

# BROADCAST engineering

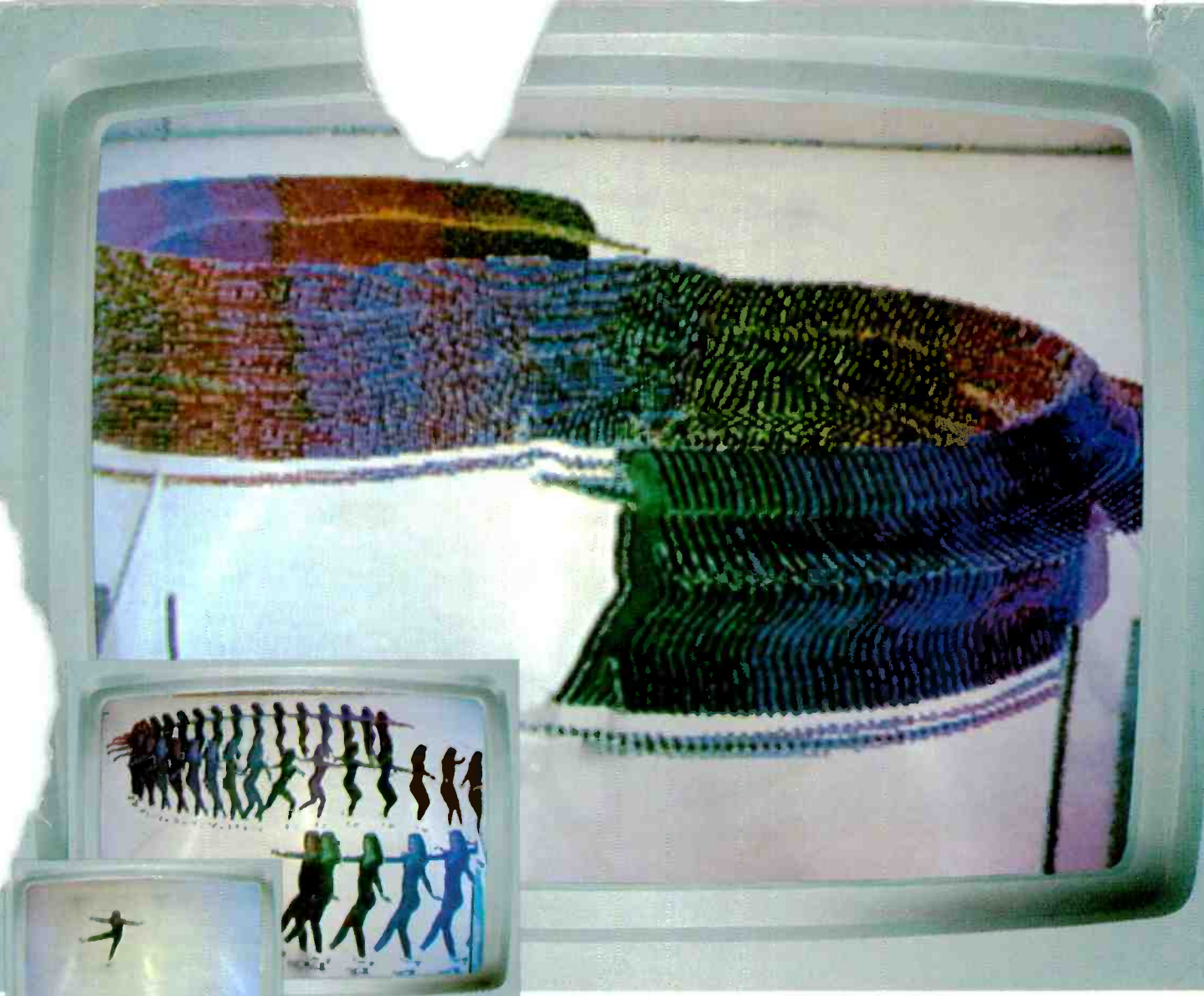
November, 1979/\$2.00

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**WBNO: Solar Powered Radio Station**



**NRBA '79 Replay  
Audio Console Roundup**



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NEC's Digital Strobe Action lets you generate, in real time, multiple images of a subject in motion. But it doesn't stop there. You can also vary the frequency of display, colorize

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Broadcast Equipment Division  
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Another option for NEC's FS-15 frame synchronizer.

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HBU-4400



You don't need a "gorilla" to carry the portable HBU-4400. It weighs only 22 lbs. without the battery and provides 10 full minutes of recording time per cassette. Cassettes are preferred for portable applications because you don't have to monkey around with reel-to-reel tape. High band "quad"

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HBU-2860



with your computerized editing system.

The HBU format is economical to own and economical to use. The HBU costs less than a third of machines of other formats with the same video quality. Tape costs are lower too. CONCLUSION: Buy the HBU and donate your "gorilla" to the zoo.

Other products from Recortec are: Video Tape Conditioners and Video Tape Evaluators for all tape widths, Video Cassette Evaluators, Video Tape Timers and Reel Servo Modifications (R-MODs) for quad recorders and Video Tape Addressors which record time code on two-inch tape at high speed.

# BROADCAST engineering

The journal of broadcast technology

November, 1979 □ Volume 21 □ No. 11

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## THE COVER

The aerial view of the industry's first solar powered broadcast station, WBNO/AM at Bryan, OH, is shown. A notice on this station's airing appeared last month (BE, p. 44, October, 1979) and a detailed article on the station and its solar photovoltaic system appears in this issue on pp. 36-42.

## NEXT MONTH

- What's Ahead in Broadcasting
- Slow-Motion/frame store/TBC roundup

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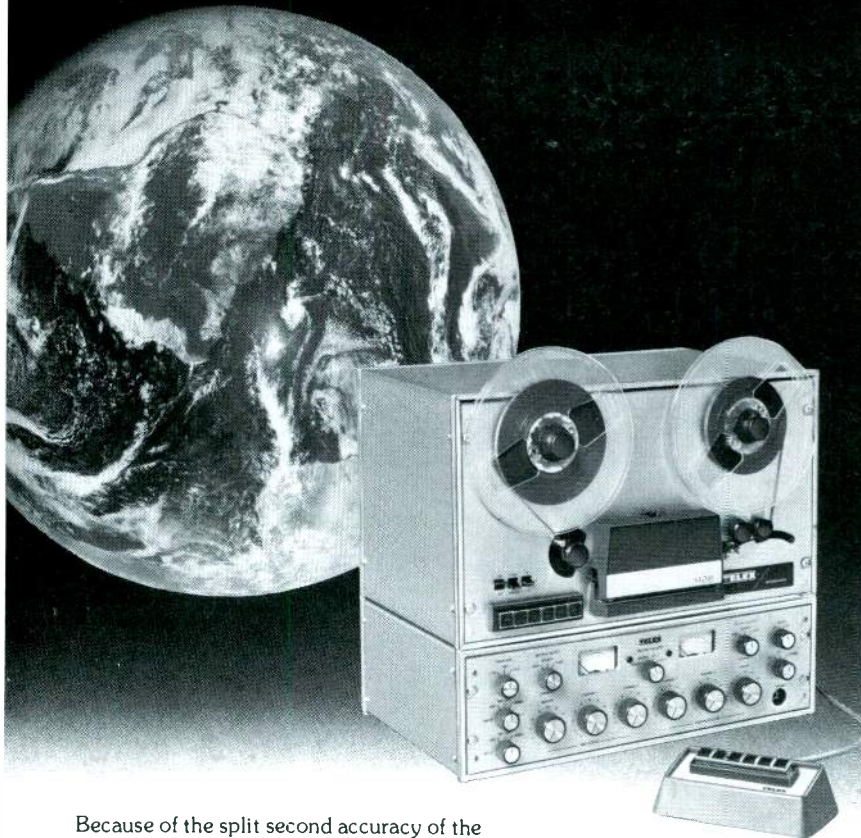
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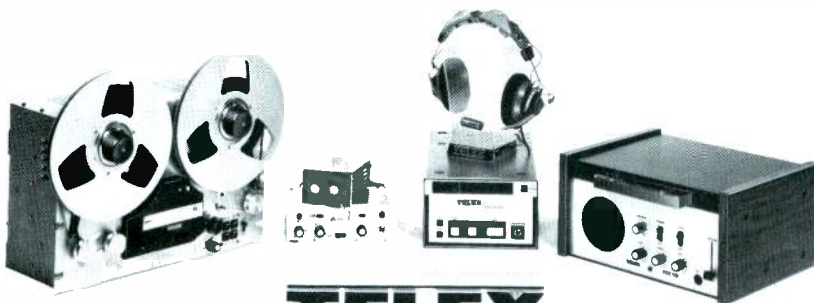
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## BROADCAST engineering

Editorial, advertising and circulation correspondence should be addressed to P.O. Box 12901, Overland Park, KS 66212 (a suburb of Kansas City, MO); (913) 888-4664.

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**BROADCAST ENGINEERING** (USPS 338-130) is published monthly by Intertec Publishing Corporation, 9221 Quivira Road, P.O. Box 12901, Overland Park, KS 66212. Postmaster, return from 3579 to the above address.

**BROADCAST ENGINEERING** is edited for corporate management, engineers/technicians and other station management personnel at commercial and educational radio and TV stations, teleproduction studios, recording studios, CATV and CCTV facilities, and government agencies. Qualified persons also include consulting engineers and dealer/distributors of broadcast equipment.

**SUBSCRIPTIONS: BROADCAST ENGINEERING** is mailed free to qualified persons in occupations described above. Non-qualified persons may subscribe at the following rates: U.S., one year, \$20; all other countries, one year, \$26. Back issue rates, \$3, except for the September Buyers' Guide issue, which is \$10. Rates include postage. Adjustments necessitated by subscription termination at single copy rate. Allow 6-8 weeks for new subscriptions or for change of address. Controlled circulation postage paid at Kansas City, MO.



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# FCC update



November, 1979

## FCC begins major radio deregulation proceedings

(BC Docket No. 79-219)

The Federal Communications Commission has voted to begin a widerange proceeding re-examining its current radio regulations. The Commission found dramatic changes in radio since adoption of its detailed regulations governing radio station ascertainment of community needs, programming choices and program log-keeping. It also found, based on current market data, that it might now be possible to rely on competitive radio market forces and

structural regulatory tools to assure the same public interest benefits formerly sought to be achieved by these regulations.

- Specifically, the FCC is proposing:
- To remove itself from detailed consideration of the precise amounts of nonentertainment programming such as news and public affairs furnished by radio broadcast licensees;
  - To eliminate all specific requirements of commercial radio licensees on how to ascertain the needs and problems of their communities;
  - To eliminate all FCC policies

dealing with limitations on amounts of commercial time and leave it to competitive marketplace forces to hold down levels of radio commercialization; and

- To eliminate federal program log requirements for commercial radio stations, but to require stations that do keep a record of the commercials and programming they air to make that record available for public inspection as is current practice.

The FCC said it would examine existing and proposed policies and regulations relevant to these areas as they affect all commercial radio licensees regardless of the size of the market in which they are located.

The proceeding reflects the FCC's continuing effort to ensure that its rules and policies remain relevant to an industry and technology characterized by dynamic and rapid changes, and reaffirms the Commission's commitment to regulate only to the minimum extent necessary to foster broadcast services that maximize the well-being of the consumer.

## Commissioner James H. Quello comments on radio deregulation

“ In going forward with this important rulemaking at this time, the Commission has taken an important first step toward deregulation of radio broadcasting. I believe we should continue our efforts to remove wasteful, unnecessary and obstructive government oversight from a highly competitive industry which is fully responsive to the marketplace.

The deregulatory thrust of this notice is timely and sensible. If the first of the options for each of the proposed rules are finally adopted they would provide substantial deregulation, reduced bureaucracy and a concomitant reduced cost of government in keeping with the mood and will of American taxpayers. It should also contribute to a less litigious, freer and better broadcast service.

While some of my colleagues have expressed misgivings regarding the self-regulating effects of the marketplace, I have no such concerns. Experience has taught me that the marketplace is a very good regulator indeed. Moreover, the Commission's own data, shows clearly that the marketplace and public acceptance, not regulation, is responsible for advancing the radio broadcasting industry in this country to its present pre-eminence in the world.

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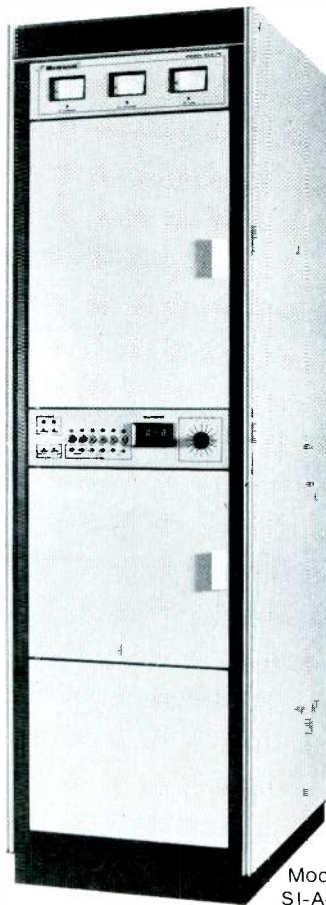
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Model  
SI-A-1S



# For KVII-TV in Amarillo and KVIA-TV in El Paso ... the ideal choice was MNC-71CP!

Marsh Media Ltd. looked long and hard when they set out to outfit their local ABC-TV affiliates in Texas with lightweight, portable ENG/EFP cameras. No simple task, considering the many video cameras currently on the market and the numerous claims made on their behalf.

In the final analysis — as Marsh Media Ltd. management well knew — dependable dealer service and full manufacturer/distributor support, with readily available parts and liberal warranty terms, were just as important as the particular features of the camera.

Marsh Media chose to go with Victor Duncan, Inc., the regional dealer for Cinema Products' line of NEC portable ENG/EFP video cameras.



"From an engineering standpoint, Cinema Products' backup program and Victor Duncan's dependable service completely free our hands from what has previously been a problem area," says Bill Canady, Marsh Media's Director of Engineering.

KVII-TV and KVIA-TV got MNC-71CP reliable, broadcast-quality performance at a reasonable price, backed by an unprecedented one-year warranty and round-the-clock service.

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"Our MNC-71CP cameras have seen considerable action since we've taken delivery of the three cameras initially ordered by Marsh Media," says Dan Garcia, Assistant News Director, KVII-TV. "The problems have been virtually nil, and with a little proper training, adjustments can be made in the field with the greatest of ease."

Alan Sheffield (right), Victor Duncan's Director of Video Sales and Rental, seen with Dan Garcia of KVII-TV during a recent video equipment seminar held at Duncan's Dallas headquarters.

"User training and preventive maintenance programs are the backbone of Victor Duncan's total commitment to the video industry," says Sheffield.



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The time has long since passed when local radio broadcasters and their audiences require extensive oversight from Washington. Virtually all radio markets are replete with diversity, competition and ample incentive to provide good service. There are many more radio stations today than TV or newspapers in every sizable market. In many markets there is almost a surplus of radio stations—there is an automatic and constant search for unserved or new program needs.

The Commission's action seeks comment upon a wide range of options and I applaud the breadth of this approach. It should be understood, however, that primary focus should be placed upon the first of the various options which constitute the recommendations of the Commission staff. Considering the natural tendency of regulators to regulate, I believe that the staff should be supported in its conclusion that there are some facets of radio regulation which should be left to marketplace forces and not controlled from Washington. If I were required to take final action today, I would support the staff recommendations. Before taking final action however, I expect to take full advantage of a wide range of

comments which I am confident will help to sharpen and clarify all of the issues and which will provide a full and complete record upon which to base a reasoned and thoughtful judgment.

It should be remembered that regulation—all regulation—places a burden upon not only those who must directly submit to regulation but upon everyone. Regulation is not free. Tax dollars must support the work of this Commission. To the extent that work is meaningless or counter-productive, those tax dollars are squandered. I believe those rules and policies considered in today's action clearly fall into those categories.

The public has much to gain by taking a very serious interest in the FCC's action. Broadcasters and non-broadcasters alike should take the time and put forth the effort to examine the issues and provide the Commission with their best thinking. The Commission, in turn, bears the responsibility to put aside narrower interests and to make its decision on the basis of providing the best service to the most people at the lowest costs.

I believe the FCC should continue its deregulatory thrust in the future, but I realize our efforts are limited

in scope by the Communications Act. Only legislation can provide major deregulation dealing with license terms, political broadcasting, government involvement in program format and alternatives to the comparative hearing process. I hope some time in the near future the FCC will take appropriate action to deliberate and make recommendations for deregulatory legislation.

My views advocating complete deregulation have been presented before the House and Senate Subcommittees on Communication. In essence, I told them that I propose clean, decisive, legislative surgery to remove the major pervasive defects and massive economic wastes of broadcast regulation. Unequivocally remove all First Amendment and regulatory constraints! *Subject broadcasting to exactly the same regulations and First Amendment constraints as its major competitor and closest cousin—newspapers.* This also means eliminating the nebulous, troublesome and outdated "public interest" standard.

In return, assess broadcasters a practical spectrum usage fee and provide for open marketplace addition of stations that meet reasonable standards of engineering feasibility. ”



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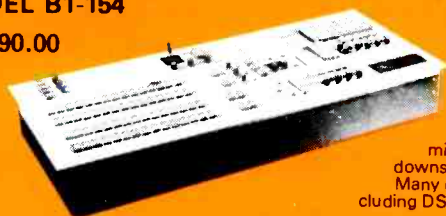
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**RELIABILITY:** An unmatched four-year track record of on the job performance for the original compact professional recorder. Day in, night out. Just ask someone you trust.

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## Communications satellite to be launched

RCA American Communications plans to launch its third communications satellite on Thursday, December 6, at 8:30 PM from Kennedy Space Center's Launch Complex 17 in Florida. The pre-launch press

briefing will be on Wednesday, December 5. This event, usually held at 11 AM, is conducted by NASA press information personnel. In addition to NASA personnel, representatives of McDonnell Douglas (manufacturer of the Delta launch vehicle), RCA Astro Electronics (builder of the spacecraft), RCA

Americom technical operations and other parties directly concerned with the launch will be present to provide input.

## NPR earth stations nearing midway point

Development and installation work on a new system of satellite earth terminals to serve 204 public radio stations and National Public Radio (NPR) is nearing the midway point, according to the Collins Transmission Systems Division of Rockwell International. The Rockwell division is providing an earth station system for public radio under a contract it received from the Corporation for Public Broadcasting (CPB) in January 1978. Current value of the contract is \$14.2 million. The system is similar to one Rockwell-Collins recently completed for the nation's public television stations.

Now you really can sound *good* and *loud*!

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In addition, the Harris Tri-Band AGC has adjustable turnover frequencies,  $\pm 10$  dB level adjustment of three bands with front panel controls, dynamic program dependent attack time—plus many other features not found in competitive AGC amplifiers.

This is the one unit that further refines the AGC concept to provide a performance level far beyond anything previously available. For more information on the new Harris Tri-Band AGC write or call Harris Corporation, P.O. Box 4290, Quincy, IL 62301, 217-222-8200.



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## Harris honored

Harris Broadcast Products division was honored September 17 by approximately 400 Quincy, IL, business people for recent successes in the national and international broadcasting markets. The party was hosted by WGEM-AM in Quincy on the occasion of the sign-on of WGEM's new MW-5A transmitter.

## Barco monitors Saturn fly-by

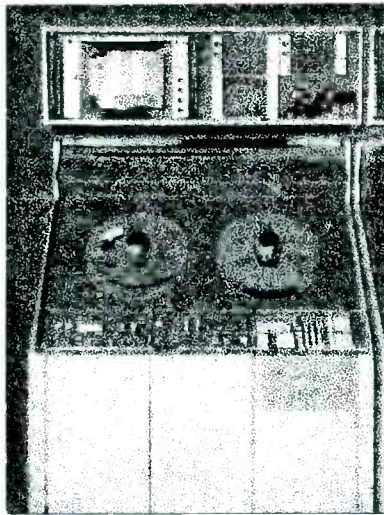
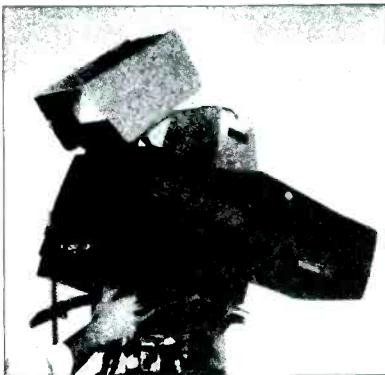


E & O System, Santa Clara, CA, US distributor for Barco multi-standard television monitors, equipped the NASA Ames Space Research Center in Mountain View, CA, with 15 CRM 2632 monitors for the recent Pioneer Saturn Space Encounter.

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# RCA

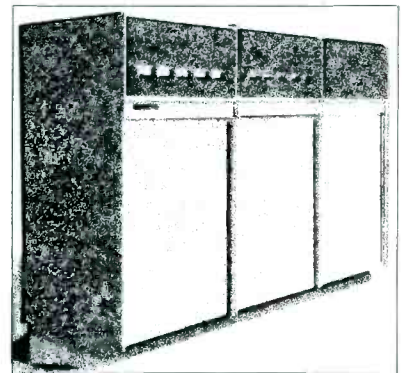


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## Gould announces major appointments and introduces new instruments

Gould has announced a series of major appointments highlighting reorganization designed to unify and consolidate sales operations both in the US and abroad and to strengthen its international markets for all product lines. The US appointments are as follows:

- Daniel T. Carroll: president;
- David Simpson: vice president; Instrument and Control Group;
- Joseph F. Swyt: vice president and general manager, Instruments Division; Cleveland, OH;
- David J. Blecki: vice president, marketing;
- Roy D. Tottingham: vice president of operations, Instruments Division/Santa Clara, CA;
- L. Briggs Dunn: operations manager, oscilloscopes; and
- Robert F. Kerzman: director, marketing communications.

Swyt, commenting on the reorganization, said "Our broad-based international company intends to capitalize on the quality reputation and market share in our three major product lines, logic analyzers, oscillographs and oscilloscopes. We

fully expect the Instruments Division to rank 3rd on a consolidated basis by the end of 1980." A leading manufacturer of high technology test and measurement instrumentation, with a 50/50 split in international and domestic sales, the Gould Instruments Division ranked 5th in 1978 among US manufacturers.

New equipment, announced along with these appointments to illustrate Gould's market thrust included:

- Model LA5000 Logic Analyzer, a

multichannel, microprocessor-based instrument with keyboard control, automatic self-test, and sophisticated recording and data analysis modes. (For data, circle 101 on the reader card.)

- Model 3054 X-Y Recorder, a general purpose instrument with cost saving features. (For data, circle 102 on the reader card.)

- Model OS3600 portable, 100MHz oscilloscope. (For data circle 103 on the reader card.)



David J. Blecki



Roy D. Tottingham

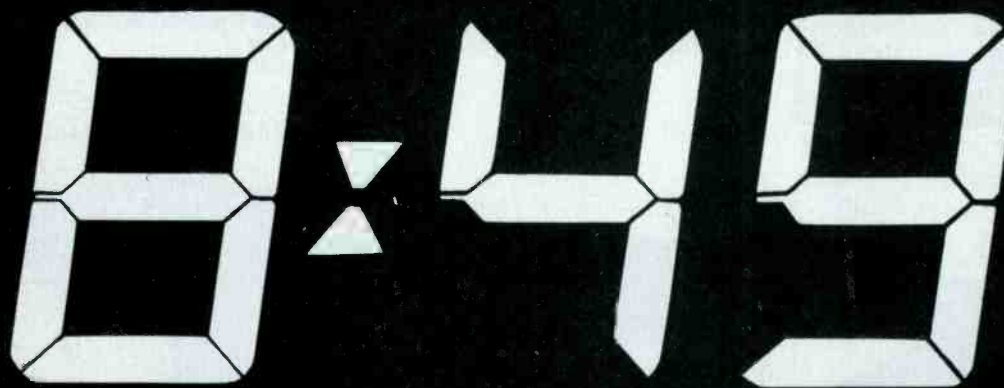


L. Briggs Dunn



Robert F. Kerzman

# Stand back 50 feet. Imagine seeing the numerals this easily while timing a newscast.

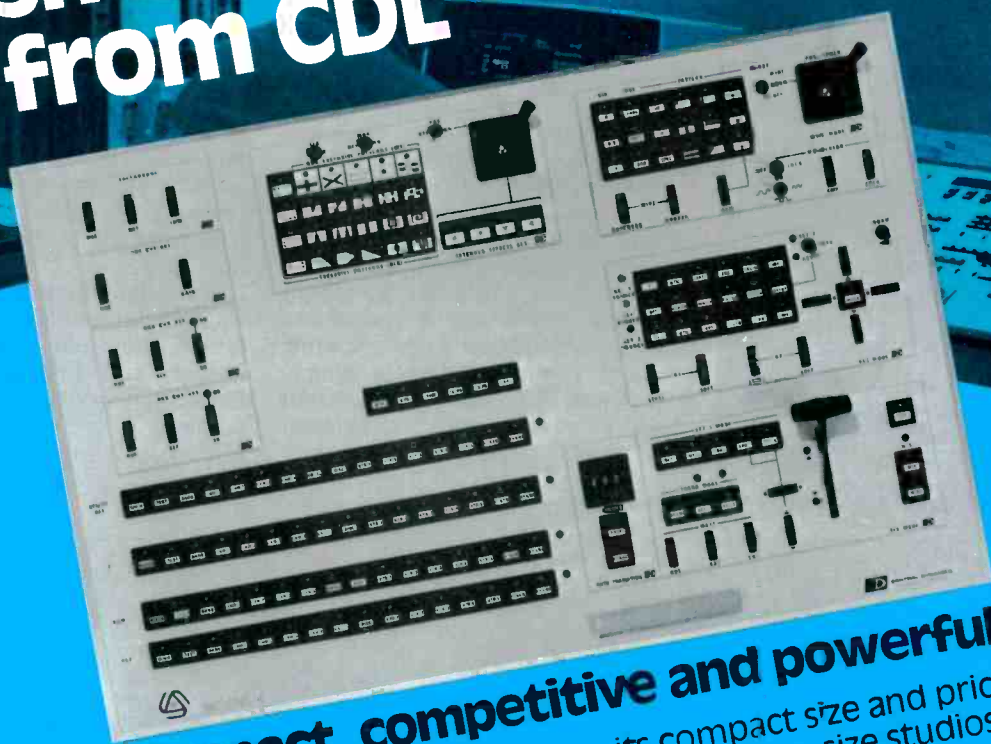


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# association news

## National Association of Broadcasters

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### NAB notes problem areas in extending EEO rules

The FCC was cautioned by the NAB that if it anticipates extending equal employment opportunity regulations to networks and group owners, it would require taking several factors into consideration. (Several minority groups have petitioned for an extension in rules.) Petitioners maintain broadcasters should be prohibited from affiliating with any network failing to comply with those FCC equal employment opportunity rules and employment

reporting requirements currently applied to broadcast licenses. They further asked that none of a group owner's stations be granted license renewal unless EEO compliance was demonstrated to the group's headquarters.

According to the NAB, the FCC should be mindful of its limited jurisdiction and overall statutory mission and not become a mini-Equal Employment Opportunity Commission.

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Senator Goldwater (fourth from left) took issue with current broadcast legislation; received standing ovation.

Jim Gabbert: "So long for now, but I'll be back."

## NRBA '79 Replay

The 6th Annual National Radio Broadcasters Association Convention, Washington, DC, October 7-10, 1979

by Bill Rhodes, editorial director, and Andy Laird\*

- Record attendance: 2,000 registered.
- Record Exhibitor/Suite sign-up: 138.
- Record passes to radio guests: 690.

### NRBA coverage

While exhibitors complained about not having enough booth traffic at NRBA, it was an exciting conference for broadcasters, editors, and attendees. New equipment was being displayed for broadcasters—in all areas of the audio chain, in transmitters, in automation and in computerized business processes—and plenty of emphasis was given to management, sales, and promotion.

Because there was so much going on at NRBA, **BE's** coverage will be of three forms: a major concentration on audio processing as seen at NRBA, short sidebars (panels) on selected events or new equipment, and photos of some of the exhibits and/or people caught in action.

Reader service numbers are given here only for audio processing exhibitors covered. However, a listing of exhibitors and their products displayed at NRBA appeared in **BE's** September issue, pp. 122-127. The reader service card in that issue may be used to obtain data from all equipment exhibitors and from software resources.

### Engineering Sessions: Audio Processing

Two of the NRBA engineering sessions dealt extensively with facets of the audio chain that need attention to hold listeners and to maintain high quality transmission. These were the sessions on *New Audio Concepts* and *Special Problems in FM*. Panelists included: Dr. Raymond Rask, Mutual Broadcasting; Gregg Ogonowski, Gregg Labora-

tories; Bill Sachs, Inner City Broadcasting; Craig Siegenthaler, KISW, Seattle, WA; James Gabbert, K-101, San Francisco; Lew Wetzel, Flash Technology; and Bob Orban, Orban Associates. Observations from these sessions follow.

Ogonowski emphasized that a new audio concept recently becoming widespread is composite clipping on FM stations. This is where the waveform after the stereo generator is clipped before entering the FM exciter. These composite clippers are being overused and creating out-of-band products that are (1) against FCC rules, (2) causing intermodulation with stereo pilot frequencies causing stereo problems in some FM receivers, and (3) creating audible distortion from too much composite clipping causing listener fatigue.

Sacks believes that most broadcast audio chains, electronically, don't match the current performance of most home receivers and that broadcast engineers need to concentrate on the electronics in their radio station and get them updated to match the specifications of even moderately priced receiving equipment available today.

Siegenthaler discussed op-amps that solve many problems encountered in the past and that can be used to improve that quality of electronics in the station. BiFet op-amps with high slew rates can be used to replace first generation chips with new pin-for-pin substitutes. Any op-amp equipment that a station has that is specified between 0.5-to-2 V/us performance should be replaced with high slew rate chips. Power supplies must be updated also to handle the new higher slew rates. There are feedback problems with the new chips and frequency limiting in the feedback loop should be considered. Also, voltage control amplifiers

(VCAs) have moved into the forefront of the broadcasting industry and are being used now in consoles for attenuators and in processing equipment. Their advantages are extremely good linearity over wide ranges of dB control, with very low levels of distortion, and excellent tracking.

Wetzel discussed antennas saying it's not good enough any more today to put up an FM antenna on a tower, plug in a transmitter, and go home. Studies should be made for the correct height, number of bays, beam tilt, null-fill, directionality, and effect that the tower has on the antenna system. Then, when the antenna is installed, it should be inspected for any mistakes, such as upside down bays. The tower should be climbed once every three months and the feed system checked for hot spots. Monitor points should be set up on 5, 10, and 40-mile circles from the transmitter site and checked every six months. If problems crop up in the radiating system they will become immediately apparent from a log of the monitoring data. If you are at a multiple-station location, consider installing a common antenna for all of the stations. It can control interference generated by stations on separate antennas in the same location.

Orban addressed audio problems in FM stations. He believes that FM stations are not living up to the capabilities of current technology; that the immediate need in the station is a calibrated monitoring system (without this you can't hear what you're doing); that the station engineer should be sensitive to the deterioration of the phonograph cartridges used for dubbing or playback of records on the air; that the phonograph preamp being used should be checked for headroom distortion and proper load to the phonograph cartridge, to remember

\*Laird is chief engineer at WDAY, Los Angeles, and a broadcast audio consultant.



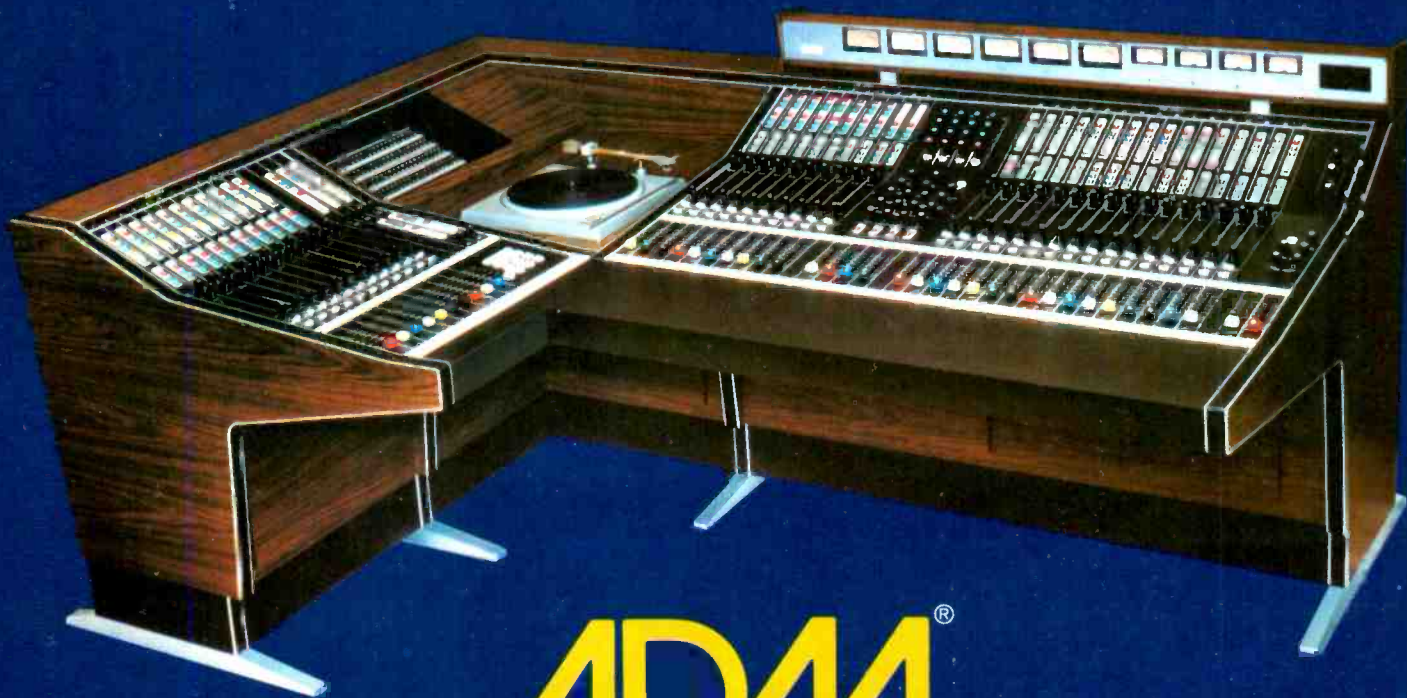
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that, with audio processing in your radio station, if you put garbage in you'll get more garbage out (the audio processing tends to amplify the effects of the distortion existing in your audio). That these items are the major contributors of the sound problems we hear on FM stations. There were discussions at NRBA on transformers versus no transformers, and trying to eliminate all transformers in audio circuitry. Orban notes that slight phase shifts introduced to the systems by good transformers are a small factor compared to other trouble spots in the audio chain. For your cartridge system, he recommends you consider adjustable azimuth for recording and/or L+R, L-R matrixing. Keep your electronics as simple as possible and be aware of baseband clipping causing intermodulation problems to your total bandwidth.

Siegenthaler, looking at audio, says all transformers in the station are suspects and should be checked for ability to pass square waves. Replace all slow slew rate op-amps. A problem in FM are poor STLs, noise distortion overshoots, and susceptibility to noise in multiple-transmitter areas. RF fields cause problems with measuring and test equipment. Many pieces of test equipment are not usable at the transmitter, however; modulation monitor systems and RF amplifier systems used at the studio aren't capable of reproducing the station well enough to show on the test equipment what really is happening with the radio station. And he suggests for RF suppression, which is an important consideration at

your FM transmitter, to use ferrite beads chosen for maximum VHF RF suppression.

#### Audio Processing: Exhibits

**Editor's Note:** As previously mentioned, reader service numbers are provided here only for audio processing equipment at NRBA '79. Other exhibitors are included, along with their products, the September issue, pp. 122-127, and the reader card therein may be used to obtain NRBA exhibitor data.

#### Audio & Design Recording

ADR showed five different processors that range from full processing systems with simple operating controls to complex operating controls, a pure and simple broadcast limiter, and a specialized application box.

The "Ex-press Limiter" is a full stereo compressor/limiter/expander system using a digital memory function selecting system. There are selectable attack and release times, an auto release network, selectable compression slopes that change into a limiter slope of 20:1 after 10dB of gain reduction. The compression mode has a choice of RMS or peak sensing with selectable pre-emphasis for FM in the limiter control chain. Expander ratio is 1:2 with three selectable threshold settings. This is the unit designed with "simplicity of operation in mind." There are four knobs, six logic pushbuttons, an electronic balance input/output meter and a power switch on the front panel. Available in mono and stereo the price is \$1150.

The "Compex-Limiter," available

in mono and stereo, has all the functions of the Express Limiter with (for stereo) 18 knobs, 12 toggle switches and two meters. Some of the functions that are switch-selected in the Ex-press are continuously variable in the Compex. In/out transformers, stereo matching and limit pre-emphasis are options. F760X: \$780 mono; \$1060 stereo.

The Vocal Stresser is one Compex-Limiter combined with a 4-band parametric type equalizer front panel switchable to the input, output, or side chain (gain reduction control) line of the compressor. This is most interesting for mix processing, specialized situations, and effects. F769X-R: \$1520.

The F600-R and -RS Limiter is a mono/stereo peak limiter designed only for the IBA in England. Front panel controls are input/output levels, attack time, release time, mono/stereo coupling, in/out of system and one or two meters. These units will be ready for delivery soon: mono, \$780; stereo \$1060.

The F690 Music-Voice Ratio Limiter is an F600 broadcast limiter with a special circuit for automatic voice-over. This device can be set up to always reduce the station music level to an adjustable talk over music level, with talk over levels independent of DJ levels. F690: \$1250.

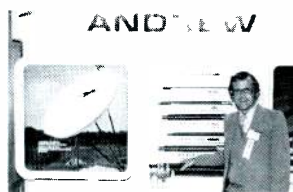
ADR also showed their *Scamp* modules for recording the complex production consoles. (62)

#### Broadcast Electronics

Broadcast Electronics has full processing systems for FM and AM stations. The FM-600 (mono) FM-601 (stereo) for FM stations are all-in-one box systems consisting of expander/compressor/limiter. The expansion rate and range are adjustable. The operating mode controls are digital and fully remotable so the mode of operation can be changed from studio with the system located at transmitter site. Mode functions include pre-emphasis selection (able to switch in and out a Dolby-B system), expansion/compression, limiting only, or line amp only. The VCA is continuously adjustable from RMS to voltage sensing and, along with a very wide range recovery control, it can be adjusted from very tight and loud to open and wide dynamic range while retaining good peak control. A power failure hard-switches input to output. Gain movement is gated and holds when level drops below set threshold. The VCA is followed by peak clipping. Controls are behind hinged front panel and are screw-



**Ampro/Scully:** was excited about new equipment offered and being planned.



**Andrew:** antenna systems and cables prominently displayed.



**Bonneville:** features automated broadcast computer system, with price tags boldly displayed.



**Broadcast Electronics:** program automation going strong.



**Cetec:** new 2000 series audio console being demonstrated.



Senator William Proxmire receives the Order of the Bird.

driver adjusted. Price: \$1195.

The AM systems are also 1-box total processors. The AM-500 is a compressor/limiter/expander. The rear panel switching selects symmetrical/asymmetrical modes, compress/limit/expand, compress only, test and power on/off. Input/output levels, and compression release are front panel screwdriver adjustments. The system is gated as in the FM model. There is no phase reversing system. Price: \$825.

The AM-400 is the same as the AM-500 without the expander and gating circuits, the selectable modes being compressor/limiting, compression, and line amp. Price: \$595. (63)

#### CCA Electronics

The PL-1 from CCA is an AM peak limiter with adjustable positive level, release hold (gate) and three front panel adjustable release times: slow, medium and fast. No clipping is used. The system uses a "patented PL-1 logic system to eliminate listener fatigue." The system was discussed at NRBA but was not available for audition. Price: \$1195. (64)

#### Delta Electronics

From test equipment company Delta Electronics, comes a piece of audio level control gear. While aimed toward ATS operations, this machine could be added to an already perfect processing system for that final last ounce of water to be squeezed from the power rock. This machine counts the number of 100% negative and 125% positive peaks/minute (or any other level selected) and slowly adjusts the feed level to the transmitter for this preset amount no matter what happens to power line changes or other slow system level drifts. The output of the last processor is fed through the AMC-1, then into the AM transmitter. (Any phase shifts at this point would be a problem to the limiting system. A unit may be made available soon for testing this case.) (65)

#### Dolby Laboratories

The 334 Dolby FM processor is not a compressor/limiter system. It's a noise reduction system that is also compatible with normal FM receivers not equipped with Dolby decoders. The compatibility is achieved by an FCC approval (for Dolby equipment only) reduction of transmitting pre-emphasis to 25/us. An FM station that works for clarity and reduced listener fatigue by using only small amounts of peak limiting can benefit greatly from Dolby encoding. The system appears

to be very compatible to nondecoded receivers under these conditions.

Dolby had a test set-up in their suite to compare a phono input to: normal FM, Dolby encoded through non-decoded receiver, and the Dolby encoded/decoded system. The processor used was an Orban Optimod running very hard, fed from an excellent copy of *Theme from Shaft*, extreme test record for radio and processing. Review of the test: With the Optimod adjusted as it was (10dB of gain reduction with a very fast release), *Shaft* was destroyed as well as it is in any other normal FM system (the high end went away and had weird gain changes in it). The Dolby encoded/non-decoded receiver set-up had slightly more upper midrange reduction with noticeably more weird gain changes. The Dolby encoded/decoded system was a major improvement over the normal and encoded-only systems. Conclusion: If your FM station is loudest on the dial so that it will burn up transistor radios as listeners sweep the band, don't bother with Dolby encoding because the audience isn't using Dolby decoders. High frequency limiting of open-sounding, clean stations can be reduced even more with Dolby encoding without a reduction in average modulation level (you may even get an increase in average level for lightly peak-processed stations). And, this added clarity benefit is passed onto non-decoded receivers, making Dolby B a consideration for immediately improving sound to listeners.

Dolby has developed an automatic system for turning on and off decoders as receivers are tuned in and out of Dolby stations. It's not available yet, so if you Dolby encode, let your listeners know it. The full encode/decode system sounds great and will improve the effective coverage area of soft-processed stations.

One other note: The Dolby system is easily set up, works with many processing systems, but is not typical radio processing equipment. Follow the directions precisely and make sure the quality of the rest of the station is high. Dolby benefits are much more apparent under these conditions. (66)

#### Dorrrough Electronics

Almost hidden in the booth of an associate, the Dorrough processors had to be searched out. Nevertheless, the Dorrough discriminate audio processor model 310 AM and FM stereo versions were displayed—the daddy of them all. With previous models, Mike Dorrough,

founder of Dorrough Electronics, introduced multiband processing to broadcasters and started an evolution in audio processing. He has remained on top of the units in field pack with over 7000 units sold worldwide. The 310s are complete, 1-box processors with a 3-band frequency split for expansion and compression functions followed by a soft clipper peak controller. Two new things are available. The version II (which can be retrofit to older models for \$100) adds a high frequency brightness control with a 4-pole Butterworth low pass filter. And a pink noise alignment generator system card facilitates quick and repeatable spectrum adjustment and matching of all 310s. This card plugs into an existing internal connector and sells for \$125. The 310 is \$2250. (67)

#### Gregg Laboratories

Gregg Labs in a van outside the exhibitor hall, showed a total AM system, and part of it is adaptable for FM/TV use. Fifteen units have been delivered and more are in production.

The 2530 Tri-Band Audio Processing Amplifier is the "AGC studio location box" for the AM system, which can be used as a building block for FM systems. It features: multi-band compression with defeatable and delayed gating; variable crossover frequencies, attack and release times; high and low pass filters; EQ effect; pre-emphasis/de-emphasis for FM use; VCA gain reducers; and balanced, transformerless input/output. Price: \$2200.

The 2640 AM peak limiting amplifier features a "distortion cancelling technique to control high frequency IM distortion, reduce limiting effects, and prevent output low-pass filter ringing and overshoot;" a variable limiting slope to allow softer or harder limiting action;" asymmetrical operation; a steep output low-pass filter; and a precision 10-turn output control. Base price: \$1600.

There is an optional phase/amplitude corrector available to reduce low frequency tilt and ringing occurring in most AM transmitters. This type of corrector tunes out the phase shifts in many AM transmitters. These time delays (phase shifts), in essence, unpeak-limit audio within the transmitter and reduce overall modulation of complex waveforms. The phase/amplitude correctors predistort the audio in the opposite direction of the transmitter phase distortion so that the audio at any frequency arrives

at the final tube with exactly the same time delay. The 2640 has one or two (for an aux/main or alt main transmitter set up) separate phase-corrected outputs available: \$1700 for one and \$1800 for two. (68)

#### Harris

Harris demonstrated their totally mix-and-match system of MSP-90 processors. Basically these systems consist of fully shielded modules that lock into mainframes either one or two modules per frame. The systems can be split between studio and transmitter by locating a mainframe in each location. All the modules use multi-LED indicators to display processing activity and output levels. Harris provides IM distortion specifications under gain reduction conditions.

The AM limiter module features adjustable release time, asymmetrical modulation control and a phase reversing system with sophisticated zero crossing, pause, cancel and adjustable detector circuits.

The FM limiter module has an unusual high frequency control circuit. After the broadband limiter section, the audio is split into two bands at 400Hz. The upper band is fed both to a peak clipper and a high frequency limiter. The outputs of these are combined at a single front panel control that can be varied from final high frequency processing totally by clipping to totally by high frequency limiter, or any combination in between. The output of this mix control is then re-added to the frequencies below 400Hz, deemphasized (if desired) and sent on to the output circuits. This system allows you to dial up exactly the high frequency limiting sound you want for your format.

A new tri-band AGC audio processor was also shown, which divides the audio into three bands with switch-selectable crossover points. The compression is RMS and program dependent for attack time; the release time and compression slope is switch selectable. Expansion attack, recovery and depth are all switch selectable, with the recovery of the three bands tied together. (Systems that are not tied together will occasionally drop the high end under special musical conditions). The tracking circuits for stereo between two units are unusual. In addition to the usual tied-together or free-running choices, there's a third setting that allows each channel to deviate 2 or 3dB dynamically from locked but tracking closely over wider movements. This allows some extra modulation without total

loss of imaging.

The fourth module is a wideband AGC with the features of the tri-band AGC module. All of these modules have simple front panel controls with all the complicated selections available only by pulling the module out of the mainframe. (69)

#### McMartin

McMartin demonstrated their new "Maxi-I" FM processor, available as a plug-in module to their exciter or as a separately packaged limiter/stereo generator combination. Around the first of the year, the processor, which has IM distortion specifications, will be available packaged by itself.

This is a total processing system with overshoot compensation and easy set-up. The AGC system has a fast attack time, tight compression slope, multiple time constant release—with the slow release adjustable from the front panel. A pre-emphasis limiter follows with low pass filtering circuits that can be phase/level adjusted between channels for good tracking. The pre-emphasis limiter also uses program dependent release time. Special care has been given to left/right channel tracking for good imaging. The BFM-1514R Maxi-I audio processor/stereo generator: \$2995. The BFM-1514 audio processor module (to be inserted into a McMartin exciter): \$1250. (70)

#### Moseley Associates

An AGC and AM limiter has been added to go with Moseley's FM limiter. These units now become the parts of a total AM and FM processing system. These new units have IM distortions specifications. The TGR-340 Audio Gain Rider is an AGC amplifier featuring a switch-defeatable, all-passed network; gating; a variable time delay along with a variable release delay for short-term dynamic range control; a switchable pre-emphasized high frequency AGC; and direct-coupled balanced transformerless output. Price: \$1000.

The TAL-320 AM audio limiter starts off with a switchable all-pass network; adjustable attack and recovery times, along with program dependent recovery time; adjustable asymmetric clipper; a switchable non-overshooting, low-pass filter; and direct-coupled, balanced, transformerless output. Price: \$1000.

The TFL-280 FM limiter features an adjustable wideband limiter followed by an adjustable transient clipper, a Dolby in/out accessory jack, and adjustable 15kHz low pass filter, and a pre-emphasized high

frequency limiter. Price: \$1095. All these units are mono, and two of each are needed for stereo. Switch controlled image tracking facilities between each units are provided. (71)

#### Orange County Electronics

This Canadian company offers three parametric equalizing modules along with their CLX compressor/limiter/expander module, all of which can be plugged into their 2-module mainframes to build a dual-channel total processor, or a CLX processor with a parametric equalizer to create a stressor. Also, Orange County showed two new products that have not been delivered yet. A total FM processing system and a total AM processing system. The VS-1 stressor consists of the mainframe with a choice of parametric equalizers along with a CLX processor. This is a front-panel, knobs-galore system (18 knobs, 10 toggle switches, 4 push-buttons). The CLX has an adjustable gated attack release threshold and range expander. The compressor section has adjustable ratio attack threshold and release, with release also having an automatic selection. The limiter is switchable in and out and has automatic release. The parametric equalizer selected is switchable into the input, output, or control loop (side chain) of the CLX. Price: \$1855.

The CLX-S-FM stereo processor is a combination of two CLX modules on an FM mainframe. That also includes a high frequency limiter selectable pre-emphasis and has available overshoot-control, low-pass filters. Without filters: \$2275; with filters: \$2420.

The new VS-2 stressor is a total AM processor in one box, and has a very simple front panel and set-up procedure. The system consists of a fully adjustable expander/compressor/limiter. Asymmetry control and a switchable contour in the compressor control circuits make the compressor act as a dynamic loudness equalizer. All of this is in a 1¾-inch high rack mount unit. Price: \$926.

The VS-3 stereo processor also has a simple front panel that has a highly adjustable expander and compressor. There is also a selectable program control multiple release network followed by a broadband limiter, a high frequency limiter and a no-overshoot, low-pass filter. The unit being demonstrated also had a front panel access door to a small PC board covered with DIP switch selectors, with factory hard wired PC boards providing

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ideal settings for different formats. The big thing about the unit shown, however, was the compression control system. In addition to the L and R processing, an L + R and L - R system was created to provide more accurate image depth control between left and center, and between right and center. The headphone demonstration seemed to bear this out. Price: \$1148; delivery in January. (72)

#### Orban Associates

There were three processing systems shown by Bob Orban: a recording limiter and total processing systems for FM and AM.

The recording limiter is designed to be used in production to keep distortion down in the cartridge and reel-to-reel recording processes while maintaining maximum s/n ratio.

The FM system, the celebrated Optimod FM, combines a total audio processing system with a stereo generator, a combination designed to eliminate the filter overshoot prob-

lems that cause overmodulation. This unit, the first system to address itself to this problem, is a processing system that is highly adjustable from dense to open sound. With a Dolby part available, this is one of the most popular FM systems on the air today. Price: \$3195.

Introduced a little over a year ago, the Optimod-AM has had a modification made to its wideband control AGC. At NRBA a new tilt and ringing circuit was introduced. It's used to pre-distort the output to match the phase and ringing characteristics of many transmitters. This allows your transmitter to operate at maximum modulation if it has designed-in time delays. Also new are separate low pass filters that can be switched in and out of the output to handle unusually narrow antenna systems. If you have separate antennas for day and night, for instance, and one of them is very narrow, the filters can be switched to match the antenna system being used.

The AM Optimod contains an overall AGC with silence/hold circuit followed by an EQ system. Then the audio is split into six bands and compressed. These bands are recombined, then phase-switched for proper positive modulation. A unique approach here allows phase reversal without waiting for a zero crossing to prevent thumps. A "Smart Clipper" then judges how much distortion is audible from the clipper and adjusts it to match the programming at that moment. The output section has switchable low pass filters and a phase/ringing equalizing system to adjust out the time delays in the transmitter. Price: \$3995. The phase (tilt)/ringing equalizer retrofit is available for \$250. (73)

#### OEI

QEI offers full AM and FM processing systems; each is basically a 2-box system: AGC and limiter. If you buy the mono version you can add another mono system and tie the control functions for stereo. The

#### Fidelipac

Announced during NRBA, Fidelipac is newly independent under established management. The Fidelipac Division of Harvel Industries began operation as a totally independent organization, now known as Fidelipac Corporation. The company will continue to provide the same high level of products for the broadcast industry available under the previous ownership. This continuity will be supplied by existing management personnel. Retaining their current positions are Daniel McCloskey, general manager; Arthur Constantine, sales manager; and Robert J. Gosciak and Frank A. Dileo, development engineers.

Fidelipac, headquartered at 109 Gaither Drive, Mount Laurel, NJ 08057, is internationally known for its broadcast tape cartridges.



Key NRBA figures pause to discuss progress of the convention. In the foreground (left to right): Abe Voron, executive vice president; Sis Kaplan, president; and Lisa Friede, administrative director.



Ramko demonstrated at NRBA their latest instrument package for broadcasters: the PhaseMaster Cart/Cassette. Dick Anderson (center) of Ramko handled the mechanical design of the system and explains its operation to Dan Dayton, WSUL, Monticello, NY. Introduced at NRBA as a new concept, the PhaseMaster reproduces carts (A&B sizes) or cassettes; reportedly solves the stereo phase shift problems by mixing the stereo signal onto the upper track (decoding in lower track) and then decoding on playback; and features three meters, digital time, crystal controlled dc motor and two cart machines plus one cassette deck. Deliverable in January.



Eric Sevareid, celebrated news commentator, receives NRBA 1979 Golden Radio Award in recognition of his pioneering years in radio news reporting and analysis. Though the years have taken their toll on his commanding voice, his spirit for the radio news has not dimmed. He shared some of his early experiences with attendees, praised the works of Lowell Thomas and Walter Winchell, and received a standing ovation honoring the occasion.



Sis Kaplan (left), new NRBA president, discusses a point in radio broadcasting with delegates from Puerto Rico.



# WE'RE GOING AFTER HIGHER RATINGS.

From WFMT in Chicago to the BBC in London to NHK in Tokyo; in China, Saudi Arabia, and Brazil, the big names in broadcast depend on Studer Revox.

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- A full range of mixing boards including the compact 12-volt Model 169, with up to 11 inputs in a 19" wide package that can be easily hand-carried or mounted in a remote van.

- Low-speed loggers, and ultra-reliable playback-only machines for automated stations.

- A full range of interface devices like balancing units and telephone hybrids for call-in shows and phone interviews.

We're backing up our product line with 100% QC, computerized order processing, fast repair service and in-field engineers to help you with your special problems and to develop special products.

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Offices: LA. 312 780-4234/NY. 212 255-4462 In Canada: Studer Revox Canada, Ltd.

1073 Mono Average Maximizer and the 1073S Stereo Maximizer are compression units that have a 4:1 compression ratio and a control range of 20dB. The front panel controls consist of input and output with a 10 unit logging scale behind the knobs for easy resetting and a variable release control. The 1073, \$695; the 1073S, \$1125.

The 1071 and 1071S Peak Maximizers are FM and FM stereo peak limiters. These units have fast attack time and two release times; a fixed fast release; and a front panel adjustable slow release. The front panel layout is identical to the AGC units. The 1071, \$975; the 1071S, \$1675.

The 1072 peak maximizer is an AM peak limiter and is like the 1071 with an additional adjustable positive peak control and automatic polarity switching. Price: \$1125. (74)

#### QRK Electronic Products

One portion of an interesting looking multi-band processing system with a QRK face tag on it was shown, but without product literature. (75)

#### RCA

RCA demonstrated a 4-box FM processing system consisting of a gated stereo single time constant

with expansion AGC unit; two separate wideband limiters (two mono units with control tie for stereo imaging), and the featured fourth unit, a digital overshoot control processor. The BA-150 DOC processor is an adjustable peak clipper system designed to be used with any FM exciter/stereo generator system with no overshoot problems due to fast high frequency limiting. The input controls are precisely-calibrated, 10-turn pots that are adjusted using a 400Hz sine wave to a threshold indication on the DOC unit. The output is adjusted for correct modulation and balance, then regular program is fed and the DOC control is turned until the 100% peak light doesn't flash. The loudness does not go down. Delivery from stock: \$2000. (76)

When NRBA '79 convened in Washington, it did so saying farewell to president James Gabbert, who stepped aside after five years of dynamic leadership. But, as expected, the typically vocal Gabbert did not step down silently. He took this final opportunity to speak out forcefully for a dynamic NRBA organization with attention focused on FCC and legislative issues; to express concern for the increased amount of government paperwork in

station applications; and to appeal to radio broadcasters for vigilance in asserting the dominance of radio as a global communications media.

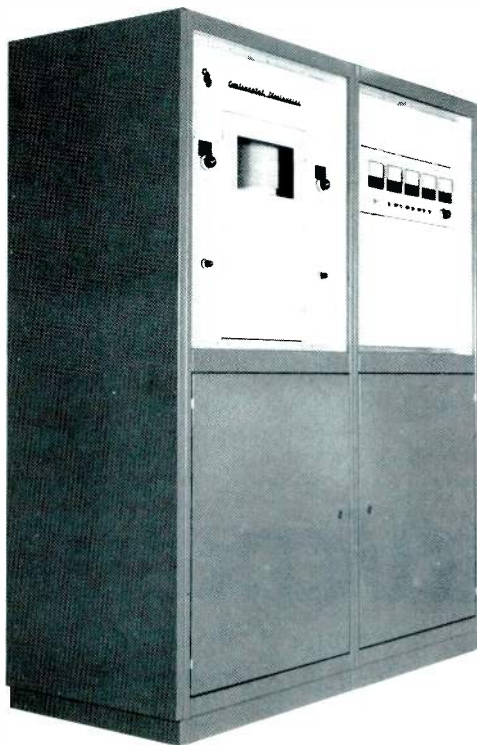
The guiding reins of NRBA have been placed in the hands of Sis Kaplan, executive vice president, WAYS/WROQ, Charlotte, NC. Elected president to succeed Gabbert, Kaplan was formerly director-at-large. Other newly elected members to the NRBA board of directors include:

- board chairman: Robert Herpe, General Communicorp;
- vice president-east: Stephen Trivers, Fairfield Broadcasting;
- vice president-west: Lynn Christian, Century Broadcasting;
- secretary: Bernard Mann, Mann Media; and
- treasurer: Ted Dorf, WGAY, Washington, DC.

Kaplan is the first woman to serve on NRBA's board and the first woman elected an officer of the association. Herpe, commenting on her contributions, cited "her creative leadership and dedication to the best interests of our industry as an inspiration to all of radio. As president of NRBA, we can expect her to lead our association to continued growth and expanded service." □

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What you program in is what goes out over the air. The 315F faithfully reproduces your program. Now *that's* quality sound.

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Continental Electronics



Circle (20) on Reply Card

## NRBA Replay



**Comrex:** demonstration of weather feed from Boston to booth impressed many with the signal quality possible using low frequency extenders.



**Harris:** exhibited 9000 Program Control series with new features.



**LPB:** excited about industry's acceptance of newly-packaged console.



**Orange County:** Andy Laird (left) discusses salient features of new processor (at top of stand).



**Station Business Systems:** one of many systems of top interest to broadcast management.



**Consolidated Electronics Industries—**superb improvement in system packaging since NRBA '78.



**IGM:** introduced GO-CART II with digital tone sensing and high-speed cueing.



**McMartin Industries:** new CP antenna of interest to many.



**Otari:** describes new high speed cassette duplicator.



**UMC:** consoles, cart machines popular items.

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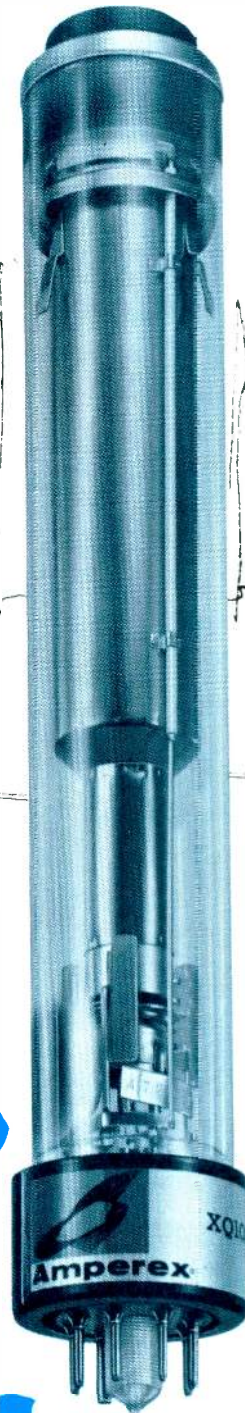
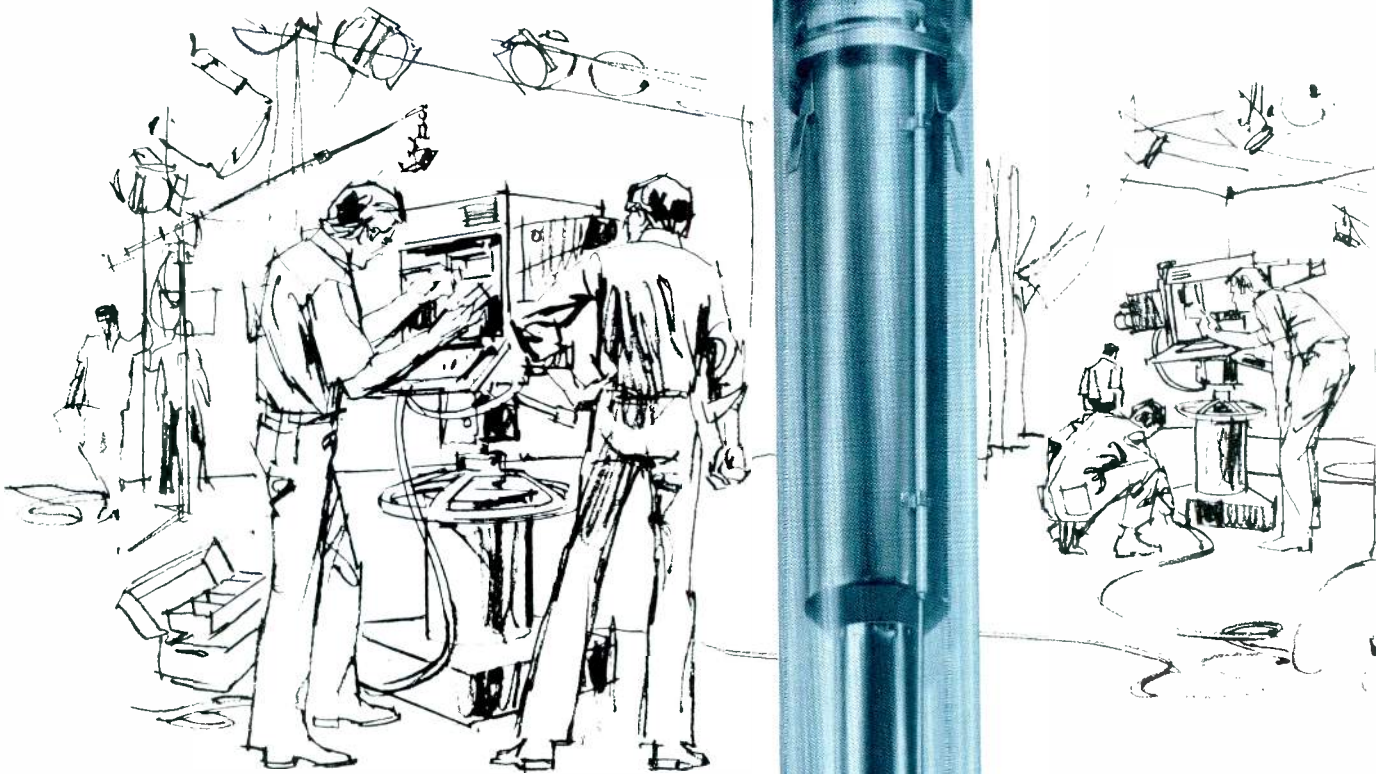
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Circle (24) on Reply Card



**Some day,  
somebody  
may imitate  
the Product...**

# ...but nobody will ever duplicate the Service!



## And in TV Broadcasting, it's the service behind the product...that keeps the product out front

On the way to selling more than 50,000 Plumbicon\* TV camera tubes, we learned how important Service is to the broadcaster. The first thing we learned was about availability—No TV station, commercial or educational, can ever afford to shut down an operation while "waiting for parts." Plumbicon tubes are instantly available, at all times, through local franchised distributors and through Amperex factory sales representatives.

And we learned the importance of the name Plumbicon to TV stations who have come to depend on it as their assurance of consistent performance and quality.

Because no product is ever "good enough," we taught ourselves to build smaller and smaller Plumbicon tubes that provide performance standards similar to the original (we're down to  $\frac{2}{3}$  inch tubes now,) and we learned to produce tubes with reduced comet tailing, with higher resolution and modulation depth, with extended-red response, and minimum lag. Contemporary Plumbicon tubes outperform the original Plumbicon by a wide margin.

We learned that the TV camera user is concerned about the operation of his camera...not merely about the performance characteristics of our tubes. So we provide him with a wide range of expert and valuable information, in print and via our field engineers, to help him get the most out of his TV camera-system. Plumbicon users who are about to install a new camera need only give our

field engineering staff a call and we'll have an expert there to help with the job.

Our franchised distributors, (your own local businessmen,) are carefully selected for their ability to support Plumbicon TV camera systems with on-the-spot customer support and service. We, in turn, support our distributors with two kinds of "seminars" for Plumbicon camera users. One is on video tape, the other is presented "live" by an Amperex field engineer. The purpose of both is to maximize the value of Plumbicon camera systems.

Finally, we learned that the best way to deal with warranty questions was to design the warranty for the customer's benefit—not to protect ourselves...and even then, to interpret the warranty in the customer's favor whenever possible. For example, a customer may return any Plumbicon tube for testing (even one that's technically out of warranty) and we'll subject it to a complete technical evaluation at our expense...and send the customer a detailed engineering report on the tube.

Yes, we've learned a lot about the importance of Service in the 13 years, in the more than 50,000 tubes sold, in the 600-plus TV stations served, since the Plumbicon tube won the Emmy award. Little wonder then, that the Plumbicon, after all this time, still offers the best all-around package of performance, price, reliability and service available. Little wonder, then, people keep on saying, "There's only one Plumbicon."

Amperex Electronic Corporation, Slatersville Division, Slatersville, Rhode Island 02876. Telephone: 401-762-3800

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Circle (22) on Reply Card

# Automation: A CBS Radio experience

By Steve Peppard, director of Management Information Systems, CBS Radio, New York.

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*Separate automation control and business systems can be interfaced to communicate directly and increase station efficiency. CBS Radio describes their experience in working with manufacturers in developing such an interface for their systems.*

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A significant marriage took place this spring of two complex automation systems: the IGM 770 programming and switching automation system and the Marketron traffic and billing system. The project has been under consideration by CBS since installation of several 770s and Marketron systems in CBS FM stations. Some way to facilitate exchange of information between the two systems clearly was needed to save time and improve accuracy.

### **Interfacing needed**

The less information that has to be transferred by persons from one system to another, the less chance there is for error. Before development of the interface between the two machines that permitted them to directly exchange information, individuals handled data several times. First, data concerning commercials, PSAs and promos was entered into the Marketron unit, producing a pre-log. The operator of the 770 then entered the pre-log into the switching schedule. After airing, the FCC log had to be scrutinized and commercials that had run were re-fed into the Marketron to be billed. Obviously, so many transfers of data provided fertile ground for operator error. The respective roles

of the two systems are shown in Figure 1.

The concept of the interface was delayed for more than two years after the installation of the Marketron units. Meanwhile, Marketron, a relatively new company specializing in sophisticated business systems, continued to install their systems in radio stations. When CBS purchased the Marketron systems, they hired Hope Wormley from Marketron as manager of station services to supervise installation, test program changes and train personnel. She played a key role in interfacing the two systems for CBS.

### **System functions: The 770**

Before discussing the engineering intricacies of interfacing the two systems, a general understanding of the functions of each is necessary.

The IGM 770 (Figure 2) is an automation control system for programming the total broadcast day and switching the various playback devices (reel-to-reel units, Instacarts, single play carts, CBS Network, etc). It is based around a DEC PDP-8 computer, with a dual-disc configuration that permits storage of an almost infinite number of operating commands. In addition to seven

days of program scheduling, the 770 offers storage for 9999 descriptions of music, commercial, PSA and program titles. The 770 has a unique ability to sort these items in several ways to monitor music rotation and to provide a music library management system for program managers. For example, the operator might ask the unit to list 25 selections by a male vocalist made between 1972 and 1976, each no longer than three minutes, and such a list will print out quickly.

The 770 also allows three different levels of password command-entry. One level may apply only to the traffic department, one only to the programmers, and one only to engineering. Each department has its own password that permits access only to that area of the computer necessary for its particular departmental use. In this way, the likelihood of interference with scheduled programming is minimized.

After receiving the traffic schedule, the 770 is able to assign locations to commercials, PSAs and promos through analysis of the total schedule, meshing music and other elements. It retains an entire week of program logs in memory so that a complete copy of commercial and music activity may be accessed and printed at any time. The system will not allow any changes to this stored data until the legal FCC log has been printed.

The unit is programmed by event number, starting each day with the number "0." Available for programming are 2400 events per day for seven days, with an additional full day retained for special formats that may be accessed from any day's schedule. Typically, each day's events are broken down into 24 groups of 100 events. Each of the

19,200 events may be programmed with either a duration switch, approximate-time switch or an exact-time switching instruction. It provides programming and traffic paperwork routines, as well as pre-log and management reports. Its program logging automatically notes discrepancies between the pre-log and the aired items, and includes certain other corrective routines. Its dual-disc system serves as a redundant data base that can be accessed automatically in case of error in the primary data base.

### The Marketron system

The Marketron business system works on actual time slots. This situation created a need for conversion of time-to-events, a file located in the IGM 770 system because of available disc space.

Using a Cincinnati Milacron Computer, the Marketron computerized system for broadcasters handles all traffic and accounting. This includes generating a vast array of specific reports for management, such as Oversold Reports, Bumped Spots Reports, Billing Reports, Receivables Analyses, Agency Payment Histories, Sales Projections as well as pre-logs, contracts, invoices and statements. The primary benefit of the Marketron system is the real-time sales and inventory data it provides a sales manager.

Pertinent to the meshing with program automation are operations inherent to the Marketron system in scheduling of sales orders for commercials, PSAs and promos. The operator enters orders from clients into the Marketron computer, including times for preferred spots, spots running throughout a full time period, those running in flights, spots fixed to certain days, and spots where the computer is permitted to select the times and days to run in accordance with other factors. When such data is interfaced into the 770, it is merged with the specified music rotation.

In addition to the traffic department's handling of scheduled commercials, the Marketron system generates a report of PSA and promo inventories to accommodate the scheduling of these elements by scheduling the announcements into fixed, pre-defined positions or by scheduling these announcements as unsold commercial avails; if no last-minute commercials are sold and scheduled for such avails, the PSAs will run at that time. A defined limit can be indicated as to how many such avails/PSA/promos may be scheduled within any given hour. When either or both of these

methods are used, the PSAs and/or promos currently being aired are entered into an inventory file. Each entry includes the name of the item, allowable days of the week, etc. The system rotates items in such file into the log as directed.

After the contracts are scheduled, pre-empted spots rescheduled, makegoods placed, and copy scheduled, the traffic manager asks for a pre-log. At the end of the pre-log, a spot count and dollar total is produced for management control purposes.

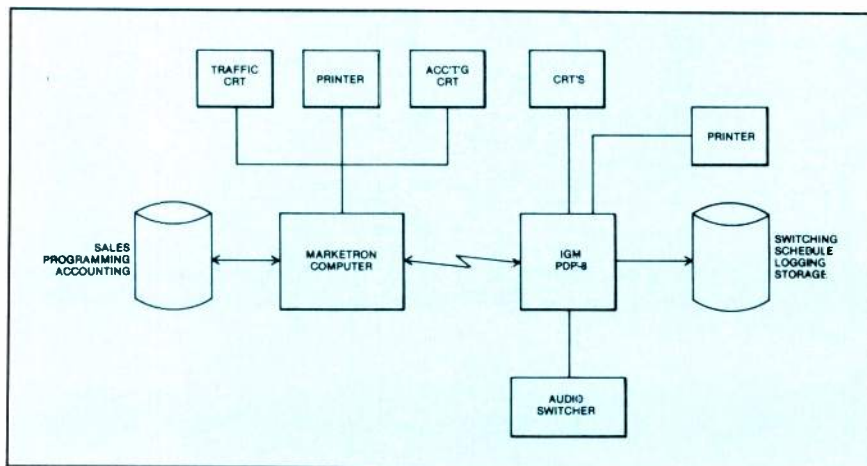
### Interfacing saves time

Prior to the interface development, the traffic manager entered

the final traffic information into the 770 through a CRT terminal keyboard. Now such data is merely transferred directly into the 770 using a serial transmission. The data covers an entire broadcast day and consumes only 7½ minutes of transfer time, a task that used to take an hour or more of operator enter time.

As indicated previously, the 770 allocates a location in the event schedule to the data received from Marketron, and airs it in accordance with such schedule, thereafter creating a verified log.

After the completion of a broadcast day, the Marketron system establishes communication and



**Figure 1** The Marketron and IGM systems were interfaced at CBS Radio to communicate directly with each other, creating improved efficiency of the station operation and reduced chances for operator errors.



**Figure 2** The 770 programming and switching automation system forms one branch of the CBS Radio instrumentation package. More than seven full days of programming may be stored. The disc cartridge unit immediately above the Infotron terminal provides massive data storage and rapid data access.

## CBS automation

Macro Flow Chart of Conversion File Maintenance Module (CF)  
Invoked from CRT-A, CRT-B, CRT-C or TTY Terminals

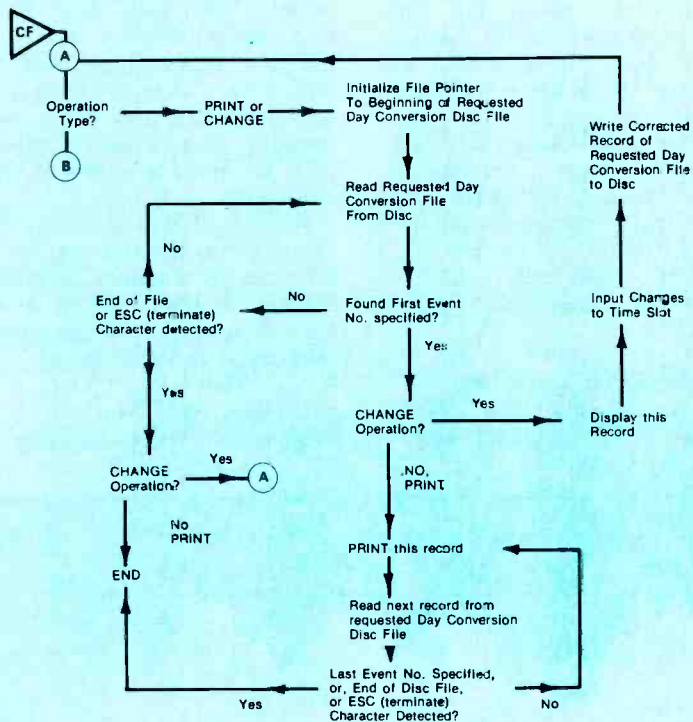


Figure 3 A portion of the logic flow chart for the 770 system operation shows the complexity of its functions. Several companion flow charts are needed to fully cover its operation.

Macro Flow Chart of Marketron/770 Transmission (MK)  
Invoked from Marketron System Only

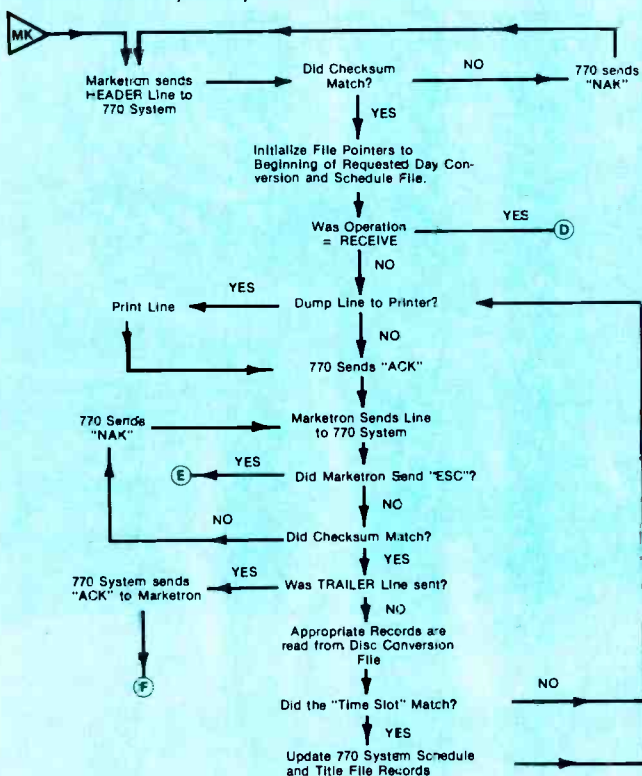


Figure 4 A portion of the Marketron flow chart illustrates some of its logic and decision paths. As with the 770, additional charts are needed to fully cover its total function.

transmits a request to the 770 to send all logged commercial, promotional or PSA information that was aired on the designated day. The 770 system selects the requested information from its log file, which it also uses to generate the FCC Log Report, and sends it to the Marketron system. Included in the transmission of each aired entry is the actual aired time, duration, advertiser and product names, together with appropriate data essential for communication control.

The Marketron unit then proceeds to complete the various billing reports and invoicing to the customer that it normally does, working from the data received from the 770. Again, prior to the interfacing of the two machines, the operator of Marketron had to enter all such data manually through the Marketron CRT keyboard, a job fraught with possibilities for error. Now the data go directly from machine to machine. The Marketron unit then checks its files to determine whether there were any differences between what was scheduled to air and what actually aired. If all spots ran as scheduled, no action is required. Posting is done and all changes made to the scheduled log, such as time changes, added spots, missed spots, makegoods, product name changes and deleted spots, are flagged on a Post Log Report. At the end of the Post Log Report is a summary of total sales for the day broken down by local salesperson and other categories.

At the end of a billing cycle an invoice to the customer is then produced, showing such items as the gross, commissions to agencies; an affidavit shows performance and lists exact times, date, class and length of each spot aired.

### Interface development

Interfacing the two automation systems sounds simple, but it required a complex set of software instructions. Its development required close cooperation of IGM in Bellingham, WA; Marketron in Los Angeles; KNX-FM, Los Angeles (the first CBS station to receive the direct interface); and the CBS Radio Management of Information Systems in New York. For Marketron, Mike Gaber was responsible for most of the software, and for IGM/NTI it was Marvin Gansler.

Several key factors had to be resolved between the two systems: the Marketron uses time only; the IGM 770 uses event numbers; and



communications protocol. At IGM a single module was created to generate and allow maintenance of Marketron Time Slot/770 System Event number conversion files for days one through seven. Four specific operations can be requested with this Conversion File command: EDIT, DISPLAY, PRINT, or CHANGE. The first two generate an entirely new conversion file for the day specified. This file incorporates previously entered time slots and event numbers which match with event numbers obtained from a Schedule File denoting commercials, promos or PSAs. In this manner, insertions or deletions can be made in the Schedule File first, followed by the use of the "CF" command EDIT or DISPLAY procedure to incorporate these changes into the desired day's conversion file.

The CHANGE procedure, on the other hand, allows one-shot editing of a time slot entry which is referenced by an event number without regeneration of an entire day's conversion file. A portion of the flow chart for these functions is shown in Figure 3.

The actual software structure consists of eight sections, corresponding to each of seven days with number eight reserved as a work file section. Each section consists of 30 sectors, with 32 individual time slot/event number entries comprising a total of 960 entries per day. Each entry further consists of eight "words" which cover schedule file event number; commercial, promo or PSA designation; slot time, hour and minutes; slot time, seconds; slot time, AM or PM; and title number.

A transmission, always initiated by Marketron, is entered as a

header record, the data going back and forth is a data record; and the end of a transmission is a trailer record. A portion of the flow chart of the transmission procedure is shown in Figure 4.

Information comes to the 770 from a Marketron transmission file prepared in the form of a 76-character record, read from a disc file and transmitted character by character through a cable that interconnects to a 770 interface card. At the end of each line of data are two characters called check sums. The 770 generates its own check sum characters after analyzing the data received and compares the two sets. It then sends a signal back to Marketron in the form of an ACK character that the data is indeed received. If the check sums don't match, it sends a control character NAK, signaling Marketron that the transmission was invalid, send it again.

There were two test stages: the first one to check data transfer methods, the second to deal with content and type of information sent back and forth. The author and Wormley spent two weeks at the IGM plant ironing out the interface with an IGM 770 system plus a Marketron unit. Avis Turner, traffic manager for KNX-FM, also attended to operate the system that she would be the first to use in a CBS station.

Although a few bugs appeared at installation time in KNX-FM, these were quickly cleared up, and the station is quite happy with the new interface. As soon as is feasible, CBS intends to duplicate this interface for the other 770-equipped stations that are using Marketron. □



Figure 5 The Marketron System 100 was developed for AM/FM combination stations.

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AND  
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BY 7421  
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Circle (23) on Reply Card

## UHF station claims rare rating coup

For perhaps the first time in broadcasting, according to Bob Wormington, president and general manager of KBMA-TV (Ch. 41) in Kansas City, an independent TV station has beaten out its local VHF network affiliate rival in a full sweeps rating period in prime time in a major market metro area. The Indie is Scripps-Howard's KBMA and the competitor is Taff Broadcasting's NBC affiliate WDAF-TV (Ch. 4), both serving the Kansas City metro area. "Independents have beaten network affiliates before in specific time periods," claims Wormington, "such as early afternoon and late evenings, but not in the prime time periods where the affiliates usually are dominant."

KBMA pulled off the coup in the Nielsen May Sweeps when it nudged out WDAF in Metro share with a 22-21 edge in the critical prime time period from 7-10 PM, Monday through Friday. However, both stations tied at 11 points in their Metro rating.

"Although this is a surprising development wherein an independent ranks ahead of an affiliate for an entire sweep rating period in a major market," continued Wormington, "other factors are also significant. In the Nielsen DMA (Dominate Market Area) ratings, KBMA trailed WDAF by only 1 point in rating and share—and that's significant when you consider the greater reach of the affiliate. We did it with a mix of

sports, movies and special programming—such as operation prime time offerings.

"This rare accomplishment also establishes KBMA as a top-rated TV station in the country. We've checked 15 of the top markets, and our sweep ratings and share lead them all."

In part, KBMA owes its success to a greater supply of diverse programming becoming available, much of which is being distributed via satellites. Wormington, who is also chairman for INTV (Association of Independent TV Stations), expects the gap between affiliates and Indies to shrink in other markets as more programming becomes available to the independent TV stations.

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## Satellite links law course: N.Y.U./KTXL-TV/U.O.P.

History was made September 4 when the first segment of a seminar on "Communications Policy and Law" was beamed by satellite from the East Coast to KTXL-TV in Sacramento, CA, and relayed to nearby McGeorge School of Law at the University of the Pacific (UOP).

The initial 90-minute taped segment, which was videotaped at the New York University School of Law last spring, marked the beginning of a coast-to-coast educational exchange experiment designed to improve the overall quality of legal education while reducing spiraling costs.

The "Communications Policy and Law" seminar, approximately 13

hours, is offered as part of the regular law curriculum at McGeorge School of Law. The course focuses on salient legal matters pertaining to American broadcasting including the Fairness Doctrine; cross and minority ownership; licensing; First Amendment problems, and the use of new technologies; common carriers; cable TV and satellites.

Following each 90-minute taped presentation at McGeorge School of Law, NYU law professor, Morton I. Hamburg, author of "All About Cable: Legal and Business Aspects of Cable and Pay Television" (*Law Journal Press*, 1979), will conduct 60 minutes of class discussion in "Communications Policy and Law" live

from NYC. Questions and answers will be transmitted via the WESTAR I satellite located 22,300 miles in space.

The two law schools are utilizing the latest state-of-the-art technology and, in effect, sharing faculty by means of satellite technology. The project is a cooperative effort uniting academia and the corporate world and represents a melding of diverse talents and resources.

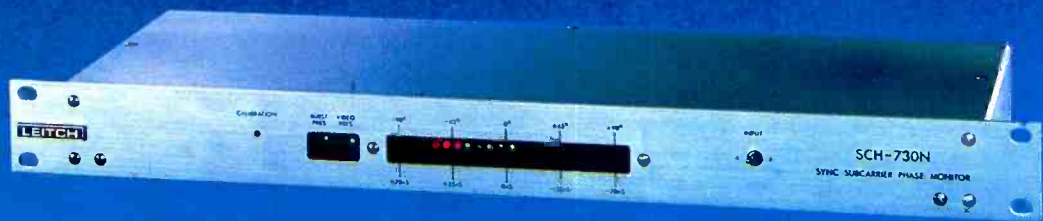
In the beginning stages, executives at Viacom International were consulted for early technical planning, and Viacom contributed all videotaping services to the project. The live broadcasts will all originate from Automation House Studios in New York City, and will then be relayed to the WESTAR I ground station in New Jersey. The signal, to be sent up to and down from the WESTAR I satellite, will be received at the KTXL-TV (Ch. 40) earth station in Sacramento, CA, and micro-waved to the McGeorge Center.

Dean Norman Redlich of the NYU School of Law and Dean Gordon Schaber of the McGeorge School of Law are optimistic about this satellite delivery educational program in terms of providing a model of inter-institutional cooperation conceivably leading to a consortium of schools offering new avenues of excellence and innovation in the training of tomorrow's lawyers.

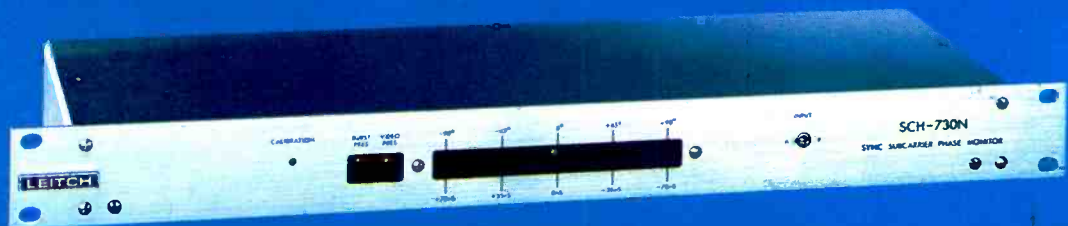


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Circle (25) on Reply Card

# The 3-tube Saticon\* camera you wanted...

**A/V executive** "I want a camera that makes my department's tapes look good at a price that makes me look good. One that can adapt to our needs as we expand."

**Purchasing agent** "I'm naturally looking for maximum value in a video camera. One that delivers a lot of features for the money...from a manufacturer I can trust."

**Field camera man** "A nice compact, lightweight, well-balanced camera. One that delivers clear shots even in near darkness. That's what I need."

**Top management** "Higher productivity, more effective training and selling, better communications... if a video camera can help deliver that, I'm for it."

**Studio camera man** "We're ready for the high performance of a sophisticated Saticon camera. And I can certainly do without having to have a separate genlock unit."



\*Registered trademark of Hitachi

# You got!

"We can turn out needle-sharp pictures with the KY-2000U. And with options like JVC's remote control unit, it's adaptable to just about any field or studio situation."

"The KY-2000U meets all my criteria for performance and price. And I know I can trust JVC, with their reputation for quality."

"This neat little KY-2000U is less than 12 lbs. with 1.5" viewfinder. Handles nice and easy. And with 52 dB S/N and sensitivity doubling to 12dB, what more could I ask?"

"I can see how the KY-2000U can help me get more out of my people wherever communications is involved."

"What a relief! No more separate genlock. And the Saticon tubes really deliver high sensitivity and resolution, and low lag."



JVC's new KY-2000U 3-tube Saticon camera is a real rarity today: an engineering breakthrough that makes economic sense, too. It has all those features mentioned above. Plus horizontal and vertical contour correction, both standard. Built-in variable blanking circuit and VTR trigger mode select. Broadcast-standard Y.I.Q. encoder. C-mount lens versatility.

And something else just as important: JVC's reputation for superb quality.

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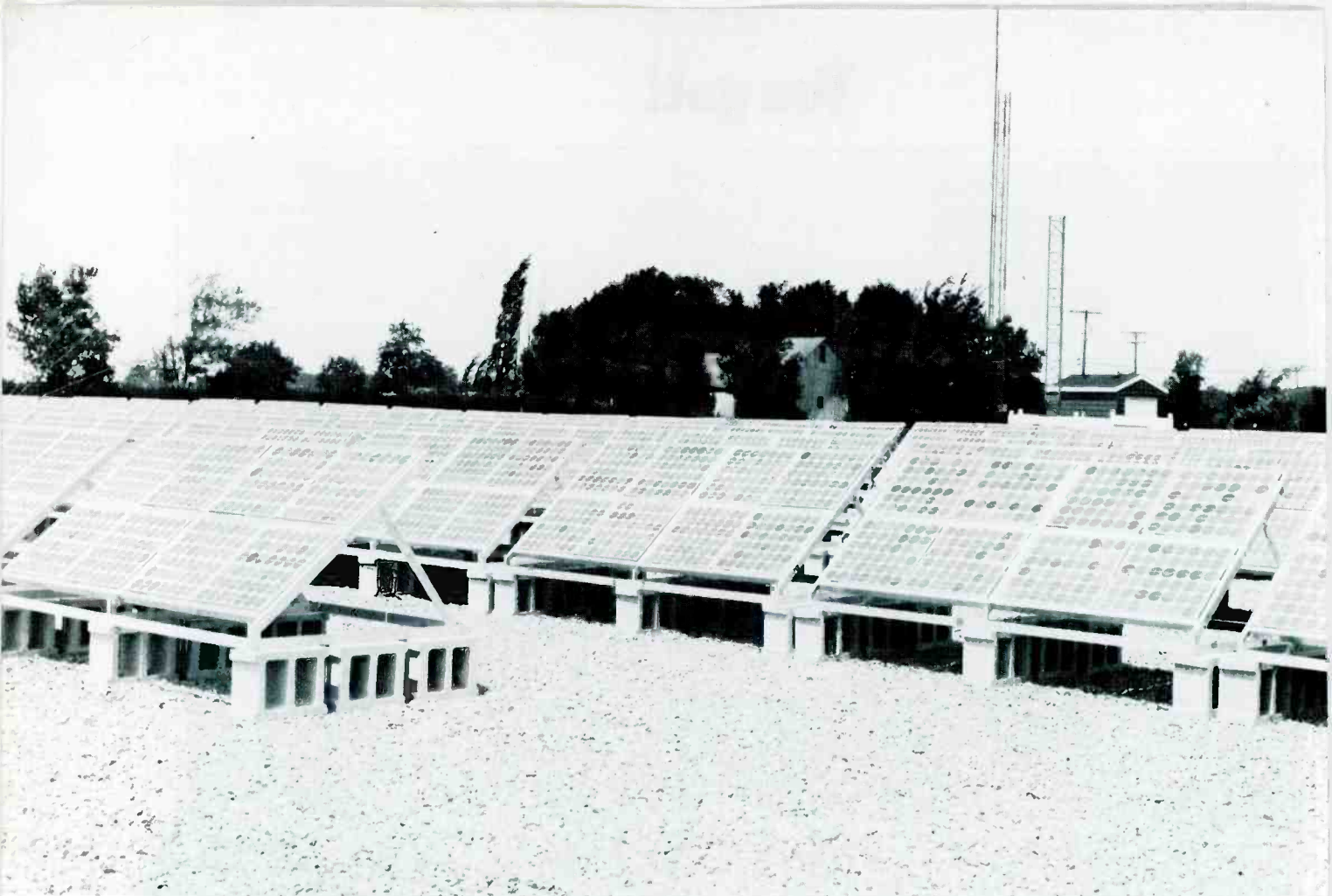
**JVC**<sup>®</sup>  
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Mail to US JVC Corp.,  
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 KY-2000U video camera.

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 Title \_\_\_\_\_  
 Company \_\_\_\_\_  
 Address \_\_\_\_\_  
 City, State, ZIP \_\_\_\_\_  
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 Type of operation \_\_\_\_\_

Circle (26) on Reply Card



This close-up of the 800-module solar array at WBNO, Bryan, OH shows the prefabricated module racks and minimal site work are part of the effort to minimize costs on this photovoltaic application sponsored by the Department of Energy, and jointly undertaken by MIT Lincoln Laboratory and WBNO. (The cover this month shows an aerial view of the array and WBNO.)

## **WBNO: Solar Photovoltaic Powered AM Radio Station**

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*With the flick of a switch on August 29, WBNO (AM) in Bryan, OH became the first commercial radio station powered by solar photovoltaic cells. The 800-module solar array contains 33,600 PV cells with a 15kW peak power capability. The cover this month shows an aerial view of this facility and the following article describes it.*

---

MIT Lincoln Laboratory, under a prime contract from the Distributed Solar Technology Division, Photovoltaic Systems Branch, of the US Department of Energy, has developed a concept for a small photovoltaic (PV) power system (up to a few hundred kilowatts) that would be usable with little modification in a variety of applications and that could be economically attractive in the mid-to-late 1980s. The system is simple to construct and

uses low-cost, prefabricated, transportable units designed for fast installation and minimum site preparation. Moreover, the system is intended for applications that require minimal energy storage and which have predominantly dc loads. An experimental system has been designed and built to determine the practicality of the concept.

A low-power, daytime AM radio station is the first application of this experimental system; it presents a

good match for a PV power system because it has a constant, predictable dc load, matches the sunlight hours, and has enough land available for the solar array. Most of the electric loads in radio transmitting stations are dc, of which the largest is the transmitter final power amplifier. With increased array and battery size, day-nighttime AM stations can also be powered by solar PV systems and, if land area is available, FM and TV stations as well.

Lincoln Laboratory furnished the solar PV modules, controller and data logger. It also provided by subcontract the PV module mounting racks, cables, and battery as well as the installation of the complete system at the site. WBNO furnished the site, transmitter load and interface equipment, and operated the system.

The PV power system is used as the prime transmitter power source

WALL STREET TODAY  
 DOW JONES: 757.54  
 ↓ 5.40  
 NY DOLLAR: 24,950,000  
 NYSE: ↓ .09  
 AMEX: ↑ .02

**News Index**

- ✉ Postal Strike
- ⚡ Storm Watch
- 🎵 Maestro Returns
- 🎬 Movie Review
- 🏆 America's Cup

**GAS RATIONING**

**80% REPORTING**

**NO** 53,942 58%

**YES** 38,617 42%

1717

**THE MORNING SHOW**

TIME: 8:25

TEMP: 68°



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**THOMSON-CSF**

Circle (27) on Reply Card

## WBNO: Solar powered

by the radio station. During the initial years of operation, the radio station will assist Lincoln Laboratory in monitoring the performance of the PV power system and will provide access to the system for interested parties, including the general public. The solar PV system powers the transmitter, studio and other loads with the available energy. (In addition, the station operates an FM transmitter 18 hours a day, which is not powered by the PV array.)

### System description

The simplified block diagram for the solar photovoltaic power system, shown in Figure 2, indicates that a dc-only system is provided. Any use of the system for serving ac loads, and the concomitant need for an inverter, would be undertaken by WBNO-AM. In addition, any dc bus voltage regulation required to ensure proper transmitter operation is also the responsibility of the radio station.

The array of PV modules provided for this experiment was allocated by The Department of Energy from the Low-Cost Solar Array Project at the Jet Propulsion Laboratory. As shown

in Figure 2, the PV system comprises the array, an input panel, power panel, controller, battery subsystem, data logger, backup dc power supply and interconnecting wiring. The PV power system will be augmented by electric energy supplied from the radio station's existing electric utility connection only when the weather is cloudy and the state-of-charge of the battery storage subsystem is low. (In addition, the radio station already possesses a diesel-generator that functions as backup to its existing electric utility service.) The PV system supplies 70 to 90% of the total energy required (annually) by the transmitter, the rest being supplied by the utility system.

On clear bright days when the battery is at full charge, surplus power will be available from the array. To avoid overcharging the battery, the control system will automatically connect additional studio, newsroom or production room loads to the system. If excess power is still available, the control system will then disconnect portions of the PV array output.

### Solar array

To develop a multi-purpose system with low total PV system costs, considerable effort was directed

toward a module structural concept that minimizes site preparation and foundation expense. A cost-cutting concept was developed: A simple, bolted, galvanized steel rack holds eight PV modules, with each rack producing a peak total power of 150kW and measuring 8 feet long by 4 feet wide. Each rack base is bolted to nine 8x12x16-inch concrete blocks; no poured concrete foundation was required—only grading and provision for drainage. In addition to the concrete blocks, steel auger-type anchors are screwed into the earth and fastened to the rack assembly. Such a system has withstood 100 mph winds in tests at Lincoln Laboratory.

One hundred 4x8-foot racks, containing a total of 800 PV modules, generate 15kW peak rating. (Peak power is defined as the power produced by a PV array on a clear day at noontime with the sunshine applied normal to the array and the PV cells at a temperature of 20°C [68°F].) Seven rows of 15 racks, each with 12 feet of space between rows to alleviate shadowing, occupy about 100x150 feet of space, or about 1/3 acre.

The nominal bus voltage is 128Vdc. Voltage variation normally will be  $\pm 10\%$  depending on the state-of-charge of the battery, but

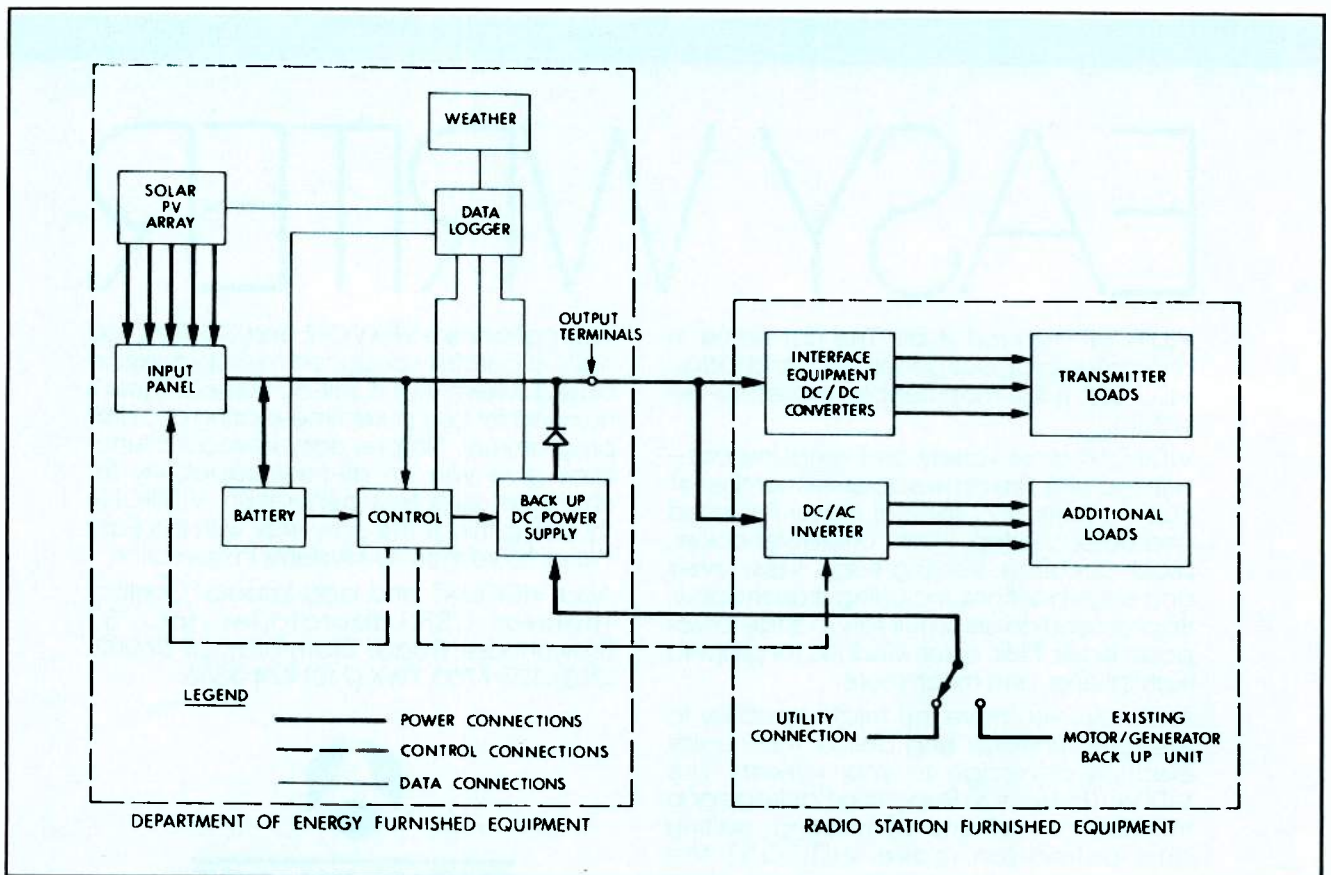


Figure 2 Photovoltaic (PV) project responsibilities for the nation's first solar-powered radio station, WBNO-AM, Bryan, OH.



# How the right mike helps you get the most for your video dollar.

You spend a lot of good money for video equipment. And a lot of expensive time to produce a great picture.

But audio is a critically important part of that picture, too. Much too important to take chances on just any mike.

That's why it pays to choose mikes carefully. Especially since choosing the right one for the job is one of the most effective ways to upgrade a video program without spending a lot of money.

It pays to pick a Panasonic.

## **Economy** (From \$18.95\*)

These mikes are best used for basic video recording. The omnidirectional WM-1100 will stand up to rugged handling. Both the WM-1150 and WM-1151 are unidirectional, with the WM-1151 providing sharper reproduction. For crisp outdoor recording there's the unidirectional WM-1181 with a 16.4-foot cable. The WM-1610, an electret condenser lavalier mike, comes with tie clip holder and mercury battery.



## **High Performance** (From \$49.95\*)

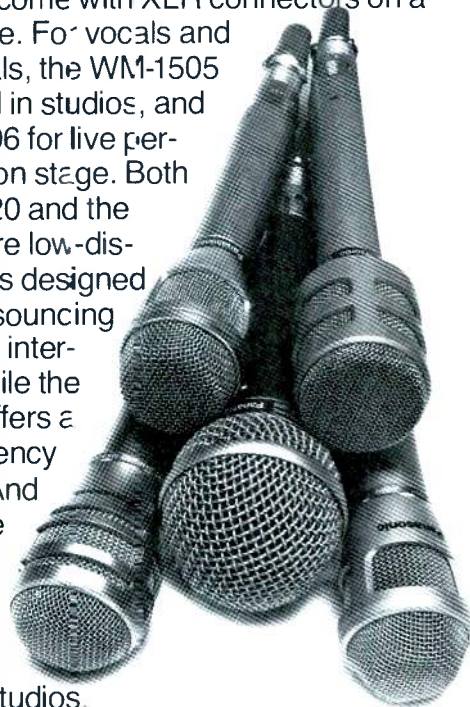
If you're looking for high performance at a good price, here's the place to look. For PA applications, there's the WM-1315. Where clear voice reproduction is a must, there's the



WM-1323 with switchable impedance (200 ohms/20k ohms). For vocals or percussion, there's the WM-1325. For onstage vocals, percussion and brass, the WM-1326 is outstanding. And in theatres and large rooms, the WM-1400, with wide frequency response and high and low tone filters, is tough to beat. These are all unidirectional, dynamic mikes, and are equipped with a 15-foot cable and 1/4-inch phone plug. Also, all but the WM-1315 have an XLR connector at the mike for use with balanced cables.

## **Professional** (From \$94.95\*)

Professional quality is what you expect from Panasonic, and these mikes deliver it. They are all balanced, unidirectional, low-impedance mikes, and come with XLR connectors on a 15-foot cable. For vocals and instrumentals, the WM-1505 is best used in studios, and the WM-1506 for live performances on stage. Both the WM-1520 and the WM-1521 are low-distortion mikes designed for natural-sounding speech and interviewing, while the WM-1521 offers a wider frequency response. And the versatile WM-1555 is our ultimate hand-held mike for broadcast studios.



So whatever kind of mike you need, pick a Panasonic. You'll like what you see because you'll love what you hear.

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

\*Panasonic recommended price, but actual price will be set by dealers

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just slightly ahead of our time.

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# WGBH engineers talk about the Ikegami HK-312

WGBH covers Boston Pops Orchestra concerts with Ikegami HK-312 cameras from Symphony Hall, Boston.

Eight Ikegami HK-312 studio color cameras are in service at WGBH, Boston, some dating back to October 1977 — long enough for intelligence on their performance. From recent interviews with key WGBH people, read these excerpts.

### **Pops without noise**

*Tom Keller, Director of Engineering:*

“The HK-312s have such high sensitivity that we were able to reduce significantly our light levels at the Boston Pops and Symphony telecasts. Yet, despite the major light reduction, we experienced no visible noise with the HK-312s . . . With their remarkable reliability record, we can depend on 6 cameras for 6-camera coverage, and not 7 for 6 as in the past. After all, you can't stop a live orchestra performance for a retake if you've lost a camera.”

### **2 IRE, but a complaint**

*Ken Hori, Senior Engineer for Advanced Development:*

“We tested several camera makes for RFI within a quarter-mile of a 50 KW radio transmitter. The HK-312 measured 2 IRE, whereas most others were in the 5 to 7 IRE area, and some as high as 20 IRE . . . For symphony remotes we'd need 2 to 5 hours for warm-up, but nowadays we're set up in less than an hour . . . We like its straightforward design — example, its truly high signal-to-noise ratio as compared to other cameras that resort to reduced bandwidth to attain a comparable ratio but wind up delivering noise too . . .”

We did get one complaint from the maintenance crew. They said that because they rarely found the problem of a down HK-312, they would never get to know the HK-312 well enough to fix it.

### **Washouts and dropouts**

*Bill Fairweather,  
Video Control Engineer:*

“During a lighting seminar staged here by Imero Fiorentino Associates, an actor in a normally lighted scene held up a sheet of white paper with printing on

it to show loss of detail in the case of more than 60 percent tv white reflectance. The HK-312, however, was able to retain enough detail for the printing to be readable on the monitor.

Next came a demonstration of the dangers of too much or too little light on a chroma-key background. The HK-312 held the key to such a low light level on the blank background that the lecturer grinned and said, “I guess WGBH has pretty good cameras!” and went on to the next subject.”

The HK-312 is the camera that met WGBH criteria for performance, stability, and reliability. They also have HL-53s, high-performance portable cameras that interface with HK-312 CCUs and can operate portably with their own CCUs.

Adapters for triax cable, using digital techniques, make their cameras remote-usable at nearly a mile from base stations, yet easily revertible to multi-core cable whenever needed.

In daily use, their HK-312s and HL-53s are interfaced with microprocessor-computer control units that automatically cycle them through all set-up adjustments, including black-and-white balance, flare and gamma correction, video gain, and eight registration functions, then recheck all those adjustments — all within 45 seconds. The cameras can also operate independently of the set-up computers, a feature that is an Ikegami exclusive.

If all of this suggests that the HK-312 is probably the best studio/field color camera in the industry, consider this: camera, set-up computer, and triax adaptor are not only operational, they are deliverable. For details or a demonstration, contact **Ikegami Electronics (USA) Inc.**, 37 Brook Ave., Maywood, NJ 07607, (201) 368-9171 / West Coast: 19164 Van Ness Ave., Torrance, CA 90501, (213) 328-2814 / Southwest: 330 North Belt East, Houston TX 77060, (713) 445-0100.

# **Ikegami HK-312**

## WBNO: Solar powered

can be as high as +25% during overcharge or undercharge conditions or in overload/underload situations.

### Storage subsystem

The PV power system includes about 40kWh (310Ah) capacity of lead-acid storage batteries. This requires 60 battery cells, each with a 670Wh or 310Ah rating.

The complete battery subsystem weighs about 2 tons and requires a storage area of about 36 square feet of floor space. Cabling, a monitor panel venting system, and a gas detector are provided as part of the battery subsystem.

### Controller

The controller monitors the array output, charge and discharge of the battery, and backup power supply switching. When the battery system is fully charged and the array output is more than the load requires, either additional loads are added to the bus or some of the array is disconnected in order to reduce the charge current to zero. The controller monitors the state of charge of the system by measuring voltage and current and, when full charge is reached, the controller switches on the additional loads or switches off the array feeders. When the battery system reaches a low state of charge, the controller switches on the backup power supply to replace the discharge current. When the array can furnish power for the load and can start to recharge the system, the controller will switch off the power supply.

### Backup power and data logger

A utility-powered ac-dc backup power supply provides dc power to the load whenever the solar power system is unable to do so and the battery reaches preset level of discharge.

The data logger measures the systems status and performance. A display panel and a paper strip printer supply information to the operator, including bus and load voltage and current and battery state-of-charge. A cassette recorder periodically records all information in digital computer-compatible format. The cassettes are then sent to Lincoln Laboratory for analysis.

### Load and weather station

The dc load (supplied by the radio station to the array/battery bus) is:

- For the first two hours after

sunrise and for the last two hours before sunset, 3kW.

- For the remaining daylight hours, 4kW.

- Additional loads of not greater than 0.5kW each for the consumption of surplus energy.

The dc bus voltage of 128V was chosen for best match to the voltage

of dc-dc converters for the transmitter and other loads.

A small weather station, which includes sensors for insolation, temperature, dew point, wind speed and direction, was furnished by MIT/Lincoln Laboratory. Indicators and outputs to the data logger are included. □

## Specifications Photovoltaic Power System Experiment WBNO (AM) Radio, Bryan, OH

<b>Sponsor:</b>	US Department of Energy, Washington, DC
<b>Project Management:</b>	MIT Lincoln Laboratory—Lexington, MA
<b>Solar Array:</b>	15kW peak rating 150 square meters cell area; 1/3 acre land area 128Vdc nominal voltage 800 Photovoltaic modules, 42 cells each module Solarex Corporation—Rockville, MD 100 racks, 8 modules each General Energy Development Corporation—Needham, MA
<b>Battery:</b>	40kWh rating 128Vdc nominal voltage 60 lead-acid cells in series ESB Technology Company (EXIDE)—Yardley, PA
<b>Power Cabinet:</b>	System controller—microprocessor Intel Corporation—Santa Clara, CA Back-up Power Supply Megavolt Corporation—Hackensack, NJ
<b>Data Cabinet:</b>	Data Logger John Fluke Manufacturing Company—Rochester, NY Tape Recorder Tektronix Inc.—Beaverton, OR
<b>Installation:</b>	Andy Nixon Contractors—Montpelier, OH
<b>Load:</b>	4kW; 17MWh/year; 47kWh/day average  The solar PV power system is expected to furnish about 80% of the energy annually for the WBNO AM transmitter.

### Key participants in the WBNO experiment:

#### Radio Station WBNO

P.O. Box 63  
Bryan, OH 43504  
*Luke Thaman, general manager*  
*Bill Priest, program director*  
*Tom Taylor, chief engineer*

#### MIT Lincoln Laboratory

Energy Systems Engineering Group  
P.O. Box 73  
Lexington, MA 02173  
*Marvin D. Pope, Photovoltaic project manager*  
*Burt Nichols, project engineer*

#### US Department of Energy

Photovoltaic Systems Branch  
Washington, DC 20545  
*Paul Maycock, Head*

# What shock absorbers do for cars...



## ...new, Electro-Voice shock-mounted microphones do for sound.

**DO56 Omni** – The DO56 shock-mounted omnidirectional microphone is virtually impervious to mechanical noise. Its isolated capsule eliminates the possibility of capsule/case collision making the DO56 the ideal microphone whenever there is lots of action. The excellent “G-factor” margin makes this new microphone less susceptible to the bell-like clang typically heard from other shock-mounted microphones when they are accelerated or decelerated rapidly. Plus, a built-in blast filter reduces “P-popping” dramatically to keep your audio clean.

The DO56 also offers attractive styling, making it ideal for broadcast applications where visual appeal is a necessity. The memreflex grille resists denting, keeping the DO56 looking like new indefinitely.

**RE18 Super Cardioid** – Where ambient noise rejection is mandatory, the companion RE18 super cardioid combines the best performance features of the famous RE15 and RE16 with superb mechanical noise isolation. Acoustic performance is the same as an RE15, while a refined small-profile blast filter resists “P-popping” as much as the larger RE16.

Unlike “multi-port” directional mikes, E-V’s exclusive Variable-D® design insures uniform frequency response at all angles, for uncolored pickup on and off axis. And Variable-D reduces the bass-boosting proximity effect found in Single-D cardioids, for consistent sound quality at any working distance.

**Electro-Voice Warranty** – Both microphones are covered by Electro-Voice’s unique two-year unconditional professional microphone warranty. For two years E-V will replace or repair these microphones, when returned to Electro-Voice for service, at no charge – no matter what caused the damage.

These are microphones to depend on, in the studio or in the field. If they weren’t, E-V couldn’t offer this warranty. When your application calls for a shock-mounted microphone, test one of these at your E-V professional microphone dealer.



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a gulton company

600 Cecil Street, Buchanan, Michigan 49107

Circle (29) on Reply Card

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# AUDIO CONSOLE ROUNDUP

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By John Willisowski, video editor

Information was collected by contacting manufacturers listed in the September 1978 **Broadcast Engineering** Buyers Guide.

With the demand for better audio quality, multi-audio channel capabilities of newly developed video recorders, and increasing advances in sound technology, the importance of being familiar with audio consoles and mixers has become vital to the success of any station's operations.

Audio board manufacturers have developed audio consoles in practically every configuration satisfying recording needs from on-location voice recordings to elaborate multi-track recordings of ballets and orchestras.

The distinction of consoles for specific uses (production consoles for sound recording,

broadcast consoles for on-air broadcast use, and consoles for auditorium sound reinforcement) has become obscure because of the ever increasing flexibility of audio consoles. **Broadcast Engineering** has elected to include any audio console that may, and will, find application in the variety of situations the broadcast engineer is required to function. This article describes representative audio consoles available from various manufacturers and offers an in-depth source index of audio console manufacturers. Each of the audio consoles or mixers is followed by a reader service number. For detailed information on any of the audio consoles described, circle the corresponding reader's service number or contact the manufacturer at the address listed.

---

## Altec Lansing

1515 South Manchester  
Anaheim, CA 92803



Model 1690

**1220AC**—A portable, mixer/preamplifier console with a self-contained reverb unit features 10 low-impedance, transformer-isolated input channels and one auxiliary input channel for high-level devices. Each channel has controls to adjust volume, bass, treble and reverb send levels. Outputs may be monitored on two selectable channels and inputs are independently monitored with a VU meter prior to entry onto the main (master) channel. The combined signals of reverb and channels 1-11 are fed to a summing amplifier in the main channel.

Circle (150) on Reply Card

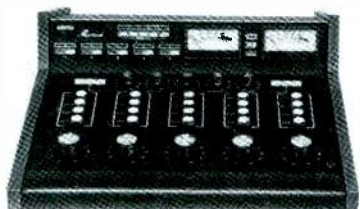
**1690**—A portable or rack-mountable, 8-channel stereo mixer/preamplifier features mode switches which configure the channel signal flow for sound reinforcement, recording/overdub or final mixdown. Other input channel features are balanced, low impedance mic inputs with slide-type level controls, unbalanced line inputs and outputs and 3-section equalization phantom power.

Circle (151) on Reply Card

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## Ampro/Scully

850 Pennsylvania Blvd.  
Feasterville, PA 19047



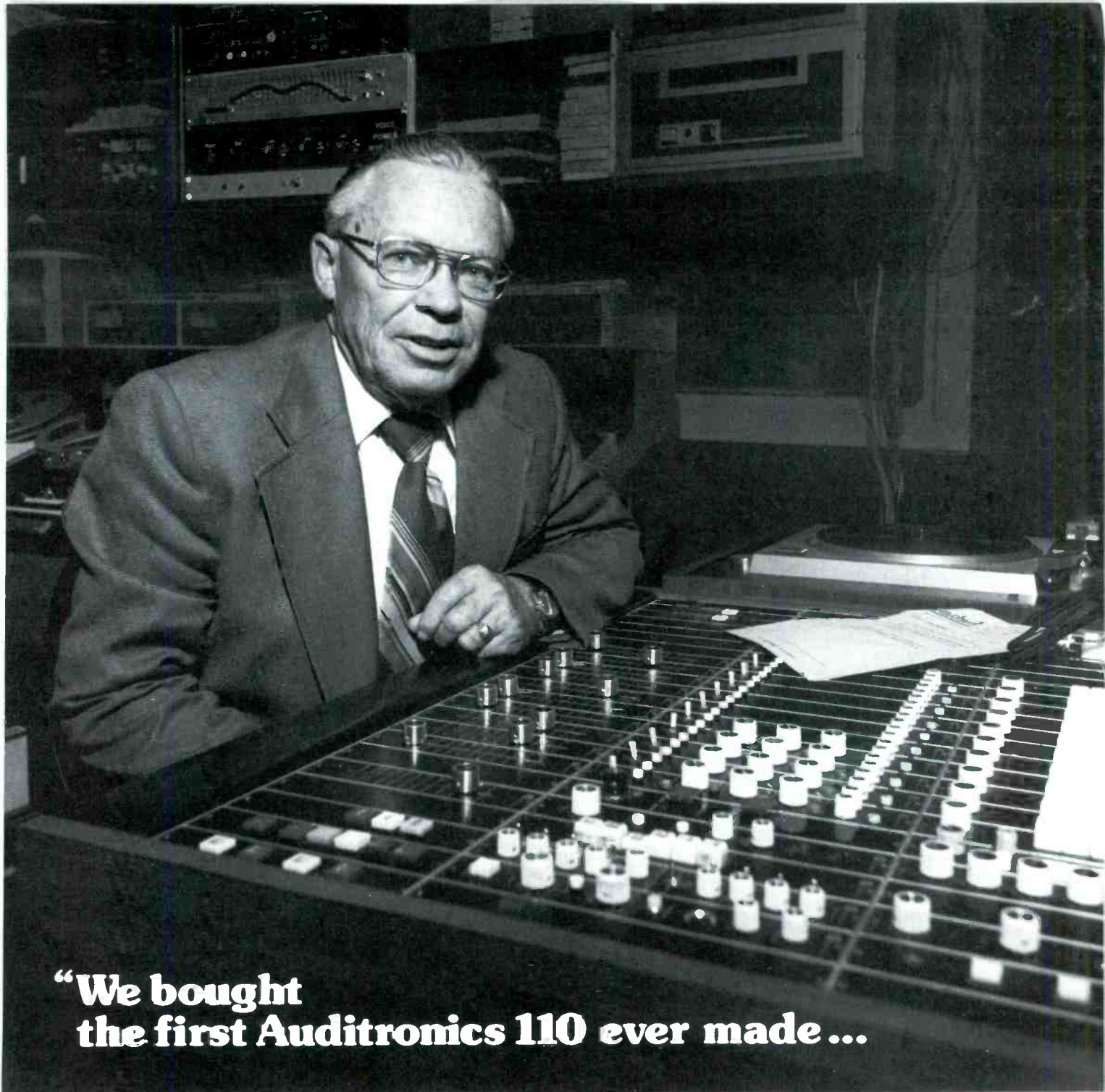
Ampro/Scully Microtouch

**Microtouch series**—Offered in several configurations: 5 and 8 mixer linear or rotary faders and dual mono or dual stereo program channels. Microtouch dc logic bus eliminates lever key and electrostatic switching. Other features include balanced transformer input preamps; two selectable mic, line or mixed inputs per mixer; a 10 W monitor amp and built-in cue amplifier and speaker.

Circle (152) on Reply Card

**AC-series**—Offered in several configurations: 6, 8, 10 and 12 channel; mono, dual mono, stereo, dual stereo and simulcast. The AC-series features step type rotary faders and detented cue on each channel, telephone grade lever key switches, four level LED "stretched peak" indicators on each output channel, two standard VU meters and a muting programmer allowing any mic input to control any of the four muted monitor outputs.

Circle (153) on Reply Card



## **“We bought the first Auditronics 110 ever made ...**

and we've bought seven more since 1972. They all get heavy production use in our AM and FM stations in Winnipeg, Edmonton, Vancouver, Moose Jaw and Calgary,” says Clint Nichol, Director of Radio Engineering for Moffat Communications Limited.

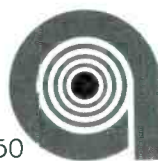
“To keep our stations’ program quality number one in their markets, our mixers need Auditronics’ equalization flexibility and the versatility to use outboard signal processing. The modular design of the 110 let us customize each board for just those features the mixers and DJs wanted, so we’ve a wide variety of configurations.”

“All our music and commercials are broadcast from carts, and they’re all produced on the Auditronics 110s. This continuous use by several different operators requires that a broadcast production console be rugged, and the reliability record of our 110s would be pretty

hard to beat. In fact, I can’t recall our ever having any down time on these boards. If I had to buy another production console tomorrow, it would absolutely be an Auditronics 110”.

Moffat Communications’ Clint Nichol is among more than 500 satisfied users of Auditronics mixing consoles. If you would like to know what they know about Auditronics quality and reliability, please circle reader service number or call us.

3750 Old Gerwell Road, Memphis, Tennessee 38118 (901) 362-1350  
Circle (30) on Reply Card



**auditronics, inc.**

**LC-series**—Incorporates all of the features of the AC-series and specifications but, is equipped with linear input level controls. Available in 8, 10 and 12 input configurations.

Circle (154) on Reply Card

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## Audio Interface

P.O. Box 7369  
Van Nuys, CA 91409



**SAC-212**

**SAC-212**—The SAC-212 is a custom built audio console. All low level signal switching is performed by PFS (photo FET switch) with logic control. High level inputs employ a transformerless, balanced input stage with 5 dB step attenuation up to a maximum of 20 dB. All microphone inputs are transformer balanced with 5 dB step attenuation to a maximum of 20 dB. Output circuits are balanced, transformerless with an output impedance of less than 100  $\Omega$ .

Circle (155) on Reply Card

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## Auditronics

3750 Old Getwell Road  
Memphis, TN 38118



**Model 110-8**

**Series-110B**—The console comes in two frame sizes, prewired for up to 18 or 26 input channels. Mic levels with gain controls are included on the input channels. The 110B has two stereo pairs and mono sum outputs with the ability to pan between the stereo pairs. Options include speakers, digital timer and clock, a test oscillator and stereo headphone functions.

Circle (156) on Reply Card

**Series 110A-4**—Four output channel consoles are available in two main frame sizes: main frame 110A-4MF is wired for up to 18 input positions. Main frame model 110A-4MFS is wired for up to 26 input positions. Other features include control room monitor, studio monitor, 2-echo return modules stereo headphone capabilities, foldback with monitor mix module, talkback and slate module and built-in test oscillator. Program inputs and all outputs of the console are transformer isolated.

Circle (157) on Reply Card

**Series 110-8**—Grandson II, model 110-8, is a complete 8-track recording console which may be expanded to 16-track capability with plug-in modules. The 110-8 series, is available in two main configurations: with 8-track monitoring and foldback or with 16-track monitoring and foldback. It is available with anywhere from eight to 24 inputs. Features include control room monitor, studio monitor module, 2-echo return modules, talkback and slate modules, foldback and test oscillator.

Circle (158) on Reply Card

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## Autogram

P.O. Box 456, 631 J. Place  
Plano, TX 75074



**Autogram AC-6**

**AC-6**—The Autogram AC-6 is either a mono or stereo console determined by customer's option as to use by plug-in modules. It is a 6-channel console which will accommodate up to 23 stereo inputs. The console will accept input levels for mics from -65 to -50 dBm and high level inputs from -10 dBm to +10 dBm. Outputs (depending on modules used) include one stereo program, one stereo audition, two monitor amplifiers, two headphone amplifiers and a cue amplifier.

Circle (159) on Reply Card

**IC-10**—This 10-channel mono/stereo console will accept up to 28 stereo inputs at the customer's option as to use by plug-in modules. Input requirements and outputs are identical to those of model AC-6.

Circle (160) on Reply Card

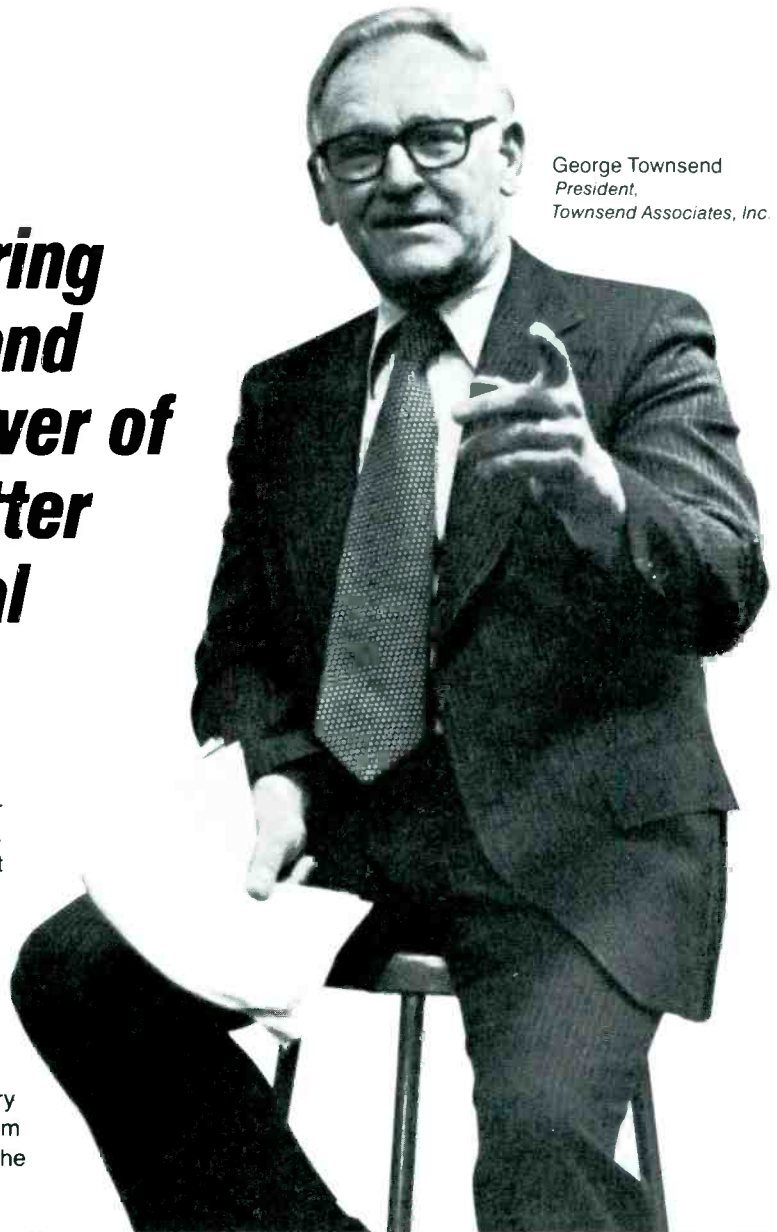
**AC-8**—The console is a scaled down version of the IC-10, with up to 26 stereo inputs into eight mixers. Depending on modules used, the AC-8 offers the same variety of output configurations available on model AC-6.

Circle (161) on Reply Card



**“Let me tell you  
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can modernize and  
increase the power of  
your TV transmitter  
at an economical  
price.”**

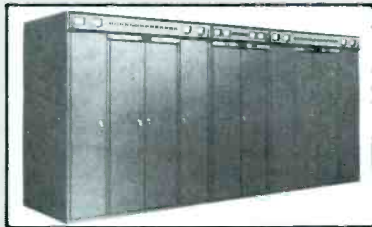
George Townsend  
President,  
Townsend Associates, Inc.



From our drawing boards have come many innovations in television transmitter technology ... including some of the most advanced equipment available. If your budget doesn't include the cost of one of our new television transmitters, we can solve that problem too. Using our accessories and components, our custom engineering services can modernize and/or increase the power of your present transmitter at a fraction of the replacement cost. We can work with your engineering group to carry out the most feasible transmitter updating program to fit your needs. We have the *hardware* and the *know-how* ... so just give us a call.

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- Solid state amplifiers to 1000 watts at VHF
- Vapor cooled Klystron amplifiers for paralleling with RCA and Harris transmitters
- Water cooled Klystron amplifiers for paralleling with General Electric and Townsend transmitters
- Diplexers, combiners, and other coaxial components as required
- Vapor and water heat exchangers
- Power supply and high voltage components
- Vacuum contactors
- Motorized Klystron bias controls for improving Klystron efficiency
- Differential calorimeters for accurate power measurements



**TOWNSEND ASSOCIATES, INC.**

P.O. Box 1122 • Mainline Drive Industrial Park, Westfield, Massachusetts 01085 • 413-562-5055

Circle (31) on Reply Card

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## Audio Design and Manufacturing

16005 Sturgeon  
Roseville, MI 48066



3200 series

**ST series**—The desk-top unit (with rack mount power supply) has totally modular inputs with two inputs per channel. Ten and 20 input mainframes are available. The ST-series has stereo and mono output capabilities. Features of the ST-series include two monitoring buses, talkback and a timer that sequences to machine stop/start capabilities. Also available are equalizers and preselect modules which plug into any input module position.

Circle (162) on Reply Card

**1600 series**—The 1600 series console is a full 16-input, 4-submaster, 2-output console. It is capable of up to 22 mic and 26 line level sources of which any combination of 16 may be used simultaneously. The 1600 is fully wired for the total module complement, but may be ordered with a fewer number of modules initially. Each console is equipped with remote machine controls for two reel-to-reels, two audio cartridge machines and two turntables.

Circle (163) on Reply Card

**3200 series**—The series 3200 is a full 32-input, 4-submaster, 2-output console. When used to its full complement, up to 92 mic sources and 116 line-level sources may be used in any combination of 32 simultaneously. The series features sealed linear, slide attenuators with cue detent and muting logic; two foldback buses and two P.A. feeds with individual level controls; individual echo send from inputs and return to submasters and masters; full 4-band, 14 frequency reciprocal equalizers and interchangeability between equalizers, filters, limiters and noise suppressors.

Circle (164) on Reply Card

**2400 series**—All descriptions given for the 3200 series apply to the 2400 series. Differences are in the maximum number of input modules (24 vs 32) and the size of the patchbay (312 vs 384).

Circle (165) on Reply Card

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## Automated Processes

789 Park Avenue  
Huntington, NY 11743



Model 1604

**Model 1604**—Capable of 16 inputs to 16 track outputs, this console is applicable for 16 track mixdown into quad, stereo or mono. It can also be used as an on-the-air console with two simultaneous stereo outputs. The unit offers foldback, audition, intercom and program interlock features required in audio production. The system is available with graphic or parametric equalizers, echo send equalizer and compressor/limiter.

Circle (166) on Reply Card

**Model 2824**—The model 2824 includes up to 28 inputs, each with direct output and quad or stereo panning; 16 mixing buses; up to 24 VU meters; four echo buses with delay features; optional equalizers in send or return, separate level controls and panning for delay and normal echo. The quad pan input has four delay and four regular echo feeds to follow program quad panning. Solo is included on each input, echo, cue and monitor.

Circle (167) on Reply Card

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## AVAB America

1714 Stockton Street  
San Francisco, CA 94113

**ME 802 RE**—This console is a self-contained, portable mixing console with a 10-octave stereo graphic equalizer and eight line/mic inputs with main settings of 30, 50 or 60 dB. Each input channel features a switch for pre-fade listening, a foldback circuit, echo send, plus bass, treble and pan controls. There are master level controls for stereo output, echo send, echo return, foldback and monitor.

Circle (168) on Reply Card

# THE COMPACT CONSOLE

This compact member of our family of fine mixers is only 35 inches wide, in a 12 mixer configuration. It's not only compact, but elegant, with furniture quality oiled walnut end panels and armrest. Compare the sensible electronic packaging, with only 2 kinds of electronic modules used. Plus, standard features like 4 inch log taper slide pots, selectively illuminated VU meters, mono output, electronic audio switching, and 2-way remote control.

Three expandable models to choose from: SYSTEM 12 (illustrated) is priced at \$7550 including 8 mixers (expandable to 12) with 3 stereo outputs and 1 mono output. Additional mixers \$365 each. Other models from 8 - 16 mixers. Delivery? Stock to 3 weeks.

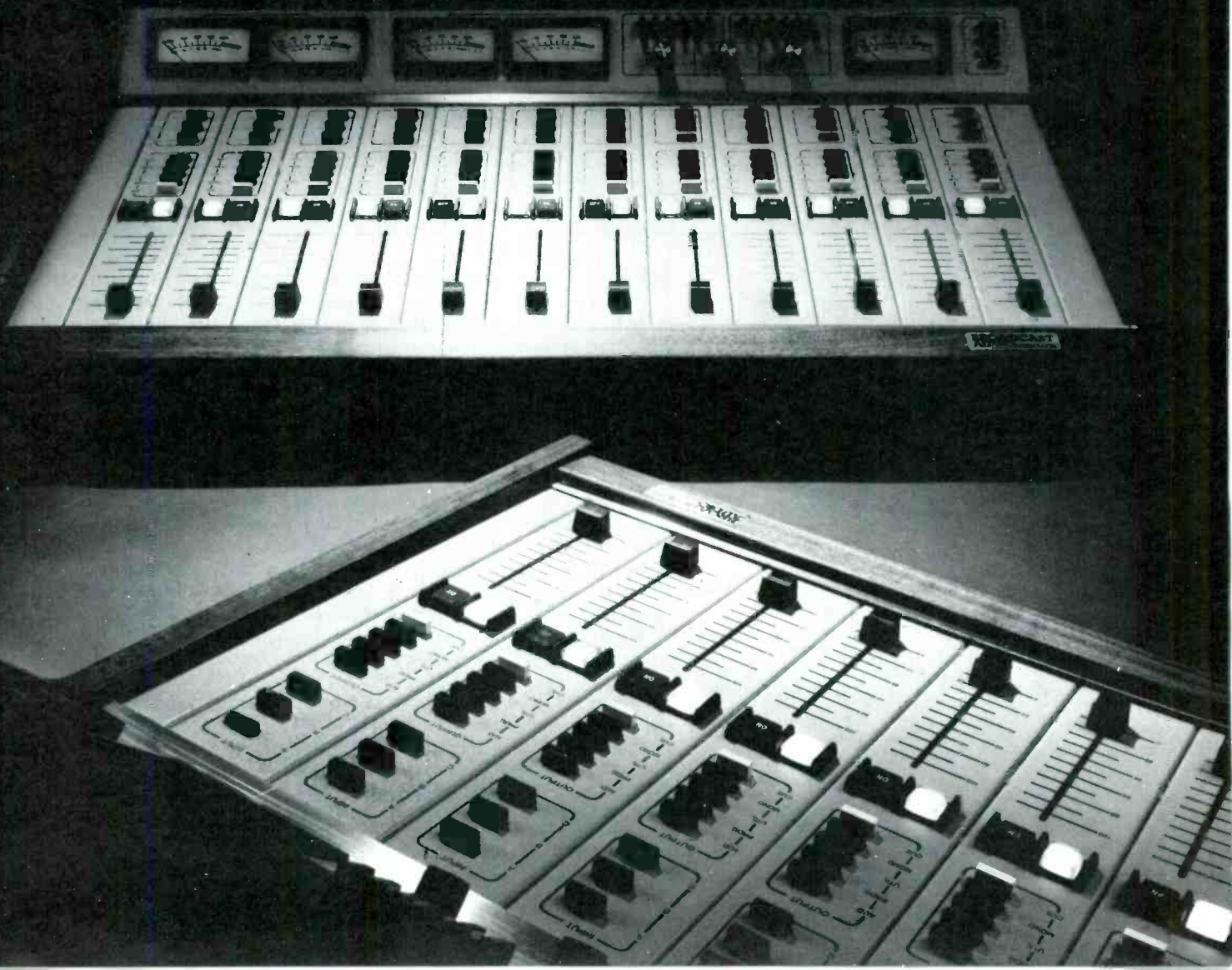
Get Compact!

**BROADCAST  
AUDIO ASSOCIATES**

11355 PYRITES WAY  
RANCHO CORDOVA, CA 95670

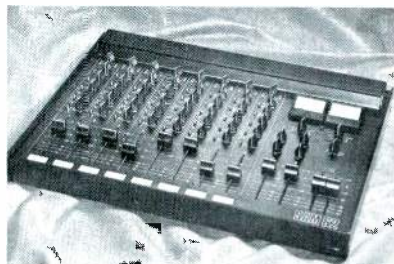
(916) 635-1048

Circle (32) on Reply Card



## Bayly Engineering

167 Hunt Street  
Ajax Ontario, Canada L1S 1P6



**SAM 82**

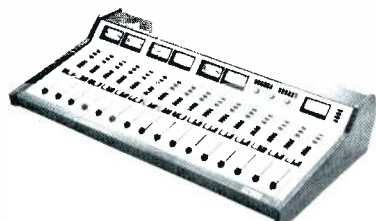
**SAM 82**—The mixer is equipped with eight mic/line inputs and two main output channels. Other functions included in the unit are two auxiliary outputs for cue and echo or studio playback, echo returns, monitoring, tape monitor input, talkback facilities, test oscillator and power supply for condenser microphones. The meters are PPM's with logarithmic scales.

Circle (169) on Reply Card

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## Broadcast Audio Associates

11355 Pyrites Way  
Rancho Cordova, CA 95670



**System 16**

**System 16**—An expandable, modular broadcast mixer featuring dc audio switching. This enables each mixing channel to be turned off and on from a remote location such as an announce studio or news booth. Ten plug-in relays, with switch selection of maintained or momentary contacts, can be used for muting or remote start from any combination of mixers. The System 16 is equipped with eight standards and up to 16 mixers maximum with three inputs per mixer.

Circle (170) on Reply Card

**System 12**—A smaller version of the System 16 with eight standard and 12 mixers maximum. Outputs include three balanced stereo line outputs, one balanced mono line output, stereo cue, phone and monitor outputs.

Circle (171) on Reply Card

**System 8**—A scaled down version of the System 12 offering identical features but with six standard and eight mixers maximum each with three inputs per mixer and two balanced stereo line outputs, one balanced mono line output, stereo cue, phone and monitor outputs.

Circle (172) on Reply Card

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## Broadcast Electronics

Box 3606  
Quincy, IL 62301



**Model 10S350**

**350 series**—The series consists of two 10-channel mixers available with dual channel mono outputs (model 10M350) or dual-channel stereo outputs (model 10S350). It features vertical conductive plastic attenuators, two input preselection with microphone or high level capability for each mixing channel. Also included is a cue amplifier producing 1 W rms per channel into an integral cue speaker. The cue amp also functions as an intercom amplifier.

Circle (173) on Reply Card

**250 series**—The series is a selection of four mixing consoles available in a 5- or 8-channel configuration in dual channel, stereo or mono. The consoles feature ladder-type maintainable step attenuators with cue bus switching and telephone-type channel keys and contact-free FET bus selection. Two input pushbutton preselection permits microphone or high level capability for each mixing channel. A mono/stereo mode switching is optional on stereo models.

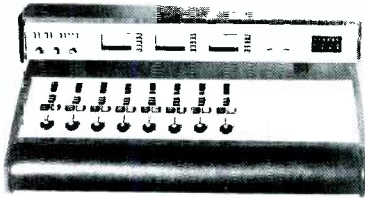
Circle (174) on Reply Card

**150 series**—The series consists of four mixing consoles available in 5- or 8-channel configurations. They feature rotary sealed potentiometers with cue bus switches. The series also features contact-free FET bus selection and modular electronics. Each mixing channel accommodates two pushbutton-selected inputs and may be preset for either microphone or high-level service. Mono/stereo mode switching is available on stereo models. Headphone and cue amplifiers provide monitoring capability.

Circle (175) on Reply Card

## Cetec

1110 Mark Avenue  
Carpinteria, CA 93013



Centurion I

**Centurion I**—This 8-channel monaural console can be specially ordered with 9, 10, 11 or 12 channels. There are three inputs per channel, each switch selectable for either high or low level inputs. The program, audition and unity outputs can be selected into any of five outputs or locations. Additional outputs include a 25 W rms monitor output, a 5 W cue output which feeds an internal speaker and a 1 W per channel to 4  $\Omega$  headset output.

Circle (176) on Reply Card

**Centurion II**—This 8-channel stereo console can be specially ordered with 9, 10, 11 or 12 channels. All mixing modules are switch selectable for three input levels which automatically select the correct input impedance. Muting is operable from all modules and each mixer has cue position. The unit has four mixing buses: program, audition, utility and monaural. Other features are the same as Centurion I.

Circle (177) on Reply Card

**Model 1040**—The 14 stereo inputs of this 8-mixer console are balanced among low and high levels, with optional exchange of low-for-high level mixing in one channel. The step attenuators all have cue positions which feed an internal cue amplifier. The gain is controllable with external speaker output terminals. Muting is provided for the microphone mixers with the Cetec Sparta MA series monitor amplifier and its plug-in muting relay system. Audition and program outputs employ identical values and components, so standby operation from audition is possible.

Circle (178) on Reply Card

**Model RA4 remote mixer**—The four mixers allow a choice of either microphone or high level inputs to each channel. Low level inputs can be 600  $\Omega$  terminated, or high impedance bridged. Both ac and dc battery supplies are internal and battery operation is automatic in case of line power failure. Ten dBm nominal program level is delivered into 600  $\Omega$ , with 22 dBm maximum. The headphone circuit, using high impedance phones only, allows monitoring of program out, or any cue position.

Circle (179) on Reply Card

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## Compact Video Sales

1104 West Chestnut St.  
Burbank, CA 91506

**Compact audio mixer**—This console is specially designed for installation in production vans. It includes 12 inputs, 12 direct outs with differential outputs, four bus outputs with panning between odd and even buses and a mono mixer. Also included are four bus meters, one mono bus meter and three solid-state logic programmable mute functions with independent enable/clear and master clear functions. The input side features Penny and Giles faders, two sends and pre/post fader switching, solo, mute/buttons for overriding the programmable mute and a 7-position gain switch.

Circle (180) on Reply Card

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## Custom Audio Electronics

2828 Stommel Road  
Ypsilanti, MI 48197



XPC-16

**XPC-16**—The design concept for the XPC-16 is totally modular. No mainframe is required, nor any motherboard used. Modules fasten together side-by-side enabling the expansion to any number of inputs at any time. Standard facilities include full stereo assignable submasters, switchable channel breaks (suitable for mic/line switching in studio application), individual channel line outputs, microphone preamp outputs, line drivers on all outputs and integral rear patchbay. The XPC was originally conceived for touring use.

Circle (181) on Reply Card

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## Dyma Engineering

P.O. Box 1697  
Taos, NM 87571

**Series 850**—This series is primarily intended for use in small- to medium-sized television facilities. The standard models include 8, 12 and 16 channels. The consoles feature six channels of three knob equalization, all illuminated push-button control, inputs and outputs on barrier terminal strips, switchable inputs for high/low level and user changeable mute logic.

Circle (182) on Reply Card



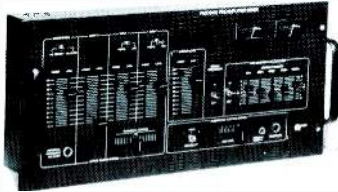
Series 850

**MA-31**—This is a 10-in, 2-out mixing console. Each channel has eight DA outputs. Features of the MA-31 include two 4-channel automatic cart switchers, switching that automatically switches turntables to the cue position when the input has been turned off, timer resets and starts with each new start command for cartridge or turntable and full tape motion controls.

Circle (183) on Reply Card

### GLI Division, VSC

2950 Northern Blvd.  
Long Island City, NY 11101



PMX-9000

**PMX-9000**—This console features two sets of switchable line and phono inputs, each with its own slide level control, and a transition slide for cross-fading between inputs 1 and 2. The unit offers cueing capabilities with level control and selector switch for previewing all inputs and cueing in program output for simultaneous monitoring.

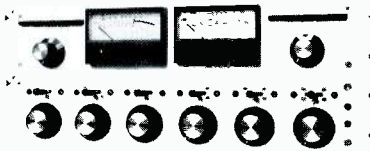
Circle (184) on Reply Card

**Model 3990**—This model features two sets of line and phone inputs, each with its own rotary level control and a transition slide crossfading between inputs 1 and 2. The unit offers complete cueing capabilities, with level control for previewing all inputs and cueing in program output for simultaneous monitoring. Complete microphone facilities include balanced differential input, bass equalization and optoelectronic talkover with adjustable program mute attenuator.

Circle (185) on Reply Card

### Hallikainen & Friends

340 Higuera  
San Luis Obispo, CA 93401



**TVA series**—The series combines audio-follow-video and manual control in an audio system consisting of rack-mountable components. The system is expandable to 36 balanced inputs in groups of six. It offers balanced audition, program, and cue outputs plus two monitor channels. The TVA 142 is the mixing stage of the system. Each TVA 142 mixing module has six balanced mic or line inputs with individual gain controls. Audio routing to the program and audition channels is controlled either manually or with the audio-follow-video feature.

Circle (186) on Reply Card

### Harris, Broadcast Products Division

P.O. Box 4290  
Quincy, IL 62301



M90

**M90**—The M90 is an expandable, completely modular, on-air production/recording console. The console provides 2-, 4- or 5-output channels with up to 26 mixing positions (52 inputs) or up to 24 mixing positions (48 inputs) in the 8-output channel version. A combined monaural output is standard in all versions. The M90 provides complete VU metering, two echo send/return channels, talkback communications, programmable control room and studio muting, optional EQ at each input, two foldback mix outputs (one is optional), a slate/test oscillator and optional stereo inputs. The M90 may also be equipped with optional peak reading LED indicators and has room for optional digital countdown timer.

Circle (187) on Reply Card

**Mono-5**—The Mono 5 has 13 inputs which can be switched into five mixing channels in a manner to satisfy most programming requirements. These inputs can include four microphones, three turntables, three cartridge reproducers, one reel-to-reel, one network and one auxiliary source. The 13 front panel input switches are of the push-on/push-off type. There are isolation transformers on all program inputs and outputs. Any of the five mixing channels may be switched to the program channel or audition to permit independent monitoring or recording of incoming sources without disturbing programming. Channels 3, 4 and 5 also have cue positions which provide signal to the amplified cue system. A 3-position monitor selector switches the monitoring amplifier input to the program circuit and terminals for external source and audition circuit.

Circle (188) on Reply Card

**Executive**—The Executive is a 10-channel stereo mixing console utilizing impedance ladder type controls in parallel. Three mic channels can be individually switched from the front panel to either full stereo operation or fully isolated monophonic feed from one microphone into the stereo mixer. Channels 4 and 5 have switching to accommodate four turntables into either channel in any sequence. Channels 6 and 7 have switching to accommodate four tape machines into either channel in any sequence. Four remote lines are switched into channel 8 when mixed into either stereo or mono. Channel 9 is the network channel and is a stereo mixer with a splitting pad on the input. Channel 10 is the auxiliary channel, with two isolation transformers on the input of the stereo mixer to prevent any interaction or grounding problems.

Circle (189) on Reply Card

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## Howe Audio Productions

P.O. Box 383  
Boulder, CO 80306

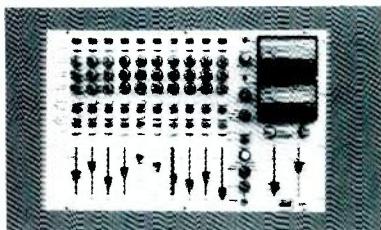
**7000**—Model 7000 is a 12-channel, stereo/dual channel mixing console. The 7000's rotary fader circuits control volume levels indirectly through optically coupled integrated circuits. Features of the 7000 include stereo speakers and a switchable LED level display. Channels 1 and 12 have six selectable inputs accepting -20 dBm to +20 dBm nominal levels while the other channels accept -60 dBm to +20 dBm levels.

Circle (190) on Reply Card

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## Industrial Sciences

P.O. Box 1495  
Gainesville, FL 32602



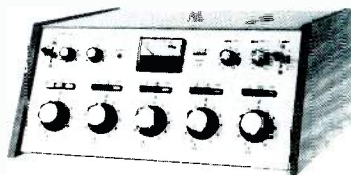
**Model 1002**—Model 1002 is equipped with 10 channels which will accept mic/line level sources. Each input channel features equalization, foldback, echo send, cue and muting capabilities. The 1002 offers slide type faders with presettable gain adjustments. Each of the 10 inputs can be assigned to either or both of the two balanced outputs. Other features of the 1002 include illuminated VU meter and LED peak indicator, headphone monitor, independent echo gain control and two monitor output level controls.

Circle (191) on Reply Card

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## LPB

520 Lincoln Highway  
Frazer, PA 19355



**Signature II series**—This series is a collection of 5-, 8- and 10-channel mixing consoles. The consoles are available in the following configurations: 5 mixer stereo, 5 mixer mono, 8 mixer stereo/mono, 8 mixer dual mono, 10 mixer dual stereo, and 10 mixer dual mono. Dual consoles have a three position output director switch on the audition output line, other consoles have this switch on the program output line. A 5-inch speaker and 1 W amplifier are located within each of the consoles.

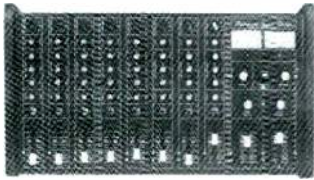
Circle (192) on Reply Card

**Monogram series**—This series consists of five mixer consoles available in stereo and mono packages. The Monogram consoles will accept 12 inputs, two to each of the first four inputs and four inputs to mixer five. Due to its plug-in construction, any or all channels can be fitted with optional mic preamps. Other features include monitor muting, torque, controlled Cermet attenuators, visual indication input selector and a bi-polar regulated power supply. The stereo version, model S-22, also has a mono sum output.

Circle (193) on Reply Card

## Listec Television Equipment Corporation

39 Cain Drive  
Plainview, NY 11803



**Richmond Sound Design Model M82 B**—An eight mixer audio console with three inputs per mixing channel features six output channels, program channels 1 and 2, monitor channels 1 and 2, foldback and echo send. The console has high, mid and low equalization; switchable microphone attenuation; and cueing and monitoring facilities on all channels.

Circle (194) on Reply Card

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## Logitek Electronic Systems

3320 Bering Drive  
Houston, TX 77057



**Custom Audio Series**—This series of stereo and mono audio consoles is available in 5, 6, 8 and 12 input configurations. Features include a monitor mono push button for verifying stereo phasing without affecting program material, wire clamping terminal blocks for input and output connections and a choice of single linear stereo fader or individual left and right faders on the stereo board's input modules. Also standard on the consoles are interchangeable balanced output program and audition amps, built-in hi-fi cue amp and speaker, modular construction and electronic switching.

Circle (195) on Reply Card

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## McCurdy Radio Industries

1711 Carmen Drive  
Elk Grove Village, IL 60007



SS 8650

**SS 4388B**—The SS 4388B audio console is an 8-mixer, single channel console providing facilities for mixing, monitoring and control of audio program material. The unit includes a cue system with 10-position pushbutton assembly, amplifier and speaker. Inputs can be cued individually or premixed, without readjusting input attenuators. Two inputs, selectable by input key, are selectable per mixer channel. A choice of five amplifiers for microphone or high level application are available. Microphone amplifier with AGC are offered at additional cost.

Circle (196) on Reply Card

**SS 8500**—The SS 8500 is a fully modular stereo production console. Ten stereo input channels, complete with A/B switching are provided, allowing for 20 stereo audio sources. Each mixer is equipped with a Penny and Giles conductive plastic stereo slide attenuator. Cue switching is provided in the maximum attenuation position of each attenuator along with a pushbutton on each input, echo send or foldback module. Two stereo output channels, program and audition, are provided.

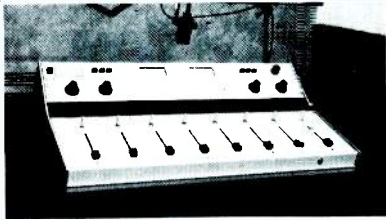
Circle (197) on Reply Card

**SS 8650**—The SS 8650 is a stereo, modular audio system designed for on-the-air use. A maximum of 16 stereo inputs with A/B switching are available. Microphone inputs are balanced and floating while line inputs are balanced and bridging. Slide attenuators have more than 80 dB before cutoff for optimum stereo tracking and separation. Complete monitoring, cue/talkback system and a provision for mono output with metering are all standard.

Circle (198) on Reply Card



**McMartin Industries**  
4500 South 76th Street  
Omaha, NE 68127



**B-1082V**

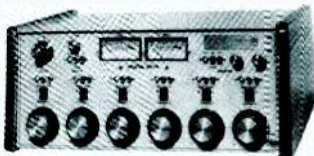
**500 Series**—The B-500 series 5-mixer audio consoles have been designed to provide audio mixing and control for production. Two models of the B-500 series are available: the B-501 monaural console and the B-502 stereo console. The B-500 series consoles provide five mixing channels, with switch selection of two inputs per mixer (a total of 10 inputs). Each mixer output may be switched to program or audition buses of the console. Each mixer is provided with a detented cue switch, to allow aural monitoring of any input channel by means of an integral 2 W cue amplifier and a built-in cue speaker.

**Circle (199) on Reply Card**

**1000 Series**—This series of audio consoles is available in the following configurations: 5-channel stereo with vertical attenuators, 8-channel stereo or mono with vertical or rotary attenuators. The 8-channel models have 18 inputs while the 5-channel models provide for 10. All channel positions can be converted to mic, or line inputs, the line inputs either balanced or unbalanced. Headphone amplifiers can be switched to monitor several console functions. The hybrid monitor amplifier modules provide up to 15 W per channel output. A built-in cue amplifier provides adequate volume for cueing purposes and cue is available on all channels. The audition output can be used as a program amplifier in an emergency situation.

**Circle (200) on Reply Card**

**Micro-Trak**  
620 Race Street  
Holyoke, MA 01040



**Model 6618**

**Model 6618**—This 6-channel console features both stereo and mono outputs. Push button switching selects one of three inputs for each of the six mixing channels. A 10 W per channel stereo amplifier is integral. Switch selectable muting allows any of the six channels to mute studio audio and provide on-the-air light switching. A 2 W headphone output is provided through a front panel jack. A cue speaker is also provided.

**Circle (201) on Reply Card**

**Model 6454B**—This console is a self-contained, self-powered audio control console designed for general application. The console is engineered to accept a variety of inputs such as tape decks, turntables, low-impedance microphones and off-air monitors for providing either off-air or internal studio monitor output. The plug-in pre-amplifier cards for each of the four channels are changeable offering either mic, high-level or phono-preamp input on any channel. Activity can be monitored via the internal cueing amplifier and speaker.

**Circle (202) on Reply Card**

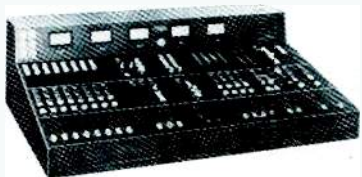
**Panasonic Video Systems Division**  
One Panasonic Way  
Secaucus, NJ 07094



**WR-450**—This is a 6-channel audio mixer. Input 1 is for low level source or internal reference tone oscillator; inputs 2-5 are switchable for low or high level sources; input 6 (phono input) is designed to add RIAA equalization and can be used with stereo and mono cartridges. The unit is rack mountable and features low cut filters for each input, VU meter, monitor amplifier with front panel speaker and two output terminals.

**Circle (203) on Reply Card**

**ProTech Audio Corporation**  
P.O. Box 638  
Ronkonkoma, NY 11779



**1632**—This is a 16-channel mixing console (8 mic, 8 hi level line). Illuminated push button switching (Centralab PB-15 series) selects one of the four inputs for each of the 16 mixing channels. The model includes three submaster mixing channels with VU meters and two program output channels with VU meters and reverb return switched to program 1 or 2. The console features two monitor output channels, headphone output from control room monitor, cue channel with built-in speaker and talkback facilities for two studios.

**Circle (204) on Reply Card**

## QRK Electronic Products

1568 North Sierra Vista  
Fresno, CA 93703

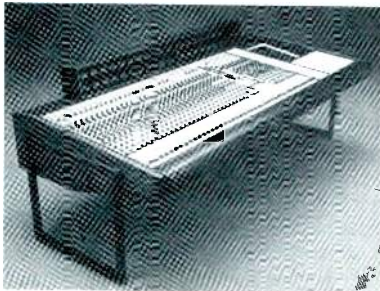


**Omega Audio Console**—A 10-input stereo console features four balanced inputs to each fader with LED indicators. Gain is programmable for either low level or high level on channels 1 and 4. There are three muting relays which are programmable on an internal patch panel. The master gain controls are inside the panel. The console features remote start switching, a digital clock located on the front panel and two headphone jacks. The monitor is selectable to program, audition and cue.

Circle (205) on Reply Card

## Quad/Eight Electronics

11929 Vose Street  
Hollywood, CA 91605



**Pacifica**—This unit is configured as a 16, 24 or 36 modular input console with eight mixing buses and stereo mixdown and monitoring capabilities. Two independent cue mixing circuits are provided for each input in addition to four separate mixing circuits usable for echo or foldback. The four echo send/return modules feature complete equalization, solo, monitoring and tape or digital delay handling and can serve as additional input modules for mic/line level sources. Complete, separate control room and studio monitoring facilities are provided.

Circle (206) on Reply Card

**Coronado**—This model is configured as a 40 input console with 24 mixing buses, quad mixdown and monitoring facilities and features six subgroup masters assignable independently from each input. Complete fader/mute automation and the associated automation processor are standard. Two independent monitor cue mix bus sends are provided for each channel in addition to four separate mix bus sends usable for echo send or foldback (input cue). The four echo send/return modules feature complete 3-band equalization, solo, monitoring, echo chamber and delay device handling.

Circle (207) on Reply Card

## Quantum Audio Labs

1909 Riverside Drive  
Glendale, CA 91202



**Recording Console Series**—The series consists of the model QM-8B and QM-12B recording consoles. The QM-8B has eight input channels, four program mix buses, two echo send/return (or effects) buses, a headphone cue mix bus and an 8X2 monitor section. The QM-12B is nearly identical but features 12 input channels. Both consoles feature a 15dB microphone input attenuator, mic/line switch for selecting either of two input sources, continuously variable 3-knob equalization offering 12dB boost or cut at six frequencies, headphone cue system providing separate mix controls for each of the eight line inputs, overall master level control, selectable bus assignment to the four output buses, or panning between pairs of output buses, built-in talkback controls and preamp and a complete monitor system featuring separate level control, pan pot and on/off switch for each of the eight line inputs.

Circle (208) on Reply Card

## Ramko Research

11355 "A" Folsom Blvd.  
Rancho Cordova, CA 95670



**Series DC-38**—A family of 5, 6, 8 and 10 mixer consoles is available in dual output stereo or dual output mono configurations. The consoles feature four inputs per mixer that are balanced and gain selectable from mic through high level. The series features dc control of all audio attenuation and switching and left and right meters, switchable between audition and program. Stereo models feature a third meter to monitor the stereo mix (mono) output. Outputs for the series include program, 600  $\Omega$ ; differential balanced, +8dBm nominal, +20dBm maximum; audition, same as program; monitor, 5W per channel into 8  $\Omega$ ; and cue, 2.5W to an internal speaker.

Circle (209) on Reply Card

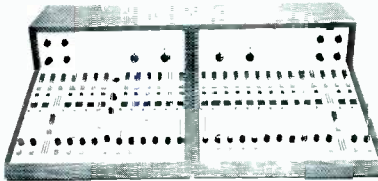
**Series DC-12**—A series of mono or stereo consoles is available with dual channel outputs and up to 12 mixers with standard control head and an additional eight with the DC-12 extender. The series features slide attenuators with two balanced, gain selectable inputs per mixer. The series has left and right meters, switchable to monitor audition or program. The stereo version is equipped with a third meter to monitor the stereo mix (mono) output.

Circle (210) on Reply Card

**P5M**—A five meter, eight input miniature remote console which has switchable mic/line inputs, cuing, built-in mic compressors, balanced inputs and outputs.

Circle (211) on Reply Card

**RCA Broadcast Systems**  
Front and Cooper Streets  
Camden, NJ 08102



**BC-300**—This series is available in 6, 8 and 10 mixer versions. Designated the BC-306, BC-308 and BC-310, these dual channel, mono or stereo consoles are standard with remote start circuitry on each mixer. Each mixing channel is equipped with 2dB rotary step attenuators and an input switch which allows acceptance of one to four inputs. Features include programmable muting, monitor circuitry to reduce monitor output to a user-adjustable, pre-set level and microphone pre-amps with internal strapping. Stereo consoles feature a switch which allows a mono source to be directed to both left and right program and audition buses and a stereo phase test circuit.

Circle (212) on Reply Card

**BC-50**—This is a do-it-yourself system assembled from a series of modules that connect together in a myriad of combinations to form a mono, stereo, quad or multi-channel console. The design centers around the *unimodule*, a device which serves as an input mixer, a submaster mixer or echo send/return level control. The housing accommodates up to 14 unimodules which include the upper panels, one of which is equipped with two VU meters, two master gain controls, two input monitor-select switches and a monitor gain control.

Circle (213) on Reply Card

**Rockwell International  
Collins Division**  
Mail Station 406-240  
Dallas, TX 75207



**Audio Rock**—A 10-mixer, dual channel stereo console which has mono mix-down and accepts 30 inputs, including up to eight mono microphones. Input and output delegation switching is done electronically permitting remote controlled audio switching. The unit features full audio metering using four backlighted VU meters. In the standard configuration, the unit is equipped with one stereo program output and one dual mic preamp which can be strapped as two mono or one stereo mic channel.

Circle (214) on Reply Card

**Mark 8**—A six mixer, stereo audio console has two independent inputs per mixer, two mixers with one direct input and six indirect inputs per mixer. All inputs are balanced, transformer coupled and may be strapped for either 150 or 600  $\Omega$  bridging inputs if desired. Stereo monitor amplifiers are provided which deliver 25W RMS per channel. Each monitor amplifier has three outputs for monitor speakers.

Circle (215) on Reply Card

**Rupert Neve**  
Berkshire Industrial Park  
Bethel, CT 06801



**8301 Kelso**—A compact console designed for recording and television production which features 10 input channels switchable to line or mic, two main output groups with optional mono mix, two auxiliary outputs with separate level controls, cue facilities, line up oscillator, two loud-speaker monitor outputs with push button selection, two PPM or VU meters and talkback microphone with routing keys.

Circle (216) on Reply Card

**5312 Melbourne**—The unit features 12 input channels with separate line and mic inputs, two main group outputs, two auxiliary outputs with separate level controls, cue facilities with built-in console speaker, two PPM or VU meters with source selection, line-up oscillator plus talkback and routing keys with microphone amplifier. Each input channel is available with one of three channel amplifiers.

Circle (217) on Reply Card

**5422 Suitcase**—This unit, designed for portable use, includes eight input channels, switchable mic/line, equalization on all inputs, high pass filter, presence/absence and high frequency/low frequency shelving. The unit features two direct high level inputs, stereo output which may be combined to give mono signal, stereo audition output, two auxiliary outputs and two VU meters with source selection.

Circle (218) on Reply Card

**5402A**—This unit has the capacity to accept up to 12 mono microphone or stereo line inputs by choice of input module. Two direct inputs are also provided for use as tape playback, off-air or reverb returns. The unit features two stereo outputs, designated program and audition which may be combined to give a mono signal; two auxiliary outputs which may be used for reverb sends or foldback; monitoring facilities with integral power amplifiers for monitor loud speakers and a high level group which may be fitted with optional voice-over unit.

Circle (219) on Reply Card

**5315**—This model is available with 12 or 24 input channels, each with separate line and microphone inputs and is equipped with one of three input channel amplifiers. The unit includes +20 value frequency equalization, controls for 10 position high and low pass filters, and EQ in and out switch and phase switch. Panoramic potentiometers are included on all channels. The 5315 also includes two direct high level inputs, four group outputs and two master outputs which may be used for 4-track recording or for stereo production or as a 4 group television mixing console.

Circle (220) on Reply Card

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**Russco Electronics**  
5690 East Shields Avenue  
Fresno, CA 93737

**Studio Master 505**—A five channel mixer with a fifth channel that accepts five hi-level inputs. The console includes plug-in preamps, cue amp and speaker with push button switching. It is available in stereo or monaural, cabinet or rack mount.

Circle (221) on Reply Card

**Disco 421 Remote**—A four channel mixer featuring one channel mono mic, two channels stereo, one hi-level input for tape and three band equalization.

Circle (222) on Reply Card

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**Spectra Sonic**  
3750 Airport Road  
Ogden, UT 84403

**1100**—This line/microphone audio mixer is designed for use in discos, sound reinforcement systems, television and recording studios. It may be installed in standard electronic equipment racks and will accept six line or microphone inputs and provide monaural and an independent monitor output. All inputs and the monaural output are transformer isolated and are terminated with XLR connectors. The high and low frequency equalizers develop a boost or cut range of +20dB at 20Hz and 20kHz.

Circle (223) on Reply Card



**1024B**—Four audio production consoles consisting of 24, 20, 16 and 12 input versions, employ modular construction and have selectable inputs, echo return, quad, stereo and mono outputs, control room monitoring, 15 frequency graphic equalizer and a signal generator.

Circle (224) on Reply Card

**1026**—Units include the same features as the 1024B but are available in 26, 22, 18 or 14 input versions. Patch bay and tape remote controls are standard items on the 1026.

Circle (225) on Reply Card

**1032**—The same features as the 1026 are standard, including the patch bay and tape remote control. The unit is available in 32, 28, 24 or 20 input versions.

Circle (226) on Reply Card

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**Studer/Revox**  
1819 Broadway  
Nashville, TN 37203

**089 MKII**—This unit is a portable 12-input console with two or four auxiliary channels for reverberation or foldback; two or four master bus bars each with fader and pre-fade buttons; and two submaster bars for forming any desired stereo groups. Each input channel is equipped with a 5-position input selector switch and offers equalization and filter facilities. The model includes two peak program or VU meters and a pre-listening circuit with built-in 6W amplifier and loudspeaker.

Circle (227) on Reply Card

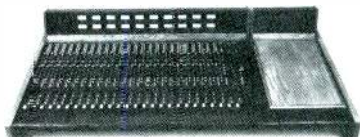


**169**—A portable unit that can be rack mounted and configured in the following formats: 11 input units and 1 master unit; 10 input units and 2 master units; 9 input units and 2 stereo masters and 1 mono master; 8 input units and 4 master units. The unit features bass cut filter; bass, treble and presence equalization; pan potentiometer with stereo model and double pan pot with 4-channel versions and two adjustable auxiliary outputs.

Circle (228) on Reply Card

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**Tangent Systems**  
2810 South 24th Street  
Phoenix, AZ 85034



**Series 80**—This unit is designed for the broadcast, film and video production industry. It features Penny and Giles conductive plastic faders and extrusion-anchored mainframes. Options include semi-parametric equalization, multiple echo and cue sends and up to 16 assign buses.

Circle (229) on Reply Card

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**TEAC Corporation of America**  
7733 Telegraph Road  
Montebello, CA 90640

**Tascam Model 15**—A mixing console available with 16 or 24 input positions. Each features eight main program mixing buses with submaster faders, eight main board outputs, solo bus, 100mm conductive plastic faders, six frequency, four knob, equalization that may be switch bypassed, stereo monitor mixes for control room and studio and two auxiliary mixing buses.

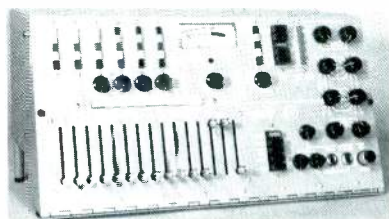
Circle (230) on Reply Card

**Tascam Model 5B**—A mixing console comes equipped with eight input positions and may be expanded from 16 to 20 inputs using the optional 5BEX extender. The console features four main program mixing buses with submaster faders, two auxiliary mixing buses (cue and echo) plus solo bus. The model also features accessory patch and direct output on each input module, four frequency, two knob, equalizers that may be switch bypassed, separate four channel monitor mix and bi-polar power supply.

Circle (231) on Reply Card

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**Telaudio Centre**  
P.O. Box 921  
Beverly Hills, CA 90213

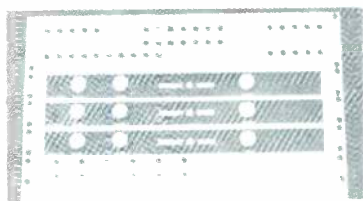


**Ultra Audio Pixtec MS-105**—This audio mixer/master control console is designed for small studio and mobile applications. Features of the unit include seven mic inputs; voice-over including, ducking of music to background; phono input; four hi-z and lo-z high level inputs; audio oscillator; slating tone; group mic submastering; two program equalizers; auditioning of all sources without interfering with program material; headphone jack for monitoring of mixer output and/or audition; and a sound compressor.

Circle (232) on Reply Card

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**Theatre Techniques**  
60 Connolly Parkway  
Hamden, CT 06514



**TTI LM 103**—This is a 10 mixer audio console in which each input mixer is switchable to accept mic or line level signals. The model has three outputs, each with monitoring facilities equipped with variable gain control and featuring two knob equalization ( $\pm 12\text{dB}$  at 100Hz and  $\pm 12\text{dB}$  at 10kHz).

Circle (233) on Reply Card

**UMC Electronics Company**  
460 Sackett Point Road  
North Haven, CT 06473



**Beaucart BC series**—Consoles are 8 to 16 channel, stereo units with top plug-in modules, each with three selectable inputs allowing a maximum of 48 hard-wired inputs. Module cards include a high-low switch for impedance matching and a  $\pm 10$ dB trim switch. The consoles incorporate three fully metered matching stereo buses out (program, audition and utility) plus a metered mono feed bus. Four program sources can be fed simultaneously from these buses. The mono feed bus is capable of feeding program, audition, or utility channels.

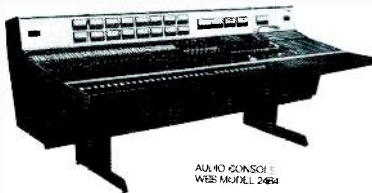
Circle (234) on Reply Card

**UREI**  
8460 San Fernando Road  
Sun Valley, CA 91352

**Mod One**—A modular console permitting a wide range of input modules and plug-in amplifier cards. The console is available with 10 mixing positions and up to 30 inputs. It features vertical faders and is available with monaural, stereo or quad outputs.

Circle (235) on Reply Card

**Ward-Beck Systems**  
841 Progress Avenue  
Scarborough, Ontario  
Canada M1H 2X4



**M2484**—The console is designed to provide the facilities required by tele-production studios utilizing the techniques of multi-track audio recording and processing and includes multi-track inputs and outputs (up to 16 tracks), multi-track metering and monitoring with associated switching, including sync for overdubbing. The console features 24 input channels, two reverberation return input channels, eight program submaster buses assignable in any combination from any console input, eight direct output channels which function as multi-track outputs 9 through 16, four program master buses, two reverberation send buses assignable from any input channel or submaster channel via a pre/post fader source selector, four foldback buses assignable from any input channel or submaster channel, one solo bus assignable from each input channel and an 18 channel monitor mixdown section utilizing as input sources either the 16-tracks of multi-track tape playback, the 16-tracks of console multi-track output signals, or any combination of both.

Circle (236) on Reply Card

**Yamaha International Corporation**  
6600 Orangethorpe Ave.  
Buena, CA 90622

**PM-430**—An 8-channel input, stereo output mixer designed for fixed or portable television production and recording applications features input channels, and main outputs, with transformer isolated XLR connectors. Two program mix buses can be used for stereo programs, or for independent monaural programs. Additional mix buses include monitor 1 and monitor 2. These buses are brought to separate master faders for overall output level control. The program master outputs have the same low and high equalization as the inputs.

Circle (237) on Reply Card



**PM-700**—The 12-channel input version of the PM-430 features cue buses brought to separate master faders for overall output level control.

Circle (238) on Reply Card

**PM-1000**—A family of 16, 24 or 32 channel mixing consoles featuring eight line outputs (four line A, four line B), four monitor speaker feeds, four master program outputs, two echo (foldback/stage monitors), one talkback monitor and two stereo headphones. All inputs and outputs are transformer isolated and input level attenuators take +4dB, line level, to -60dB mic level in 11 steps and include five frequency equalization.

Circle (239) on Reply Card

**PM-2000**—This model is available with a 24 or 32 input mainframe and features 14 mixing buses; 4-knob, 20 frequency equalization; interchangeable pre/post take-off for effects and monitor sends; interstage patching; headphone cue, talk-back systems and a combination oscillator/pink noise source. The unit also features a separate 18dB/octave high pass filter with 40Hz and 80Hz positions. Of the 14 mixing buses, eight are designated for main program mixing, four for foldback and two for echo/effects sends.

Circle (240) on Reply Card

## Additional companies

### Altec Lansing Sound Products

1515 S. Manchester  
Anaheim, CA 92803  
Circle (241) on Reply Card

### Boston Sound and Power Systems

3 Ferdith Rd.  
Weymouth, MA 02189  
Circle (242) on Reply Card

### Bud Industries

4605 E. 355 St.  
Willoughby, OH 44094  
Circle (243) on Reply Card

### CCA Electronics

Box 5500, Broadcast Plaza  
Cherry Hill, NJ 08034  
Circle (244) on Reply Card

### CRV Systems

1901 Madison Ave.  
Huntington, WV 25704  
Circle (245) on Reply Card

### Electrohome

809 Wellington St., N.  
Kitchener, Ontario, Canada N2G 4J6  
Circle (246) on Reply Card

### J&D International

Interstate Industrial Park  
Bellmawr, NJ 08031  
Circle (247) on Reply Card

### International Communications and Control

Box 11749  
Knowville, TN 37919  
Circle (248) on Reply Card

### Charles Moore

Box 2023  
Rocky Mount, NC 27801  
Circle (249) on Reply Card

### MCI

4007 N.E. 6th Ave.  
Ft. Lauderdale, FL 33334  
Circle (250) on Reply Card

### Magna-Tech Electronics

630 Ninth Ave.  
New York, NY 10036  
Circle (251) on Reply Card

### Modular Audio Products

50 Orville Drive  
Bohemia, NY 11716  
Circle (252) on Reply Card

### Opamp Labs

1033 N. Sycamore Ave.  
Los Angeles, CA 90038  
Circle (253) on Reply Card

### Pacific Recorders and Engineering Corporation

11100 Roselle Street  
San Diego, CA 92121  
Circle (254) on Reply Card

### Pulse Dynamics

Manufacturing Corporation  
Box 355  
Colchester, IL 62326  
Circle (255) on Reply Card

### ROH Corporation

107 Technology Park  
Norcross, GA 30092  
Circle (256) on Reply Card

### Russco Electronics Manufacturing

5690 E. Shields  
Fresno, CA 93727  
Circle (257) on Reply Card

### Shure Brothers

222 Hartrey Ave.  
Evanston, IL 60204  
Circle (258) on Reply Card

### Singer Products Company

One World Trade Center, Suite 2365  
New York, NY 10048  
Circle (259) on Reply Card

### Sphere Electronics

20201A Prairie  
Chatsworth, PA 91311  
Circle (260) on Reply Card

### Superscope

20525 Nordhoff Street  
Chatsworth, CA 91311  
Circle (261) on Reply Card

### Track Audio (TA)

33753 9th South Federal Way  
Washington, DC 98003  
Circle (262) on Reply Card

### Tri-Tronics, Professional Electronics

Highway 210 N  
Lillington, NC 27546  
Circle (263) on Reply Card

### Tweed Audio USA

4545-E. Industrial 5E  
Simi Valley, CA 93063  
Circle (264) on Reply Card

### United Recording Electronics Industries

8460 San Fernando Road  
Sun Valley, CA 91352  
Circle (265) on Reply Card

### VIF International

Box 1555  
Mountain View, CA 94042  
Circle (266) on Reply Card

### Wilkinson Electronics

Box 738  
Trainer, PA 19013  
Circle (267) on Reply Card

## Colorado Magnetics



P. O. Box 713  
Colorado Springs  
Colorado 80901  
303 / 596-0684

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40 sec	2.16	2.21	2.58	3.20
70 sec	2.19	2.25	2.64	3.27
100 sec	2.25	2.32	2.73	3.38
2.5 min	2.48	2.56	2.83	3.51
3.5 min	2.59	2.67	2.96	3.66
4.5 min	2.72	2.75	3.08	3.81
5.5 min	2.89	2.96	3.21	3.97
7.5 min	3.06	3.14	3.41	4.21
10.5 min	3.48	3.56	3.73	4.61



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Circle (33) on Reply Card

# CBS Unveils Teletext Studies, invites industry to share a new dimension of television transmission

It's easy for TV broadcasters to get excited when new technology comes along to add another dimension to their service—especially when that service can increase their profitability. CBS is proud of their recent work on teletext experiments that add realistic, factual data to speculations on how this new technology may affect broadcasters, television viewers, and many potential industrial users. To celebrate their accomplishments and to share their test data with the industry, CBS unveiled their data at meetings in Washington, DC, and in St. Louis, MO, to selected members of the industry.

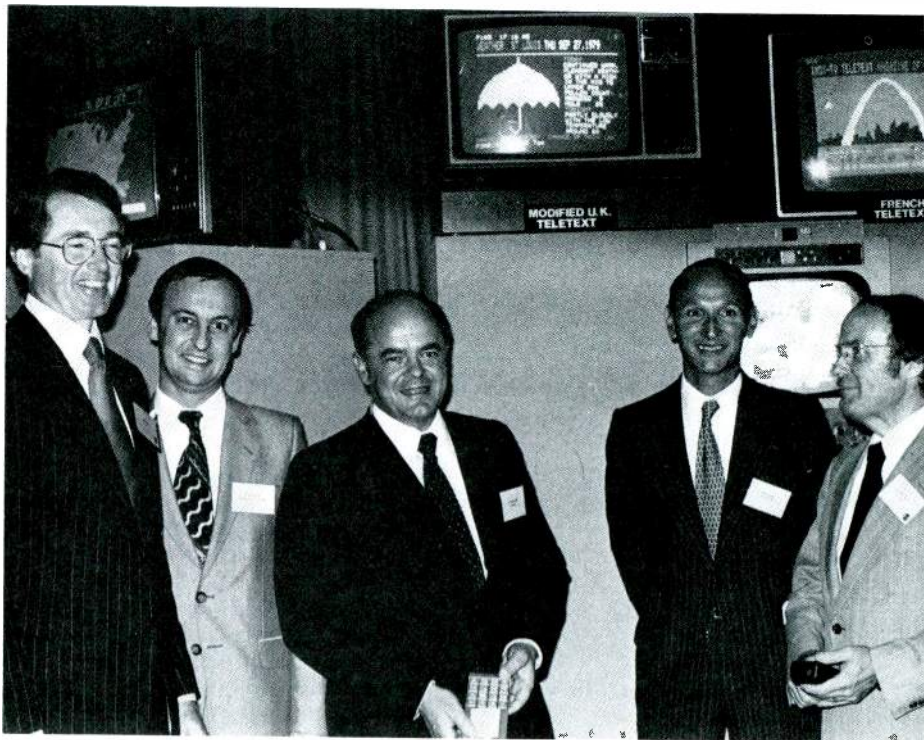
In Washington, at the CBS corporate offices, approximately 50 guests attended the CBS teletext experiment reviews representing the FCC, press and congressional interests. In St. Louis, at CBS' flagship KMOX-TV station, 83 outsiders from manufacturers, standards committees, and the press packed studio A to hear the latest on teletext.

When CBS initiated its experiments on teletext, it did so with a major commitment in terms of money, people, and facilities. Participating in the teletext briefings were Gene F. Jankowski, president of the CBS Broadcast Group; and the following CBS Television Division officials: Joseph A. Flaherty, vice-president, engineering and development; Robert O'Connor, vice-president, transmission engineering; and William G. Connolly, managing director, development. Their presentations in St. Louis, along with the introduction by John McKay, vice president and general manager of KMOX-TV, sparked with enthusiasm for the data accumulated and conveyed a bright future for this rapidly developing technology.

## Background

On February 23, 1979 CBS filed an informal application with the FCC for a Special Temporary Authority (STA) for major tests of teletext systems over KMOX-TV. Authority was granted on March 9 and teletext transmission began March 23, with two extensions of the STA being granted to continue the tests to date.

The press meeting in Washington and St. Louis covered Phase I of the CBS program involving data gathered from 23 sites within the KMOX-TV service area.



French television leaders joined CBS executives at the KMOX-TV unveiling of teletext experimental transmissions. Shown in front of a pair of TV receivers with pages of teletext appearing on them are (left to right): John McKay, vice president and general manager of KMOX-TV; Pierre Gaujard, president of Antiope Videotex Systems, a U.S. subsidiary of SOFRATEV; Jean Guillermin, president and general manager of SOFRATEV; Maurice Remy, general manager of Telediffusion de France; and Joseph Flaherty, vice president of engineering for CBS Television Network. (Note the teletext controls held by Gaujard and Flaherty.)

## The Teletext system concept

"Teletext" is a generic term for systems that broadcast over the network alphanumeric data (letters and numbers) and graphics to the home viewer. The teletext signal is transmitted simultaneously with the television picture and is invisible to the unequipped home receiver.

By the use of a special receiver equipped with the necessary decoding circuitry, or an external decoder that attaches to existing television sets, the home viewer has access, with use of a small hand-held control keypad, to an electronic *magazine*.

The viewer can select from hundreds of *pages* of information being transmitted via the teletext system: a code for news, one for sports, for stock quotations, weather reports, entertainment programs, weather data, airline flight schedules, etc.—whatever is programmed into the resource banks. Potentially, thousands of such pages can contain information matter of the widest possible variety, instantly available on call and kept up-to-date by skilled editorial staffs.

In addition, teletext systems can provide captioning for the hearing-impaired. As opposed to other proposed systems that provide captioning only, a teletext system can simultaneously provide other accessible data.

Messages for teletext are transmitted during the few microseconds of time occupied by the vertical blanking interval. While the television beam is recycling to the top of the screen to form a new picture for the viewer, data for teletext can be transmitted. Because it plugs in a gap of unused time, teletext can provide a wide variety of services, make the home set more efficient and fully used, and offer broadcasters a new source of revenue.

More than a score of teletext systems have been developed and experimented with, around the world, with the French ANTIOPE system being one of the most prominent.



Modified CEEFAX/ORACLE systems from the UK and of the ANTIOPE system from France were used in the CBS experiments. Bit error rate measurements common to all systems were also made.

Furthermore, CBS engineers traveled to France and England to study available data. Encoding and decoding equipment was borrowed and modified at the CBS Technology Center in Stamford, CT, to meet US standards and to work properly. European standards generally provide a bandwidth of 7 or 8MHz and 625 line/50 field scanning as opposed to the 6MHz bandwidths and 525 line/60 field scanning used in the US. Once the equipment was modified, field tests proceeded with use of a specially equipped mobile van.

### The CBS show

The CBS team of Jankowski, Flaherty, O'Connor and Connolly presented a 2½-hour technology program detailing the background of the CBS tests, the factual results to date, and what the future might hold for the industry.

The teletext tests around St. Louis

### The ANTIOPE system

ANTIOPE is a teletext system that has been developed at CCETT at Rennes, France, and experimentally tried out on the network of Telediffusion de France (TDF). Its name is an acronym derived from L'Acquisition Numerique et Televisualisation d'Images Organisees en Pages d'Ecriture (Translator's paraphrase: Digital Signal Processing Conversion to Printed Page Image on Home TV Sets).

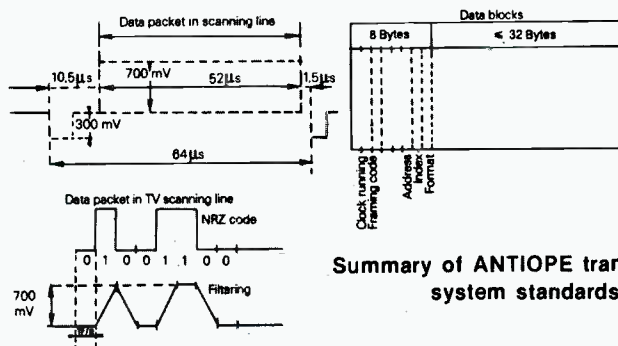
In ANTIOPE, the magazines stored by the computer or on a floppy disc are cyclically transmitted to a multiplex system in which the data are separated into a packet of 32 bytes that are inserted in the free scan lines of the TV signal.

The specifications for insertion are as follows:

Bit frequency: 397 line frequency

Organization: Each packet is preceded by an 8-bytes heading consisting of:

- a clock run-in
- a frame code byte
- a 3-bytes sender's address
- a continuity index for successive packets from the same sender
- a fill-in index of the packet.



Summary of ANTIOPE transmission system standards

### CBS cooperates in industry standards

Early this year a new industry committee was formed to recommend technical standards for a US teletext system. It is a subcommittee of the EIA's Broadcast Television Systems (BTS) Committee, with CBS' O'Connor as chairman. In view of the accelerating developments in the field of teletext and viewdata, the committee was charged with taking maximum advantage of previously conducted studies and test results throughout the world, and was to endeavor completing its activities by the end of 1979. CBS has been actively participating in the committee and has offered to cooperate in any of the areas of its studies.

The BTS subcommittee was organized as a steering committee to direct the activities of five major task forces. This steering committee is composed of the chairman, the executive secretary, representatives of the principal industries involved, the chairmen of the task forces and observers.

### BTS subcommittee on Teletext

- R.A. O'Connor (CBS) chairman  
 E.M. Tingley (EIA) executive secretary  
 C.B. Neal (Sylvania-BTS committee) ex officio

#### TV networks

- F.L. Flemming (NBC)  
 J.A. Flaherty (CBS)  
 J. Serafin (ABC)

#### TV stations or groups

- D.R. Wells (PBS)  
 H.L. Kassens (A.D. Ring, representing AMST)

#### TV equipment manufacturers

- B.J. Lechner (RCA)

#### TV receiver manufacturers

- M. Palladino (GE)

#### TV receiver component

- N.M. Williams (Signetics)

#### Task Force A Systems, C. Eilers (Zenith)

Task Force B Lab and Field Tests, D. Sillman (PBS)

Task Force C Analysis of Data, S. Goyal (GTE Labs)

Task Force D Time Domain Adaptive Equalization, W. Ciciora, (Zenith)

Task Force E International Liaison, H. Kassens with assistance from the subcommittee as needed.

#### Observers

FCC Broadcast Bureau

- W. LaFollette, C. Breig (CCIR IWP 11/3)

FCC Common Carrier Bureau

- G. Rosch

NTIA

- J. Jessperson

NAB

- G. Bartlett

SMPTE

- J. Roizen

NCTA

- R. Luff

CBS (Canada)

- D. Garforth

DOC (Canada)

- J. Storey

TCT (Mexico)

- M.F. Quiroz

## Teletext

analyzed the effects of propagation on the teletext signal at each site and determined the page access time. This parameter is a function of the data bit rate, the number of pages in the magazine bank, and the number of lines in a vertical blanking interval used. CBS was authorized to use lines 13, 14, 15 and 16 of both fields, provided the normal picture transmission was not affected.

The objectives of the tests were to determine (a) an appropriate bit

rate, (b) the specific lines usable in the vertical interval, (c) the optimum pulse shape and amplitude, and (d) the relative merits of a synchronous format vs. an asynchronous format.

Besides the host of teletext transmission equipment, the CBS tests involved 16 modified receivers: For the British system there were three from Zenith and one from Sony; for the French system there were 10 from Thomson-Brandt and two from Sony.

The display format for the French system consisted of 40 characters per row with 20 rows (using the

alphabet and character set developed for that system). For the British system, the display was 32 characters per row with 20 rows (using the system's own alphabet and character set). The two alphabets and character sets differ considerably, but use the same basic ASCII alphanumeric code involving seven bits plus one parity bit per character.

### TV lines used for tests

CBS used TV lines 13, 14, 15 and 16 for the teletext tests, but lines 13 and 14 had not been so used before. CBS conducted a controlled test involving the entire KMOX-TV staff, and found the presence of the data signals during retrace on lines 13 and 14. Also, television service shops reported interference.

Following these reports of visibility, lines 13 and 14 were abandoned and only lines 15 and 16 were then used, either on a time sequence basis or with each system occupying only one line per field, with the pulse level set at about 70 IRE units for both systems. Virtually no problems existed with lines 15 and 16.

As new receivers are built with better vertical interval retrace blanking, the use of earlier vertical interval lines, perhaps down to line 10, may become possible. However, in view of the visibility problem with existing receivers, the specific lines currently feasible for a teletext system need to be more definitively determined.

### Tentative results to date

The Phase I field test in St. Louis has provided considerable data and experience. The most significant outcome of the field test was that both the British and French systems gave satisfactory teletext service at all sites tested. The teletext pages displayed at the site had negligible observable errors. This performance was obtained for all sites tested regardless of their individual signatures. The analyses of measured bit error rate at the two frequencies used in the British and French systems were generally con-



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McKay points out interference at top of picture caused by teletext transmissions.

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sistent with the system performances.

During Phase I, the measurement sites were located within relatively strong signal areas, approximately within the grade A contour. Teletext system performance at sites located in lower signal strength areas are still to be determined. It is planned to make measurements at such sites during later phases of this investigation.

No definitive comparison between the British and French system could be made since many of the equipment features were not the same.

It is planned for the next phase of the measurement program that these equipment differences will be reduced so that a more comparable analysis can be made.

Experience in the Phase I field test has indicated that a change in field test procedures is required.

VIT signal waveform photographs and eye height patterns have not been of much value and their use will be reconsidered. Synchronous detection shows a small but definite advantage over envelope detection and the latter need not be measured. With fewer parameters, it is hoped to measure more sites per day in the future.

Additional measurements in Phase II of the field test will include teletext system tests at different data rates so that an optimum data rate can be selected. Measurements will also be made with indoor receiving antennas to evaluate the importance of this factor in teletext system operation.

Based on the data taken so far, the Phase I field test gives hope that a teletext system for US television standards will be technically feasible with data rates that provide a satisfactory degree of service. Final test data and firm recommendations for the FCC are expected to be available when NAB '80 rolls around.

#### Final observations

Those attending the CBS press conference were left with a distinct conviction of a bright future for US teletext in spite of the system's shortcomings. Noticeable was the slow access time as the amount of available data increases and the poor quality of current graphics. However, this is a technology still in its infancy, and these problems can be overcome.

It is also obvious that a tremendous effort must be put into the data bank care and feeding if teletext is to be viable, but the techniques for doing this are available and require no new developments.

Some observers have referred to

teletext as blue sky technology. On the contrary, teletext is an inescapable, hard reality. Only time and effort are required to implement it into a viable service to commerce and consumer. What is blue sky, is the ultimate breadth of information that may be available through teletext. Will it make the Library of Congress, or the universe of knowledge, available at the touch of a control? And to whom? To everyone with a home receiver or to selected subscribers?

Thus, teletext stands on the doorstep to expanding television technology. And one cannot guess

the investment to date, but Flaherty guesstimates that CBS' experiment has already cost around \$1 million.

While the CBS team thoroughly covered their work to date, they clearly pointed out that teletext has a long way to go. And, they also were quick to share the limelight. Bill Loveless, a pioneer, in teletext from Bonneville International in Salt Lake City, UT, was in attendance and was asked to stand for a round of applause for his independent works—a tribute he well deserves.

The next detailed report is expected to come at NAB '80 in Las Vegas. □

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# business news



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### Sony expansion

Sony announced the expansion of its eastern regional office, effective October 1, 1979. The expanded facility will house the eastern regional sales office of Sony Consumer Products, the eastern service operation, sales, sales and service training departments, and the eastern regional hi-fi office of Sony Industries. The new address is 15 Essex Road, Paramus, NJ, (201) 368-5000.

### Dynasciences selects regional dealer

Compact Video Sales, a subsidiary of Compact Video Systems, has been selected exclusive dealer for Dynasciences products in the southern California region.

### Otari moved

Otari moved its operations to a new location in San Carlos, CA, effective September 24, 1979. The new address is 1559 Industrial Road, San Carlos, CA, (415) 592-8311.

### FCC contract awarded

Silliman, Moffet and Kowalski has been awarded a contract by the FCC to assess the cost of AM broadcast licenses should the AM broadcast channels bandwidth be reduced from 10kHz to 9kHz, according to John A. Moffet. One portion of this project will involve assisting the FCC in constructing a complete AM computer data base. The amount of the contract is \$228,593.50.

### Matsushita creates news center

Matsushita Electric has announced the creation of the Matsushita News Center in New York. The news center will enable Matsushita to maintain continuous contact with US trade and consumer press. The news center will be located at the offices of Ruder & Finn, 110 E. 59th Street, New York, NY 10022.

### Harris

Harris has completed its acquisition of Consolidated Video Systems of Sunnyvale, CA for \$12.8 million. Consolidated Video is a producer of

studio equipment for television stations, cable TV companies and industrial, educational and government closed-circuit TV systems.

Consolidated Video, with current annual sales of approximately \$9 million, will remain in Sunnyvale and will be operated as part of the Harris broadcast products division.

The California firm will be re-named the Harris video systems operation. Its former president, Jim A. Summers, will become a vice president of Harris broadcast products and will continue to manage the operation.

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## SALES/CONTRACTS

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### AKG

AKG has received an order as exclusive supplier of microphones, headphones, reverberation units, time-delay units, accessories and components for the 1980 Olympic Games to be held in the USSR. Featured equipment to be used includes the AKG modular C-450 system microphones, the BX-20 and BX-10 model reverberation units, TDU 7000 time-delay units and K-240 headphones.

### FTZ

The Telecommunications Engineering Centre (FTZ) of West German PTT, has ordered a second DICE from Marconi through Marconi Electronik, in Germany. DICE (Digital Intercontinental Conversion Equipment) is capable of converting the 625 line PAL and SECAM color television pictures as used in Europe, Australia and elsewhere, to the 525 line NTSC standards used in the Americas, Canada and Japan, and vice versa.

### Harris

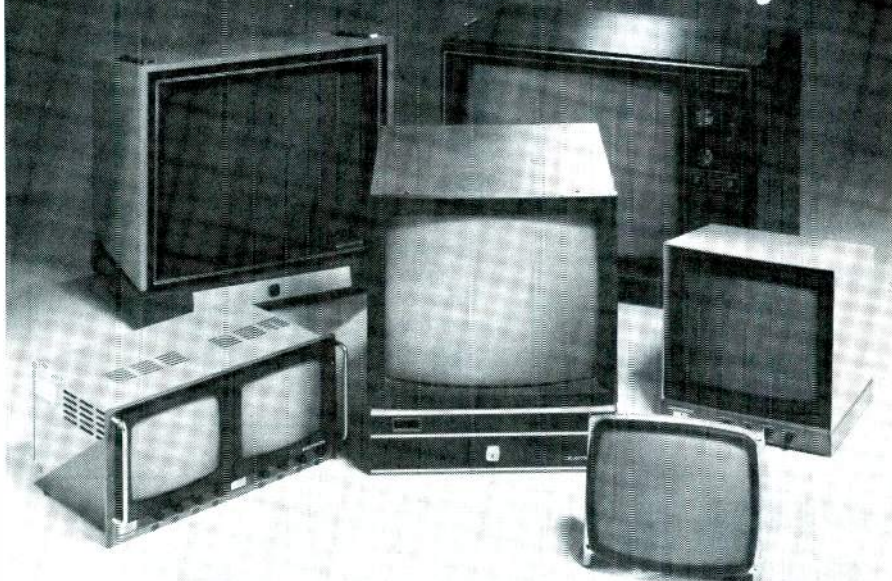
BBC Television has ordered a Quantel DPE 5001 digital production effects system including the optional autosequence event recording/playback option. The unit will be housed at the BBC's special video effects section in London.

Belo Broadcasting has ordered \$750,000 in television transmitters from Harris to be installed at WFAA-TV, Dallas, TX. Included in the contract are two Harris BT-50H3, 50kW VHF high band color television transmitters.

Post-Newsweek Stations have ordered approximately \$400,000 of television transmitting equipment from Harris broadcast products division.

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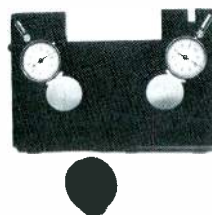
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## Sony unveils expanded product line

As a springboard into marketing video products for the 1980s, Sony Video Products called a press conference in New York to reveal many of their new equipment additions and to outline a marketing strategy they feel best serves the professional video community and provide market penetration.

Koichi Tsunoda, president of Sony Video Products, opened the meeting by explaining the status of the video market. "Today" he said, "we have a variety of markets for video products; broadcast consumer, business and industry. While the basic technology has remained somewhat constant, each market now has specific demands and special needs."

To serve the purchasing and special requirements of these specific markets, Sony has developed three operating divisions: Sony Video Products (which includes Sony Broadcasting), Sony Consumer Products and Sony Industries.

According to Tsunoda, Sony Video Products will use a 3-prong approach in assisting the buyers of video equipment in the use of all the innovative tools produced for the market. Describing this approach Tsunoda said, "First we have made a strong commitment to extend the video utilization service program...a series of workshops that teaches video people to make better use of their equipment. We have also made an increased commitment to our Video Technology Center. This center is a source for many innovations in video technology; but just as important, it is a laboratory for customized video technology at the disposal of our users. And finally, Sony is, to our knowledge, the video company with the largest program series on video technology now available on videotape. Through our school, users can learn the basics of video technology from every major format."

In the display of new equipment at the conference, Sony exhibited its expanding product lines of U-Matic and Betamax format videocassette player/recorder groups. Introduced also for the first time was a newly-developed MF Tricon camera that uses a 2/3-inch tube with smaller photo conductor area size and featuring a new f1.4 zoom with built-in "macro" focal length, a pair of advanced random access controllers and programmers and a specially designed dual color.

## Consultants aid broadcasters in EJ/EFP

A budding, 1-year-old consulting firm near the network citadels in New York has found a niche for itself serving broadcasters and production facilities. The key: training of personnel in EJ/EFP (electronic journalism/electronic field production) and videotape editing.

The firm is KTK Video Consultants, with a staff of four, headed by principals Lee Kaminski and Douglas Tishman. "Network production personnel, cameramen and film editors are crowding the conference room at KTK," says Tishman, "attending our comprehensive EJ-EFP course. The course was initiated in 1978 on a request from NBC News, which asked KTK to design a program for re-training film editors as videotape editors. Since then we've serve other networks as well."

Kaminski, former instructor of television production at Columbia University, conducts the intensive 10-week series of lectures and hands-on workshops, covering everything from theories of electrom beam recording to the nuts and bolts of butt editing. The course has been so successful that KTK recently instituted a special weekend intensive program to accommodate people from the other networks and from the industry at large. The course has also been expanded to include remote shooting techniques, as well as editing. In its pro-oriented training program, KTK uses an RCA TK-76 video camera and a Sony broadcast 3/4-inch editing system.

KTK also does virtuoso electronic field production for the networks and for a wide variety of other clients in broadcasting, industry and retail merchandisers.

For information on the KTK services and capabilities, contact: KTK Video Consultants, 226 East 54th Street, New York, NY 10022, (212) 223-0520, or circle 100 on the reader card.

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## FINANCIAL

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### Ampex

Ampex reported net earnings for the first fiscal quarter of \$7.2 million, or \$.63 per share, compared with net earnings of \$5.6 million, or \$.49 per share reported for the

same period last year.

### Cohu

Cohu directors have authorized a quarterly cash dividend of \$.04 per share, payable January 25, 1980 to shareholders of record on December 5, 1979. This will be Cohu's ninth consecutive quarterly cash dividend of \$.04 per share.

### Harris

Harris has reported sales up 12.6% in fiscal 1979 to almost a billion dollars, with net increasing 20.9%.

### Chyron

Chyron reported sales for fiscal year ended June 30, 1979 rose to \$4,656,000 compared to \$3,156,000 for the prior year, an increase of 48%. Net earnings advanced to \$440,000 or \$.49 per share from \$89,000 or \$.09 per share in the preceding year.

### CEI

CEI reported record August sales of \$975,000, the highest in the company's history. First half sales for the current fiscal year increased 47% over the same period last year.

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# association news

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## Take 1: The (British) Guild of Television Cameramen on Training

We, in the ASTVC, are not alone when it comes to concern regarding the training (or lack of it) available for cameramen. This means basic training for entry-level camera positions as well as the more advanced and complex studio and/or remote assignments. Our British counterparts are so concerned with this aspect of their organizational responsibilities that they have now formed a 5-man committee to deal specifically with training. They have gone on to divide their training objectives into three areas: • Initial

entry requirements; • Training-theory and practice; • Career enhancement. This training committee is currently soliciting comments and/or opinions on this subject from their membership. This leads us to wonder whether or not our cousins might have happened to have been reading copies of **Broadcast Engineering** dating back to last winter, when the ASTVC launched its series of articles relating to the same areas of concern. If they have missed out on this current series, then it just proves, once again, how great minds run in similar circles. We applaud their efforts and look forward to sharing and/or exchanging ideas of mutual concern.

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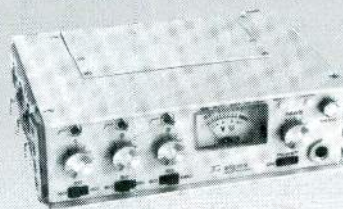
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We believe that the reader (be he an old pro or aspiring candidate for this coveted job) will find the following extract from the Guild's training doctrine most interesting. Of the listed 10 qualities (for a trainee) we chose number nine, "Future Potential." They believe that a career as a TV cameraman should be for a limited period only because "...the fast reflexes, the stamina...the manual dexterity are...likely to deteriorate with age. However, during this time (he) will come into contact with all areas of TV operation, and it would be senseless not to make use of this fund of knowledge. It would be best initially to consider applicants who have considerable potential that can be developed in new areas as the years pass. This will provide for full career opportunities in the industry."

We found their entire manifesto on the subject well thought out and we believe that the readers of BE will share our enthusiasm for the Guild's project as we follow through in future issues.

## Take 2: It's not just broadcasting: There are other pastures!

Take away the antenna...and the transmitter and what do you have? Did somebody say: "A lot of electrons going nowhere"???? No, that's not the answer. You have: a closed-circuit TV installation. Now, this might be further enumerated as: An instructional-support activity such as operated at West Point and many other institutions of learning; A corporate communications activity such as run by MLPFS and many other large financial, publishing and/or industrial entities; A production house (whose end-products need no elaboration); or A hospital support/training facility and other varieties of the above. Now this last named category is a case in point. And we will refer back to it in just a moment.

All the above is just to remind those individuals interested in getting into the TV operations field that it is just not (all) broadcasting. And, by the way, there are a considerable number of graduates of

the Broadcast Station School of Learning who have (for one reason or another) gone on into these various fields.

Now, back to the hospital training facility utilizing a TV studio setup. A report from Marc Scott tells us that while researching various areas for the proposed ASTVC documentary on training in and for the industry he has been made aware of the potential career field(s) in this particular area of health services.

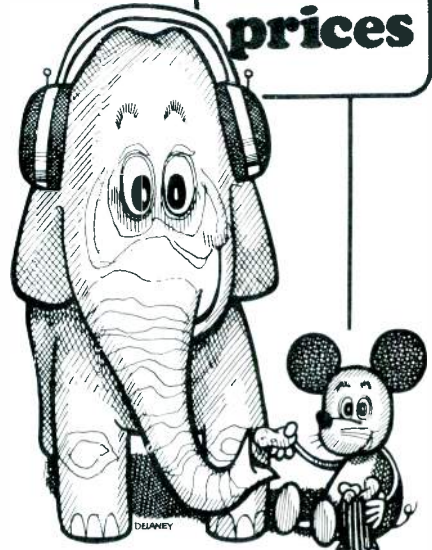
What caught his eye, and this column's attention was the following which appeared (periodically) in one of his local area newspapers: Wanted TV engineer (to) supervise installation & maintenance of sophisticated production and CCTV distribution system. Experience: 1st Class licence required; salary \$18,000 to \$20,000. This typical ad was placed by the director of media services for the teaching hospital of an area state university. Upon personal contact with the director, Marc learned that this facility was having trouble finding applicants for this job and others that opened in the same CCTV installation! Why is there an overabundance of applicants knocking on the doors of the TV station(s) and a scarcity in these nonbroadcast areas? Maybe this question is best answered by the job candidate himself. Could it be that our job-seeker has visions of being part of a glamorous, well-paid, exciting industry with the chance to rub shoulders with famous, well-paid and exciting people?

## Take 3: People you (shoud) know

Cameramen do make it! Chip did. Chip Nowitsky, last heard of as a cameratype at WTAR-TV, now associate director of TV opens for the Miss Universe Pageant. Some guys have all the luck. Frank Celecia and Hank Ferro (ABC cameramen) have launched a joint venture in the production area, we wish this new endeavor much luck. Tony St. John, who produced that bang-up ASTVC/Sony seminar at KRON-TV, recently returned from Cairo and documentary on the tomb of you-know-who. Maybe we can entice him into lending some of his talents for the aforementioned ASTVC documentary? □

# RUSSCO gives BIG performance

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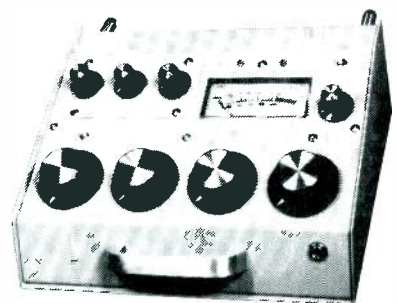


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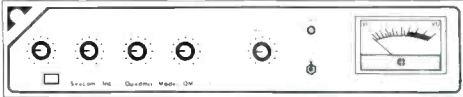

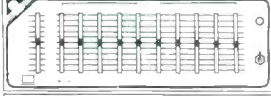



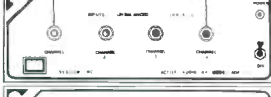

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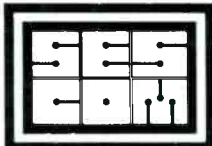
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**people  
in the news**

**Radio/Television**

**Bill Williams, Jr.** has been named traffic reporter for KARN Radio/920 in Little Rock. He was a reporter for KTHV.

**Ralph Sanabria** has joined Schulke Radio Productions as vice president. He has worked for WPAT AM-FM, Paterson, NJ, for nine years.

**Mary White** has been appointed director of station relations of Weedeck. White held similar posts with Filmways Radio and KOH, Reno.

**Manufacturers/Distributors**

The optical products division of Canon has named **Joy Wenzlaff** assistant regional manager for broadcast products in the company's west coast office. Wenzlaff previously worked for Phillips Broadcast Equipment.

**Steve Pequignot** has been named northeast regional sales manager for Convergence. Pequignot was a salesman for Sonocraft and MPCs in New York.

**Richard Dienhart** has been appointed NEC broadcast equipment division marketing support group manager. Dienhart was formerly director of programming and production of New Trier Television in Winnetka, IL.

**Patrick M. Choate** has joined Focus Marketing as director of broadcast research. Choate was formerly director of marketing for Data Communications (BIAS).

ADDA has named **Jesse Blount, Jr.** to the board of directors. Blount is ADDA's vice president-marketing.

**Paul Romney Farmer** has joined RCA American Communications as administrator, public information. Farmer was advertising manager for The Western Union Telegraph Company.

**Margaretha E. Bystrom** has joined the magnetic tape division at Fuji Photo Film as advertising manager. Bystrom previously held the same position with Sony. Also at Fuji, **Robert M. Gargus** has joined the industrial video sales staff. Gargus was mid-atlantic distric sales manager for JVC's professional division.

**Jay A. Clark** has been named director of public relations for Ampex in Redwood City, CA. Clark had been manager of media relations at Rockwell International in Pittsburgh, PA.

**Dr. Donald S. McCoy** has been appointed vice president and general manager of CBS Technology Center, Stamford, CT. He was formerly division vice president, technical liason for RCA's video disc system.

**Thomas M. Jordan, Jr.** has been appointed manager, studio and control equipment product management,

for RCA Broadcast Systems. He was previously product manager for control equipment. Also at RCA, **Robert E. Winn** has been named manager, antenna product management, for RCA Broadcast Systems. Winn was a TV transmitter and antenna engineering sales specialist for the RCA activity.

Dyma Engineering has promoted **Michael Ziomko**, sales manager, to the position of vice president. He has also been elected to the board of directors. Ziomko joined Dyma two and a half years ago as a sales engineer.

**Dennis L. Shelton** and **John L. Romanko** have joined the marketing staff at Echo Science. Shelton was formerly with TeleMation for eight years, and served in the areas of engineering, production, special products design, and as product manager. Romanko worked with The Canadian Broadcasting Industry as chief engineer in both radio and television.

**Koichi Yasunaga** has been named vice president and director of corporate planning for Fuji Film USA. He has been with Fuji since 1953.

TDK Electronics has appointed **Stanley A. deSzameit** as midwest regional sales manager. He was sales manager, national accounts with Superscope.

McMartin Industries has appointed **Thomas S. Butler** director of international sales. Butler has been selected to head the expansion and reorganization of McMartin Industries' international marketing program. He was previously eastern US sales manager.

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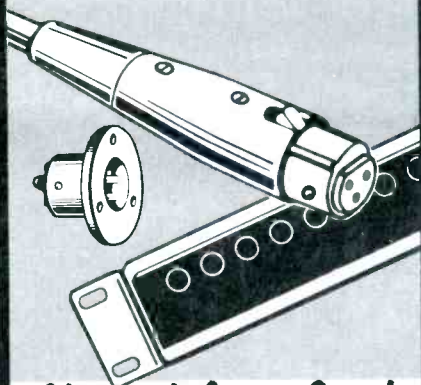
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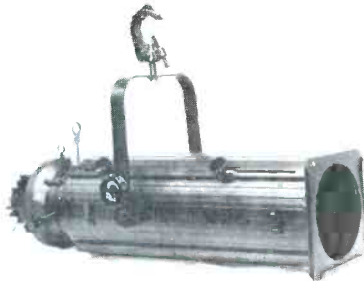
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## new products

### Variable spotlight

The Parelisphere 220, a 220mm variable spotlight, is available from Electro Controls. The spotlight is designed for throws up to 100 feet



using a standard EG series lamp. It features an adjustable field angle, and an iris option.

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### Cartridge storage units

Dyma has introduced a line of cartridge storage units available in three styles: carousels, free-standing and wall racks, designed to hold Series 300 NAB tape cartridges.

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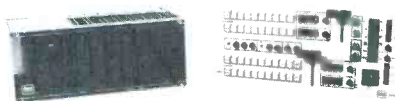
### UHF wireless microphone

The WRT-57 UHF wireless microphone from Sony weighs 7 ounces, is 6.8 inches long and uses 6.4 inches of antenna wire. The WRT-57 features miniature helical resonator filters, hybrid ICs and a frequency response of 50-15,000Hz.

Circle (302) on Reply Card

### Video production switcher

The 902 video production switcher from ISI is available in NTSC, PAL and PAL-M versions. The unit is a 4-bus switcher with program and



preview output switching buses and 10 inputs. The 902 features included two mix/effects systems, electronic spotlight and pattern modulator.

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## New products

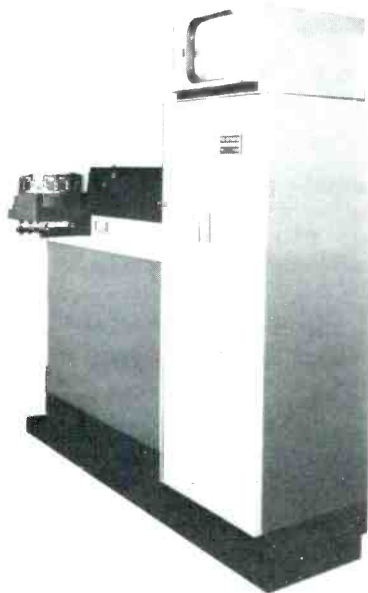
### Tri Band AGC

The MSP-90 Tri Band AGC audio processor from Harris splits audio into low, mid and high frequencies. Filtering is phase coherent. The unit



features automatic gain control and a mid-band expansion scheme. Compression is indicated in 3dB increments to 24dB.

Circle (304) on Reply Card



### Color film camera

Cohu has introduced the model 1550B Telecine system broadcast color film camera. The 1550B features Cohu's model 8500 color encoder with image enhancer, automatic balance, automatic differential gamma balance, and an optional color compensating variable masking system.

Circle (305) on Reply Card

### Slot antennas

A series of UHF-TV slot antennas has been introduced by Cetec Antennas. The JSL antennas are available with rms gains of 4, 8, 12 or 16. The series offers low VSWR, a wide range of azimuth patterns and low weight and wind-load.

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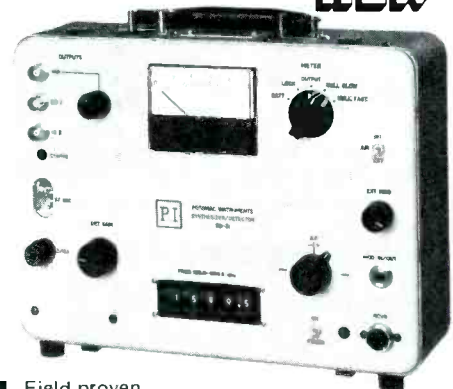
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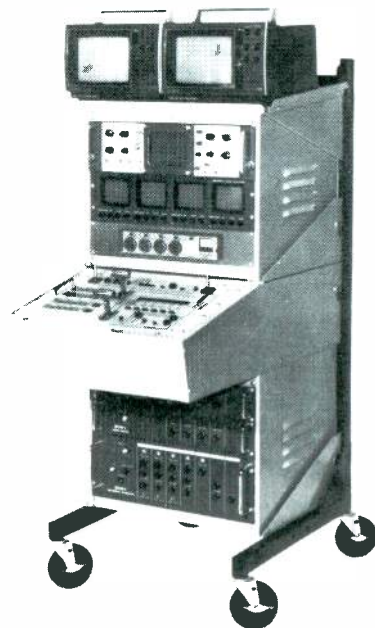
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## New products

### Portable production console

A portable production console is available from Winsted. The modular design steel unit rolls on 5-inch

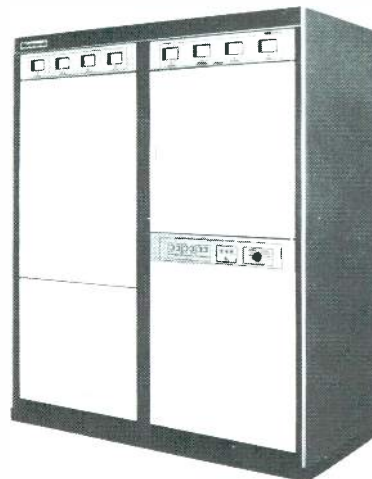


industrial-type casters. Features include sloping switcher equipment panel, two 14-inch rack height cabinets and removable back panels.

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### AM transmitter

Sintronix has introduced the model SI-A-5 3-tube 5kW AM broadcast transmitter. The unit is self-con-



tained in a dual 30-inch frame. The low level RF and audio circuitry is located on eight plug-in modules. The SI-A-5 provides 125% positive peak modulation.

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**GE 12KW UHF TRANSMITTER**—With Channel 14 Antenna. \$18,000  
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**AMPEX VPR 7800 VTR's**—1" Format, 5 available ea. \$1,000  
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**RCA TT-10AL VHF TELEVISION TRANSMITTER**—Low Band, Spares \$8,000  
We will buy your used TV equipment. To buy or sell, call Toll Free 800-241-7878, Bill Kitchen, Quality Media Corporation. In GA call 404-324-1271. 9-79-tfn

**IKEGAMI HL-77A** w/9-118mm Canon Auto-Zoom, Genlock, AC power supply, cable & case. M. Schlansky, (212) 594-8700. 9-79-3t

**VIDEO EQUIPMENT:** Conrac 5522 12" Rack Mount Color Monitor; 3M 1114 SEG with Chroma Key, like new, (518) 439-7614, ask for Bob or Ted. 11-79-2t

## EQUIPMENT FOR SALE (CONT.)

**IKEGAMI HL-77A Camera**—Self-contained, equipped with a 14:1 zoom lens and built-in 2X extender, complete with genlock, AC power supply, chipcharts, quic release plate. **Cost: \$32,000.** All Mobile Video, Inc., 630 Ninth Ave., New York, NY 10036, (212) 757-8919 or 446-3835. 11-79-1t

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**STUDIO ENGINEER:** Competent VTR and studio maintenance engineer for VHF NBC affiliate. Experience required: Minimum of four years hands-on maintenance experience with Ampex VTR and state of the art switching equipment. Strong in digital technology. Located in the Black Hills area of South Dakota. Write or call Director of Engineering, KOTA-TV, P.O. Box 1760, Rapid City, SD 57709/605-342-2000. 11-79-1t

**AM/FM TRAINEE ENGINEER WANTED FOR HONOLULU.** Must have First Phone, also good knowledge of all fundamentals. Free car, tools and telephone provided. Call collect any morning between 6 AM and 8 AM Hawaiian time, (808) 923-7289. 11-79-1t

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**MASTER CONTROL AND PRODUCTION TECHNICIAN WANTED.** First Class Radio Telephone license required. Experience with Quad and 3/4" tapes, master control switching and production editing. Excellent salary and benefits. Send resume to Dept. 473, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. An Equal Opportunity Employer. 10-79-31

**50KW DA-2/50KW FM combination** looking for young, energetic Chief with the technical and administrative ability to take over. Immediate opening. Resume and salary requirements to: Michael J. Grady, Director of Engineering, Capitol Broadcasting Corporation, P.O. Box 4318, Charleston, West Virginia 25304. 11-79-11

**TELEVISION CHIEF ENGINEER**—for Herreich Broadcasting Stations. Experienced hands-on Chief Engineer wanted for rapidly-expanding UHF group-owned station in Fort Smith, AR. Applicant must have TV engineering supervision experience and FCC first class license. Heavy engineering maintenance experience a must. Send resume to Don Vest, Director of Engineering, Herreich Broadcasting Stations, Inc., P.O. Box 4150, Fort Smith, AR 72914, an Equal Opportunity Employer. 11-79-11

**TM PRODUCTIONS SEEKS ADDITIONAL MAINTENANCE ENGINEER,** extremely capable, familiar with multi-track gear. Send resume to Ken Justiss, VP/Operations, TM Productions, 1349 Regal Row, Dallas, TX 75247. No calls. 11-79-21

**TV STUDIO ENGINEER:** Progressive VHF TV & Production Studio has immediate opening for experienced maintenance engineer familiar with latest RCA studio equipment. Numerous benefits & salary open. Contact Chief Engineer WJBF-TV, P.O. Box 1404, Augusta, GA 30903. 11-79-11

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## HELP WANTED (CONT.)

**SENIOR VIDEO ENGINEERS**—Maintenance or Operators; in Post Production Services. Call or send resume. George Sharpe, JSL Video Services, Inc., 25 West 45th Street, New York, New York 10036, Tel. (212) 575-5082. 11-79-11

**TV MAINTENANCE ENGINEER**—Major West Coast independent. 4 years TV maintenance or related experience required. BSEE, TV and digital experience preferred. EOE. Send resumes to Personnel, KTUV Television, 1 Jack London Sq., Oakland, CA 94607. 11-79-11

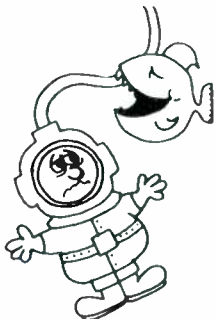
**TELEVISION MAINTENANCE ENGINEER:** ABC Network Affiliate needs an engineer with strong background in all areas of commercial TV Engineering. TCR 100 cartridge tape equipment, ENG experience and First Phone required. Salary commensurate with experience/excellent benefits. E.O.E. Contact Lewis Gordon, WTVC, Inc., Chattanooga, TN 615-756-5500. 11-79-21

**TV BROADCAST TECHNICIANS.** Established public television station moving to new color facility. West Virginia University and WWVU-TV has vacancies for technicians experienced in master control and studio maintenance and operations, or all phases of transmitter and/or microwave transmission systems. Send resume of qualifications and salary history to Jack Podaszwa, Personnel Officer, West Virginia University, Morgantown, WV 26506. An Equal Opportunity/Affirmative Action Employer, M/F. 11-79-21

**CHIEF ENGINEER** for South Florida group owned TV station. Must be a hands-on man knowledgeable in RCA equipment and SONG ENG. Resume to Box Dept. 468, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 8-79-11f

**CHIEF ENGINEER FOR WCCF/WQLM,** Punta Gorda, FLORIDA. Must be capable technician in AM/FM and automation. Good references required. Immediate opening. Permanent. Call (813) 639-1188. 11-79-21

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**ASSISTANT CHIEF ENGINEER** for South Florida group owned TV station. Must be a hands-on man knowledgeable in RCA and SONY ENG. Resume to Dept. 469, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 8-79-tfn

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10-79-2t

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## HELP WANTED (CONT.)

### TELEVISION ENGINEER

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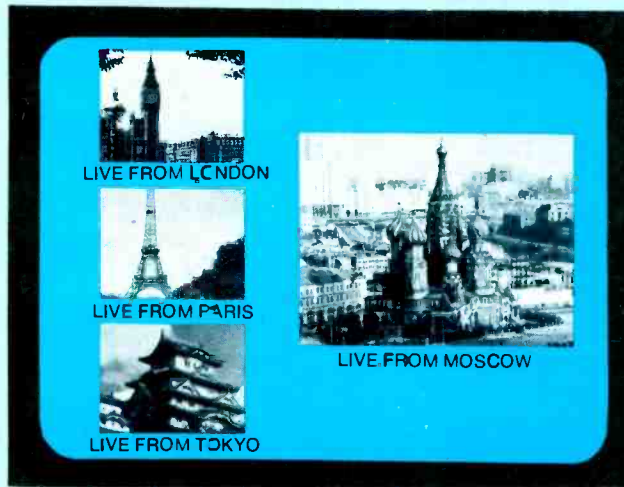
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