a telephone circuit to the nearest uplink. Still, circuit availability and quality problems not solved by noise reduction persist. NPR is currently examining solutions to these *first mile* problems, including digital program modems on T-carrier facilities, development of high-quality RPU (remote pickup) equipment and deployment of portable satellite uplinks that can be taken to the point of organization.

Portable uplinks have already been tested in several broadcasts this year. Minnesota Public Radio and KUSC, Los Angeles, successfully transmitted several concerts live from the Aspen Music Festival in August using a portable 4.5m uplink provided by the Public Service Satellite Consortium. NPR coverage of Republican and Democratic national conventions was also beamed via satellite using a Satellink transportable terminal. The eventual system being planned would be dismantled, packed, shipped by air freight to another place and set up by two technicians. Because of Westar I's large "footprint" for receiving and retransmission, uplinking will be possible from anywhere in the 48 mainland states to the entire NPR system.

Growth in NPR stations

The 239 member stations of the public radio system are capable of bringing public radio services to about 65% of the US population. Ideally, NPR would like to reach the public with an eventual network of public radio stations sustaining at least the minimum requirements of a clearly receivable 18 hours a day of public radio services, providing 100% of the population with the opportunity to hear public radio and offering the majority of Americans a simultaneous variety of public radio programs from which to choose. Realistically, in the next five years, NPR will be aiming to reach about 90% of the population and to offer audiences in the top 100 radio markets possibly two or three public services.

Noncommercial radio limited

The expansion of public radio in

NPR: surging ahead

larger markets has already been severely hindered as a result of haphazard assignments of frequencies reserved for noncommercial radio. Many significant population centers are prevented from obtaining adequate public radio service in the noncommercial portion of the FM band. The top three markets illustrate the problem: in New York, Los Angeles and Chicago, public radio stations cannot serve their entire metropolitan area with an adequate signal.

Since broadcasting's beginnings in the 1920s, legislative attempts to secure reservations for noncommercial stations in the AM spectrum have failed, with predictable results. To this day there are no such reservations, and only about 25 noncommercial AM stations in the country remain, compared with more than 4500 commercial AM stations.

In its comments to the FCC on a proposed Table of Assignments for the noncommercial portion of the FM band, NPR suggested the following priorities for matching available frequencies with system expansion priorities:

1. One channel for high-powered stations for each of the top 100 markets.
2. One service for every part of the United States.
3. A second channel for high-powered stations for each of the top 70 markets.
4. A second service for every part of the United States.
5. A local transmission service for every city with a population in excess of 100,000.

NPR will also be looking for methods of combining satellite capabilities with nonbroadcast carriage, retaining to the greatest extent possible the integrity of local broadcast services. Some alternatives for delivery of public radio services might include the low-power unattended transmitters or cable FM signals where local radio service is not possible, either for technical or economic reasons. NPR will also explore contractual possibilities whereby existing local services have priority or programming control or both over services by secondary distribution. For example, should NPR have a satellite channel fully programmed for off-air reception and retransmission, it would be important to existing public radio stations and their audiences that the additional signal not duplicate existing services in a given market.

Public radio in new forms

Upstaged for years by the school slide projector or TV, radio production is once again earning a place in the classroom as an effective teaching medium. Drawing on the resources of NPR's news, public affairs and cultural production, the Education Services staff is assembling programs, often with print or visual texts, as background material for educators. The development of a teacher's guide and audiodisc on the SALT II issue, the marketing of a multi-media package on William Shakespeare, and the development of a minidocumentary recording on the Afghan crisis mailed to 14,000 teachers are examples of NPR programs reaching beyond the general radio audience. In the future increasing use of public radio material will be seen in the community library, the local school district, museums, hospitals, junior colleges and universities.

Extension of programs for special groups is most evident in the NPR national print-handicapped service. This service extends to about 50 Radio Information Services, the majority of which are on the SCAs

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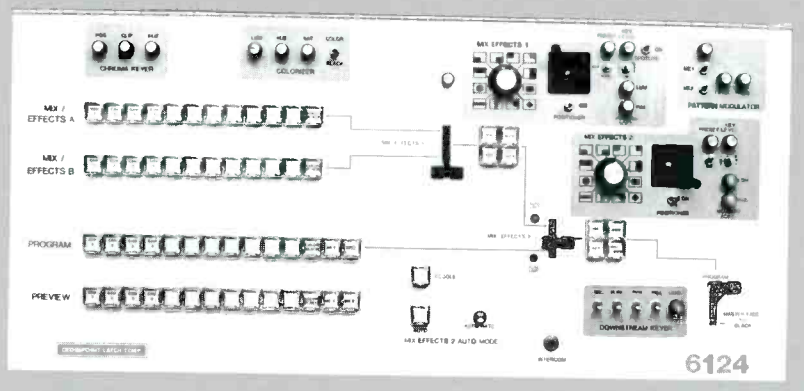

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(subcarrier broadcasting) of public FM stations. Present programming includes information of interest to the print-handicapped, including daily reading of the *New York Times* and *Wall Street Journal* live from New York.

SCAs offer new distribution possibilities in a world of crowded RF spectra and growing needs for specialized programming. SCA is now being combined with computers so that data transmission, facsimile and even audio/slow-speed video services are possible.

NPR supports development of SCA for community services. To that end, it operates the SCA Mobile Laboratory to improve SCA transmission quality and spur technology in this area. Through good planning and engineering. SCA can become a resource for the public radio station that wants to be a complete radio/audio community information center.

Audio quality in the '80s

Broadcast audio quality is an issue that deserves great attention in the '80s, and NPR will continue to promote it actively. Several facts have led NPR to its position:

1. After several years of work, NPR has developed a satellite distribution system with high audio quality. It is an analog FM system, but various techniques (threshold extension, companded processing, low-distortion demodulators) used in the design give audio performance that rivals some digital audio systems, including greater than 70dB dynamic range, less than 0.1% THD, negligible noise-reduction side-effects and precise channel matching.

New standards of audio quality are continually being reached in consumer equipment. The use of digital and direct record mastering, noise reduction systems, metal cassette tape and PCM audio recorders are exposing the public to ever-higher fidelity.

2. Although some public radio stations have built (or are planning) admirable production and broadcast facilities using the finest equipment, many stations have limited funds to upgrade their station equipment. Improving processing and modulation equipment often must take a lower priority to other needed equipment, such as tape recorders, consoles and turntables.

3. There are a lot of audio processors for FM, but many are designed for battle in the commercial "loudness race." Thus, one may pay for capabilities not needed when good dynamic range and minimal processing effects are desired. On the other hand, having effective modulation capability is made difficult by the strict modulation limit imposed by FCC rules.

NPR hopes to relieve this complex situation for broadcast audio in several ways:

- to encourage discussion by NPR and member station engineers on important topics, through its technical newsletter *Engineering Update*;
- to provide a forum on broadcast audio quality as a regular part of the Public Radio Conference, to compare ideas, uses and performance of new and old broadcast audio equipment;
- and to advocate, on behalf of its member stations, standards, procedures and funding that uphold high broadcast standards, for instance, avoidance of composite clipping, desirable processing for various types of programs and SCA transmission performance.

NPR thinks public radio must stand behind these ideals of quality. After all, sound is our first, last and only product. How the public perceives us in this age of high fidelity will determine whether we gain listeners and their respect as a medium for listening enjoyment. □

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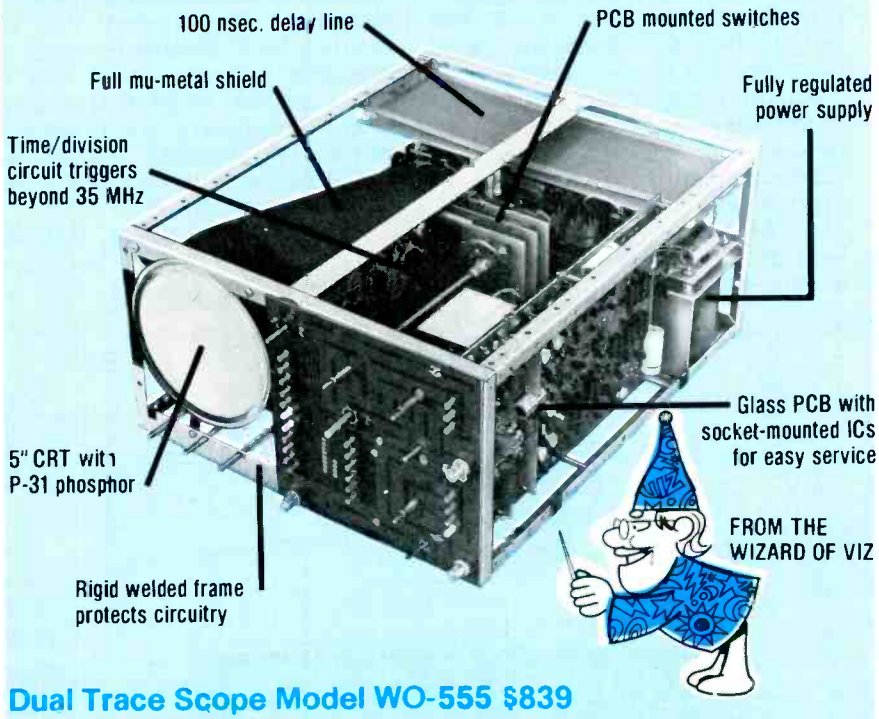

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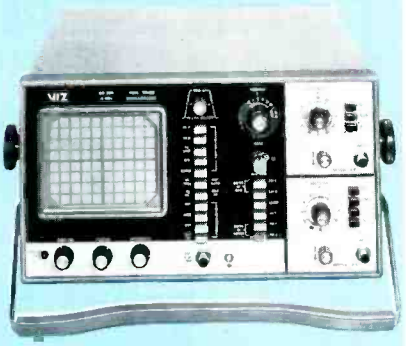

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feedback

Addendum to "Worldwide Color TV Standards: Similarities and Differences." The paper by Pritchard and Gibson, published in the August and September issues of **BE** on the NTSC, PAL and SECAM color television standards and their many variants has received many favorable comments. The following letter is by Michael Robin, Studio Systems Department, Engineering Headquarters, Canadian Broadcasting Corporation, 7925 Cote St., Luc Road, Montreal, P.Q. H4W 1R5, Canada. It points out that this article could be enhanced with some additional comments. With approval of one of the authors (Pritchard) and with permission from the SMPTE, the following letter is offered.

I read with interest the article *Worldwide Color Television Standards Similarities and Differences,** by D. H. Pritchard and J. J. Gibson. I would like to point out a few statements in this article that could be interpreted as inaccuracies.

August, p. 50 col. 3: "The concept of providing horizontal interlace for reducing the visibility of the color subcarrier(s) is followed in all approaches." This is true for NTSC and PAL but is untrue for SECAM because of the frequency modulation of the subcarriers. Various attempts, detailed elsewhere in the article (see September, p. 117, col. 1, last paragraph) have been made to achieve reduced subcarrier visibility. There is, however, no luminance/chrominance interlace in SECAM, except when there is no chrominance information and the subcarriers are at rest.

August, p. 51, paragraph 1: "simple PAL" and "standard PAL" are mentioned at the end of this paragraph. Standard PAL (actually PAL-Delay line or PAL-Deluxe) as opposed to PAL-Simple is just another way of decoding the PAL signal. The impression is given that there are two PAL systems, namely: PAL-Simple and PAL-Standard. Regardless of the transmission standards (PAL-I, PAL-B, PAL-G, PAL-M, or PAL-N) there is only one method of PAL color encoding common to all standards. Hence the statement "The standard PAL system has been adopted by numerous countries..." may be misleading. The countries adopt the transmission standard; manufacturers choose the decoding method best suited for the price category of their products.

August, p. 53, col. 2, following equation (2): It should be pointed out that, strictly speaking, the **I** and **Q** signals are formed in the camera encoder and not at the transmitter, as stated in the article.

September, p. 44, col. 2, paragraph 3: With regard to the "wideband systems available in France and the USSR," it is worth mentioning that the same SECAM signals are used in East Germany, Egypt, Greece, Lebanon, etc., which use the "narrowband" B, G, systems.

With regard to the next paragraph, it should be pointed out that SECAM is a color encoding system that can be used with any transmission standard. The method of sound transmission is specified by the transmission standard and not the color encoding standard. The following three are examples:

1. France uses the L system for its 625-line, SECAM-encoded transmissions. System L specifies an 8MHz transmission channel, AM sound, positive picture carrier modulation, 6.5MHz intercarrier spacing.

2. East Germany, Greece, Egypt, Lebanon, etc., use the B system with their 625-line SECAM-encoded transmissions on VHF. System B specifies a 7MHz transmission channel, FM sound, negative picture carrier modulation, 5.5MHz inter-

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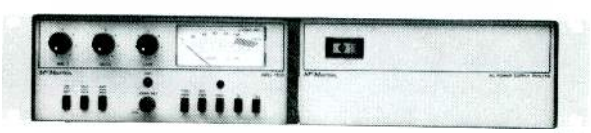

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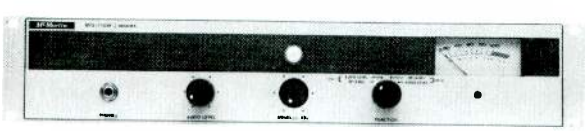

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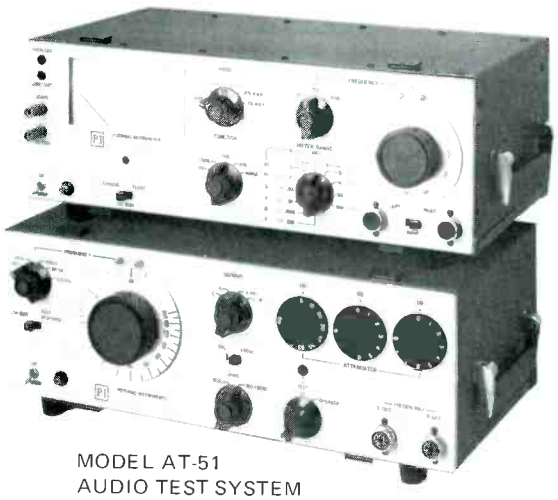

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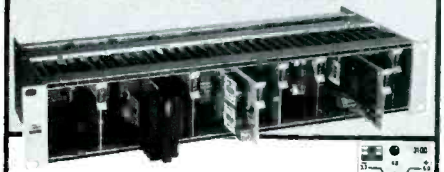

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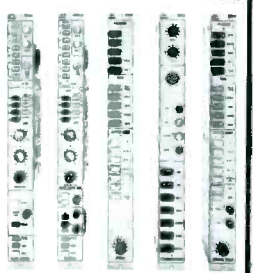

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Feedback

carrier spacing. On UHF, these countries use the G system, which is identical to the B system, except that it is transmitted in an 8MHz channel.

3. The Soviet Union, Poland, Czechoslovakia, Hungary and Bulgaria used the D system for their 625-line SECAM-encoded transmission on VHF. System D specifies an 8MHz transmission channel, FM sound, negative picture modulation and 6.5MHz intercarrier spacing. System K, identical to system D, is used for UHF transmissions.

Hence, it is erroneous to imply that for the transmission of sound SECAM employs amplitude modulation only.

September, p. 46, Fig. 18: With regard to L III SECAM, the following should be kept in mind: L is a transmission system and III refers to the third chronological version of the SECAM color encoding system. As a matter of fact, since it was first conceived in the 1950s, the SECAM concept has undergone the folowing changes: SECAM I, line sequential AM modulation of a single subcarrier. This was dropped because of poor compatibility; SECAM II, line sequential FM modulation of a single subcarrier. This was dropped because of poor compatibility; and SECAM III, line sequential FM modulation of two subcarriers.

SECAM IIIb, also called optimized, is the same as SECAM III but with the addition of high frequency subcarrier pre-emphasis (BELL) and periodic phase change of the undeviated subcarrier frequencies in an effort to improve the compatibility. This latter version is now known as SECAM (no suffix).

In addition, there are two types of SECAM decoding methods (not unlike PAL with PAL-D and PAL-S). They are as follows:

SECAM V, where the line switching sequence synchronizing signal is derived from the identification signals transmitted during the vertical blanking interval. This method is slowly becoming obsolete, especially in countries using negative modulation, because of its susceptibility to noise and, hence, the possible occurrence of full wrong color fields.

SECAM H, where the line switching synchronizing signal is derived from the nondeviated subcarrier present on the horizontal back porch. This method allows a line by line correction, (as opposed to a field by field correction as in SECAM V) and is favored by the

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Feedback

newcomers to the SECAM world who all use negative modulation.

With regard to the chrominance bandwidth in the system identified as L III SECAM in Fig. 18, the following applies: The chrominance bandwidths shown are apparently not intended for accurate frequency scaling purposes. Essentially the SECAM chrominance information is contained in a spectrum extending from 3.9 to 4.8MHz, as a result of clipping of the color difference signals after pre-emphasis and prior to frequency modulation of the respective carriers. (See also Fig. 24 under SECAM chroma and bursts deviation). This explains why SECAM can be transmitted in 5MHz systems like B and G without difficulty.

September, p. 46, Fig. 19: The "N" in this figure is not an NTSC standard, but rather it is a 625-line, 50Hz standard with reduced luminance bandwidth (4.2MHz) transmitted in 6MHz channel conforming to the practice used on the American continents. (See page 48, top paragraph.)

September, p. 48, Fig. 21: The "E" in this figure is not a SECAM E system. System E is a monochrome 819-line, 50Hz standard transmitted in a 14MHz channel. It happens to be used in France where the SECAM encoding system was invented.

Perhaps it is not accurate to note in Fig. 21 and in text on page 52, column 3, that this system is becoming extinct; it is radiated by some 1200 transmitters in the VHF bands I and II and carries the main French program, but in monochrome because of lack of compatibility with SECAM. Its extinction is still far in the future when the third UHF 625-line network will achieve full country coverage.

The "L" (III) in Fig. 21 is not a system, as explained earlier. Furthermore, Russia and other East European countries are standard "D" on VHF and standard "K" on UHF. Both standards use negative modulation and FM sound.

September, p. 48, point (4): "Some systems use positive polarity (luminance proportional to voltage) modulation of the video carrier..." Now, positive modulation is generally defined as occurring when the amplitude of the modulation envelope of the radiated picture carrier increases with increasing light in the scene before the camera.

September, p. 48, Fig. 22. In this figure, as well as in the text, mention is made of "sound carrier frequency" in megahertz. I believe that what the authors mean is "sound carrier to picture carrier spacing" in megahertz. All of the megahertz frequency values shown in Fig. 22 refer, of course, to baseband values (spacing in the RF domain).

September, p. 52, bottom of page. I don't know of any television camera chains manufactured to operate at "625 lines and 48-field rate..." Rather, the Europeans operate their telecine chains slightly faster, at a 50-fields rate, and accept the associated 4% sound pitch change and movement acceleration as inherent and generally unnoticeable.

(With regard to this point, the following authors' comment was received: "In the US users of television-to-film conversion systems have modified broadcast cameras by replacing the conventional standard sync generator with a special sync generator chip to operate at 655 lines, 48 fields. Note that 655 lines is correct, not 625, as erroneously given. Europeans operate their telecine chains with another technique, as stated by Robin.) □

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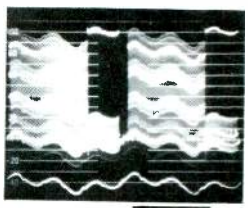

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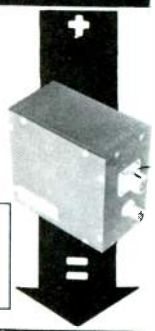

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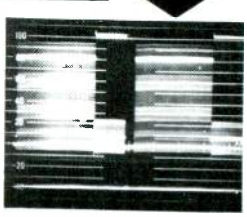

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new products

Microphone/line distribution amplifier

Modular Audio Products has introduced the self-powered rack mountable model 7823 microphone/line distribution amplifier. The 7823 includes the model 4003 transformer

coupled microphone preamplifier with adjustable gain to 65dB, and the model 4820 balanced output distribution amplifier that drives eight 600 lines at +20dBm.

Circle (85) on Reply Card

Frequency counter

The model 5612 from **DSI Instruments** frequency counter's sensitivity is typically 10mV-15mV over a range from 100Hz to 250MHz and 15mV to 50mV up into the 450MHz region.

It is encased in a molded cabinet. Its combination carrying handle-stand can be positioned at various angles to facilitate readability and portability. Accuracy meets all FCC regulation requirements for broadcast, land-mobile, RF and telecommunications.

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Cooling base

The **Stantron** Cooling Base provides approximately 530 CFM free air delivery, and attaches to the bottom of the Stantron modular

electronic cabinet. This method of assembly eliminates the necessity of using the available panel space.

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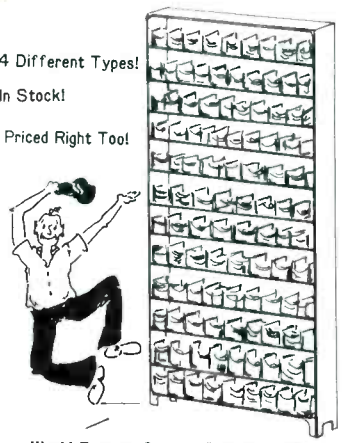

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Color monitor

A high line-rate color monitor from **Mitsubishi Electronics** is capable of up to 1800 lines of resolution. Before this model, C-8912, the highest line rates available were about 1200 lines, according to the manufacturer.

Circle (88) on Reply Card

Tower guys

Philadelphia Resins announced a new line of Phillystran tower guys with improved performance, particularly in the areas of low stretch and electrical transparency. Specifically developed to meet needs of broadcasters, the new product exhibits low elongation—not exceeding 0.3% at usual working loads and less than 1% at tensile loads up to 50% of the minimum break strength—coupled with negligible creep to decrease tower deflection and simplify tensioning procedures. The tower guys are stronger than extra high strength galvanized steel and offer a three-to-fourfold advantage in weight per foot, according to the manufacturer. The lighter, smaller cross section decreases wind resistance and reduces ice build-up. Other advances include an olefin copolymer jacket and guy terminations specifically for synthetic guys.

Circle (89) on Reply Card

VU meter

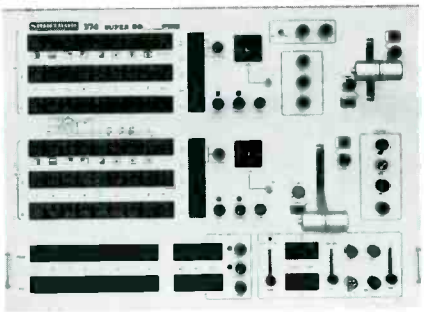
The 10 point LED solid-state VU meter from **Phoenix Co.** can be read in light or dark. The solid-state feature provides resistance to shock

and vibration. Horizontal and vertical sales, 20dB to +3 dB, are included. The meter outside dimensions are 3x1-3/8 x 13/16 inches.

Circle (90) on Reply Card

Switcher

Shintron has announced the model



374 Super 80 Switcher. The 374 is an 8-input, double effects generator-equipped switcher utilizing modular components from the 375 Super-Switcher. Mix/effect bus No. 1, which handles inputs from buses A and B, and mix/effects bus No. 2, which handles inputs from buses C and D are structured so as to make double re-entry in a criss-cross fashion. This makes complex effects such as "wipe to wipe" an easy operation.

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Audio level displays

Logitek's Bright-VU LED audio level display is an accurate way to read peak and average audio levels. Using 16 individual LEDs spread

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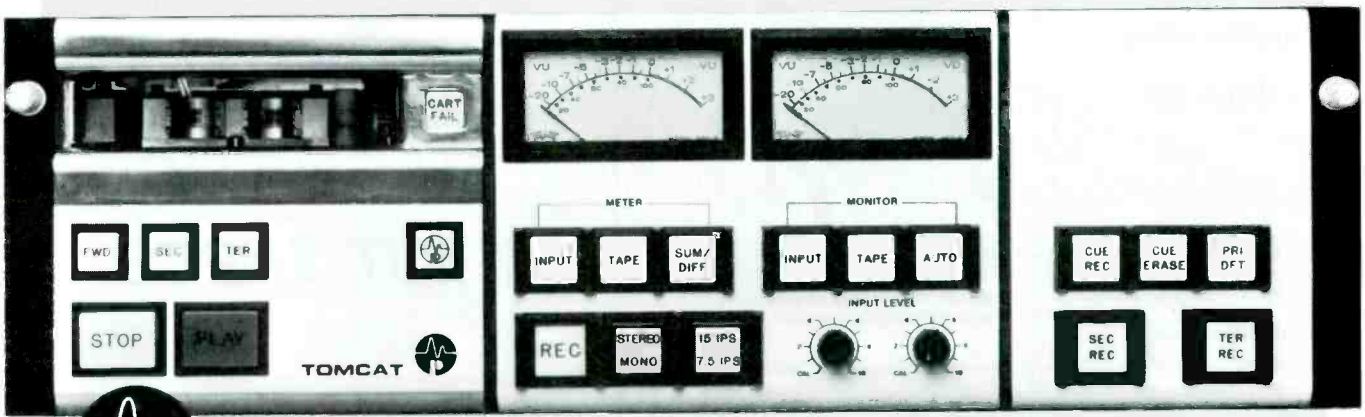

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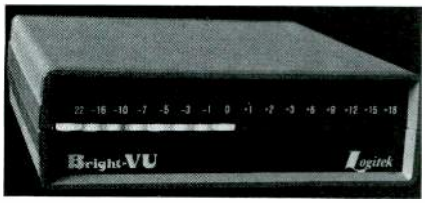
New products

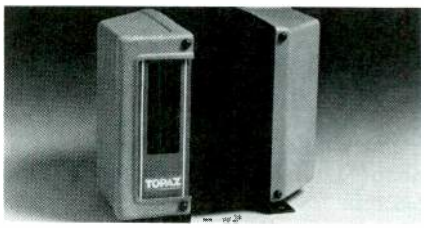


over a dynamic range of 40dB, Bright-VUs have the range and accuracy to meet the requirements of broadcasters and recording engineers. Bright-VU displays are stocked in mono and stereo models.

Circle (92) on Reply Card

Ultra-Isolators

Topaz Electronics has introduced its series of enhanced Ultra-Isolators. These new noise suppressors feature UL listed models, low coupling capacitance and guaranteed noise-free power output. They provide considerably better performance than any of the earlier Topaz Ultra-Isolators and yet they are



priced approximately 60% less, according to the manufacturer. Additional protection from transient noise is provided by solid-state limiters set to clip any voltage exceeding the peak level of 135VRMS.

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Antenna range

Scientific-Atlanta has introduced model 5752 compact millimeter antenna range. Operating in the frequency range between 4 and 60GHz, this product extends the compact range capability into the millimeter frequency region. Eight years of compact range production experience have allowed the company to develop techniques that yield a reflector of sufficient quality to operate in the millimeter region.

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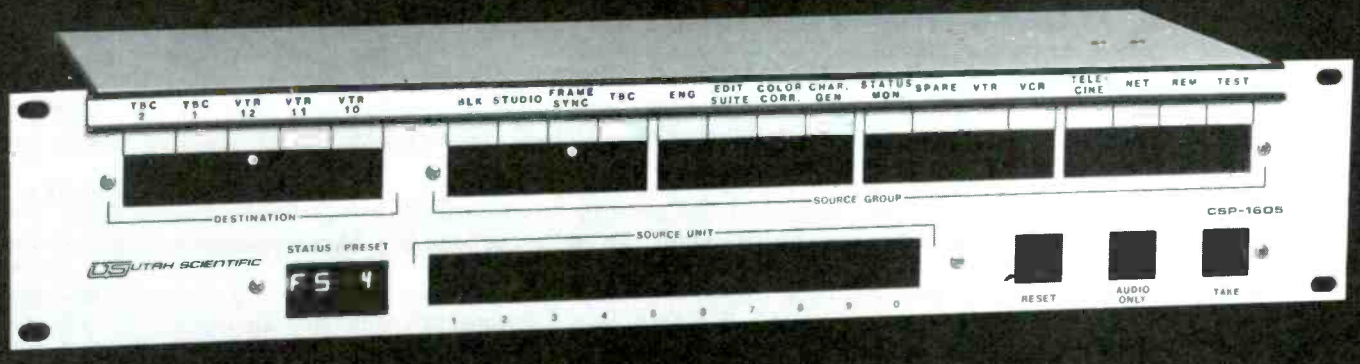

CSP-1605 FIVE-BUS ALPHANUMERIC PARTY LINE CONTROLLER - $1,700

The CSP-1605 panel is one of a new series of routing switcher controllers from Utah Scientific. Each of these new models features alphanumeric **Preset/Status** displays with up to 1600 assignable name/number combinations to let your operator address sources by their actual name — VT 14, CM 3, etc.

The CSP-1605 model pictured here can control five matrix busses and provides current status readout instantaneously as busses are addressed. Input selection is made by either one, two, or three keystrokes. Separate audio switching and statusing is standard and, as with all Utah Scientific party line panels, connection to the matrix is via a single coax.

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ITA board elected

Six new directors were elected to the board of ITA at the association's annual membership meeting in New York City, October 21. ITA also voted to amend its corporate name to International Tape/Disc Association Inc. but to continue using ITA as its initials.

The new board, which met immediately following the membership meeting, then elected a slate of new officers to serve for the coming year.

Elected as members of the board were: Maria Curry, Agfa-Gevaert; James Jimirro, Walt Disney Telecommunications; Al Markim, Video Corp. of America; Al Pepper, Memorex; Robert Whitehouse, Sharp Electronics; and Larry Trerotola, E.I. DuPont.

The newly elected officers are: chairman of the board, Irwin Tarr, Matsushita Electric Corp. of America; vice chairman, Ed Khoury, Capitol Magnetics; president, Sam Burger, CBS Columbia Records; senior vice president, John Povolny, 3M; vice president, planning, Gordon Bricker, RCA "SelectaVision" Videodiscs; east coast vice president, K. T. Tsunoda, Sony Video Products Co.; midwest vice president, Anthony A. Mirabelli, Quasar Electronics Co.; west coast vice president, Steve Roberts, 20th Century-Fox; European vice president, Arnold Norregaard, Bellevue Studio, Copenhagen; vice president membership/events, Larry Finley, Larry Finley Associates; secretary, Bill Orr, Orrox Corp.; and treasurer, Gerald Citron, Intercontinantal Televideo.

Henry Brief, who has been serving as ITA's executive director, was elected executive vice president.

Maganavision videodisc player available nationwide

The Magnavision Optical Videodisc Player, from the Magnavox Consumer Electronics Company, achieved nationwide availability when it went on sale in the following markets November 9: New York, Houston, Philadelphia, New Orleans, San Francisco, Sacramento and Baton Rouge. With the addition of these seven major metropolitan markets, Magnavision will be available in 32 cities across the country, including Los Angeles and Chicago. Now 600 Magnavox dealers with 2000 outlets are selling Magnavision to consumers.

Matsushita licensed to use dbx noise reduction circuitry

Matsushita Electric Industrial Co. Ltd. has consummated a licensing agreement with dbx Inc., Newton, MA, via dbx's parent company subsidiary, BSR Japan Ltd., for the dbx tape noise reduction system. Matsushita plans to market its first products employing dbx noise reduction technology under its Technics brand name, with initial distribution in Japan followed by worldwide distribution.

Microdyne to supply antennas to SSS

Microdyne announced an agreement with Satellite Syndicated Systems to supply up to 100 12-foot antennas for use by SPN affiliates.

SSS is the owner of Satellite

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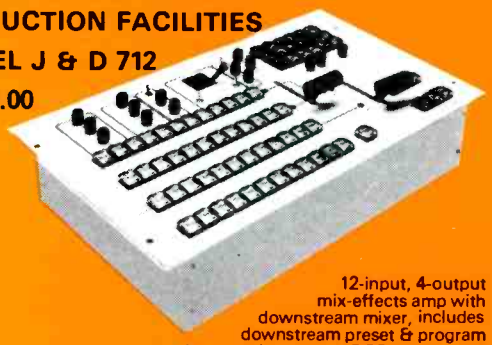

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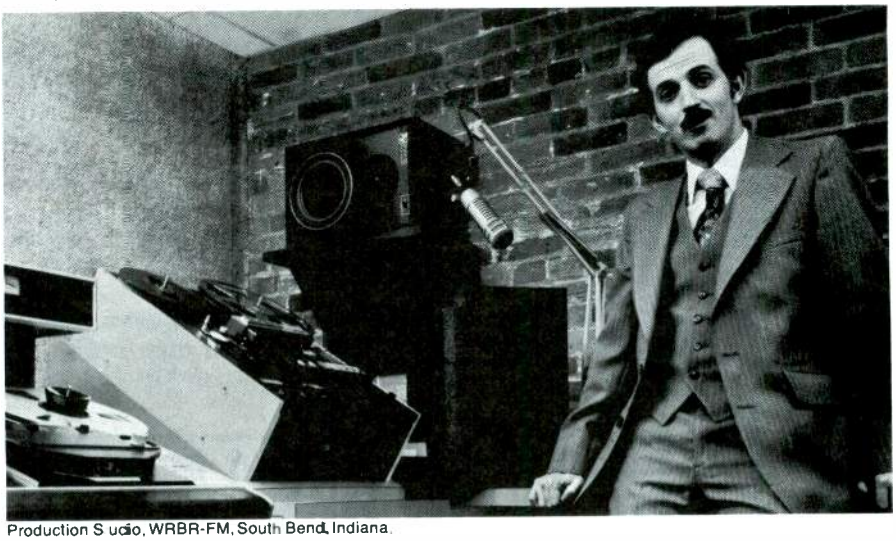
Electro-Voice's Greg Silsby talks about the Sentry 100 studio monitor



Production Studio, WRBR-FM, South Bend, Indiana.

In all the years I spent in broadcast and related studio production work, my greatest frustration was the fact that no manufacturer of loudspeaker systems seemed to know or care enough about the real needs of broadcasters to design a sensible monitor speaker system that was also sensibly priced.

Moving to the other side of the console presented a unique opportunity to change that and E-V was more than willing to listen. When I first described to Electro-Voice engineers what I knew the Sentry 100 had to be, I felt like the proverbial "kid in a candy store." I told them that size was critical. Because working space in the broadcast environment is often limited, the Sentry 100 had to fit in a standard 19" rack, and it had to fit *from the front, not the back*. However, the mounting hardware had to be a separate item so that broadcasters who don't want to rack mount it won't have to pay for the mounting.

The Sentry 100 also had to be very efficient as well as very accurate. It had to be designed so it could be driven to sound pressure levels a rock 'n roll D.J. could be happy with by the low output available from a console's internal monitor amplifier.

In the next breath I told them the Sentry 100 had to have a tweeter that wouldn't go up in smoke the first time someone accidentally shifted into fast forward with the tape heads engaged and the monitor amp on. This meant high-frequency power handling capability on the order of five times that of conventional high frequency drivers.

Not only did it have to have a 3-dB-down point of 45 Hz, but the Sentry 100's response had to extend to 18,000 Hz with no more than a 3-dB variation.

And, since it's just not practical in the real world for the engineer to be directly on-axis of the tweeter, the Sentry 100 must have a uniform polar response. The engineer has to be able to hear exactly the same sound 30° off-axis as he does directly in front of the system.

Since I still had the floor, I decided to go all out and cover the nuisance items and other minor requirements that, when added together, amounted to a major improvement in functional monitor design. I wanted the Sentry 100 equipped with a high-frequency control that offered boost as well as cut, and it had to be mounted on the front of the loudspeaker where it not only could be seen but was accessible with the grille on or off.

I also didn't feel broadcasters should have to pay for form at the expense of function, so the walnut hi-fi cabinet was out. The Sentry 100 had to be attractive, but another furniture-styled cabinet with a fancy polyester or die-cut foam grille wasn't the answer to the broadcast industry's real needs.

And for a close I told E-V's engineers that a studio had to be able to purchase the Sentry 100 for essentially the same money as the current best-selling monitor system.

That was well over a year ago. Since that time I've spent many months listening critically to a parade of darn good prototypes, shaking my head and watching some of the world's best speaker engineers disappear back into the lab to tweak and tune. And, I spent a lot of time on airplanes heading for places like Los Angeles, Grand Rapids, Charlotte and New York City with black boxes under my arm testing our designs on the ears of broadcast engineers.

The year was both frustrating yet enjoyable, not just for me but for Ray Newman and the other E-V engineers who were working on this project. At this year's NAB show it all turned out to be worth it. The Sentry 100's official rollout was universally accepted, and the pair of Sentry 100's at the Electro-Voice booth was complemented by another 20 Sentry 100's used by other manufacturers exhibiting their own products at the show.

What it all boiled down to when I first started the project was that I knew that the Sentry 100's most important characteristic had to be *sonic integrity*. I knew that if I wasn't happy, you wouldn't be happy. I'm happy.

Greg Silsby

Market Development Manager,
Professional Markets

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Circle (61) on Reply Card

Business news

Program Network. SPN will switch its programming from Satcom I to Westar III this December. To accommodate the change, the SPN affiliates therefore must purchase a second antenna to view Westar III.

SSS is proposing to the 600 plus SPN affiliates desiring additional threshold margins the Microdyne 12-foot antenna as a cost-effective means of expansion.

KLRA sold

Dallas businessman and broadcasting executive Philip R. Jonsson has agreed to purchase Little Rock radio station KLRA for $2.3 million from KLRA Inc.

The transaction, which was announced by Jonsson and Toby Coe, president of KLRA Inc., is subject to approval by the FCC.

SAECO moves to larger quarters

SAECO, as of October 1, has taken over the premises and operations of Medico Electric Labs (Mel Audio), one of the oldest distributors in the area.

SAECO will continue to service the trade formerly handled by Mel Audio, as well as their own operations, which is primarily the assembly and export of complete broadcast video and audio systems worldwide. The products are Ampex, Conrac, Hitachi, Grass Valley, Tektronix and many others.

Malrite buys KNEW

Carl E. Hirsch, president of Malrite Broadcasting Company, announced the acquisition of KNEW radio, Oakland/San Francisco and the appointment of Steve Edwards as general manager.

Edwards comes to KNEW from KFOG, where he was general manager. He is also serving as president of the Northern California Broadcasters Association. His previous affiliations include CBS-TV in Los Angeles and Cox Broadcasting's KFI and KOST Los Angeles, where Edwards served as general sales manager.

Continental Electronics, Rockwell conclude sale

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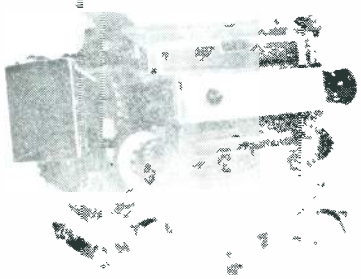

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The *new* Cricket lets you go where no dolly has ever been before. And work in areas that are inaccessible for more conventional equipment. Cricket smoothly elevates any size camera—without bumps or vibrations. A new triangular design prevents twisting.

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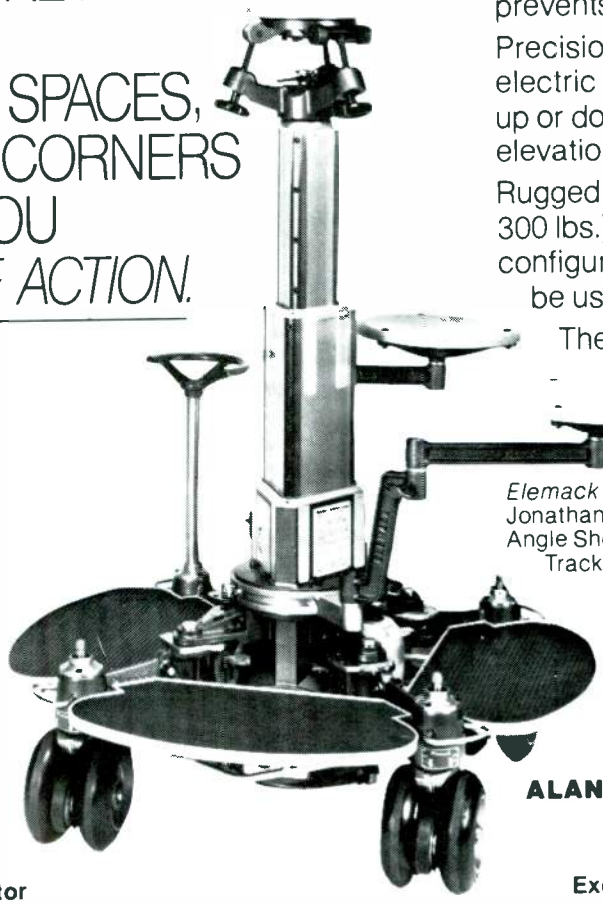
The Elemack Cricket. One of the lightest, most compact hydraulic dollies available.



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Business news

tion and Continental Electronics Mfg. Co. jointly announced they have concluded sale of Rockwell's Collins broadcast products business to Continental.

The sale includes Collins' line of AM and FM radio transmitters, audio consoles and other related radio broadcast equipment.

Datatron reports record earnings

Datatron Inc. reports its net income for the fiscal year that ended June 30, 1980, as the largest in six years.

Sales for fiscal 1980 were $6,312,439 against $5,058,810 for fiscal 1979. Net income was $574,046 compared to $231,108 at June 30, 1979.

Per share earnings were $.23 as against $.13 for the previous year.

American Research and Development invests in Image Resource

American Research and Development, a division of Textron Inc., has joined with a private group to invest a sum "...well in excess of $1 million" in Image Resource Corporation of Westlake Village, CA. Image Resource's Videoprint System produces hard copy records of color video output.

North Supply announces distributor agreement

North Supply Company, Lenexa, KS, has announced the signing of a distributor agreement with United States Tower Company of Afton, OK. USTC has produced the first low-cost efficient spherical satellite antennas enabling users to receive signals from as many as 11 satellites simultaneously with a single antenna.

Akai America moves

Akai America Ltd. moved to a larger corporate headquarters that was specifically designed and built to meet the present and future growth needs of the company. The new address is 800 West Artesia Boulevard, Compton, CA 90220.

The mailing address continues to be PO Box 6010, Compton, CA 90224. The customer service mailing address will remain PO Drawer 13, Compton, CA 90224. □

1" VTR to go

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New information: The following information updates listings in Broadcast Engineering's 1980 Buyers' Guide issue. Please correct your records.

ATI-Audio Technologies Inc., 328 W. Maple Ave., Horsham, PA 19044
Ed Mullin (215) 443-0330

REGIONAL SALES CONTACTS:

Audiotechniques, 652 Glenbrook Rd Stamford, CT 06906 (203) 359-2312 Michael Faulkner
Allied Broadcast Eqpt., 635 South E St Richmond, IN 47374 (317) 962-8596 Roy Ridge
AVC Systems, Inc., 1517 E Lake St., Minneapolis, MN 55407 (612) 729-8305 Doug Ordom
Audio Distributors, Inc., 2342 Division Ave., S. Grand Rapids, MI 49507 (616) 452-1596 Dave Velsme
Audio Innovators, Inc 5001 Baum Blvd., Pittsburgh, PA 15213 (412) 471-6220 Norman J. Cleary
Audio Associates 3130 Chalfonte Ave., Bethlehem, PA 18017 (215) 865-6013 Art While
Broadcast Comm Products 8179 Second Ave., Leyden, CO 80401 (303) 424-3231 Greg Pine
Broadcast Eqpt & Supply Co., P.O Box 3141 Bristol, TN 37620 (615) 878-2531 Clifton Droke
Cramer Video/Audio Systems, 120 Hampton Ave., Needham, MA 02194 (617) 449-2100 Jim Ritterman
Crouse-Kimzey Co., P.O Box 9830 Ft Worth, TX 76107 (800) 433-2105 Mark Bradford
Broadcast Supply West, 2711 Locust Ave W., Tacoma, WA 98466 (206) 565-2301 Bill Colglazier
Flanner and Hafoos, 2500 N Mayfair Rd Milwaukee, WI 53226 (414) 259-9665 John Loeper
Full Compass Systems, 6729 Seybold Rd Madison, WI 53719 (608) 271-1100 Jonathan Lipp
Gray Comm Consultants, Inc., 5401 Southern Comfort Blvd Tampa, FL 33614 (813) 885-1411 Dave Orienti
David Green Broadcast Consultants P.O Box 590 Leesburg VA 22075 (703) 777-8660 David Green
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JNS Electronic Industries, P.O Box 85, Rosanna, Victoria 3084 Australia 439-1430 John N Stannard

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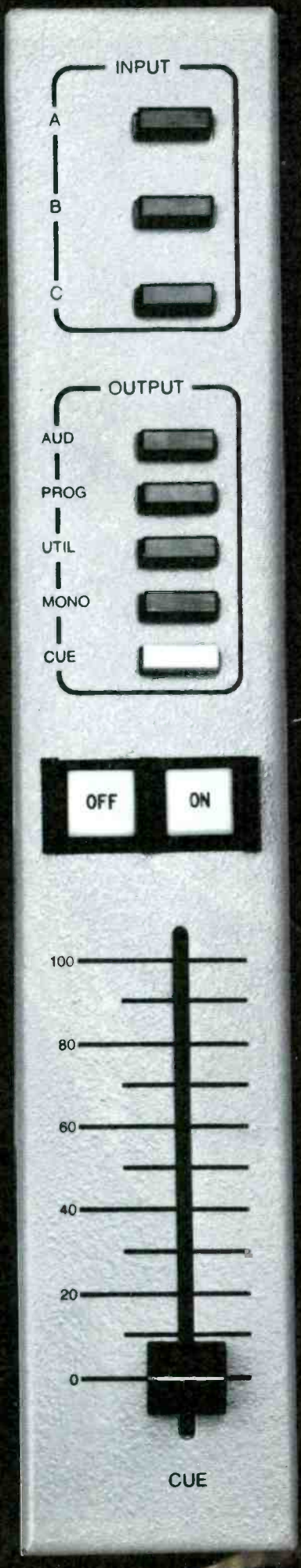

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Sensible engineering design, thoughtful operator conveniences and reasonable prices are good reasons for choosing Broadcast Audio. We have 3 models, base priced from $6,450 to $8,950 and will deliver in 3 weeks or less. Why wait?

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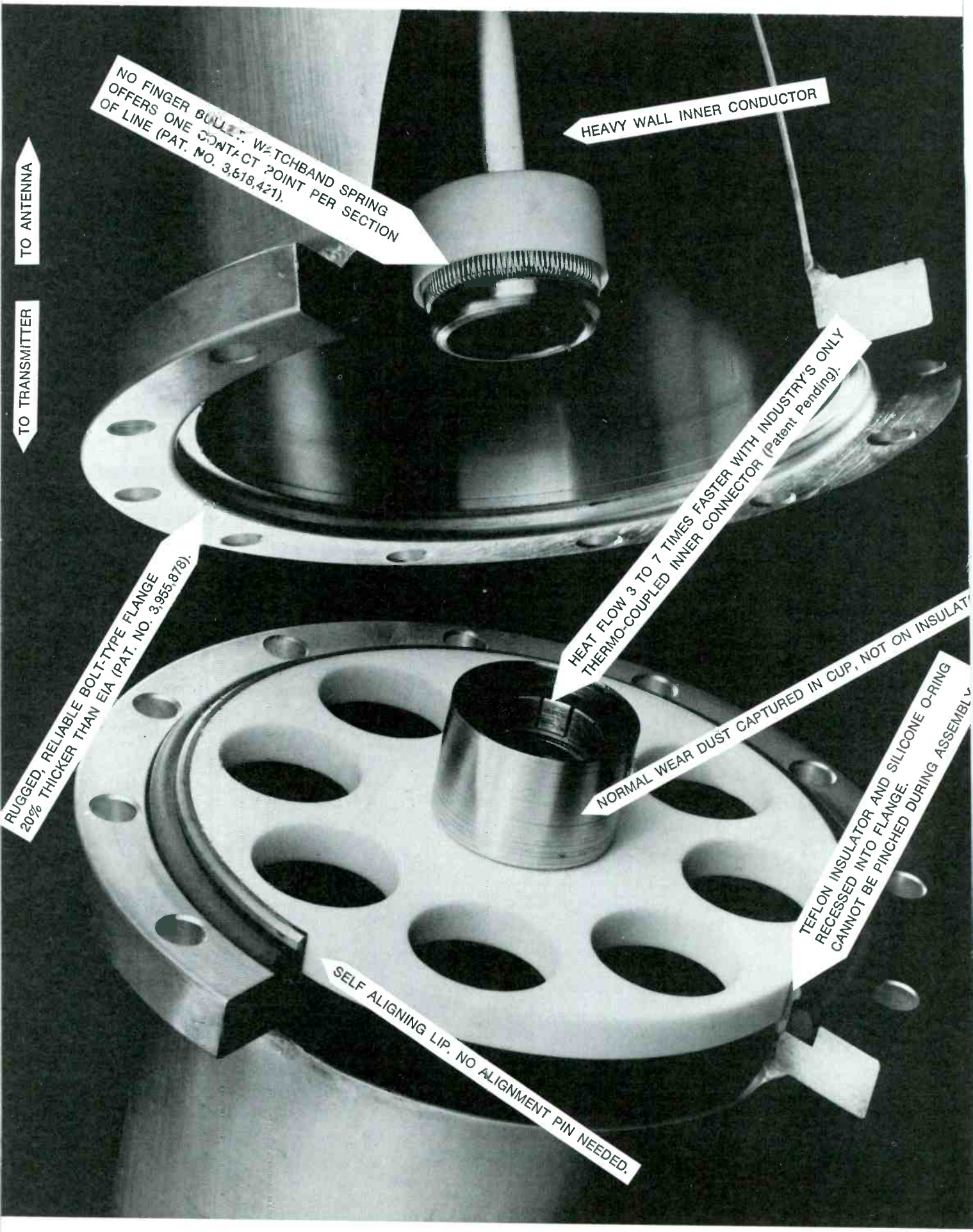

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If your life-line is your transmission line, and you want to avoid burn-outs and costly down-time, then put reliability into your system.

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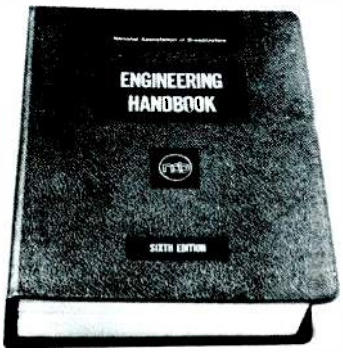
Send us your

station-to-station

ideas. We'll pay you cash or send you the NAB **Engineering Handbook.**



If your equipment tips or other operating ideas are selected by **Broadcast Engineering** to appear in Station-to-Station, you will receive a $30 minimum payment or a free copy of the prestigious *NAB Engineering Handbook*.

The latest *Handbook* contains over 1,000 pages and 1,000 illustrations covering every aspect of AM, FM and TV operation and maintenance: recommended procedures, fundamentals, standards, rules and how-to instructions.

Station-to-Station affords you an opportunity to share your expertise with readers throughout the industry: how you solved a nagging technical or production problem, modified a circuit for more flexibility, redesigned a studio or facility, developed new test procedures or employed an operating idea to save time and money. By sharing your knowledge, you'll share in the wealth of information contained in the *Handbook*.

Send your items to: Station-to-Station editor, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. Please indicate if you want to receive the *Handbook* or prefer to receive a check.

The *Handbook* can also be purchased directly from the NAB at $40 a copy for NAB members and $80 a copy for non-members. Write to: Station Services Dept., NAB, 1771 N Street, N.W., Washington, D.C. 20036.

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people in the news

Dr. Vladimir Kosma Zworykin, 91-year-old TV pioneer, was honored by the Eduard Rhein Foundation of Germany for his many contributions to "fully electronic" television. Eduard Rhein, a German writer, publisher and physicist, personally presented the first "Rhein Ring" to Zworykin, honorary RCA vice president. Rhein's foundation has established the ring as a "prize of honor" for persons "who have made significant contributions to audio-visual techniques."

Cy Leslie, president, CBS Video Enterprises, was honored by New York University with the first "Creative Leadership in Music Business Award" at a dinner at the university on November 5.

Larry Kenward has been named chief engineer for the Jenel Consultants Corporation of Dallas. Kenward's major responsibilities are to design both television and cable studio facilities, as well as develop process control and computer automation systems.

B. J. Jones has been named engineering services manager for the Jenel Consultants Corporation of Dallas. Jones' major responsibilities are mechanical design of both television and cable studio facilities, mobile units and earth stations.

Gilbert R. Kesser, chairman of the board of Microtime, has been named president and CEO following the resignation of David E. Acker.

The Oktel Corporation, Campbell, CA, has announced the appointment of **Frederick L. Bones** as vice president and general manager. Bones, formerly general manager for the Broadcast and Communications Division of Marconi Electronics, will be responsible for the development and direction of all marketing activities relating to the Oktel line of magnetic disc recorders and related products.

David Archer has accepted the position as "The World of People's" technical supervisor at the production center in Sausalito. Archer came from Viacom of San Francisco, where he was the chief engineer.

Panasonic has announced the appointment of **Tom Mizuno** as vice president. Mizuno, who will continue to serve as general manager of the Panasonic Finance Division, will be responsible for company wide financial affairs.

Panasonic has announced the appointment of **Victor F. Ioppolo,** as vice president of Panasonic West Inc. Ioppolo has also been elected to the Board of Directors of PWI.

Kusuo Hirata was elected chairman of the board of Fuji Photo Film. Hirata had served as president and chief executive officer.

Bernie K. Yasunaga was appointed executive vice president of Fuji Photo Film USA, the American marketing arm of Fuji Photo Film Co. Yasunaga replaces **Fred M. Nakamura** who is returning to Japan to become general manager of the Domestic Marketing Division. □

advertisers index

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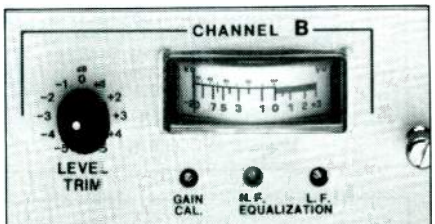

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The Inovonics 377 Dual-Channel Tape Playback Pre-amp adds new life to radio automation system sound. You can expect high stability, low noise, and wide-range response—with new or existing installations.

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16mm TELEVISION FILM CAMERAS: 7-Canon Scoopics, 1-Beau Lieu, 1-Auricon Pro-600 sound camera in excellent condition, and 4-CP-16 sound cameras. Contact Robert Swayze, WJRT-TV, Flint, MI (313) 233-3130. 12-80-1t

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HELP WANTED

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HELP WANTED (CONT.)

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PRODUCER DIRECTOR. Minimum 7-8 years immediate experience in the field of large scale industrial teleproduction activities. Experience in design, development, production and evaluation of video programming to support in-house personnel development and communication objectives; operation of state-of-the-art studio and remote teleproduction equipment. Salary upper 20's. Send resume in confidence to Sherrill Malloy, 11800 Sunrise Valley Dr., Reston, VA 22091. 12-80-1t

MAJOR TV STATION in New York needs **SENIOR PROJECT ENGINEER** experienced in design of studios and up-to-date TV facilities. 7 Yrs. prior design experience desired. Excellent salary and benefits. Submit resume, including salary history to Broadcast Engineering, Dept. 521, P.O. Box 12901, Overland Park, KS 66212. Equal Opportunity Employer. 12-80-1t

MAJOR TV STATION in New York needs **DESIGN ENGINEER**. 5 Years experience in design of TV facilities desired. Excellent salary and benefits. Submit resume and salary history to: Broadcast Engineering, Dept. 522, P.O. Box 12901, Overland Park, KS 66212. Equal Opportunity Employer. 12-80-1t

TELEVISION ENGINEER/MEDIA PRODUCTION SPECIALIST: Install, operate, maintain educational microwave television system; facilitate teaching classes and producing educationally related programs. $26,760-$32,292. Starting as soon as possible after appointment. Apply by January 2, 1981. For position announcement listing qualifications write or or phone Samuel Oppenheim, Coordinator Instructional Television, California State College Stanislaus, Turlock, California 95380, (209) 633-2111. Equal Opportunity/Affirmative Action Employer. 12-80-1t

VIDEOTAPE OPERATOR/TECHNICIAN WANTED. Must be experienced with Ampex and RCA VTR's. Contact W. Fenn, C.E., WNVT-TV, 8325 Little River Turnpike, Annandale, Virginia 22003, (703) 323-7000. EOE. 12-80-1t

TELEVISION ENGINEER: Staff engineer for new PBS station operating on Channel 6. Duties include installation, bench repair and some master control operation with some limited switching duties. Qualifications are: Graduate of electronics technical school, military school training or experience required. Must have FCC license and training in digital electronics is desirable. Types of equipment include: 1" type C video tape machine, ¾" video tape machine and studio electronics new gathering camera. Send resume to: Personnel Office, Administration Bldg., Room 108, CMSU, Warrensburg, MO 64093, or call Jack Lockridge at 816/429-4257. Central Missouri State University is an Equal Opportunity/Affirmative Action Employer. M/F. 12-80-1t

POSITION OPEN: TV BROADCAST ENGINEER— Position open at growing Southern Minnesota public television station for a TV Broadcast Engineer to operate and maintain modern television production studio and transmitting equipment. Renewable 12 month contract with a base salary of $11,000 to $11,500 plus excellent benefits. Minimum requirements: 1st class FCC license, two (2) years of formal electronic schooling, two (2) years of experience in maintenance of television systems (including operation of a TV master control and troubleshooting), and experience with Sony BVU equipment highly desirable. Send cover letter and resume to Mr. Wendell Nelson, Chief Engineer, KAVT-TV, 1900 8th Avenue N.W., Telephone 507-433-6000, Austin, Minnesota 55912. KAVT-TV, owned and operated by Independent School District #492, is an equal opportunity employer. 12-80-1t

HELP WANTED (CONT.)

ORAL ROBERTS UNIVERSITY seeks Assistant Instructor, Instructor, or Assistant Professor to teach broadcast production. Professional experience required; Masters preferred. Broadcast news experience helpful. Begin August 1981. Salary 12,000-20,000. AA/EEO employer. Contact Chairman, Communication Arts, ORU, Tulsa, OK 74171. 12-80-1t

MAINTENANCE SUPERVISOR: Expanding southern Minnesota Public Television Station needs an individual to do supervision and maintenance of radio and television equipment. Minimum requirements: First Class FCC license, two (2) years of formal electronic schooling, four (4) years of experience in television maintenance. Experience with UHF transmitters and Sony BVU equipment highly desirable. Base salary $13,000 plus excellent benefits. Send cover letter and resume to Mr. Wendell Nelson, Chief Engineer, KAVT-TV, 1900 8th Avenue N.W., Austin, Minnesota 55912. Telephone 507-433-6000. KAVT-TV, owned and operated by Independent School District #492, is an equal opportunity employer. 12-80-1t

VIDEO MAINTENANCE ENGINEER: Minimum ten years experience in maintenance or design of TV Production equipment, cameras, video tape and disc, switching, sync and computer. Send resume to Personnel Director, Broadcasting, P.O. Box 100, Nashville, TN 37202. An Equal Opportunity Employer. 12-80-2t

MAINTENANCE ENGINEER, TUCSON, ARIZONA: Minimum requirements—FCC 1st Phone, 3-5 years TV maintenance experience. Duties include maintenance and routine alignment of studio equipment. Experience on ACR25, AVR2, VPR1, TR60 is desirable. If you want to drive to work this winter in shirtsleeves, this Tucson station would like to hear from you. Send resume to Chief Engineer, Box 50307, Tucson, AZ 85703. An Equal Opportunity Employer. 12-80-1t

CHIEF ENGINEER—NY surburban AM-FM facility seeks full-time experienced radio engineer with transmitter, studio equipment & automation repair/maintenance background. Salary commensurate with experience. Contact S. Spengler, 914-241-1310. 12-80-1t

HELP WANTED (CONT.)

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Broadcast Engineers

Times Mirror Cable Television, continuing its commitment to lead the industry in technical capability and expertise is offering excellent employment opportunities to seasoned broadcast engineers. Our teleproduction facility has an opening for a Chief Engineer who has "hands-on" maintenance experience and who would be responsible for supervising the maintenance staff, maintaining equipment and facilities, and assisting in planning and development. A second opening exists for a Maintenance Engineer whose responsibilities would include maintaining RCA TR800, TR600 VTRS, 3/4" VTRS, time base corrections, Vital switchers, and Scientific Atlanta uplink facilities. Both positions require individuals with substantial broadcast maintenance experience and a first class FCC license.

As a communications subsidiary of the Times Mirror Company, we offer an excellent compensation package, including incentives, along with an exceptional benefit program. If you are a skilled and aggressive individual with the proven ability to succeed, we would like to talk with you about your future in cable.

Please send your resume including salary history in confidence to **Wrise Booker, Manager of Human Resources, Times Mirror Cable Television, Inc., P.O. Box 19398, Irvine, California 92713.**

We are an equal opportunity employer and encourage women and minorities to apply.

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HELP WANTED (CONT.)

HELP WANTED: Television Maintenance Engineer for nationally recognized, quality-minded Public Teleproduction Center utilizing RCA quad and 1 inch VTRs, RCA and CEI cameras, and CDL switching equipment. FCC 1st class license plus experience independently maintaining professional broadcast equipment at a beginning salary of $18,400. Apply to Pam Thornburg, Personnel Office, University of Wisconsin-Stout, Menomonie, WI 54751. An Equal Opportunity Employer. 12-80-1t

PLANNING NOW—BUILDING SOON! Quality minded Chief Engineer with sales or announcing skills to build, and work thereafter, for class IV AM station going on air next March. Knowledge of construction, automation and maintenance required. Live, work and enjoy life in rural Southwest Oregon. $1500.00 monthly plus, depending on ability and motivation. Reply Post Office Box 758, Selma, Oregon 97538. 503-476-1527. EOE. 12-80-1t

FM RADIO/MAINTENANCE ENGINEER, for Public Broadcast/NPR affiliate in Pittsburgh. A minimum of 3 years must have been spent in recording, dubbing, mixing and production work. Experience in maintaining state-of-the-art and older production and automation equipment related to radio a must. FCC First Class license required. Please send resume and salary requirements to Personnel Department, Metropolitan Pittsburgh Public Broadcasting, Inc., 4802 Fifth Avenue, Pittsburgh, PA 15213. Equal Opportunity Employer. 12-80-1t

APPLICATIONS are being accepted by JEFFERSON PRODUCTIONS, a full service production facility, from experienced computer Video Tape Editors and Sound Engineers. State-of-the-art facilities and expanding business requires the addition of qualified craftsmen. Apply in confidence to PERSONNEL DEPARTMENT, Jefferson Pilot Broadcasting Company, Charlotte, N.C. 28208, (704) 374-3603. An Equal Opportunity Employer. 12-80-1t

VIDEO MAINTENANCE TECHNICIAN

Responsible for the maintenance, troubleshooting and repair of video equipment and systems. Requires good working knowledge of electro and mechanical operating principles of video reel to reel and cassette records, camera chains, MATV and other supportive equipment that make up a B/W and color TV studio and distribution systems.

Candidates must be a graduate from a qualified technical school with a minimum of 2 years' experience in the maintenance of video equipment. FCC .2d class license a benefit. Stop by for an interview 9am-11: 30am, Mon.-Fri. or call Richard Towle at 617/353-4484 for an evening interview appointment. (Outside Boston area send resume or call collect.)

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MAINTENANCE TECHNICIAN needed to join our maintenance team. Must be quality conscious self-motivating technician, with 1st phone and experience in studio and remote maintenance. Top salary and benefits in beautiful Hawaii Send letter and resume to: Harold Maupin, KHON-TV2, 1170 Auahi Street, Honolulu, HI 96814. An Equal Opportunity Employer. 12-80-2t

TRANSMITTER TECHNICIANS— Voice of America has overseas positions available at supervisory and operating levels for experienced transmitter technicians. Duties include operation and maintenance of high power VOA transmitters and related facilities. Applicants must have 3 to 5 years "hands-on" experience in technical operation of broadcast, TV or military fixed-station transmitters. Must be available on a worldwide basis to serve in VOA's radio relay station system. U.S. citizenship required. Starting salary commensurate with qualifications, plus housing and overseas allowances. Full federal fringe benefits apply. Qualified candidates should send standard Federal application form SF-171 to International Communication Agency, MGT/PDE, 1776 Pennsylvania Ave., Washington, D.C. 20547. An Equal Opportunity Employer. 12-80-3t

BROADCAST ENGINEER TV—with first class license. Experience preferred. Working knowledge ENG, ¾ inch VCR, 2-inch VTR, studio cameras, audio systems, switchers. Familiarity with transmitters helpful. Good opportunity for right person. Send resume and salary requirements: P.O. Box 7428, Shreveport, Louisiana, 71107, Attn. Engineering. Equal Opportunity Employer. 12-80-1t

OPERATING ENGINEER: Interviews will be arranged following receipt of resumes. Address correspondence to Al van Dinteren, Chief Engineer, WATU-TV, P.O. Box 1526, Augusta, GA 30903. Qualifications are: 1st Phone required. Experienced in Video Tape Editing, Production and Studio Support. WATU-TV is an equal opportunity employer. 12-80-1t

SENIOR MAINTENANCE TECHNICIAN—Position now available with Producers Video Center in Kansas City, Missouri. Requires a minimum of 5 or more years demonstrated experience in the design, building, installation and maintenance of a wide range of broadcast television equipment, including videotape recorders, production switchers and allied audio/electronics equipment. Some supervisory background would be helpful. This facility is a subsidiary of Hallmark Cards, Inc. You will receive an excellent salary and an outstanding benefit package. Please submit confidential resume, including salary information, to: P.R. Malone, Professional Staffing Department, Hallmark Cards, Inc., 2501 McGee, Kansas City, Missouri, 64108. An Equal Opportunity Employer M/F/H. 12-80-1t

HELP WANTED (CONT.)

TV TECHNICAL OPERATIONS MANAGER, requires a dedicated, innovative manager whose experience and training (at least five years in the TV broadcast industry, preferably in a supervisory position) have prepared the applicant for network level responsibility and challenge. Washington, DC, location, excellent benefits; salary range $31,000 to $38,000/ANNUM to start; ample room for growth; equal opportunity employer. Resumes should be sent to Dept. 524, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212 12-80-1t

TELEVISION HELP WANTED—TECHNICAL: $40,000+ FIRST YEAR GUARANTEED. Our company has grown so quickly in the past 5 years, we are in desperate need of a very special person who knows broadcast equipment intimmately and has aggressive sales ability. We are diversifying into other areas and need someone to take over the equipment sales division. Responsibilities include sales of new and used broadcast equipment and further development of equipment sales division as business demands. We are a first rate company and believe in paying top dollar for the right person. Call Bill Kitchen, Quality Media Corp., (800) 241-7878. 9-80-TFN

ENGINEERS, TV Systems Engineers, Electronic Technicians, Technical Supervisors, Maintenance. Immediate openings. Experienced. Full time, Full benefits, plus Pension. Excellent Salary plus commissions. Send resume to Technical Operations, Inc., P.O. Box 840, New Hyde Park, N.Y. 11040, or call Personnel Mgr. (516) 352-2238. 9-80-tfn

TELEVISION BROADCAST MAINTENANCE ENGINEER. Transmitter experience preferred. Salary negotiable. First Class License required. Call or write Chief Engineer, WMBB-TV, P.O. Box 1340, Panama City, FL 32401, (904) 769-2313. E.O.E. 10-80-3t

TELEVISION OPERATING ENGINEER for studio operations. Primary duties—quality control of signals and light duty maintenance. First Class License desired. Call or write Chief Engineer, WMBB-TV, P.O. Box 1340, Panama City, FL 32401, (904) 769-2313. E.O.E. 10-80-3t

SITUATION WANTED

SAN FRANCISCO BAY AREA. Competant maintenance and/or production engineer with good management skills. Experienced as C.E., state-of-the-art audio and RF, digitals, etc. Bill Motley, 231 Hartford, San Francisco, CA 94114. 10-80-1t

WANTED

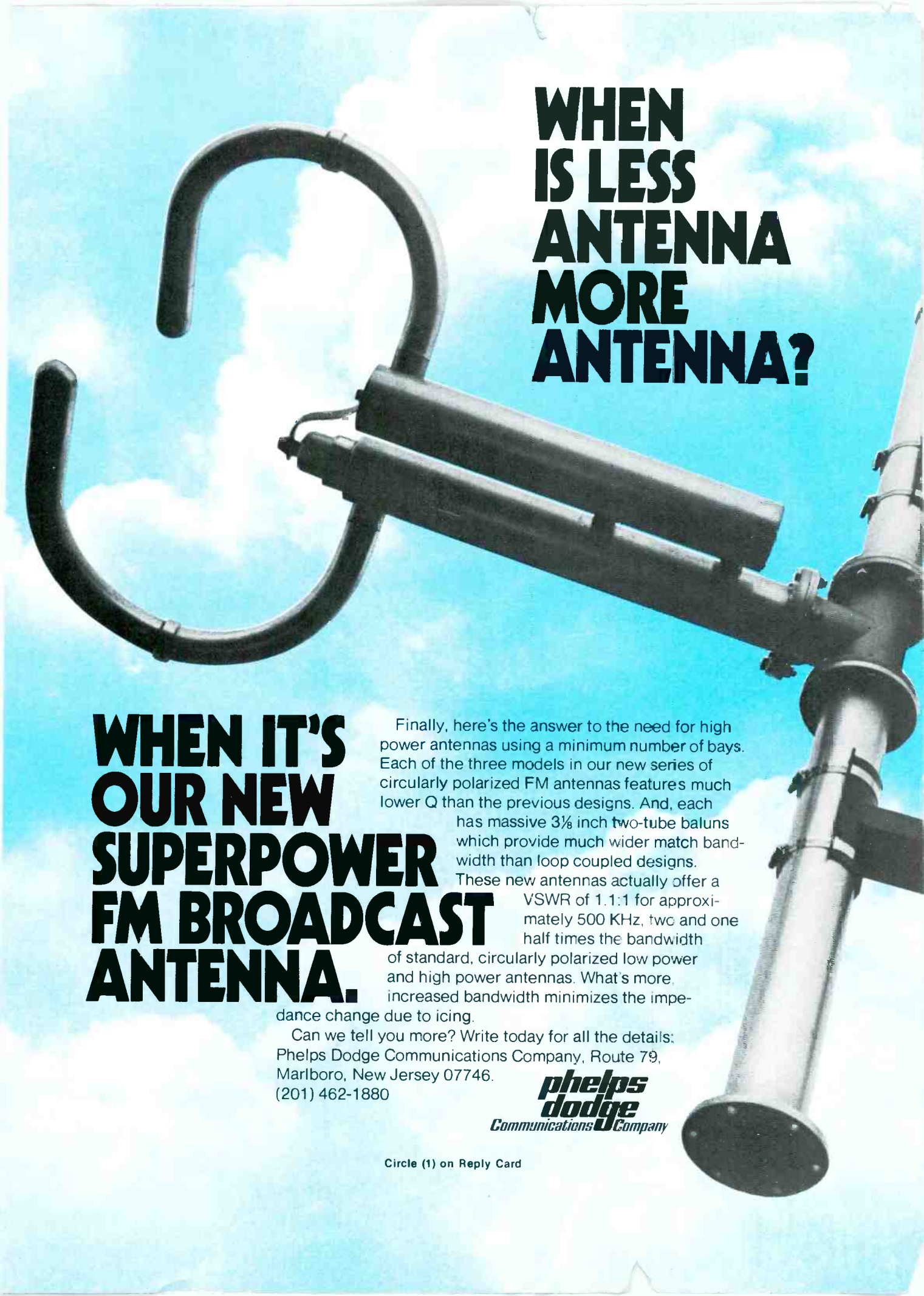
WANTED: Pre-1926 radio equipment and tubes. August J. Link, Surcom Associates, 305 Wisconsin Ave., Oceanside, Ca. 92054, (714) 722-6162. 3-76-tf

HIGHEST PRICES PAID for 112 Phase Monitors and for clean, 12 year old or less, 1 KW and 10 KW AM Transmitters. All duty and transportation paid. Surplus Equipment Sales, 2 Thorncliffe Park Dr., Unit 28, Toronto, Ontario, Canada, M4H 1H2. 416-421-5631. 2-79-tfn

INSTANT CASH FOR TV EQUIPMENT: Urgently need transmitters, antennas, towers, cameras, vtrs, color studio equipment. Call toll free 800-241-7878. Bill Kitchen, Quality Media Corporation (In Georgia call 404-324-1271). 6-79-tfn

WANTED: Radio Transcriptions 16" E.T.'s, any Eddy Arnold, or other Country 16" or 12" Transcriptions. Will consider others. Interested in Radio Station Libraries to purchase, all speeds of records. Boyd Robeson, 2425 W. Maple, Wichita, Kansas 67213. (316) 942-3673, 722-7765 Eve. 9-80-tfn

******URGENTLY NEEDED****** 12AP4 (1803-P4) picture tubes and parts for R.C.A. TRK-12 antique television. Arnold Chase (203) 521-5280. 9-80-5t



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