

DECEMBER 1976

# BME

BROADCAST MANAGEMENT ENGINEERING

## BEST STATION AWARD ENTRIES



# The reality of 5 footcandles.

Unretouched filmstrips of the Eastman Ektachrome video news film 7240 (tungsten)



ASA 125  
Normal studio lighting  
160 footcandles,  $f/4$   
Standard process



ASA 500  
6 footcandles,  $f/1.4$   
Forced 2 stops



ASA 1000  
100-watt bulb 6 ft.  
over model's head.  
5 footcandles,  $f/1.4$   
Forced 3 stops

Real life isn't always bright sunlight or floodlight. Sometimes, when you're on a terrific assignment, the light situation may be not-so-terrific.

Eastman Ektachrome video news film is capable of providing broadcast quality images down to 5 footcandles (with forced processing). And this can make the difference between picking up a good story beautifully—or having no story at all.

**EASTMAN EKTACHROME** Video News Film 7240 (tungsten), 7239 (daylight).

ASA 1000  
2 candles  
(not footcandles)  
 $f/1.4$   
Forced 3 stops



Film is good news.



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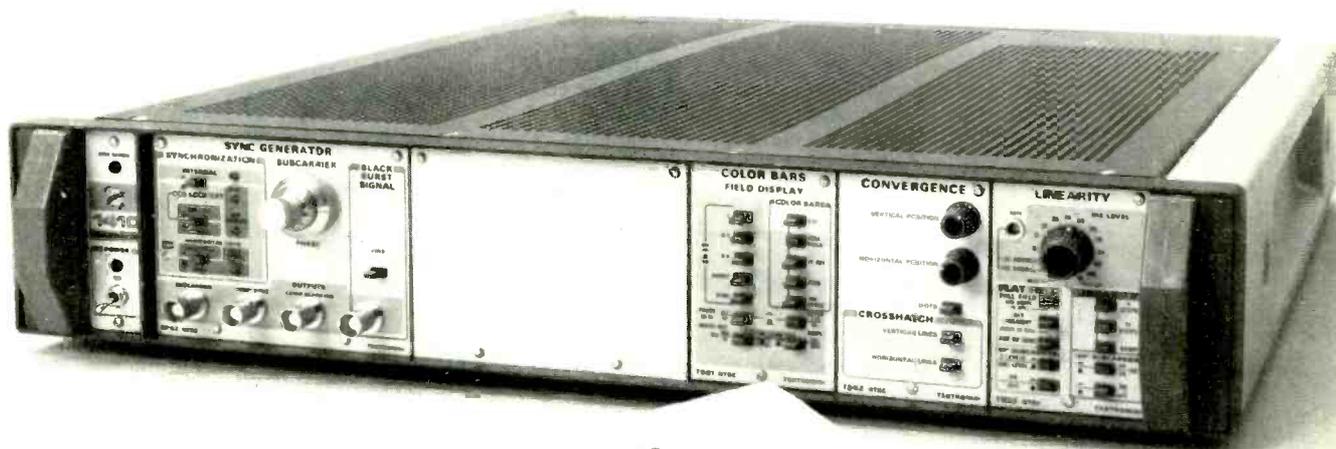
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- ✓ BLACK BURST
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- AND
- ✓ SYNC PULSES FOR STUDIO B

# BM/E

BROADCAST MANAGEMENT/ENGINEERING



This month's cover collage was composed from design and decor elements found in 1976 "best stations" (see p. 34). Illustrative credits other than stations represented go to Creative Studios and Westlake Audio, both of Los Angeles.

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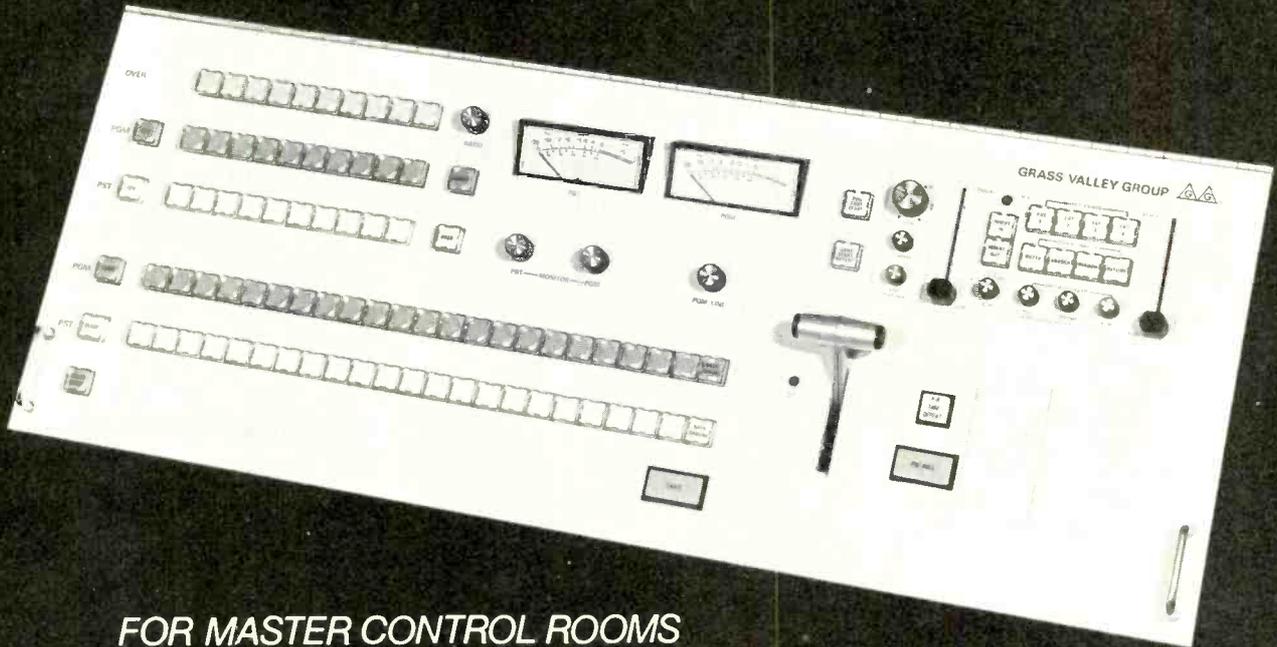
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# BROADCAST INDUSTRY NEWS

## Broadcasters Show Excitement At Satellite Meet

Keen interest in satellites was shown by the over 80 broadcasters who attended an earth station technology conference conducted by Scientific Atlanta, October 13-15.

As the conference opened, S-A announced the first network affiliated station to acquire a transmit and receive earth station: WBEN-TV, Buffalo. WBEN will use this equipment to transmit sports programs originating in the Buffalo area and Canada to TV stations in other cities requesting these feeds. This station will also be used to receive sports programs when Buffalo area teams are playing away from home.

Current users of satellite channels—Roy Sharpe, Hughes Television Network, Maurice Shonfeld, ITNA, and Robert Wold, Robert Wold Co.—spoke glowingly of future prospects.

Sharpe described the creation of several specialized networks (see *BM/E*, Oct. p. 58) made possible as a result of satellites. Shonfeld said the new independent television news association would not be viable if it were not for the lower cost of satellite distribution. Wold said the top 50 markets should have earth stations for discretionary program exchange and he announced that he was forming a new common carrier "partnership" company to build stations in at least 30 markets. Wold has given a letter of intent to S-A to cover the purchase of 30 systems.

Broadcasters showing most interest in satellites at this time are 1. Independ-



*Microwave link ties satellite station site with downtown transmitter.*

ents who either survive on sports or who want the INTA news feed, and 2. network affiliates who are either in big sports towns or unusual entertainment centers (such as Nashville or Las Vegas).

Sports clubs see the satellite as the ideal way to bring away-from-home games back to fans. They are encouraging this more. But as a quid pro quo, the club would allow home games to be telecast only on pay cable or pay TV.

The S-A conference impressed broadcasters with one other not-so-self-evident truth: satellite technology is not experimental. Rather, it is field proven. All of the components of a receive or transmit earth station are off-the-shelf items.

## IBEW Proposes Permanent SMPTE Panel on Labor

IBEW took the opportunity presented by a panel discussion of Labor in A Changing Technology at the 118th SMPTE Technical Conference to propose that the organization set up a permanent committee to deal with the subject of labor and technology.

The proposal, set forth by Jarret L. Jennings, Assistant Business Manager, IBEW Local #1212, called on SMPTE to "form a permanent committee dealing only with all aspects of "Labor in a

Changing Technology."

The committee, said Jennings, should consist of broadcast management, organized labor, education, and manufacturing interests, and should investigate the existing problems caused by advances in technology. Such a committee should also investigate future trends and advances and establish guidelines and requirements for educational institutions involved in training people for broadcast careers.

## NBC Quits On All-News NIS For Radio

Because the operation was far below a profitable level and gave no indication of moving that way, the National Broadcasting Company announced that its News and Information Service, a 24-hour centralized news feed to subscriber radio stations, would be terminated in mid-1977. The service, described in detail in *BM/E* (April, 1976), supplied radio stations with 23 to 47 minutes of news and feature material every hour around the clock. NBC had hoped for 150 subscriber stations and 750,000 listeners by the end of 1976, but the total were 62 stations and about 200,000 listeners with a downtrend in evidence. NBC officials said the network would give subscribers help in restructuring their programming to take account of the loss of NIS. Herbert S. Schlosser, NBC president, said that "... NBC's commitment to radio remains strong ... in the last year we have made significant progress in strengthening the NBC radio network and the NBC-owned stations."

## Copyright Law Would Free CATV of Distant Signal Rules

Burt I. Harris, chairman of NCTA urged the FCC to do away with restrictive rules that have served as "copyright substitutes."

Harris claimed that the FCC's major rationale for rules restricting the importation of distant signals rested upon "cable's failure to 'pay' for programming it received." Now, with the institution of the 1976 Copyright Law,

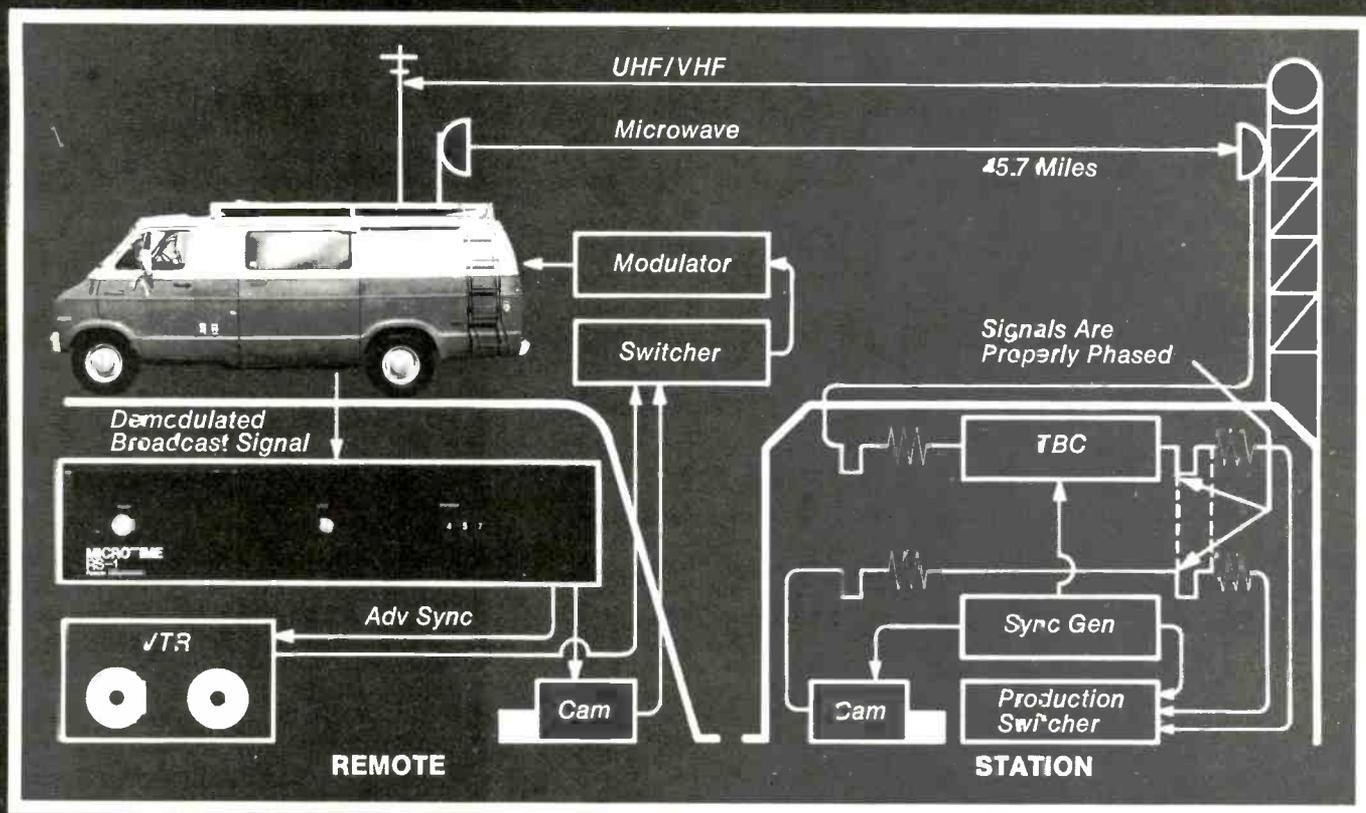
continued on page 8



*S-A conference delegates visited Turner Communication's WTCG (Ch. 17) transmit-receive satellite station.*

# RS-1

## Remote Synchronizer



**Synchronizes remote camera or VTR to station without costly frequency standard or frame synchronizer**

**Phases remote signals for mixing-effects with station video**

**Provides 3.58 feedback to remote VTR to time base correct video at station in direct color mode**

**Use with any TBC located at station**

The RS-1 Remote Synchronizer is an exciting new device for direct airing of remote camera or VTR feeds up to 59 miles away from the station. Priced under \$4,000 the RS-1 replaces costly rubidium/cesium standards or frame storage units to synchronize remote video feeds with station signals for use through a production switcher.

The RS-1 locks to demodulated broadcast signals to generate a camera or VTR sync reference that is advanced to compensate for the transmission path delay and the remote signal's return path delay. The remote signal can then be time base corrected at the station with station sync reinserted to prevent closed loop effects and to fully phase

the remote signal with station video for direct airing, editing, etc.

The amount of sync advance generated by the RS-1 is determined by the distance between station and the remote location. A front panel range selector on the RS-1 corrects phasing up to 1/2 mile accuracy while the fine tuning range control corrects phasing to within 140 feet. A front panel selector provides advanced black burst for up to two cameras or a three line advanced composite sync reference for VTR's.

The RS-1 allows any TV station to program live remote broadcasts within a reasonable budget.

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# MICROTIME

## NEWS

which becomes effective in January 1978, CATV systems will be required to pay for the carriage of all distant non-network television programs. "Irrespective of the original merits of this position (non-payment for programs), it is now moot," said Harris.

Harris dismissed the argument that CATV's importation of distant signals would have an adverse impact on local broadcasters as "virtually groundless."

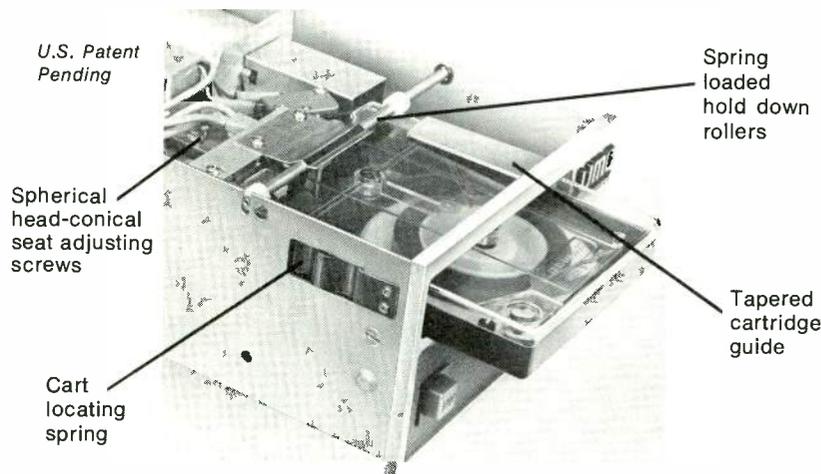
But Vincent T. Wasilewski, NAB chairman, presented an analysis of Nielsen data and FCC financial data to Congressman Lionel Van Deerlin (D-CA), chairman of the House Communications Subcommittee, that indicated importation of distant signals would result in loss of revenue for local broadcasters.

In his letter to Van Deerlin, Wasilewski said a summary by NAB of Nielsen data shows that in the 23 three-station markets for which information is available, local stations share of viewing is 21.6 percent lower

in cable households than in non-cable households. In 54 markets with less than three stations, the reduction is 34.3 percent, and in 22 markets with more than three stations, it is 13.2 percent lower.

In further support of the NAB claim that importation of distant signals will injure broadcasters, Wasilewski cited recently released FCC financial data for 1975 that show nearly one-third of the stations in the markets below the top 100 lost money in 1975 and one-half either lost money or earned less than \$100,000. "... (T)he full impact on stations of the present distant signal rules has yet to be felt," said Wasilewski, and he warned of a continuing erosion of those rules by the FCC. The most recent change, that concerning "leapfrogging," will not affect station ratings until this fall at the earliest, according to the NAB president.

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## TV Makes Elections Unpredictable

A Temple University political science professor claims that his research indicates that the use of television for political campaigns will result in a "greater probability of unpredictable individual electoral outcomes and more wildly fluctuating outcomes over time."

According to Dr. Richard A. Joslyn, "by relying on 20, 30 and 60-second spot ads, candidates can communicate with these voters" (undecided, uninterested, and non-partisan) who otherwise would not voluntarily expose themselves to political propaganda. According to Dr. Joslyn, the greatest amount of "learning" takes place among the undecided voters.

Another result of political television advertising is reduced candidate dependence on the party structure. If political advertising is determined to be more effective than personal voter contact, then the role of money in campaign coffers will be more important than the manpower available in political parties. Already some candidates are using commercials in which they minimize their party affiliation and maximize their personal accomplishments or appeal. This increases the opportunity for "short-term" defections by voters from their normal party affiliations.

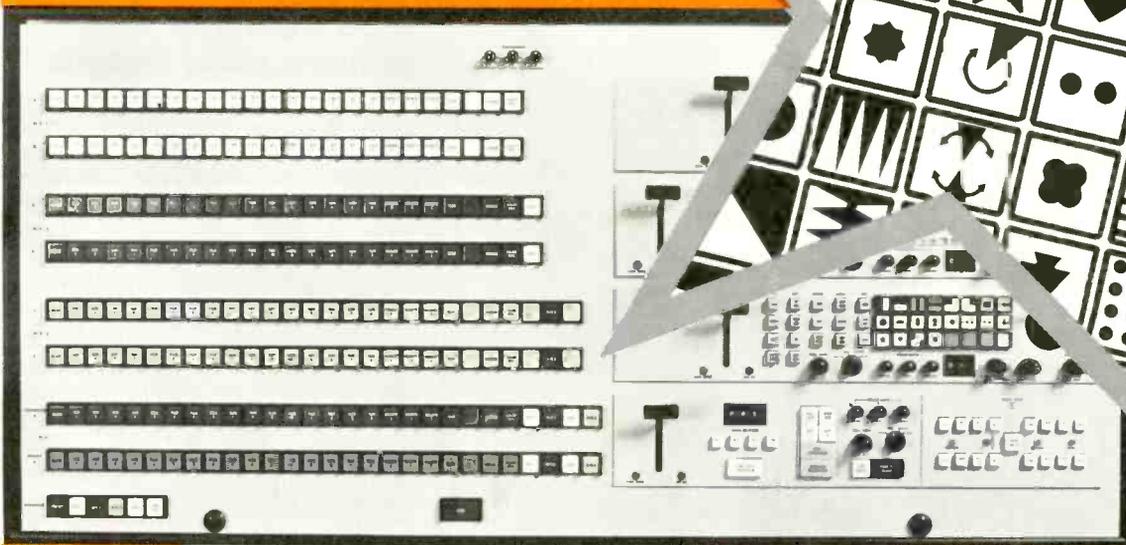
## "Bell Bill" Rings Sour Note

The president of the NCTA and the president of a major satellite communications firm blasted the so-called "Bell Bill" before the House Communications Subcommittee.

The proposed legislation, entitled Consumer Communication Reform Act of 1976 (H.R. 12323), and dubbed the

continued on page 10

# in Switching. the Star is Vital



- 12, 16, 20, or 24 inputs. 4 bus, 6 bus, 8 bus or more bus systems.
- All digital waveform and quad split generators.
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Do not fear to discover a superior product in the VIX-114 series switchers. Ask to see the demo tape for a sample of what we can do for users of switching equipment. You'll like it.

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## NEWS

"Bell Bill," by its critics, is a "thinly disguised effort on the part of established telephone and telegraph industries to legislatively reverse a series of FCC and court decisions which have selectively opened up various areas in the communications field to competition," charged Robert L. Schmidt, president of NCTA.

Schmidt said that the cable TV industry is strongly opposed to the telephone company sponsored legislation which

would limit or prevent CATV from competing with telephone companies in such areas as "home shopping, security systems, data communications, and other emerging communication services."

Similarly, Emanuel Fthenakis, president and chief executive officer of American Satellite Corporation, charged before the same committee that the proposed legislation "is inherently anti-competitive and anti-consumer in nature and impact."

Fthenakis said that American Satellite had demonstrated a responsiveness

to the special requirements and new service needs of various private line users, at a time when AT&T was alleging that such service arrangements were technically impracticable or unreasonably expensive.

Schmidt testified that "pursuant to the bill's provisions, new entrants in the communication field must prove in a full evidentiary hearing that the service to be provided will neither harm nor be duplicative of services which are provided or *may be provided* by established monopolies." Such a provision constitutes an unreasonable burden of proof to the new entrant since he must prove a "negative" with "facts" in the exclusive control of the established carrier, according to Schmidt.

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Now you can erase cartridge tape and locate the splice in the same operation automatically — without chance for human error. Simply insert your cartridge and press the start button. There's nothing else to actuate or hold down. When the splice is located, the machine automatically releases the cartridge — fully erased!

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## Video Expo '76: Technologically Eclectic

This year's Video Expo presented nearly 6000 people with a sort of "Whole Earth" exhibit of video technology. Visitors to the exhibits examined everything from \$100,000 VTRs to \$485 video switcher/faders with equal interest.

The show reflected a trend in this portion of the market that is marked by an increasing technological sophistication of the industrial and institutional users on the one hand and a continuing lack of uniformity on the other. Unlike broadcasting where the basic entrance into the industry comes with a rather high ante, the non-broadcast video user is in the game with anything from a few dollars to a barrel of money.

The audience for the exhibitors consisted of mostly corporate and education types with a liberal sprinkling of commercial and industrial producers. Broadcasters were present but in relatively small numbers. Exhibitors who had done their homework prior to the show displayed a potpourri of equipment. Sony Corporation exhibited everything from their Broadcast ENG camera and a new line of color monitors, to a tiny remote controlled, low-light level surveillance camera. Philips Audio Video Corp., displayed equipment that ran the gamut from a \$36,000 LDK-11 to a circa \$2,000 CV-550 color camera.

Perhaps the most interesting item introduced at the show was a 2-hour, 1/2 in. cassette recorder/player, the V-Cord II from Sanyo. Sanyo has developed several models for both the industrial and consumer markets. The industrial version, Model 8400, will sell for approximately \$1160 with its consumer model sporting some cosmetic changes and options like a tuner/timer and built-in RF output and a slightly higher price.

The big broadcast manufacturers were present showing those items

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## Introducing a Color Corrector for Electronic News Gathering.

Electronic News Gathering makes tough demands upon the broadcaster. Color imbalance and colorimetry problems are frequently encountered. Matching remote camera shots to indoor studio programs or assembling tapes from different locations or cameras is "chancy" at best. Often that fast-breaking story doesn't allow for camera rebalancing!

Thomson-CSF Laboratories now provides a solution to such difficult encoded signal color problems. With the Model 5500A Color Corrector, you'll be able to rebalance and match video signals *after* encoding. It can be used either after the play-back tape machine or following the microwave receiver during live coverage. In most cases, a noticeably improved color picture will result. For ease of operation, a Remote Control unit is included as standard equipment.

As an added feature, an optional automatic Sensor unit is also available to control the Color Corrector for telecine use.

Whether for Electronic News Gathering, tape production or telecine use, the Thomson-CSF Laboratories Color Corrector System should be working for you. Interested? Give us a call.



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sued to the industrial—educational market. IVC and Ampex both showed their 1-in. video systems. The Ampex VPR-10, portable color helical-scan VTR, especially designed for ENG, was shown here in the U.S. for the first time. IVC was showing the Bosch-Fernseh system which they will modify for the American market and manufacture under license. This system will be known as the IVC-8000 series and should be ready by NAB convention

time.

Cameras were in abundance. The Broadcast Products Division of Harris Corp. ran the full gamut of cameras, reflecting their understanding of the widely disparate market. They showed the TE-301 color camera which features a compact and uncomplicated 40-lb. package, the medium priced, no-frills TC-50, and a top-of-the-line, TC-80 featuring Triax as an option. Hitachi brought out their SK-80, back-packless ENG camera priced \$24,600 without the lens. Philips showed their LDH-20 and was offering it in a special

industrial-configuration for \$15,000. Ikegami had both the HL-37 and HL-77 cameras on display in addition to their other cameras and video devices. Most of these cameras have previously been seen by broadcasters but this was the first time they had been shown to a primarily industrial-educational audience. Surprisingly, high-end equipment and its prices did not seem to scare off that many Video-Expo participants.

In addition to the interest in improved recording equipment, editing devices grabbed a lion's share of the crowds. Convergence Corp.'s PC-3 edit-control computer and TT-4 and TT-5 tape timers had continuous crowds of interested users. The industrial-educational users without SMPTE time code experience or prejudice found the pulse counting system easy to adapt to and easy to understand. Spectra Vision showed their systems as well and exhibited some lower priced models that seemed well suited to this market. Datatron demonstrated their Tempo 76 editor which is capable of controlling up to three cassette editors and three SMPTE time code readers simultaneously or operating with control-track pulses.

The word from those on the floor of the Madison Square Garden exhibit area was that equipment is becoming more flexible and less expensive in terms of realized advantage. Moreover money to purchase the higher technology is becoming available. Last year's Expo did not earn high marks in the volume of orders taken but this year order writing was quite good.

One of the few areas in which there was no participation by the big broadcast manufacturers was switchers. Nevertheless, switchers were in abundance and some were even ingenious. Sharp Electronics showed a \$2000 switcher/S.E.G. called XEG-2000. It is a compact desk-top or rack-mounted device with up to 5 inputs. A "take-bar" replaces the need for a second buss bank. The camera on program is signaled by a steady red LED while the camera on preview has a flashing red LED. When the operator desires to take the previewed camera feed, he hits the take bar. Fades and wipes are automatic between the program camera and preview, and the rate of wipe can be adjusted. A joy stick also permits manual wipes and dissolves.

But the price competition is stiff. ECHOLab, Inc. premiered a \$1300 SE/2C color special effects generator capable of handling up to four composite or non-composite video inputs. Six special effects are possible including ellipse/circle wipes or key.

The range of video equipment can best be demonstrated by the mini "Hip-Switcher" manufactured by

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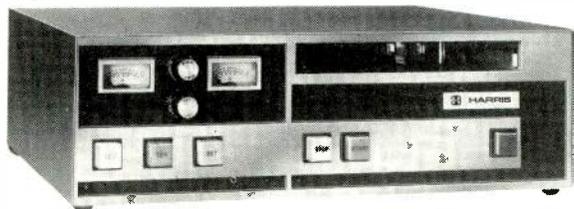
## We've packaged our compact Criterion three different ways.

**Criterion I** ... only 8-1/2" wide. Direct capstan drive comparable to the finest reel-to-reel machines. Speed accuracy of 0.2%. 1, 2 or 3 cue signals available for automatic equipment. Handles A & B cartridges. Mount two units side by side in a standard 19" rack.

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**Criterion III** ... combines three playback decks in a single compact unit. One, two, or three decks may be operated at the same time, each feeding a different program input. Handles A & B cartridges. Mount twin playback units side by side in 12-1/4" rack space.

For more information, write Harris Corporation, Broadcast Products Division, Quincy, Illinois 62301.



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**Harris...originators of the tape cartridge machine.**

**audiopak A-2**  
BY CAPITOL

# The broadcasters' choice for reliable playback.

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50  
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BY CAPITOL  
professional broadcast cartridge

## The Audiopak® A-2 by Capitol® Broadcast Cartridge.

Broadcast engineers rely on Audiopak® A-2 Cartridges for good reason. All of the major components are assembled to get you from point A to point B. With efficiency and precision. For example, the constant-force, foam pressure pad assures unvarying head to tape contact over the life of the cartridge. The positive, non-slip brake mechanism locks the tape, rather than the hub, assuring accurate cueing and timing. The strong durable housing is yet another factor contributing to its reliability.

And to assure you of premium performance, each part is individually tested — 100% — for wow and flutter, electrical output, tension, and other properties. And because we manufacture the entire package — from tape to packaging — we can assure you of the highest possible quality control.

After a while, no other tape manufacturer knows professional recording and duplicating needs better than Capitol.

AUDIOPAK® A PROFESSIONAL PRODUCT MANUFACTURED BY THE SAME PEOPLE WHO MAKE AUDIOTAPE®, AUDIOFILM™, AUDIODISCS® AND THE LEARNING TAPE™ BY CAPITOL®

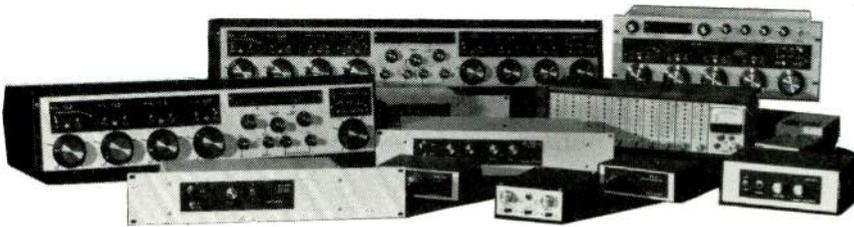
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BY CAPITOL



CAPITOL MAGNETIC PRODUCTS A DIVISION OF CAPITOL RECORDS, INC., 1750 NORTH VINE STREET, LOS ANGELES, CALIFORNIA 90028

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# 58 SOUND REASONS FOR RAMKO AUDIO.



YOU HAVE PROBABLY KNOWN for some time that Ramko manufactures a wide variety of advanced broadcast equipment. For example we manufacture Audio Consoles, Turntable Preamps, Mic/Line Amps, Audio Distribution Amps, Studio Monitor Amps, Mic/Line Limiters, Cart Winders, Solid State Meters and various console accessories. We add to our product line as industry needs dictate — 57 different products to date.

YOU MAY NOT KNOW that Ramko now manufactures 9 separate console models. The price range will fit any budget — from \$695 to \$1880 for our dual 8-channel mixer stereo model. And of course we design and manufacture custom consoles for special requirements.

THESE ARE VERY UNIQUE AUDIO CONSOLES containing exclusive features not found in other consoles 5 times more expensive. DC controlled audio attenuators, solid state

touch-pad switch, plug-in modules, solid state 'VU' meters, RF suppression, input gain select, patch panel monitor and cue mute select are only a part of the difference in advanced technology.

THE 58th SOUND REASON for doing business with Ramko is just as important as the other 57. It's called customer service.

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WE WOULD LIKE TO TELL YOU MORE ABOUT OUR PRODUCTS. Call Collect, wire or write for our new catalog. There are 58 sound reasons for doing so.

## RAMKO RESEARCH

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Adwar Video. This "black-box" is made to switch, fade, or dissolve between two cameras. Ideally, it is used in the field with handheld cameras and can be operated by one of the camera people. The operator can preview the other camera output on the in-camera monitor and handle the switching task with the "Hip-Switcher" hanging on his belt.

The level of sophistication in the market is growing. For once, ancillary equipment such as time base correctors and image enhancers were getting their fair share of attention. Consolidated Video Systems and Microtime had steady interest from visitors to their booths who indicated that the advantages of video processing were becoming well understood by the industrial user.

In fact, this year's typical visitor had a level of understanding unknown in this market just a few years ago. The questions fired at booth representatives showed savvy and a dollar consciousness. At Kodak's exhibit, where they demonstrated the VPX-1, Super 8 Video Player, the visitors would ask to have the player put through its paces, using 16mm film transferred to Super 8 cartridge or original Super 8, and compared side by side to original video. The quality was very good (slightly better with the original Super 8). The questioners showed that what they wanted was a relatively inexpensive film to tape transfer system, specifically for utilizing Super 8 footage that might be recorded as inserts to a video problem.

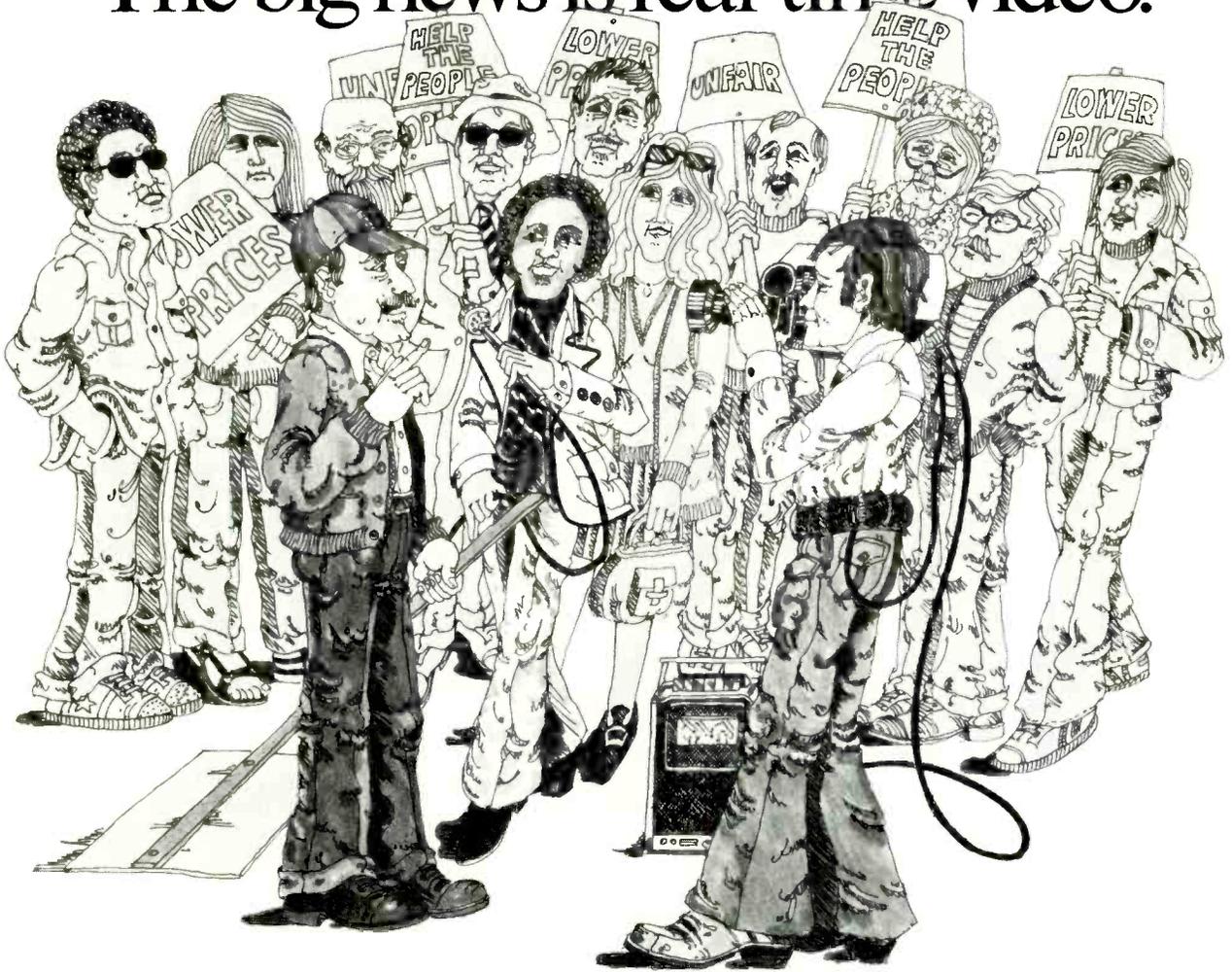
Judging from the diversity of the equipment shown and the diversity of interest on the part of the participants, the modern industrial video facility is likely to resemble a sort of "newly monied" living room with the super-sophisticated sharing the same 19" rack with a dilapidated "black box" of nondescript lineage. But as equipment gets better and cheaper, the industrial user is prepared to take advantage of it.

### Videocassettes And Projection TV Dominate Vidcom

The 5th Vidcom at Cannes, Sept. 23-28, included Mipcom (international market of communications programs) and vestiges of a cable TV show, yet it turned out to be little more than a forum of producers, production houses and equipment manufacturers talking to themselves. Very few video users, aside from those who were on the extensive five-day program, attended. Presumably the registration fee of \$325

continued on page 16

# The big news is real-time video.



## Ampex ENG is on the scene.

Ampex ENG products are best because we took the time to bring you true quality in portable equipment. With a reputation like ours to protect, we couldn't risk hanging a hundred pounds of batteries on the back of an ex-lineman and sending him into a crowd.

BCC-4, for example, is the ENG camera that feels like a film camera and shoots like a studio camera. This full-color midget is as stingy with power as it is generous with picture quality.

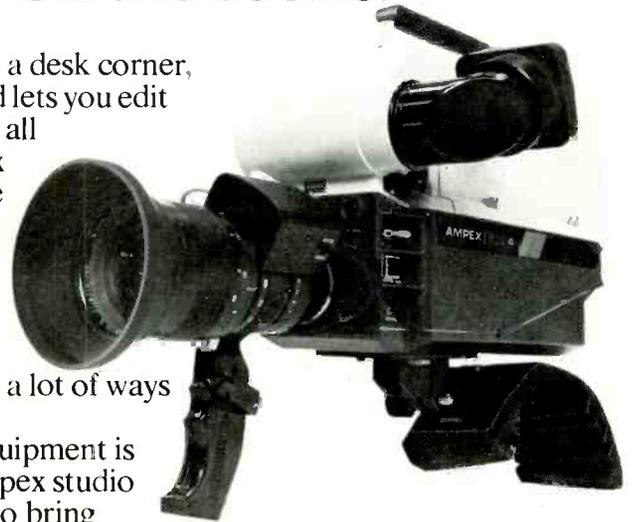
And the portable VPR-4400 isn't much larger than the 3/4-inch videocassette it uses. But it brings back a tape that has everything the camera saw, and everything the mic picked up.

Back at the studio, the

VPR-8300 hides on a desk corner, plays back tapes and lets you edit the segments easily, all with famous Ampex video fidelity. Route the signals through a TBC-1, and you're on the air with steady, time-corrected program material. You'll find a lot of ways to use this system.

Ampex ENG equipment is a nice match to Ampex studio equipment. A way to bring back location material that doesn't fight with your studio-originated material. Quality without a backache.

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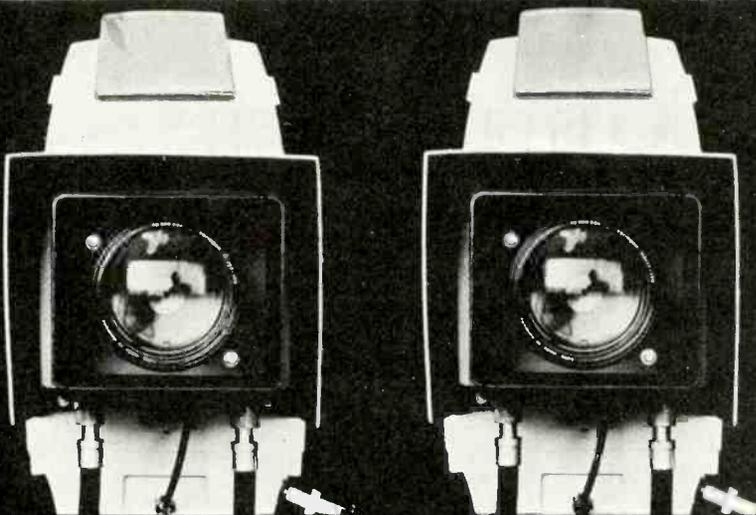
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## NEWS

for the full five days caused many prospective visitors to wonder if they would get their money's worth aside from a French Riviera vacation. Those who stayed home didn't miss a great deal. The conference had its high points but it also had some lows. A program entitled Video Future was nothing but downbeat.

The subject of video discs, which had dominated earlier Vidcoms, was barely discussed. Thomson-CSF gave the only paper on the subject. The only video disc equipment on display was that shown by Magnetic Disc Recording of Nurnberg, Germany. The disc, being magnetic, allows for recording as well as playback thus distinguishing itself from the Thomson-CSF, MCA/Philips and RCA versions. MDR inventor Hans Rake says the system will be introduced in the U.S. through an unidentified Boston manufacturer in 1977.

With little new to be said on behalf of the yet-to-emerge video disc market, Vidcom tended to come off as a video cassette show and, surprisingly, a projection TV system show. In fact, Cannes became the launching site of one brand new projection system, the Zygma 2001. The new system is the product of a new company, Zygma Electronics Ltd., 21 Upper Brook St., London, W1Y 2AR, U.K., and it claims to produce 25% more light than other units. The price is about \$7500. Color pictures on the screen measure 7' (diagonally) and offer a 90° viewing angle. The system operates on 16 channels, NTSC, Secam and PAL.

Others showing projection systems were General Electric, Iris Television (France), Projections Systems Inc., and TeleTheatre. The president of Advent was also at Vidcom as a member of a panel.

The most interesting papers were those which described successes and difficulties in establishing video networks. Rory Kaplan, CK Communications, U.S.A., excited a number of visitors with her description of Vidmart, a private videotape program produced for the National Assn. of Chain Drug Stores but underwritten by pharmaceutical houses. A magazine format is used with limited time for commercials. Criteria for success of video networks, said Peter Funk of IVS, is finding someone other than the viewer who will pay for programming and distribution.

The future role of "home" cassette systems such as Sony's Betamax and Sanyo's V-Cord II was painted very bright by Bob Pfannkuck of Bell & Howell—both for home use and educa-

continued on page 18

“ This is probably a terrible conversation to have during the dead of winter (Eastern style, that is), but Broadcasters who have visited our California marketing headquarters on the beautiful Santa Barbara coastline tend to identify us as the “Sea-Tek” Broadcast Group.

Curiously, we actually pronounce our name “SEA-TEK” . . . with an S, and an E, and an A, for your S-E-A . . . with a T, and an E, and a K, for your T-E-K—SEA-TEK.

However, when we print it, we spell it Cetec . . . with a C, and an E, and a T, and an E, and a C.

Well, enough of this. There's a lot more from the good group at Cetec on the following page.

Read on . . . ”

## NEWS

tional-industrial applications. In terms of reducing tape costs, the new systems are significant: EIAJ standards call for 100 square feet per hour; the Philips VCR uses 80; the ¾ in. cassette, 70; the Betamax, 20; V-Cord, 16. Translating this into duplicating costs, for 25,000 copies, one hour, Pfannkuck estimates the MCA disc to be \$1.34 per copy, RCA, \$1.31, V-Cord, \$2.98 and Betamax, \$3.10. For two hours, costs are MCA, \$2.60, RCA, \$2.50, V-Cord, \$4.49 and Betamax, \$6.19 (two cassettes).

Assuming a four time mark up, \$10 for a video disc movie seems achievable and at this same multiple, a tape would be \$17-18. However the tape is reusable so a premium for it is reasonable, said Pfannkuck.

These figures point to the viability of tape right now—and a place in the future. Before video discs prove themselves, a great many customers will have to buy players.

Since tape units can acquire programming off the air (or from cable TV), Pfannkuck feels the future prospects for tape players is good indeed.

One of the more positive events taking place at Vidcom was the International Tape Assn. meeting. Business

for members is good, said executive director Larry Findley. He put out a call to set up a European chapter.

### New Cameramen's Guild Seeks North American Expansion

Formed in May 1972 with 37 cameramen from Independent Television and the Facilities Companies in the United Kingdom, the Guild of Television Cameramen is now seeking new members from the ranks of the profession in Canada and the U.S.

The Guild now has some 450 members from Europe and Canada and, according to R.J. Hibberd, publicity officer for the Guild, hopes to encourage participation by US cameramen. Chief among the goals of the group is to obtain input from cameramen to manufacturers regarding development of new equipment.

Recent achievements of The Guild include 14 modifications to the IVC 7000 P camera and the Vinten Fulmar pedestal.

Information on participation in the Guild can be obtained from Mr. Hibberd by writing to him at Guild of Television Cameramen, International Section, 5 The Lettons Way, Dinas Powis, South Glamorgan, CF6 4BY, U.K.

### English Are First To Get Optical Waveguides At Home

Thirty-four thousand cable television viewers in the Hastings area of England are believed to be the first in the world to watch TV programs brought to their receivers over strands of glass rather than wire.

Since March of 1976, Rediffusion Limited of London has been using a 1.427-kilometer length of optical cable, which was inserted into its existing network in place of metallic-conductor cable. The cable was manufactured by BICC Telecommunication Cables Ltd., using glass strands made by Corning Glass Works in the US.

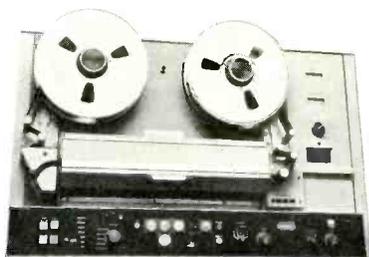
In addition to the greatly expanded information capacity of optical cable, Corning spokesmen note that, whereas the cost is already comparable with metallic conductors, when normal commercial installation becomes feasible in perhaps 3 years, costs will drop dramatically. Corning has already offered to take orders at \$.10 per meter.

### News Briefs

CBS Radio Network analysis of May 1976 Arbitron Reports indicate that

continued on page 20

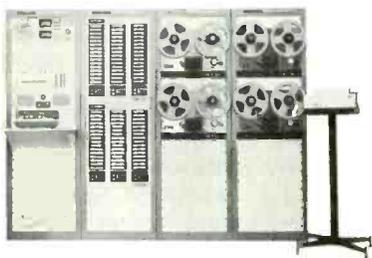
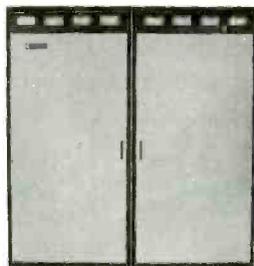
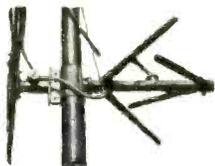
## R-MOD ⇒ INTELLIGENT VTR



### R-MOD now provides *AUTO-CUE*

R-MOD is the Reel-Servo Modification kit that makes old quads handle tape like the latest "intelligent" VTRs. Now with AUTO-CUE, R-MOD has the ability to remember, with frame accuracy, a cue point selected when the HOLD button on the timer is pressed. When the HOLD button is pressed again, anytime the VTR is not in play mode, R-MOD will search automatically and stop at the preroll position. Cost? This new feature is available at no increase in price to all R-MOD customers—past and future!

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## You may not know that Cetec is one of the major producers of radio broadcast equipment. Maybe you should.

Cetec Corporation's major divisions in the broadcast equipment business are now united to meet your expanding needs! The specialists that make up the Cetec Broadcast Group are:

**Cetec Schafer.** The World renowned leader in radio automation, with a tradition of quality and rugged dependability. Schafer manufactures a wide line of automation for every format and station size . . . all with features that you won't find anywhere else.

**Cetec Sparta.** The people with a new generation of transmitters including both AM and FM all-solid state models. Sparta is also the recognized value leader in audio consoles, with a size to fit every application and every budget.

**Cetec Jampro.** The antenna specialists with circular FM antennas for every power level . . . each with performance specifications second-to-none. Jampro is now the

company with a circular TV antenna for either VHF or UHF, too!

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the typical radio listener is not much of a dial-twister, regardless of the number of radio signals in market or the size of the market. In the top 10 markets the average number of radio stations listened to per person, per week, is 2.6; in the markets 152-161, the average is 2.0 . . . CBS radio researchers also reported their analysis of **RADAR XIII** which showed that the middday radio audience, widely assumed to be female, does in fact, include a large

male audience—nearly one in every four adult men (18 and over) listens to radio for a ¼ hour on the average weekday between the hours of 10:00 AM and 3:00 PM.

**Business Briefs**

RCA announced the purchase of \$1 million worth of TV transmission and studio systems by **WETA-TV**, the Washington, D.C., public television

station and an order for TV transmitting equipment valued at approximately \$425,000 from the South Carolina Educational Television Commission.

Overseas, **RCA** contracted to deliver 6 TCR-100 videotape cartridge machines to 6 Australian commercial television stations and received orders from TV Studios Silvio Santos, Ltd. in San Paulo, Brazil for TV transmitting systems, studio, and remote production equipment totaling approximately \$1.4 million.

**Ampex Corp.**, has been awarded a contract valued at approximately \$1 million by the General Services Administration to supply professional audio and video equipment to federal government agencies. Included in the order are Ampex AVR-2 and AVR-3000B quad videotape recorders, VPR-1, VPR-4400 and VPR-8300 helical videotape recorders and several of the Ampex audio recorders.

**Pye TVT Ltd.** of Cambridge, England began a massive airlift of 40 tons of radio, TV, and microwave equipment to Indonesian Television as part of a nearly \$2 million contract . . .

**Scientific Atlanta, Inc.** has received an order from **WBEN**, Buffalo, NY, to furnish and install a video transmit and receive earth station. **WBEN** plans to use the installation to supply sports programming to other television markets. **Cox Cable Communications, Inc.** has selected Scientific Atlanta's Series 6500 Distribution equipment for their Norfolk, Portsmouth, and Virginia Beach, Virginia system. It is anticipated that the total usage will approach 2,000 miles over the next 24 to 30 months.

**WSFA-TV**, Montgomery, Ala., will erect a "tall tower" which will rise some 2,000 feet above its Grady, Ala., site. The tower will be fabricated by **Kline Iron and Steel** of Columbia, S.C. . . . **Ikegami** has announced plans to distribute its line of CCTV equipment through a national network of qualified dealers.

**Image Transform Inc.** put in more than 120 manhours restoring the film classic, "Gone With The Wind," for its premier television presentation last month on NBC. The work included noise reduction, image enhancement, and scene by scene treatment of color balance, contrast and brightness.

**WFMT's** classical music and fine arts programming is now broadcast to Chicago area listeners on AM as well as FM from their new facility licensed to Cicero, IL . . . **Swanco Broadcasting, Inc.**, Tulsa, OK, has added two Fort Worth radio stations, **KFJZ** and **KWXI-FM**, plus a new subsidiary, **CPI Radio, Inc.** CPI operates the more than 130 station Texas State Network, Continental News Service, and Servi-

continued on page 23



**Nobody has it like  
the new Spotmaster 3000 Series**

Here's the 3200RPS — a stereo cart machine with all the standard features: large air damped solenoid, a direct drive synchronous motor; and a rugged machined deck.

*PLUS* the Spotmaster exclusives: Phase Lok III head bracket for optimum stereo phasing; a superior, up-to-date, modular electronic package; a unique cartridge guidance system; and a full range of options including manual fast forward.

The 3200RPS is a full feature, top quality, stereo record/playback machine yet it is only 7¾" wide. Two Model 3200's go side-by-side in a standard 19" rack. Available for stereo or mono in playback and record/playback models.

For details call or write Broadcast Electronics, 8810 Brookville Road, Silver Spring, Maryland 20910. Telephone: 301/588-4983.

**BROADCAST ELECTRONICS, INC.**  
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# PEACE OF MIND.

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When your problems have optical solutions, we can offer you the most comprehensive

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It's a paradox, but the newest company in the refurbished video head business is also the most experienced. This comes about because the people who established Videomagnetics have been in the field for more than 20 years and have the kind of technical, manufacturing, and business know how that it takes to succeed and to meet your needs.

It all boils down to three basics: 1) a product better in all ways (including price), 2) experienced people and sophisticated facilities, and 3) a sound operational position coupled with business acumen. Videomagnetics has them all.

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## NEWS

cio Informativo en Español.

**Electronic Modules Corp.**, has signed a subcontract in excess of \$600,000 with Tethered Communications, Inc., to supply the payload telemetry and command system for TCOM's Nigerian communications system. The Nigerian system will employ tethered balloons, called aerostats, to support transmitting and receiving equipment at altitudes of 10,000 and 15,000 feet.

**Arvin Systems, Inc.** announced that **Echo Science Corp.**, its wholly owned subsidiary, has acquired **Pemtek, Inc.**, manufacturers of a multi-channel I.R.I.G. tape recorder. Pemtek's operations will be consolidated in Echo's Mountain View, CA, headquarters.

**TeleMation** has announced an agreement with **Video Data Systems** for the exclusive sales and marketing of VDS character generator products and automated services in the U.S. and all other countries except Canada, where distribution will be limited to certain products. . . . **Shintron Company, Inc.**, of Cambridge, MA will market the entire line of **VEDCO** products, including routing switchers, distribution amplifiers, and other high grade television accessories under the Shintron label.

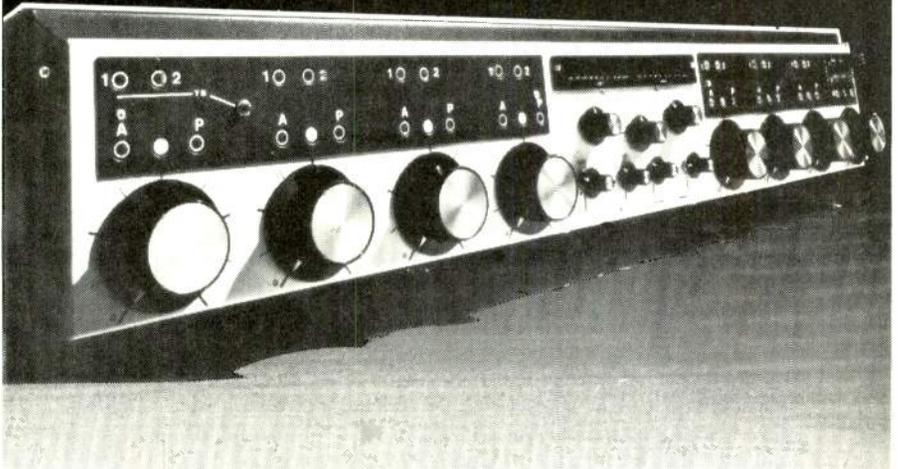
A new company, **Videomagnetics**, has been formed to sell high quality refurbished video heads directly to recorder owners. The company's founder, Ted Barger, with 20 years experience in video head rebuilding, expects to offer lower prices by selling direct to the end user. Videomagnetics will operate at two locations, Sunnyvale, CA, for its general offices and marketing, and Sunbury, PA, for its manufacturing, quality control, and engineering.

**Jim Loupas**, formerly director of engineering at WCFL Radio, Chicago, has left the station to form his own engineering consulting firm, **Jim Loupas Associates, Inc.**, at RR#2, Box 526, Chesterton, Indiana. . . . **Modular Devices Inc.**, and its subsidiary, **Modular Audio Products** have moved into new headquarters at 50 Orville Drive, Bohemia, NY.

**Electro Sound** announced plans to sell its line of audio recorder/reproducers direct to the end user at lower prices.

**Century 21, Productions and Programming, Inc.**, has moved to 2825 Valley View Lane, Suite 221, Dallas, Texas 75234; tel: (214) 243-6721. The programming company also announced the completion of a new promotional jingle package for modern country stations, called "Century Super Country," and the signing of six more stations to its automated contemporary programming service.

# ADVANCED TECHNOLOGY MAKES RAMKO CONSOLES THE BEST BUY IN THE INDUSTRY.



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- ILLUMINATED TOUCH PAD AUDIO SWITCHING.** Your finger tells the audio where to go; light emitting diodes tell which function is on. Your touch gives instant command for COS/MOS audio switcher action.
- SOLID STATE 'VU' METERS.** Guaranteed to indicate the fastest transient and can be read 20 feet away. Eight red LED's indicate from - 21 dbm thru 0 dbm. Two yellow LED's indicate over modulation - + 1 dbm and + 2.5 dbm.
- DC CONTROL OF ALL AUDIO FUNCTIONS.** Hum free, noiseless audio processing with remote, mixer control and elimination of stereo pots and their tracking problems. Electronic cue switching eliminates mechanical switches on rear of mixers.
- SIMUL-Q MONITORING.** Permits simultaneous monitoring of other inputs, while on the air with that same channel.
- MANY MORE EXCLUSIVE FEATURES.** Ramko consoles also feature Plug-In I.C.'s throughout; RF Suppression through individual tuned circuits; Plug-In Amp Modules; Patch Panel Input Gain Select; Equalizer and Special Effects Interconnects and Patch Panel Monitor and Cue Mute.
- NINE CONSOLE MODELS RANGE IN PRICE FROM \$695 TO \$1880. ALL CARRY A 2 YEAR WARRANTY AND 10 DAY FREE TRIAL PERIOD.**

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# Station Identification Announcements

By Frederick W. Ford and Lee G. Lovett:  
Pittman, Lovett, Ford and Hennessey, Washington, D.C.

The Rules governing broadcast station identification announcements have been amended twice within the last year. The amendments have eased, to a limited extent, the Commission's strict rules concerning the content and timing of station ID's.

## General rule

Broadcast stations must make station identification announcements (1) at the *start* and *finish* of each broadcast day and (2) *hourly* during the broadcast day (as close to the hour as a "natural break" in programming permits). The announcement must contain the station's call letters and the name of city to which the station is licensed (e.g., the city specified in the license issued by the Commission). The station identification announcement need *not* name the state in which the city of license is located.

*Permissible ID:* "WZZZ, New York" (assuming that New York is the city of license)

The Commission has maintained a longstanding rule against insertion of a variety of extraneous words between the call letters and the city of license in the ID announcement. The rationale is, of course, that insertion of promotional material in a station ID announcement would lead to listener confusion as to the identity of the broadcast station and its official location.

*Impermissible ID:* "WZZZ, the sound of New York"

## Exceptions to the general rule

1. **Licensee's Name:** The Commission amended its station identification rule<sup>1</sup>, effective March 18, 1976, to permit inclusion of the licensee's name *between* the broadcast station's call letters and the city of license.

*Permissible ID:* "WZZZ, Ajax Communications, New York"

The Commission views this exception fairly strictly; insertion of extraneous words, in addition to the licensee's name, is not permissible.

*Impermissible ID:* "WZZZ, the sound of Ajax Communications, New York"

2. **Station Frequency Or Channel Number:** The Commission recently made another exception to its station identification rule. Licensees are now permitted to insert the station frequency or channel number in ID announcements.

*Permissible ID:* "WZZZ, Ajax Communications, 770 On Your AM Dial, New York"

As in the past, the Commission sticks with its proscription against insertion of extraneous matter between

the licensee's call letters and the city of license.

*Impermissible ID:* "WZZZ, Ajax Communications, 770 On Your Swinging Dial, Fun City, New York"

3. **True Coverage Area:** A station that is licensed to a suburban community which provides primary coverage to all, or substantially all, of an adjacent metropolitan area is not required to omit all reference to the metropolitan area. The Commission simply requires that the licensee's ID announcements *not* mislead the listening audience as to the station's true city of license. Licensees should be extremely careful that data exists which supports the station's coverage claims.

*Permissible ID:* "This Is WZZZ, Bronxville<sup>2</sup>, serving the Greater New York City Area." (assuming that Bronxville is the city of license)

*Permissible ID:* "Station WZZZ, Bronxville, serving the New York Metropolitan Area"

A station is free to identify "promotionally" with a city that it serves that is not the city of license. This may be done by means of announcements other than the required station ID's. Again, the Commission requires that the listening audience *not* be misled as to the true city of license.

*Permissible Announcement:* "WZZZ, Bronxville, increased its cume (different listeners weekly) from 418,000 to 540,000 since last May in the New York, N.Y. ADI" (assumes that this announcement was made at a time other than when the required station ID is normally broadcast)

## Dual city identification announcements

In certain situations, the Commission has licensed a radio station to two separate cities (generally "twin" cities). In such situations, the station ID announcement must include the name of both cities in the order that the names are listed on the FCC license.

*Permissible ID:* "KZZZ, Jones Communications, Dallas-Fort Worth" (assumes that cities are listed in this order on Commission license)

*Impermissible ID:* "KZZZ, Jones Communications, Fort Worth Dallas" (assumes that Commission specified city of license as "Dallas-Fort Worth")

In particular limited circumstances, the Commission will consider whether or not the public interest will be served by granting a suburban broadcast station a dual city designation. The station then includes the name of the adjacent central city in its on-air station ID announcements.

The Commission will look to competitive and economic reasons which would justify a dual city designation. For instance, if a small, troubled suburban radio station competes against numerous large, economically

continued on page 27

<sup>1</sup>Section 73.1201(d) of the Commission's Rules.

<sup>2</sup>For those readers not familiar with New York City, Bronxville is located in lower Westchester County and is physically adjacent to New York City limits.



# Whatever happened to the concept of TV news as an important public service?

It was only natural that the advent of ENG would generate a great deal of excitement. Because, conceivably, for the very first time, television news could begin to compete with radio news in terms of immediacy. The ENG minicams made it possible to transmit live coverage of 'action news' as it happens. And the live coverage of the SLA Shootout made television history!

Unfortunately, it also unleashed a form of ENG hysteria bordering on dementia. To extrapolate this unique SLA Shootout-type situation to every other type of news coverage — from minor local stories to in-depth news documentaries — is invalid in the extreme.

**A new mentality — a 'minicam mentality' — seems to have invaded television news. A self-serving mentality that insists that all stations must go all-electronic regardless of news-worthiness or cost effectiveness.**

Whatever happened to the concept of TV news as an important *public service* — which is what serious news programming is supposed to be all about?

It is no secret that one of the first true casualties of this new 'minicam mentality' is an O&O's local evening news program in Los Angeles, for many years one of the most respected and admired news programs in the area.

It is indeed a strange mentality that will not recognize that a 'Top 20 News' approach has reduced this TV news program to a headline service at best.

... a mentality that condescendingly presumes that the average viewer has an attention span of 8 seconds, and an insatiable appetite for all the fires,



Ed DiGiulio, President of Cinema Products Corp., talking with TV-news cameramen at the National Association of Press Photographers conference in Atlanta

accidents and murders that can possibly be covered — preferably live — during the scheduled news hour.

... a mentality that deems it desirable to fire up to 50% of a station's veteran TV-journalists, and by going fully electronic, to mechanize and computerize the news gathering process to where the reporter may become no more than a puppet at the end of a microphone!

It is a vacuous 'minicam mentality' that would judge a newscaster's performance by measuring (through some dubious 'skin test' response) an audience's reaction to his TV screen personality, rather than evaluate his effectiveness as a journalist performing an important public service.

As if the name of the game in television news is purely showbiz and higher ratings! (Interestingly enough, this O&O's evening news program is still very much behind in the daily ratings!)

**And yet, all the hoopla and ballyhoo in support of going all ENG continues unabated. For the 'minicam mentality' refuses to recognize that the recording and transmitting paraphernalia of ENG still make it far less portable and versatile than a newsfilm camera,**

**and would have us believe that merely speeding up the news is in the public interest.**

What it really aims to do is provide us with an electronic brand of 'instant news' — cosmetic, pretty packaging (with blood and gore, to be sure), but without any substance.

Needless to say, this is patent nonsense. Any real newsman knows it! And so do serious station owners and managers who won't let themselves be sold a bill of goods and be made suckers for a fad!

**If your main concern is better TV news coverage and more in-depth news stories rather than blind pursuit of the latest equipment fad — before you commit yourself to a capital outlay of \$200,000 or more per quality ENG outfit (complete with van and microwave transmitting equipment) — do consider what a reliable and efficient CP-16R/A can accomplish at about one twentieth of the cost!**

For the fact of the matter is that there is not one single ENG camera on the market today that can match our completely self-contained, single-system CP-16R/A camera for quality, mobility, and cost effectiveness!

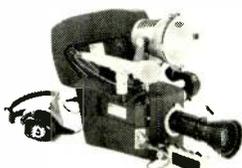
As for performance, there is no way an ENG crew can cover a fast-moving news situation, or move into a crowd and become part of the developing action in the manner of a TV-journalist operating a CP-16R/A newsfilm camera 'one-man-band' style.

This is one in a series of 'open letters' to the TV news industry — to station owners, managers, chief engineers, news directors, controllers and accountants — dealing with the role of ENG in relation to film in a news gathering operation.

If you have any question concerning the issues raised in these 'open letters', please feel free to call me directly at Cinema Products.



*Ed DiGiulio*

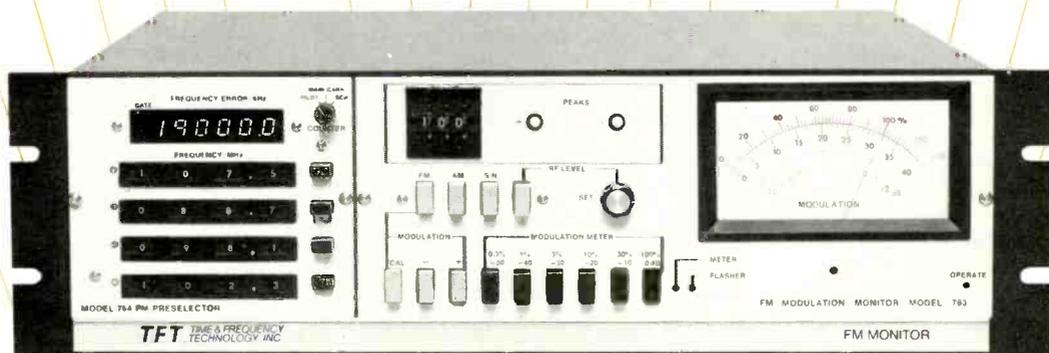


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## FCC RULES & REGS

powerful radio stations licensed to the adjacent central city, the Commission might grant a dual city designation to the suburban station in order to improve its competitive position, vis-a-vis the larger central city stations. Station identification announcements with a dual city designation might apprise potential advertisers of the fact that the suburban station serves the entire central city area. Additional advertising revenues may flow in, enabling the suburban station to improve service to its own suburban community.

Dual city designation, in a situation the reverse of that described above, will not be permitted by the Commission. For instance, a powerful broadcast station in a large central city may place a principal community contour over an adjacent suburban community in which operates a less powerful broadcast station. The Commission will *not* grant dual city designation because the central city station's very size, and, probable financial muscle, would adversely affect the economic ability of the suburban station (e.g., local advertisers in the suburban community that normally utilize the suburban station, might decide to switch advertising to the larger central city station to attract customers from the city and other communities served by the central city station).

Small suburban community stations that have not received Commission permission to utilize dual city designation must avoid misleading their listeners into believing that they are licensed to the central city.

**Impermissible ID:** "This is WZZZ, covering the greater New York City area." (assuming that WZZZ is licensed to Bronxville)

A suburban station is prohibited from misleading listeners into believing that the station is licensed to an adjacent central city *at any time*, not just at times that station ID announcements are required by the Commission's Rules. The following hypothetical announcement is impermissible, not because of extraneous verbage inserted after the call letters (which is proscribed only in required station ID's), but because the announcement misleads the listening public into believing that New York City is the city of license.

**Impermissible ID:** "This is WZZZ, a symphony of sound designed for New York City." (assumes that WZZZ is licensed to Bronxville)

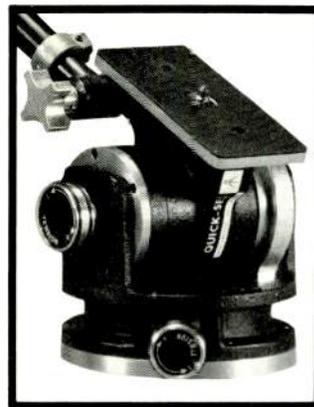
### Commission sanctions

The Commission requires strict compliance with its Rules and policy statements concerning station identification announcements. Violation of the Rules may result in designation of a broadcast renewal application for hearing or, in some cases, monetary forfeiture<sup>3</sup>.

### Conclusions

Communications counsel should be consulted if a broadcast station utilizes a station ID which includes information in addition to the station's call letters and city of license. Similarly, if promotional announcements are utilized to advise potential advertisers that a station maintains a significant listening audience outside of its city of license, special care should be taken to assure that listeners, themselves, are not misled as to the station's true city of license.

<sup>3</sup>Lakewood Broadcasting Service, Inc., 26 RR 2d 685 (1973).



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## A Speak Out on New Production Trends

### Dave MacDonald Looks Beyond ENG: TV Systems That "Do-It-Like-Film"

*Dave MacDonald feels that no single achievement in broadcast technology will create as much confusion and controversy during the next few years as the new one-inch formats. In this Speak Out, Sony's "Mr. ENG" examines the tape vs. film controversy and makes some strong predictions about the future of tape technology.*

*This new Speak Out department in BM/E is an opportunity for all concerned members of our industry—broadcast managers, engineers, producers, manufacturers—to air views on controversial industry practices, equipment trends or other subjects. Let's hear what's on your mind—it's your turn to "Speak Out." Call or write today.*

NOW THAT THE "ENG" revolution has taken hold in the broadcast industry, you are faced with a new revolution. Its significance may be substantially more important than the major changes that have taken place in news technology over the last two years.

The quadraplex video tape recorder, developed over twenty years ago, is about to receive a real challenge from a new brood of one-inch machines. Quad has sustained such challenges before, but never by machines that could boast of multiple advantages over the two-inch segmented machines that have been the standard of the broadcast world.

The BVH-1000, for example, boasts of signal characteristics that meet or exceed AVR-1, but delivers at a fraction of the cost. Smaller overall size and the absence of vacuum guides means that one-inch is more flexible than quad. On top of this, the broadcaster can anticipate huge operating cost reductions as a result of savings on tape. Machine maintenance costs will also be substantially reduced.

Despite the fact that the new one-inch formats are technically good, they might not ordinarily have impacted broadcaster practices except for the crack in the armor caused by ENG.

The widespread use of portable VTR's and editing equipment for recording news events has affected the broadcast industry in a way that goes far beyond "news." In addition to a

**Dave MacDonald** is the general manager of Sony's newly formed Broadcast Division.

new technique, ENG has begun to break down a concept barrier both by the users of technology and the producers of technology. The adoption of something other than quadraplex in broadcast recording has created a growing willingness on the part of engineers to study new approaches to old problems. This change of attitude sets the stage for one-inch and, in addition to changing attitudes, ENG has provided important clues to what it takes to launch a new high-band production recorder.

#### What does ENG portend?

It is now clear that one of the principle reasons ENG took off at such a fast clip\* is largely due to the similarity between it and the film methods it was replacing. The people who were responsible for collecting and editing news were not required to throw away their old skills. The film cameraman picked up an Ikegami and the video tape editor used methods that mimicked film. Although some of the technical mechanics were different, the creative method was very much the same. The ease of adaption of tape to ENG meant that there was adequate staff to use the equipment and secondly, resistance to the new technology was lessened because it had little impact on job assignments. ENG quickly developed into a "good" experience at every level and as the word spread, the adoption of the technology was assured.

For a one-inch format to be successful, it may be that a similar formula may have to be used. That is to say, the machine should presently do what quads are expected to do but in addition, they should be designed to employ the basic creative skills of those people currently working in 35mm film.

#### Quad vs. 35mm production

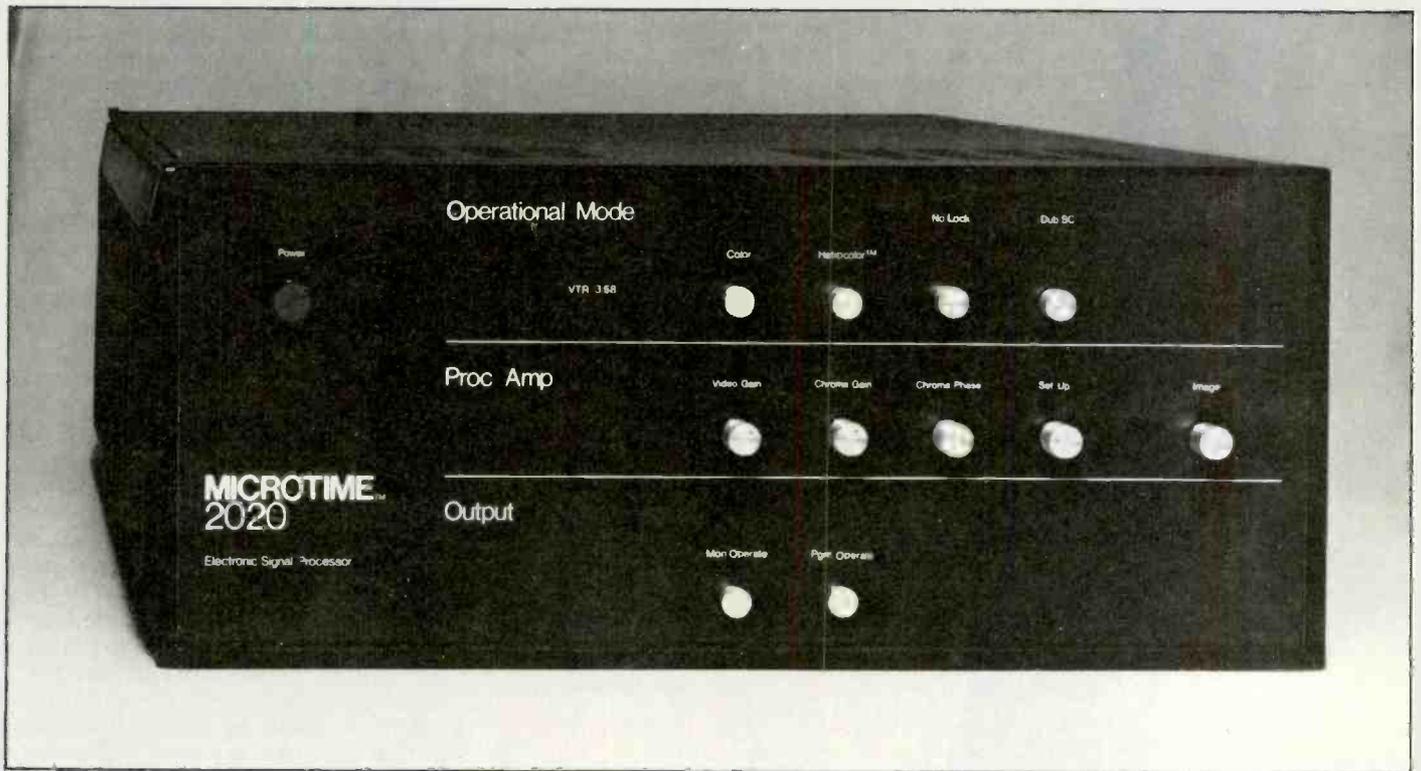
In the early years, the switcher dictated the method of all video editing

continued on page 30

\*Approximately half of all the commercial stations in the United States are involved to some degree in ENG and the growth rate has not abated. Asia and Europe are now beginning to respond to the idea of electronic news gathering, albeit at a slower pace than the United States.

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## SPEAK OUT

because all television was "live." Switching and effects systems became very elaborate offering the user a multitude of methods of getting from camera 1 to 2. But as sophisticated as switchers were to become, they represented real time. Unlike 35mm film cameras utilizing single camera techniques, the television camera had no method of storage. Game shows, sports events, music programs and some drama that had stage play context could be aired using live switching, but programs requiring panoramic production typical of film production could not be done live. Film methods, particularly in prime time, had to be used.

Even when Ampex made an enormous breakthrough with a broadcast video tape recorder, little change occurred in production techniques and film continued to be the principle method of production in the area of drama—a position it still holds today. We ought to ask why the advent of quadruplex recording did not have the same impact on 35mm film as ENG had with news film.

I think there are a lot of reasons, but let me touch on a couple of the most important ones. First, the approach to production by means of VTR is *vastly* different from the methods used by the film producer. The film producer always shoots single camera technique and a major element of the film producer's creative genius comes in that effort we know as editing. The film person does not say *post* production editing because that is the only kind he does. By contrast, the television producer continues to rely on the production switcher and makes the majority of his edits on the fly. In a five-camera shot using one isolated camera, television production throws away three cameras. He does not depend heavily on post production editing because the VTR does not afford him the flexibility of film editing. He can't shuttle or stop tape with picture continuity as his film counterpart. Off-line editing systems utilizing non-segmented recorders have been used in the last few years to bridge the creative editing gap between tape and film, but they have been, for the most part, unreliable, expensive and time consuming. In other words, unlike ENG, the tape production methodology is quite different from film. What was really needed was a tape recorder that would match or exceed quadruplex but would behave like film.

Although the new one-inch recorders are similar in many respects, the idea of building a recorder that would

continued on page 89

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SETCHELL CARLSON		User Price List EFFECTIVE JULY 1, 1976	
MODEL NUMBER	DESCRIPTION	USER PRICE	RET
5M016C	FIVE-INCH MONITOR and picture tube without cabinet		
5M016MB	TRIPLE-FIVE MONITOR, three 5 inch monitors in a row with rack, desktop, metal cabinet	\$200.00	
6M017	SIX-INCH MONITOR with metal cabinet and adjustable underscan	706.00	
6M017T	TRIPLE-SIX MONITOR, three 6-inch monitors in a row with rack, desktop, metal cabinet and adjustable underscan	346.00	
10M018	TEN-INCH MONITOR with metal cabinet	600.00	
10M018C	TEN-INCH MONITOR chassis and picture tube without cabinet (left panel blank)	226.00	
10M018RL	TEN-INCH MONITOR with rack, desktop metal cabinet (right panel blank)	225.00	
10M018RA	DUAL-TEN MONITOR, two ten-inch monitors in a row with rack, desktop metal cabinet	260.00	
10M018RT	TWELVE-INCH MONITOR with metal cabinet	406.00	
12M018	SEVENTEEN-INCH MONITOR with metal cabinet	285.00	
17M022	RACK MOUNT KIT for seventeen inch monitor	330.00	
17M022	TWENTY-THREE-INCH MONITOR with metal cabinet	22.00	
17M022	Optional control compartment door	420.00	
SEC920M	TWENTY-FIVE-INCH IC-100 COLOR MONITOR	21.00	
SEC920R	TWENTY-FIVE-INCH IC-100 COLOR RECEIVER	825.00	
SEC920MR	TWENTY-FIVE-INCH IC-100 COLOR MONITOR/RECEIVER	825.00	
SEC920VTR	TWENTY-FIVE-INCH IC-100 COLOR MONITOR/RECEIVER with VTR video/audio drive outputs	930.00	
DEM019	RF DEMODULATOR with rack/desktop metal cabinet	975.00	
MD-1	MOTION DETECTOR with metal cabinet	15.00	
		15.00	
		15.00	
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# BEST STATION AWARD CONTEST

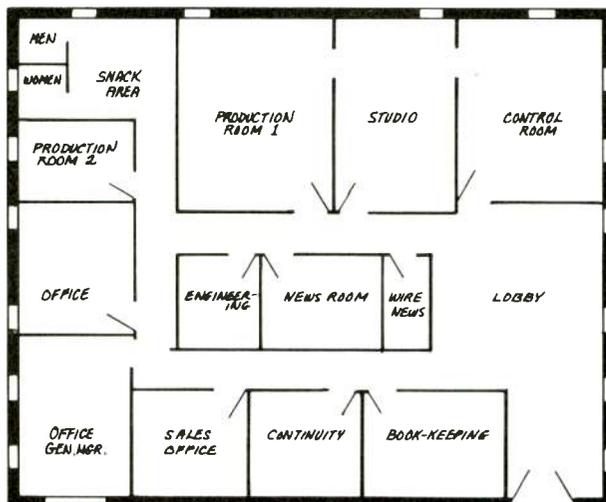
We are delighted to present the 1976 BM/E Best Station Award nominees. The stations whose stories are presented here were submitted either by the station itself or by others in the industry who felt that the accomplishments of these broadcasters were noteworthy. Ten stations are represented in three categories—AM, FM and TV. Each station has carefully sought to achieve greater efficiency and strived to provide better service to its audience. We ask you to read these stories and analyze the efforts made and the significance of the solutions. Then, vote for the numbered station, one in each category, that you think has best fulfilled the goals they had set forth. Record your vote using the corresponding numbers on the reader service card at the back of the magazine. The one station in each category receiving the most votes will receive the BM/E Best Station Award Plaque.

## Convenient, Uncluttered AM Plant With Room For Future FM In A Building 60' × 50'

### BEST STATION AWARD CONTEST AM RADIO ENTRY 1

*Submitted by Bill Thomason, owner and general manager, WBAC-AM, Cleveland, Tennessee*

WBAC-AM is a 1-kW-day, 250-watt-night AM station, which has been on the air about 32 years in its Smokey Mountain foothills town, with a town and country population of about 60,000.



Floor Plan allows for future FM expansion.

Recently it was bought by Bill Thomason, who then proceeded to design an entirely new plant, right down to the consoles themselves. He wanted the 3000 square feet of space to be used for an open, uncluttered, office-studio-production plant, with room for expansion—an FM station will be added soon. The transmitter is remote, reached presently by telco lines.

As the floor plan shows, the layout is very logical and straightforward: it demonstrates well how to get an efficient AM (and later FM plant) into a building about 60' × 50'. The control room and large production room are 15 × 20 feet each, and have identical consoles and much duplicated equipment. The large size allows for an easy-to-get-around quality—additional equipment can be fitted in for the FM station. The sense of space is enhanced by the absence of any rack-mounted equipment. Thomason put everything—jack bays, cart racks, etc.—into the consoles, which were built to his design by local cabinet makers. All cabling is under the floor.

The photo shows the control room from which most of the programming is originated. The format, says Thomason, is basically "contemporary upbeat music," produced in part from the carts seen in the rack over the cart player machines. About 100 carts are in the control room rack at all times, and they are constantly updated. The carts in the lower part of the console are the current commercials. The operator can load the four cart machines with upcoming items. He can put any cart machine on the air with the pushbutton control box to the right of the console. About 100 discs and some open-reel tapes are also on hand in the control room for on-air material, and these originate from the units on the oper-



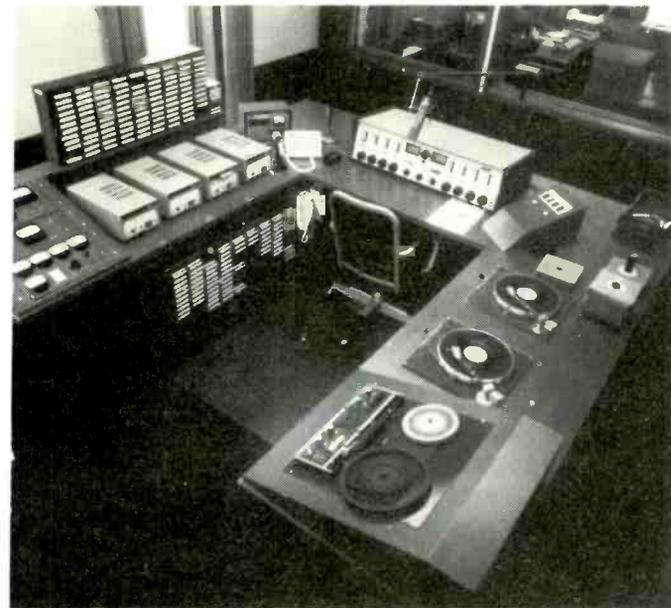
*Spaciousness is apparent the minute one walks into the reception room.*



*View into control room from reception area.*



*View of smaller production room.*



*Expansive low profile consoles make it impossible to look cluttered.*

ator's right.

The studio is used for broadcasting or taping of interview shows and for some production of commercials. The system design allows the station to go on the air in an emergency from either of the two production rooms or from the news room.

Thomason put growth space not only into the operating rooms but also into the offices. The new stereo FM station will be absorbed with an absolute minimum of readjustment. The large production room will be the control room, and the cabling, etc., is laid out to make the changeover easy. WBAC is ready for the long haul in its new plant.

## WPTB: First All-Solid-State AM Broadcaster In The World

### BEST STATION AWARD CONTEST AM RADIO ENTRY 2

*Submitted by the staff of WPTB, Statesboro, Ga.*

Although radio station WPTB-AM, Statesboro, Georgia, made its debut earlier this year without much fanfare, there was a story here that had real significance to the entire broadcasting industry. In April, 1976 this one kilowatt station, at 850 kHz on the dial, went on the air as the world's first all-solid-state broadcasting facility!

"The only tubes we can count in the complete set-up," says Vice President & Chief Engineer Bernard Morris, "are the fluorescents that light the building."

The area's only clear-channel station, with a permit to broadcast 24 hours a day at full power, WPTB is situated a few miles from the center of Statesboro, a southeastern Georgia city of 17,500. Primary coverage includes a population of 110,000 in an almost perfect flat-terrain circle that radiates 40 miles and encompasses 4,880 square miles.



*Gently rolling hills and a ranch-style home offer a unique setting for station WPTB.*

## BEST STATION AWARD

The facility, a corporate entity known as Rosemor Broadcasting Co., Inc., is owned by Morris (45 per cent), Helen Rosengart, president (45 per cent) and Ruth Alexis, secretary and office manager (10 per cent). Programming runs to a middle-of-the-road, adult contemporary format.

"Our equipment list reads pretty much like a Harris advertisement," says Mrs. Rosengart, "but we came to it in the most meticulous manner.

"While our license application was in the last stages of approval, we visited shows, talked to other station owners and engineers, and listened very carefully to our consultant.

WPTB is equipped with a Harris solid-state MW-1 transmitter and a Harris 12-mixer main control console, plus Harris turntables and tape cartridge machines. A remote production room is also Harris equipped, and has on-the-air capability.

"With our MW-1, we run the modulation at about 115 per cent on the positive peaks and 95 per cent on the negative peaks," says Morris, "and we know we could go to 125 per cent on the positive peaks with absolutely no distortion.

"But the points we feel are most important are: the ease of adjustment; the simplicity of design; and the ease of maintaining rated power output. (When I say 'we,' I'm quoting also our very competent AM consultant, Palmer Greer.) This equipment will 'forgive you' to the point that you can lose half of your amplifier modules and still stay on the air.

"On most days," continues Morris, "we're heard as far away as Augusta—70 miles to the north."

The plant itself looks very much like a large modern ranch home. It is situated in gently rolling farmland just outside Statesboro.

"I designed the building to take advantage of the economies inherent in construction of single-family units," says Helen Rosengart. "Yet, as you can see, we have all the room we need for studios, auxiliary studios, production, offices, reception area, equipment and even a lunch room in our 2,700 square feet of floor space. The lunch room is a real boon, since we're on the air 19 hours now, and our location is somewhat remote."

WPTB exists today because Helen Rosengart, Bernard Morris and Ruth Alexis saw a need for a highly "community-minded" AM station that boasted good programming.

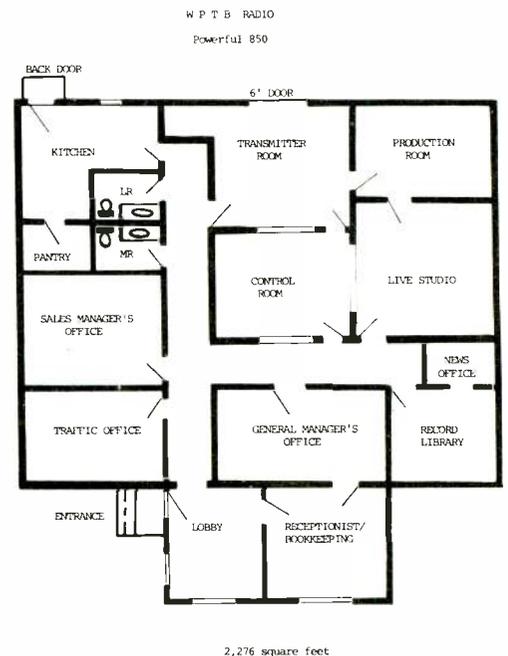
"I felt a real need to give something back to a fine community that has done so much for me," says Mrs. Rosengart. "There was just no medium in the area that was doing the job for the community. In addition, we felt that the suburban area was not adequately served by radio.

"One of our recent success stories involving community activities has to do with 'A Day For Southern.' For years Statesboro and surrounding area residents worked hard on a special annual crusade to gather funds for student scholarships at our own Georgia Southern College. The college, with an enrollment of more than 6,000 has an extremely strong economic impact on the area. However, it wasn't until WPTB got into the act with live reporting of college activities and free spot announcements that information on the crusade was disseminated adequately. "For the first time—ADFS met its \$60,000 goal . . . which was doubled with HEW matching funds."

continued on page 36



Studio and transmitter room of WPTB.



Floor plan shows how ranch house is made into a radio station.

# THINKING ENG? THINK CAMERA MART

**Because you want the right equipment to do the job.**

With all the experience we've accumulated packaging film equipment for the broadcast and industrial fields, you'd expect Camera Mart to be leading the way in ENG. And you'd be right.

#### **CAMART CUSTOM IKEGAMI/SONY PACKAGE**

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**The lens:** The Angenieux f/2.0 10-150mm zoom, for wider wide-angles and tighter tele's. Manual or power zoom available.

**The battery pack:** Frezzolini's most advanced model, which charges in only 3 hours to give you more time on the go.

**The recorder:** Sony's easy-to-operate VO-3800—a 30-lb. package that gives you up to 20 minutes of NTSC color on a single U-Matic® cassette which can be edited on the 2850.

\*Also available with HL-35.

\*\*Plumbicon is a trademark of N.V. Philips

#### **OPTIONAL ACCESSORY: "VIDEO CRASH CART"**

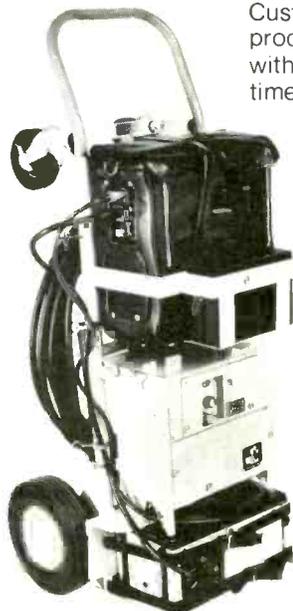
Custom-designed to make production safer and smoother, with reduced set-up and strike time, easier transport and

fatigue-free shooting.

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virtually anywhere your crew can go.

Holds camera backpack, recorder, AC adapter, cables—even extra cassettes.



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## BEST STATION AWARD



Helen Rosengart, president, and Bernard Morris, vice president and chief engineer of WPTB, "saw a need for a highly 'community minded' AM station . . ."

Community service is reflected in the programming at WPTB. The station airs six local newscasts daily, and employs on-the-scene techniques liberally. In addition, AP Radio News is slotted into the music/local news format. An AP teletypewriter is employed to provide audiences in-depth coverage of major national and international news events.

According to music director Walter McCreary, WPTB's audience is a cross section of the area population, with widely varying tastes . . . possibly reflecting a way-of-life in the New South today.

"We follow a Contemporary MOR format through most of the day. My show at night, however, is a mixture of favorites by artists like E.W. McCall, Johnny Cash, Barbara Fairchild, Captain & Tennille, America, Kis, Parliament, Tyrone Davis, Diana Ross, and Lou Rawls. This seems to please a varied nighttime listening audience."

Both Morris and Mrs. Rosengart are extremely high on Harris service. "It's no secret that we're not high-technology experts here," says Morris, who is a First Class licensee. "Now, if we call Quincy and our original contact doesn't have an immediate answer—you can set your watch on it—someone *who really knows* will call us back in less than 30 minutes."

"Another thing," adds Mrs. Rosengart, "if we're experiencing a problem, someone will come down here from Quincy and work until he's satisfied, and we're satisfied, that everything is ok."



Music director Walter McCreary preparing for his evening show in the alternate studio of WPTB.



VP—chief engineer Bernard Morris likes the simplicity and reliability of his MW-1 transmitter.

## Giving The Newscaster A Compact Studio For Fast, Accurate Operation

### BEST STATION AWARD CONTEST AM RADIO ENTRY 3

Submitted by John E. Shepler, Chief Engineer,  
WROK, Rockford, Ill.

WROK presents a very fast paced contemporary air-sound and the news department must not be an exception. The newspeople often find themselves working right up to, if not during, a newscast.

The news studio has been improved in the last year to make it more human-efficient. As shown in the accompanying photos, all the necessary controls are within

continued on page 38

# RCA power tubes of the future have a remarkable past: actual lifespans up to 30,000 hours.

Tube Operating Hours Reported by 20 TV Stations*		
<b>Up to 5 kW</b>	24,142 hrs.	21,329 hrs.
Types 8890 & 8806	12,263 hrs.	19,200 hrs.
Aural service	16,200 hrs.	14,000 hrs.
<b>Up to 12.5 kW</b>	10,096 hrs.	10,525 hrs.
Type 8891	9,402 hrs.	
Visual service		
<b>Up to 17.5 kW</b>	16,600 hrs.	18,300 hrs.
Type 8807	29,800 hrs.	21,200 hrs.
Visual service	30,100 hrs.	20,400 hrs.
<b>Up to 27.5 kW</b>	9,778 hrs.	9,776 hrs.
Type 8916	7,875 hrs.	13,183 hrs.
Visual service	10,799 hrs.	

\*Serial numbers and tube type data available on request

RCA power tubes are at work now in new-generation color transmitters. Proving their value with an excellent combination of high gain, high linearity, plus long operating life.

*Documented* long life. In the table, you can see actual operat-

ing hours reported by 20 TV stations. That reliability comes from RCA's sturdy, coaxial CERMALOX® construction and thoriated-tungsten mesh filament, which minimize inductances and feed-thru capacitances. So you can use simple, economical broadband circuitry.

In fact, RCA can supply you with the right circuit and cavity to go with the tube you select.

For high performance and proven long life in a wide range of power tubes, there's one thing to do. Contact your RCA Representative. Or, RCA Power Tube Marketing, Lancaster, PA 17604. Telephone 717/397-7661.



# RCA

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## BEST STATION AWARD

arm's reach and can be operated without the announcer's having to take his eyes off the news copy.

The system is based on a Gates Dualux board which has been slightly modified. The board is raised to permit standup operation.

The space under the board is divided into two compartments. To the left is a telephone designed and built by Illinois Bell. The internal phone parts are mounted out of sight with the line buttons and touch tone pad secured to a metal panel. The handset can be seen on its cradle to the left. This handset can be removed and an operator's headset plugged in for talk shows.

The right compartment consists of Switchcraft lighted pushbuttons. The two long rows are input assignments for the last two pots on the board. These allow selection of phone lines, network, two way, etc. The two-unit buttons to the right determine which board channel feeds the tape recorders, phone line, or cart machine. The board "A" channel is permanently wired to the main studio for newscasts. The second channel can be used for

independent recording even when the news studio is on the air.

Remote pushbuttons are provided near the cue speaker for activating commercials that are loaded in the main studio. Other buttons control the tape deck and two-way. On top of the board, a shelf holds the ITC 3-deck cart machine and a plexiglass copy holder.

To the right is cart storage, a superscope cassette deck and Revox reel recorder. The unit containing the Revox used to hold two such machines, but only one was found to be necessary when the cassette deck was added. A digital thermometer can be seen atop the studio window, but still within view of the newscaster.

To the left of the "U" shaped operating desk is another cassette machine which is activated by the mic key. Its sole purpose is to record all newscasts which are saved for 30 days. Cassette and copy storage are also provided to the far left. Two extra microphones can be used for discussion shows at the open table to the left.

In summary, the recent upgrading of the WROK news studio has compacted the operation and made it possible for the news department to present fast-breaking stories with much greater ease.

*Gates Dualux board raised for stand-up operation. Below are telephone and external line inputs.*



*To left of console is another cassette player and extra mics.*



*To right of console is cart storage, cassette player and reel-to-reel player.*



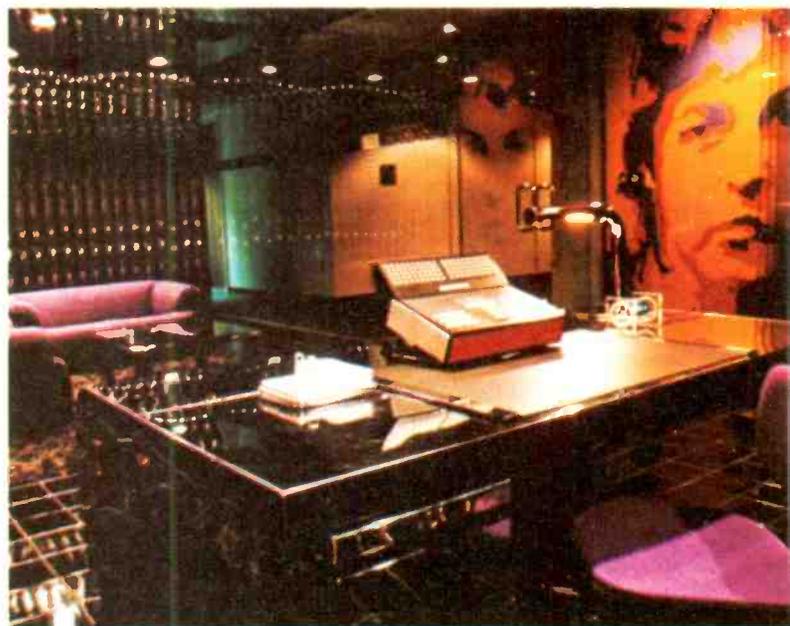
One of the three "on the air" control rooms of the new WQXI AM/FM studios. The equipment consists of custom modified Sparta console with six ITC cartridge reproducers in a suspended frame. Part of the cartridge storage can be seen at right. All consoles are "stand-up" height with everything at the announcer's fingertips.

George Harrison is one of 14 giant murals handpainted on hallways and offices of WQXI. This photo looks over desk of reception area. Desk is custom chrome finished, floor is black tiled. Ceilings are mirrored and walls are covered with chrome fins.

## Getting A Show Place That Reinforces The Heavy Promotional Effort Of A Big-City Station

### BEST STATION AWARD CONTEST AM RADIO ENTRY 4

Submitted by Gerald S. Blum, General Manager,  
WQXI AM/FM, Atlanta, GA.



In 1974, when WQXI was bought by Jefferson Pilot Broadcasting Company, the staff of the AM/FM operation was 54 people, still housed in the 3,000 square feet of space that had been designed to house about 31 employees eleven years before. The new owners decided to build an entirely new plant with much more space; a plant that would be highly "visible" and in an area or building with very positive "identification." Gerald Blum, Manager of WQXI, selected a new strategically located, 30-story glass structure known as "Tower Place," in the Buckhead section of North Atlanta.

The design firm of Rinaldi & Co. of Atlanta was called in to develop, with approval of Blum and WQXI's Chief Engineer, Tom Giglio, offices and studios that would be a show place, yet practical and functional, so that the various WQXI departments could operate smoothly within their own departments but within reach of all other sections of the station. That goal was reached after eight months of revisions, additions, deletions, and hundreds of cups of coffee.

WQXI AM/FM now occupies approximately 9,500 square feet of functional contemporary office space. Upon completion of the studios, Blum stated "these studios are so magnificent, that WQXI will be the stand-

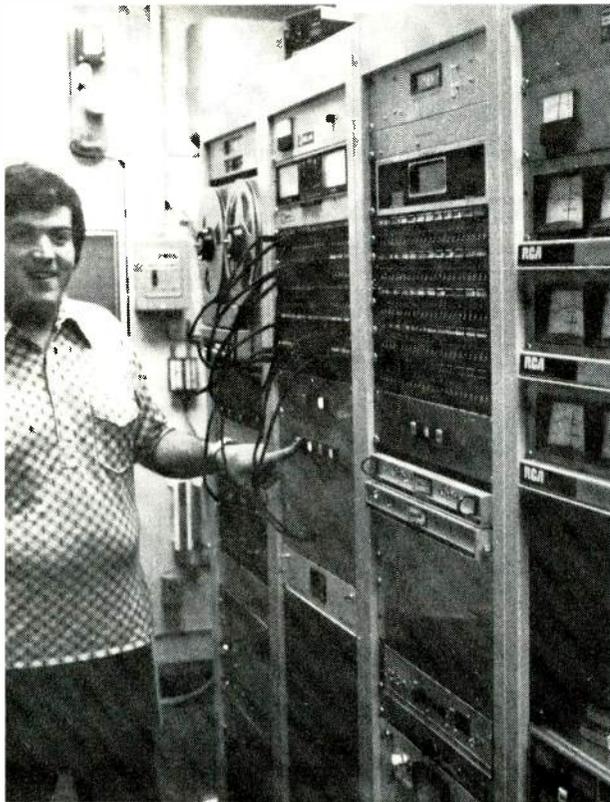
ard by which all other radio stations that will be built in the next fifteen years will be judged."

The reception area consists of black tile floor, with mirrored ceilings. The walls are covered with 4 inch chromed fins. Throughout the offices, ten foot high graphics of contemporary rock stars are strategically placed on walls. Two primary colors are used throughout to coordinate with the light grey walls and the charcoal carpet. Those colors are purple and orange.

The move to these studios was total. Employees just "brought their pencils"; everything else was brand new, from file cabinets to four-track stereo tape to be used for production.

The offices were loosely defined into three main areas. Area One consists of the employee lounge (with free coffee), bookkeeping, comptroller, sales manager, sales staff, sales secretary, sales conference room, reception and general manager's office; it sits between Area One and Two. Area Two consists of program director, assistant program director, two secretaries,

## BEST STATION AWARD



*Patch panels, remote transmitter controls, logging recorders at WQXI are located in a separate engineering equipment room.*

main conference room, and the exotic Room 19, the disc jockey lounge, equipped and lighted for mediation and emotional recharging. Area Three is the largest. It consists of AM and FM traffic and continuity, public service director and assistant, news director, chief engineer, engineering work room, equipment room, AM and FM music director's office, three fully

equipped production studios, news complex, and bathroom, AM control room, news "on the air" studio, and FM control room round out the studio. Total compatibility exists between all three air studios and the three production studios. All are equipped with four channel capability, even on the AM side.

After thorough investigation and "hands-on" inspection by the WQXI engineering department, four new Sparta Centurion Control Consoles were purchased. "The Centurion Consoles were chosen for several reasons," says Giglio. "They are modular, easy to maintain, even while on the air, and they are simple to operate." Simplicity of operation is a necessity for the less technically-oriented on-air talent. "And, besides" Giglio adds, "these consoles are highly adaptable to the individual customizing necessary to meet our sophisticated requirements."

The WQXI engineering staff spent months customizing the consoles, constructing special switching equipment, and designing custom monitoring systems. Total information control panels were designed and built into the control boards, that contain all switching and status indicator lights, digital thermometers, digital clocks, and up to three separate reset timers. The entire technical design was designed around the theme, "easy to operate, easy to maintain."

The end result is a modern, very impressive looking, yet highly flexible studio complex. It fits well, both in functional design and in design spirit, with the station's high-powered handling of program promotion and strong involvement with community projects. This runs the gamut from a 5,000-person "welcome" ceremony in a public park for a new disc jockey who arrived by helicopter with two bands, huge balloons, TV interview coverage: into a weekly program trying to find homes for stray animals or a "Skateathon" to raise money for Muscular Dystrophy sufferers. Thus high "visibility" in the design of the plant matches high visibility in the station's relations with the community, the basis for its success.

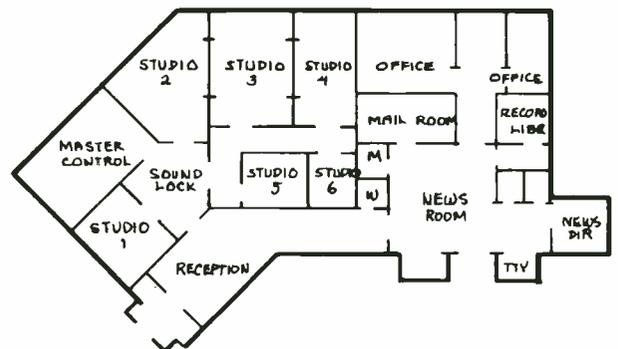
## A University FM Station With A Multiplicity Of Services Gets A Studio Complex At Moderate Cost

### BEST STATION AWARD CONTEST FM RADIO ENTRY 5

*Submitted by Brad Dick, director of engineering,  
KANU-FM, University of Kansas, Lawrence,  
Kansas*

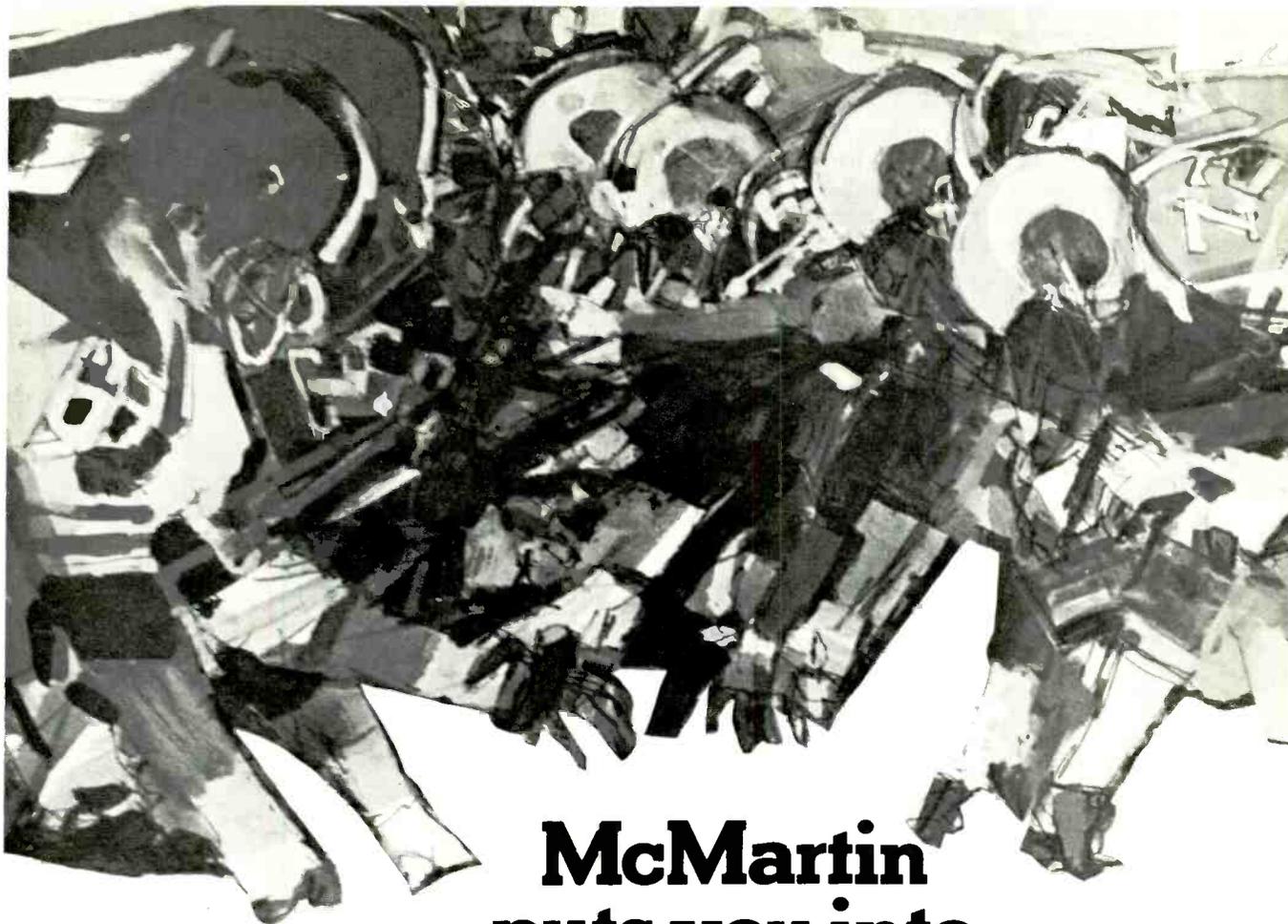
KANU is the 110,000 watt FM Voice of the University of Kansas. Broadcasting 19 hours per day, the station provides public radio service to over 3 million people in Kansas, Missouri and Nebraska. The final touches to new studios were added recently, culminating over two years of hard work by the engineering staff.

The original KANU building was constructed during WW II. Materials being scarce, a professor of engineering developed the idea of constructing the building of Kansas soil. While not a sod house, the bricks of the



*In the modernization of KANU, master control was relocated so that it could overlook four studios. Studio 4 serves as a second control room.*

continued on page 42



# McMartin puts you into action!

On the playing field. At the scene of an emergency . . . a headline moment. McMartin remote broadcast equipment puts you into the kind of action that attracts listeners and builds profits.



(B-1100T shown)



**B-1100T / TBM-1100R.** 40 watt combination FM transmitter / 3 channel mixer with a companion base station receiver. The ultimate in location flexibility and performance. No telephone lines required. Operates on any two specified frequencies in the 148-172 mega-Hertz range. High fidelity performance. Ideal for any remote pickup from on-the-scene news and sports to the most demanding music application. AC or battery operation.

B-1100T (transmitter/mixer) ..... **\$750**  
TBM-1100R (receiver) ..... **\$450**

**BR-400.** Four channel broadcast remote mixer for telephone line or tape recorder feed. AC or battery operation (with optional internal battery pack) featuring automatic change-over to battery power in case of power line failure. Four low impedance mic channels, two are field convertible to RIAA equalized magnetic phono operation or 600 ohm line level input. Dual outputs: 600 ohm balanced line and 5K unbalanced output with independent level control. Built-in tone generator and headphone cue amplifier. Ideal for sports and D-J remotes. .... **\$310**

**MX-5.** For extreme low budget, educational, and sound reinforcement applications. Professional performance at low cost. 4 channel mixer. AC or external battery operation. Four low impedance mic inputs, two are field convertible to magnetic phono. Bridging high level 600 ohm program level input. Built-in tone generator. 600 ohms balanced line output. .... **\$149.50**

## BEST STATION AWARD

building are a composition of Kansas soil from the Wakarusa River Valley and cinders. The blocks were fired in ovens in the basement of the University auditorium. The end result was a building, called the "Mud Hut." Due to its unique construction, the University decided to preserve the building. We had no

choice but to remain and completely renovate the interior.

Management set forth three criteria. First, the new design had to provide for superior quality in the production of programs. Second we had to allow for versatility in the kind of productions we could undertake. Finally, the total cost for the project had to be reasonable.

A major facet of our operation is the great variety of the

*Engineer Bob Gillegan and producer Jamie Jon reviewing a tape in the master control room while visiting performer (rear) looks on.*



# When it's time to switch





Studio four at KANU which can also serve as control room.



Announcer Cheryl Chambers working in studio 5.

programming we have to handle, from music of every variety to sports, remotes, regular and special news, "community programs," etc. Keeping this in mind, we decided to use two control rooms and two studios for the major portion of program production. Each control room, MCR and Studio 4, has access to two recording studios, Studio 2 and 3. (See floor plan: the windows are designed for vision all the way from MCR, through Studio 2 and 3, to 4.) This allows us to tailor the needs of the program not only to the recording studio, but also to the control room best equipped to handle the required task.

Studio four, in addition to being a control room, is our primary production studio complete with three stereo recorders mounted horizontally for ease of editing, turntables, cart machines and a 20 input 5 output Harris console. The console was modified to achieve the required outputs and metering for the production or dubbing of several programs at one time.

Studio 6 (news booth) is complete with Scully recorders, McMartin console and ITC cart machines. The news booth is equipped to allow the newsmen to record from many sources while leaving the console free to do live newscasts.

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## BEST STATION AWARD

Studio 5 is the on-air studio; most programs originate here, and the operator has full control. This studio and studio 4 have identical consoles which make it easy for new people to go from production to on-air chores with no confusion. It also means a bonus to engineering in that parts and trouble-shooting become easier to handle. A unique feature of Studio 5 is the overhead catwalk. The original studios had a height of over 15 feet. The new construction lowered the ceiling to the standard height and provided the catwalk for wiring and conduit runs.

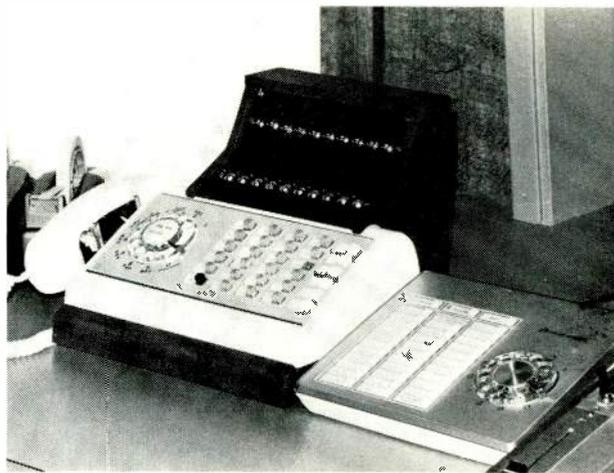
Studio 1 is primarily for producing recorded disk shows. Over 25 hours per week of jazz and opera production take place in this studio alone. The studio has the usual compliment of Harris console, cart machines and Scully recorders.

The heart of our studio facility is Master Control. Practically everything in the station goes through this room. The Master Control Room (MCR), had to do double duty. The engineering department needed work space, but we also needed the second production facility. The solution was to combine the workspace and production facility into one. While this may not at first seem like a workable idea, it turned out to be great. The engineers at KANU do a great deal of recording, including studio recordings, network (NPR) recordings and remote work and we have found that having the electronics bench in the back part of the room causes no problems.

Knowing that MCR had to remain flexible, we wanted to steer clear of the old Christmas tree type of terminal blocks. Not only are they hard to wire, but it is almost impossible to make changes on them. The answer was found in the use of Western Electric style telephone blocks. Our primary concern about the blocks, in the beginning, was that of crosstalk because some of the wiring would not be shielded. Discussions with the engineering department at the telephone company and tests run by us indicated that the crosstalk would not be a problem. Indeed final noise measurements, when completed, showed noise figures superior to what we had expected.

All the 2000 connections to the patch bays were wired on the bench. The completely wired bay was then mounted in the rack and the free ends of the cables were terminated on the upper section of the terminal area. All sources and inputs were connected to the lower area and the required jumpers were then installed with twisted #26 wire. The attractive feature of this arrangement is that any patch point can be changed quickly to another feed or input with no soldering. Total time to make the change is about 5 minutes.

KANU is presently involved with a four-channel studio recording and four-channel remote recording. In order to accommodate the requirements of these recordings we use a Scully 282-4 four-channel 1/2" recorder and a custom Fairchild console. The console was fabricated in house with Fairchild components to save expense. The four-channel console also comes in handy for the sports network. We feed 25 stations for KU sports and provide engineering both at the remote site and at our studios. If the game is out of town we use voice couplers and feed the program to the studios. We then equalize the line to obtain good frequency response, and feed it to the console. The console then acts as a distribution center for the



*Sports network control center and adjunct dialer at KANU.*

game. Channel 1 takes the equalizer output and feeds it to the limiter. The output of the limiter feeds channels 2, 3, and 4. Channel 2 feeds a local station on a 5 kc loop. Channel 3 feeds our own studios and channel 4 feeds the sports network.

The method of distributing the signal to the 25 stations is unique and efficient. In order to keep the cost of distributing the game down, we use recorder connectors. The recorder connectors are controlled by a call director, adjunct dialer and a custom control console mounted just above the call director. To connect a station to the network, the engineer selects a line on the call director and presses a button on the adjunct dialer corresponding to the station he wants to call. At this point the dialer automatically dials the number of the station desired.

Once the station is ready to receive the game, the engineer throws a switch on the control console to activate the recorder connector. At this point the station is receiving the game and the engineer can go on to another station.

Having an MCR as complex as ours meant having to monitor from many sources on command. Our solution is a 30-source monitor switcher. Two identical control panels are used, one rack mounted and one mounted in the Fairchild console. One can select any of the sources to monitor on the four speakers and control the volume from either control panel. All volume controls for speakers, headphones, intercoms and IFB's use DC control voltages via light-controlled faders.

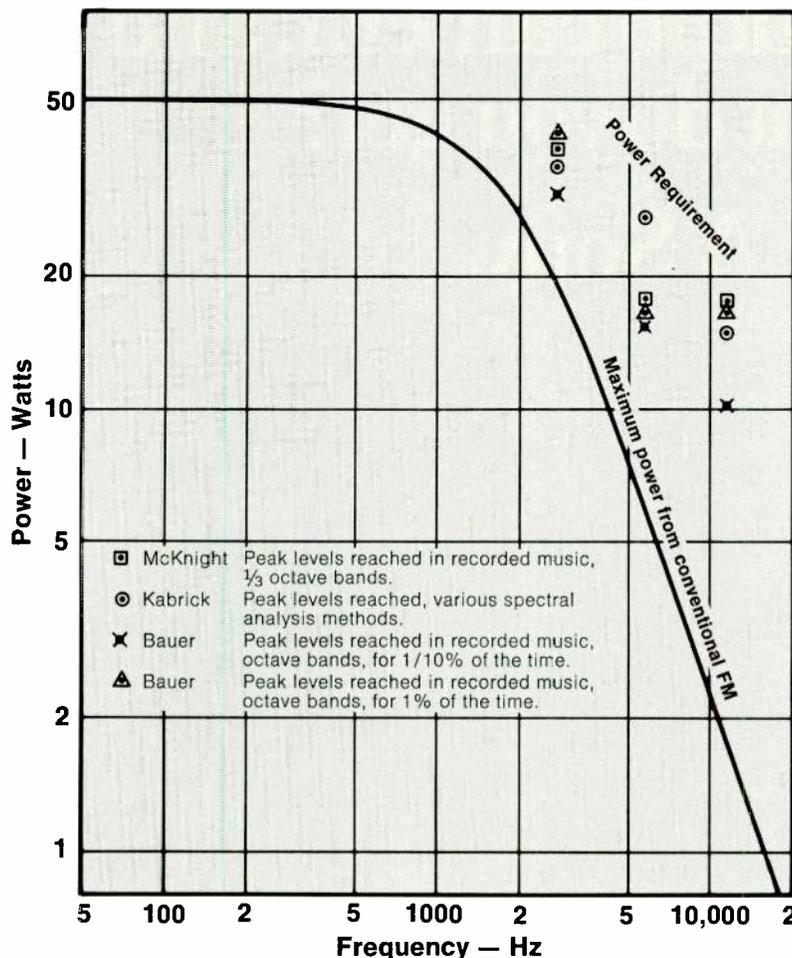
One of the final projects installed was a studio switcher. By merely pushing a button we can put any of 5 control-room sources on line to the transmitter. This again allows us to tailor the on-air control room to the needs of the program. This also makes it easy to run proof of performance from a studio or perform routine maintenance.

The end result of this effort shows in the kind and quality of programming the station produces. Since the construction of KANU's new studios, we have won six national awards for program material (including a Peabody and two Armstrongs). The engineering staff has also produced several record albums including one national release. We feel that it is the listener who must benefit most of all from renovation. We at KANU think we have made the "Mud Hut" do very well.

continued on page 48

# Dolby FM Ends The High-Frequency Power Shortage

Look at this graph. You wouldn't tolerate an amplifier that did this to your music. So why put up with an FM system that does this to your amplifier?



This curve shows the maximum power output of a 50-watt amplifier when fed from conventional FM. The power curve and the power requirement points are all shown with respect to full mid-frequency modulation at the transmitter and 50 watts peak power from the amplifier.

Take a typical state of the art 50-watt amplifier. It will deliver its full 50 watts over the whole audio bandwidth. Well, what would you think of a system that treated the high frequencies like the one pictured above? A droop to half-power at only 2 kHz? Or a pitiful 2 watts at 10 kHz? It sounds ridiculous. And yet this is what the conventional 75 microsecond FM broadcasting system does to the signal. It is impossible for a conventional station and a conventional receiver to do better than this.

Of course, the full 50 watts isn't needed at high frequencies. The graph

points in the high-frequency region of the drawing show how much power is actually required, according to researchers who have investigated this matter. Obviously, there is a significant difference between the requirement and what conventional FM can provide.

What does this have to do with Dolby FM? Plenty. Dolby FM provides not only lower noise but a dramatically improved power capability. In fact, the power curve of a Dolby FM receiver runs right through the power requirement points on the graph above (which is no accident). Thus Dolby FM gives you the full high-frequency power

needed for accurate reproduction of music. Brasses retain their bite. Cymbal crashes don't collapse.

If this improvement in FM broadcasting and reception interests you, then you may like to write to us for further technical details. We also invite you to consider purchasing one of the more than 30 new models of receivers with built-in Dolby FM circuits (write for receiver list and Dolby FM station list). Check with your hi-fi component dealer for details on the specific receiver models available in your area.



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**Mix an ENG camera  
with a studio camera, and  
what do you get?**

**A Sony.**



The Sony BVP-100, to be exact. A new kind of portable color video camera, from Sony Broadcast.

There have been portable ENG cameras before. Field production cameras, too. But the BVP-100 is a camera deliberately designed to give you the best of both worlds.

The BVP-100 combines the lightweight body, economy, and simple setup procedure of an ENG camera with the broadcast picture quality, manual controls, and built-in professional features of a field production camera.

It's like having two cameras in one.

In the field, the BVP-100 is fully portable, easy to handle, completely automatic. You can depend on it to cover fast-breaking news, sports events, any ENG situation you run into.

But when you're in commercial or documentary production, you need more than an automatic ENG camera. You need a camera you can control manually. A camera you can interface with other cameras. A camera like the BVP-100.

Take a look at some of the special advantages the Sony BVP-100 can offer you:

**1. Beam-splitting prism optics.** Three 2/3" Plumbicons\* with beam-splitting prism optics provide broadcast quality signal resolution, high sensitivity, low registration error, and extremely stable operation—at a signal-to-noise ratio of better than 50db.

**2. Built-in masking generator.** Unlike many portable color cameras, the BVP-100 has built-in masking circuitry. This insures optimum predictable colorimetry at all times,

and of course allows matching the BVP-100's colorimetry to that of other cameras.

**3. Built-in test generators.** On location, you can make many necessary balance and test monitoring adjustments without accessory equipment. And the less accessory equipment you need, the faster you can move.

**4. Quick adjustment to changing light.** The BVP-100 special black stability circuit and automatic white balance help maintain correct color proportion levels. Even in rapidly changing lighting conditions.

**5. Flare compensation.** The BVP-100 has fully adjustable flare compensation circuitry to remove any annoying distortion in black balance created by an optical disturbance.

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## BEST STATION AWARD

# Owner-Engineer-Manager Designs Compact, Efficient Plant For Expansion To 100 kW FM

### BEST STATION AWARD CONTEST FM RADIO ENTRY 6

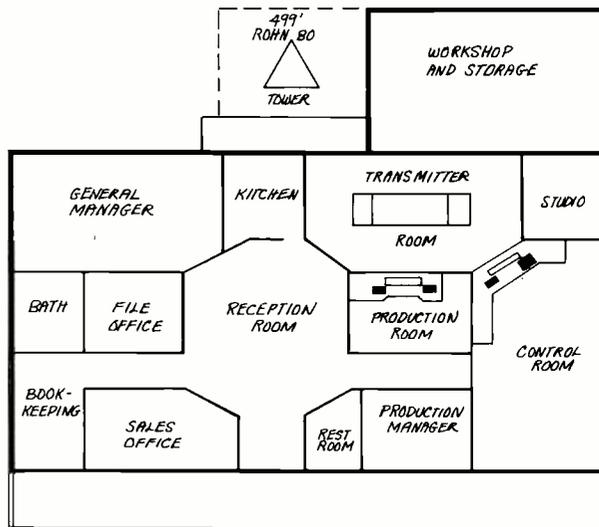
Submitted by H. Byrd Mapoles,  
Owner-Engineer-Manager, WXBM-FM, Milton,  
Florida.

When WXBM-FM owner-manager-engineer Byrd Mapoles decided to move to new larger quarters and raise power from 3 kW to 100kW, he took the opportunity to get just the plant he wanted, with seasoning from 23 years in broadcasting. He designed and built the station himself, and was able to move the operation to the new plant in December of 1974.

The design effort covered all aspects of the operation, from the management as well as the engineering point of view, and with a close look at the dollar. The entire facility carries the flavor of the Old West, as Country-Western is the format of the "BIG X." From the time a visitor drives up until he drives away he feels he is part of the station's operation. From the reception room the transmitter, production and control rooms are visible—from the production and control rooms, the others can be seen. The west half of the building is predominately production and transmitter and the east half is basically offices, bookkeeping and management.

All the previous equipment of WXBM-FM was kept and completely re-worked after the Collins 100 kilowatt-equipped station went on the air. The Gates Stereo Yard is the heart of the production room while the Gates FM-ICS with its separate antenna system gives the station a complete auxiliary transmitting capability.

The control room, including a satellite cart-work bench, was designed and built by Mapoles to fit the needs and desires of the station. The cart workbench is directly behind the operator who can swing his chair 180



Control room, production and transmitter room are all visible from the reception area.

degrees to have the carts there immediately under his hand. This keeps loose carts away from the operating spaces around the console. On the cart bench, carts can be filed alphabetically or stored in various locations according to function or need.

The heart of the control room is the Collins IC-10 console which gives the station QUAD capabilities for the future. The Revox reel-to-reel, Advent cassette and eight track decks, and, of course, the ITC cart machine allow the handling of all program materials. Weather and police monitors are fed directly into the console, as is also the Marti 450-mHz remote broadcast equipment which originates from a 22' mini-motor home, which is completely self-sustaining. The mobile home studio has a 15-channel LPB console and QRK turntable and cassette and reel-to-reel facilities.

The complete station is housed in a steel building which has proven to be the remedy for all RF problems.

The IGM 400 automation is used daily to allow announcers to do production work. The system consists of two Revox reel-to-reel, one carousel and Insta-cart with 700 step MOS. The IGM is about five years old and has been extremely reliable.

The station is complete with kitchen and the manager-engineer office, which is 15 x 25, also has a bathroom and shower.

The Collins 831G-1B 22.5 kilowatt transmitter has been updated with the installation of the new Collins 310Z-2 Excitor which gives the station an excellent stereo signal.

The station also incorporates a two-way news reporting remote broadcast system using GE two-way radios in the 150 MHz band. Each employees' car is radio-equipped for reporting.

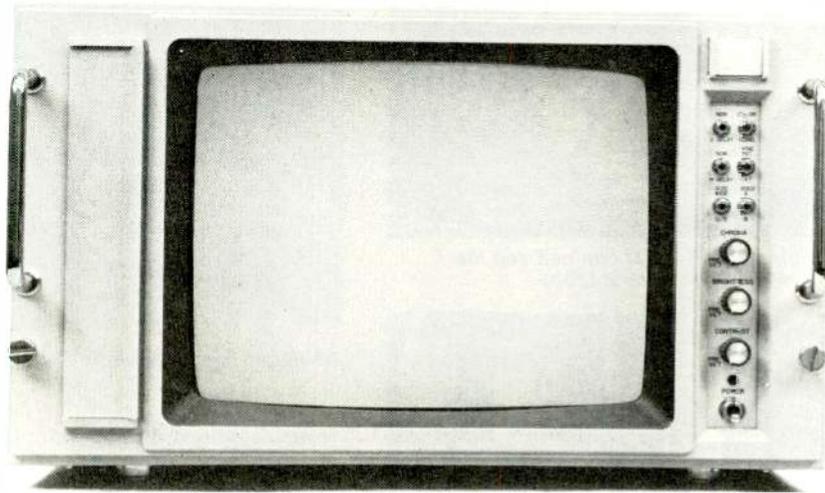
Automation is used from two to four hours a day, depending on the program production load. During the non-automated periods, musical programs are originated

continued on page 50



WXBM-FM building bespeaks country and western which is, of course, the music format.

# It takes guts to run your video through an Ikegami broadcast monitor.



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## BEST STATION AWARD



From the control room of WXBM-FM one can see the transmitter room, production room and lobby.



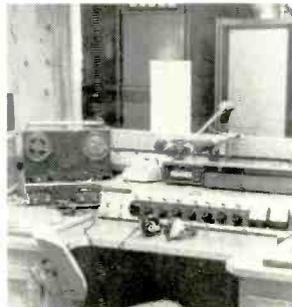
View from the lobby looking through the production room into the control room.



Manager Byrd Mapoles in his office.



WXBM-FM mobile studio. (Donkey ties in with station's slogan, "I don't listen to WXBM, but then look what I am.")



View of production room at station.

from disc recordings. Mopoles says he has learned to "listen" carefully to his audience in designing his program format and he is convinced his mixture of country music, local and national news, community programs, with a large proportion of "live" operation, is one the mark. His standing in the ratings supports him: the station is the top country programmer in the market and on weekends is rated top of *any* station, AM or FM, in the area, an example of the new dominance of local markets by FM.

## Careful Planning For New Station In Resort Area Gives It Strong Start Against The Competition

### BEST STATION AWARD CONTEST FM RADIO ENTRY 7

Submitted By Ed Crook, Vice President and General Manager, KRLT-FM, South Lake Tahoe, CA

It took nearly four years of planning—and fighting for a license—to do it, but when KRLT went on the air in June, 1976, on the shores of Lake Tahoe, near the California-Nevada line, everything fell into place.

Manager Ed Crook and his associates wanted a smooth, fully professional sound right from the start, so the station is fully automated with a Schafer 903E system, which can be programmed in 3-day segments, allowing the station to operate with a small core of high-skill personnel.

The format, carefully researched to supply what the management felt was lacking in the area, is the con-

temporary up-beat music, supplied for the most part by syndicator Chris Clauson. The smooth operation and class of music are designed to appeal to the vacationers who are the main corps of listeners in the area: they are a rather sophisticated audience, from cities, in the country

KRLT-FM is housed in Harvey's Resort Hotel.



temporarily. The working personnel in the many gambling houses around the lake are also largely young and highly educated, a prime audience for the same class of music.

The antenna and transmitter, a Sparta 603A 3 kW FM, are atop the Harvey Wagonwheel Hotel, which is a few feet east of the Nevada-California line. The base of the antenna, a Jampro JSCP, is about 150 feet above the street. The studios are a few blocks west, in California, with a microwave STL.

Typical of the effective planning in the creation of the station was the installation of the antenna on top of Harvey's Hotel. The antenna was carried up to the roof in sections by helicopter, just after dawn on June 2nd, so that the colder morning air would supply good lift for the 600- and 800-pound loads. First went the 800-pound welding unit; then the base of the antenna (see photos); then the two-bay antenna itself. The job had been laid out in advance so well that the whole antenna was in place 30 minutes after the start.

An unusual arrangement provides transmitter moni-

toring for the 24-hour station during the night periods, when regular station personnel are not on duty. A special remote metering panel, built by Sparta, went into the wall of the telephone office at the hotel, which is manned 24 hours a day. Several of the night personnel of the hotel have qualified as Restricted Licensees and they log the required transmitter readings through the night. They are on the station payroll for their part-time services. (Program logging is automatic at the studios).

Another unusual device, this one in the studios, is a production room built into a pre-fab sound booth. This booth was originally designed for school language or music department use. It works well as a production room or control room, can be easily moved, enlarged, changed in configuration.

The long effort made by the management is already beginning to pay off. The combination of lively young-adult music with a number of news and community-involvement programs, has won a substantial audience after only a few months on the air. The future looks good for KRLT.



The Schafer automation system is located just a few feet inside the front door and is part of the reception area. Behind it is the production room.



Production room is modular pre-fab construction which can be moved. Walls include large glass panels.

Antenna on top of hotel was hoisted in place by a helicopter.



Hotel night personnel log transmitter readings through the night.

## KSTP-TV—Attractive Decor, And Advanced Technology Are Good News

### BEST STATION AWARD CONTEST TELEVISION ENTRY 8

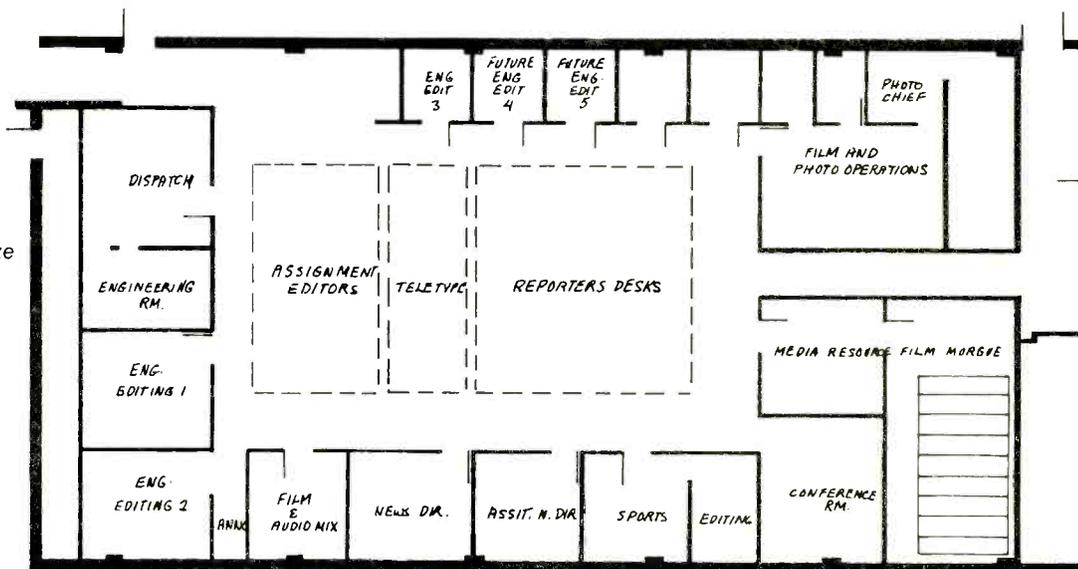
Submitted on behalf of KSTP-TV, Minneapolis-St. Paul, by George Merrill, Chief Engineer

There are a number of reasons why KSTP-TV, the flagship station of the Hubbard Broadcasting Company in the Twin Cities of Minneapolis-St. Paul, is the leading news station in the market, but the most outstanding reason perhaps is the legacy of news orientation created by Stanley E. Hubbard, chairman of the board of Hubbard Broadcasting and his son Stanley S., president of the group stations that make up Hubbard Broadcasting.

Stanley E. Hubbard, over the years has garnered an incredible number of "Firsts" in the news area and in

## BEST STATION AWARD

KSTP-TV's new uncluttered news room is over 10,000 sq. ft.—double the size of the old one.



View from dispatcher's end looking down aisle on tape/film editing room side. Floor covering, chairs, paper trays are bright colored.



View of producer's area, far end.

View of news reporters area, center



View looking across news area to editing room.

broadcasting in general. KSTP-AM was the first station to set up its own news bureau back in the glamour days of radio; it was the first to create a "news bureau" and the first to introduce ENG equipment into the Twin Cities market in television.

The Hubbards have carried on their "newsworthy" traditions with a recent expansion of their Minneapolis-St. Paul plant which includes one of the most modern news departments in the country featuring the latest developments in ENG gear, general communications and news gathering and writing facilities. In all, KSTP-TV has invested nearly two million in the expansion of its existing plant and a major proportion of this has gone into the creation of a news department which is perhaps one of the most elaborate communications complexes in the broadcast industry, including network operations.

In terms of both personnel and equipment, the KSTP-TV news department is uniquely prepared to handle any kind of assignment, whether a live ENG mini-cam story or a disaster in surrounding communities. It is perhaps one of the few local station news oper-

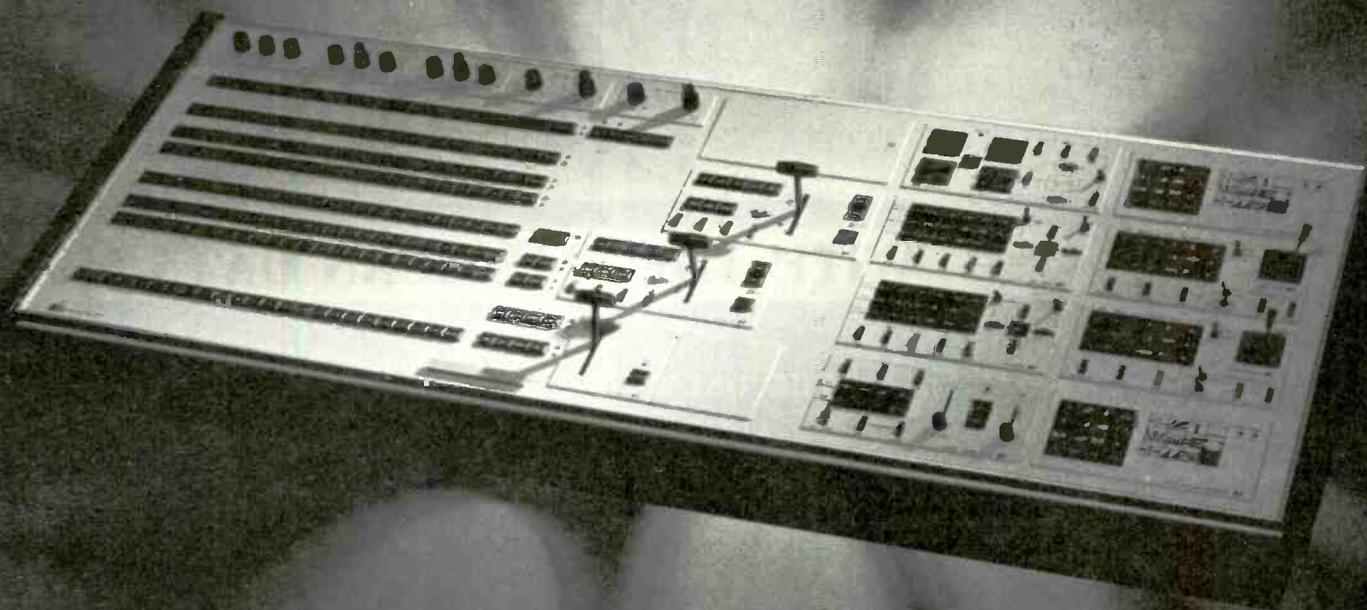
ations with two aircraft at its disposal for emergency news stories out of the metropolitan area.

From the standpoint of Stan Turner, news director for KSTP-TV, the new news facility is "the answer to a news director's prayer." The new news operation is double the size of the old KSTP-TV news set-up. It covers over 10,000 sq. ft. and, unlike the image of the old "city room," is beautifully decorated with wall-to-wall carpeting, modern lighting and air conditioning and all of the modern equipment utilized in the newsroom has been positioned with an eye to efficiency of use and facility of access.

Rectangular in design, the KSTP-TV newsroom maintains the openness found in most busy news city rooms

continued on page 55

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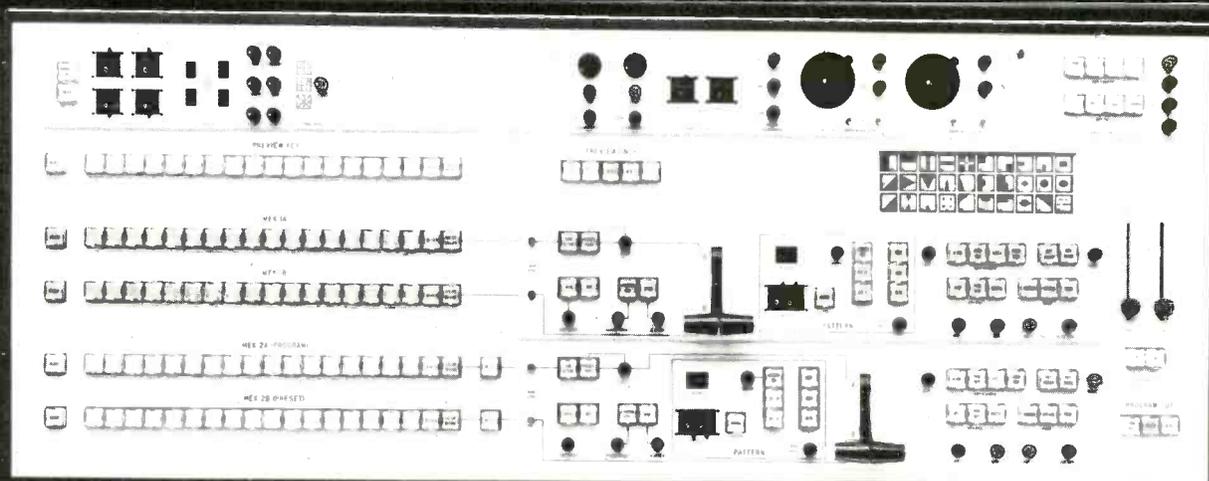


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- Mix to a Bordered Key
- A-B Mix Behind a Chroma Key
- A-B Wipe Behind a Chroma Key
- A-B Wipe with Borders Behind a Chroma Key
- Mix-Wipe or Bordered Wipe to a Preset Wipe Behind a Chroma Key
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- Wipe to a Luminance Key over a Chroma Key
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## BEST STATION AWARD

without all of the clutter and mess which seem to be the norm. At either end, the room is broken up into offices, special editing rooms, the communications center, photo files and dark rooms.

According to Stan Turner, the KSTP-TV newsroom has been designed to offer maximum working conditions for the staff with easy access to all of the tools necessary for top notch news reporting. The news staff consists of about 60 people including 10 photographers, 9 reporters, five film/tape editors, six producer news writers, three dispatchers, three lab technicians, two secretaries, an assignment editor and a staff artist. The reporters and writers are grouped in the city room section of the news department within easy reach of all of the wire service "X-tel" silent teletype machines and the new "laser" AP photo copier.

Located along one side of the rectangle are four film/tape editing positions each equipped with two 2850 Sony's for instant editing via a Convergence editing system—a triple-reel system which is much faster than normal editing procedures. This area also contains an announce booth which is tied-in with the overall communications system and which is used for adding on audio portions of the tape.

The core of the news center, from a communications standpoint, is the Dispatch Center, located at one end of the rectangle. The Center features a specially built Motorola console which operates on four separate channel frequencies; three on 160 megacycles and one on 450 megacycles for direct communication with the ENG crews. The Dispatch Center controls all taping of ENG initiated news stories which are then distributed to one of the editing rooms for processing and editorial selection. In addition the dispatch center monitors about 40 various channels; police, fire, public service and others, and has a self-contained scrambler system for transmission to the 40 separate two-way systems for autos that all members of the news staff and the management are equipped with. The dispatch center console is also tied in with the frequency of the F-27 aircraft used by the news department for stories outside the metropolitan area. As for the scrambler, Stan Turner shrugs and says, "We know we're being monitored all the time by the opposition so we just make it a little tough for them."

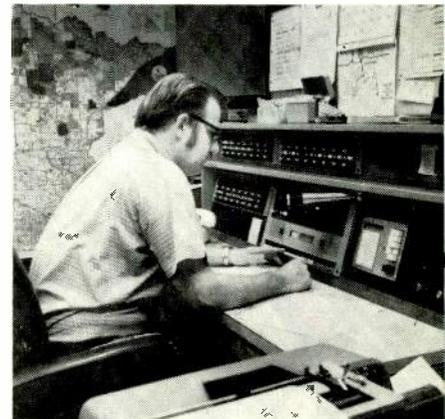
KSTP-TV has perhaps the most unique ENG equipped mobile units in the entire country. In addition to their mini-cam remote van which is completely equipped to transmit live action stories onto the air via a microwave unit on the top of the van, the station boasts three Mercedes-Benz limousines. Each of them carries a two man crew and is equipped with a mini-cam ENG camera and a Sony tape recorder for instant editing. The Mercedes-Benz', the brainchild of Stanley S. Hubbard, are not only great public relations vehicles for the station but are also a delight to the comptroller for their economy of operation. Being diesel-engine driven, they consume far less fuel than American cars, are quieter and give a far more comfortable ride over all kinds of terrain.

KSTP-TV has three TK-76's and two Fernseh cameras with three additional TK-76's on order. At the present time the Fernseh's are used mostly for production.

Also located in one of the offices off the City Room of the KSTP-TV News Department is the Weather Office.



Close-up in editing room showing Convergence ECS-1 editor.



Core of news center is the Dispatch Center. At right is specially built Motorola console. At left are incoming microwave feeds.

Like everything else at the station, the weather office features the absolute latest in weather forecasting equipment. The major feature is the WSR-74c, only the second radar type weather forecaster to be utilized at a TV station in the US. This \$250,000. installation features a radar beam which scans 450 kilometers, (280 miles), and is so sensitive that it has picked up a light snow falling in a town 100 miles from the station. Dr. Walter Lyons, the KSTP-TV meteorologist, who presents the Eyewitness Weather each night on the KSTP-TV news, notes that the WSR-74c can not only predict the course of storm patterns but can also determine the intensity, height and the path of any storm.

Dr. Lyons has also organized a Metropolitan Observer Network consisting of 25 TV viewer volunteers. The network spans a 50 kilometers area and the observers phone in daily reports based on equipment given them by KSTP-TV concerning the weather in their particular areas. The latest equipment to be added to KSTP-TV's weather operation is the "Laserfax" satellite receiver. This machine utilizing a satellite picture which is transmitted via Washington, D.C. and Kansas City, is processed through the KSTP-TV Laserfax and provides continual up-to-the-minute pictures of weather throughout the country.

With the continuing up-grading of the state of the art in the processing and development of ENG equipment due to the increasing use of ENG tapes on the air, KSTP-TV has added another piece of equipment which George Merrill, chief engineer for the station, feels is the ultimate in signal protection—"for the time being." This is the Consolidated Video Systems Model "600" frame corrector which guarantees maximum efficiency and quality for on-air pictures and is especially important

continued on page 58

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*Master control is the functional center for the station. Operator can see four film islands behind console and videotape room below through a glass wall.*

In addition to the MC and studio switchers, there are twelve routing switchers in the station; all can be monitored from three master monitor positions located at studio switchers "A" and "B" and the master control switcher. The routing and studio switchers can be used for on-air switching should Master Control fail.

Positioned in front of the Master Control console are four fully equipped film islands. This layout permits the MC operator to see all film sources and to visually confirm that they are responding to commands. All of the islands are remoted to Master Control and are rolled from there with a 2-second pre-roll. Each film island includes a monochrome camera which is used for pre-view and for keying inserts. Color film cameras include two TK-28s, a TK-27B, and a GE-240.

As an independent, TV-11 is heavy on film for programming making the four telecine islands necessary for smooth operation. For example, a studio originated news and host/interview show aired every weekday morning frequently requires all four film islands for film clips and inserts.

The videotape area at KSTW adjoins Master Control, separated only by a glass wall. This arrangement has the advantage of giving the MC operator a direct view of both tape and telecine operations.

Inside the tape room is an imposing array of machines, including two TCR-100A "cart" machines, two TR-70Cs, one TR-70B, and a durable TR-22HB. The "cart" machines are equipped with EPIS (Electronic Program Identification System), editors, and "Random Home." With this built-in capability, the TCR-100s can serve a dual function—as on-air "cart" commercial playback systems and as production machines.

The two "cart" machines are essential since they allow KSTW to handle both production and air requirements and still have back-up. The TCR-100s are workhorses at TV-11, handling an average of 430 plays per day, sometimes running as many as ten "carts" on a single break, and making about 30 new dubs a day.

All incoming commercials (film and tape) and PSAs are dubbed to "cart" as are all station promos, IDs, and spots. The "cart" machines are used extensively for "intros" and "extros" for regularly scheduled programs. They are used to insert segments into standing program material. For example, in making up-dated material, such as promoting the next day's movie, the



"cart" machine is used for filling in a "doughnut" commercial. After the intro, an action clip from the film might be inserted, with a part of the sound track, or a voice-over announcement. Using the A to B external dub mode on the TCR-100, the intro and extro material is played on the "A" deck through the switcher, where "fill" material is inserted, with the composite being recorded on the "B" deck.

KSTW was first to install a commercial satellite earth station and, later, plans to dub satellite news material and locally originated rews film to "carts." This will provide more flexibility for adding, deleting, or changing the news sequences.

Each of the four VTRs, as well as the two TCR-100s, has an editing capability. One pair of TC-70s share a TEP-1 Tape Editing Programmer. In conjunction with the TEP-1, the KSTW technical staff is developing a system for "group roll" of tape and film machines which will add even more versatility in production assignments.

Another innovation in the TV-11 tape room is that every tape machine has access to a routing switcher. The input of the VTR is fed by the output of the routing switcher. This makes all of the video facilities of the station available to any tape machines for making recordings, and eliminates the need for audio and video patching.

The themes of redundancy and flexibility are carried

## BEST STATION AWARD

throughout the facility, from master control, video control, digital signal distribution, and production studios. The goal was to build a technical plant that would ac-

comodate the realities of an independent station, dependent primarily on itself for most of its programming. The success of TV-11 is evident. It has an overall 12 share of audience ratings in the Seattle/Tacoma market and is No. 1 from 3 to 6 p.m. Nationwide among independents, KSTW now ranks 10th.

# KPLR-TV Refurbishes Completely While Doing 20 Hours Of Local Programming Daily

## BEST STATION AWARD CONTEST TELEVISION ENTRY 10

*Submitted by Hal Protter, vice president/general manager, KPLR-TV-11, St. Louis, MO*

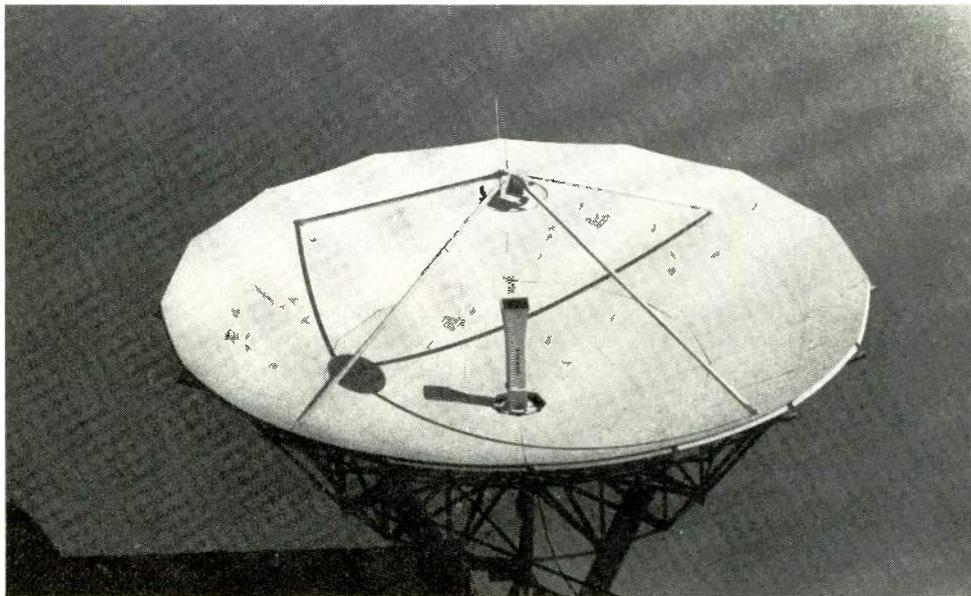
KPLR-TV, St. Louis's on-the-move leading independent station modernized the hard way. Rather than to move to the suburbs—which usually happens when a station feels it must expand—KPLR decided to stay in its cramped but urban location. This happens to be an apartment building in the city proper.

It would have been easier to move to a new location

and especially so since so much new equipment had been purchased in the last two years. But we were able to keep our old address and managed to lose no more than part of a week of studio production time. Absolutely no air time was lost even though we have a heavy schedule of 20 hours of programming daily. We consider this quite an accomplishment, particularly so since we didn't have the benefit of computer floors through which to run cables, etc. In fact the electrical wiring in the apartment building was not adequate for our purposes and new power cabling had to be added.

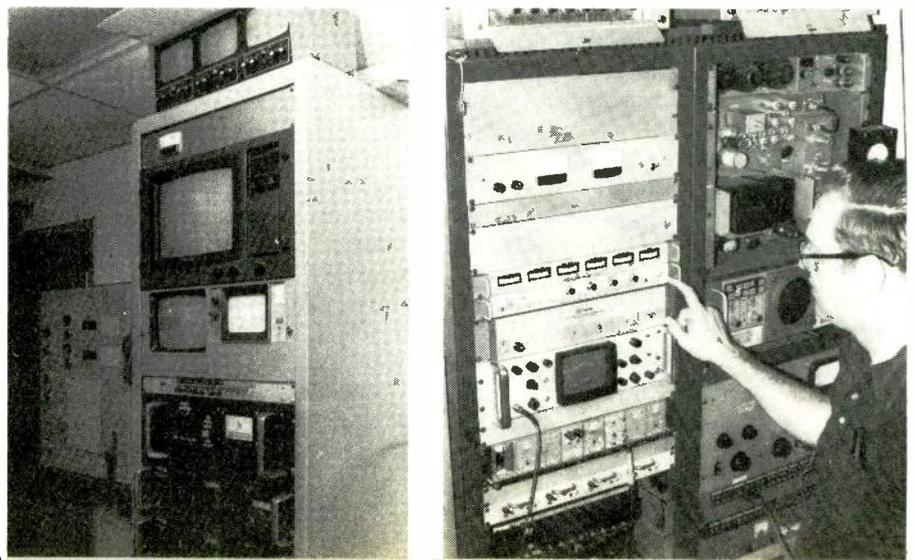
Despite the obstacles, here's what we were able to do in the last 24 months:

- Construct an 11 meter satellite earth station (receive-only) in our urban area to bring the INTA news feed.
- Install new dual 25 kW transmitters.



*KPLR-TV satellite receive antenna is located on garage adjacent to studio. (KPLR-TV was first broadcaster to apply for and receive satellite license. Installation was by Rohr.)*

*Near right is satellite receive station rack (and AT&T line input). Three upper monitors are AT&T, Westar I and Westar II. Large monitor is color and below it AT&T b&w picture and waveform monitor. Uppermost black panel is LNA power supply. Below it two Microdyne TV 1100 receivers. KPLR does its own satellite signal processing using G-V proc. units. Far right is Tektronix 1440 automatic video correction system located at transmitter site.*





View of master control showing Computer Image switcher.

Videotape area. Two RCA TR-600s, a routing switcher panel, TR 70-C and a piece of a TCR-100.



- Incorporate a closed loop transmitter operation with a Gates demodulator and a Tektronix 1440.
- Add a second cart machine, an RCA TR100-A.
- Install all new reel-to-reel tape equipment: 1 RCA TR70-C, 2 RCA TR600's.
- Install a new Grass Valley studio switcher.
- Install an all-new Grass Valley sync and distribution system.
- Install a Computer Image switcher for on-the-air operation.

- Install a new RCA audio board and a complete station audio system.
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  - Rebuild our STL's.
  - Refurbish three Marconi Mark VII's by incorporating IC pre-amps and by adding new lenses.
  - Eliminate announcers by putting all announcements on automatic tape cartridge.
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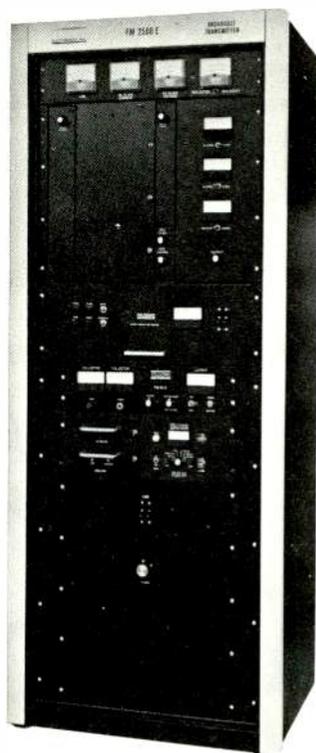
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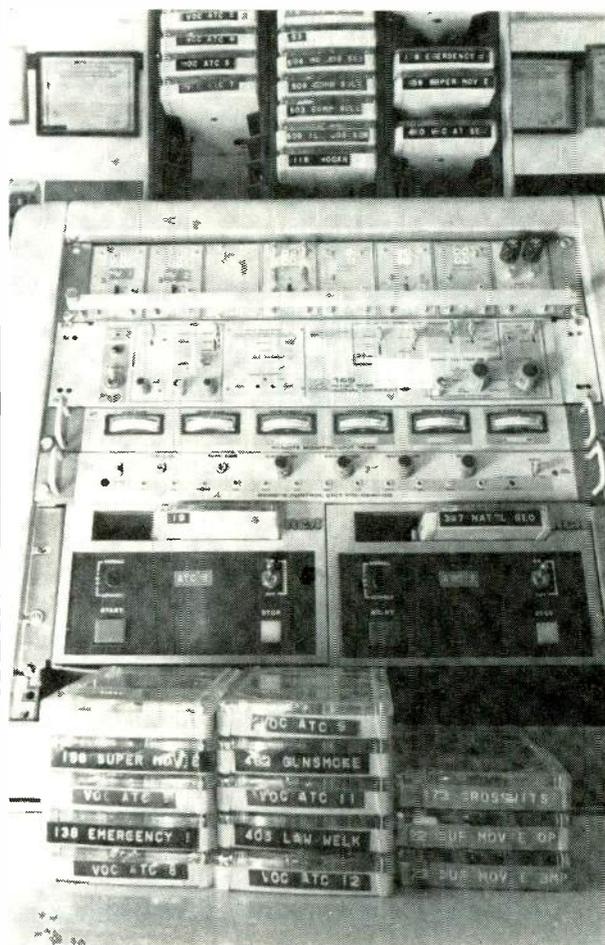
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## BEST STATION AWARD



*This close-up of announcer's tape cartridge machines which are located on the left side of master control console. Above cart player is signal processing equipment to optimize picture before adding VIRs signals at studio end.*



*Close-up of production switcher, a G-V 1600/7G.*

new RCA film island for air use (the TK28 with ASCET color correction) and take delivery of our first ENG minicam—an RCA TK76. We also have ordered a Thomson-CSF Microcam.

KPLR-TV, as you can tell, is strong on news. We are particularly proud to be the first station to acquire its own satellite receive station. The antenna, incidentally, is mounted on the garage of our apartment building.

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# Noise Reduction Is An Audience-Builder

Minimizing the noise added to an audio signal as it passes from source to transmitter, in a broadcast plant, is primarily a question of good design in every part of the audio chain. But every broadcast engineer has to live with one or more systems that are noisier than he would like them to be. He can't get the money for a better one; or, perhaps, even if he had the money, the makers of that kind of hardware still have a way to go in noise control.

So a good technical case can be made for broadcasting's use of a system using the compression-expansion cycle that is universal in recording studios today. The idea gets added relevance from the fact that the two firms that currently dominate this field, Dolby and DBX, have both, in the last couple of years, brought out improved units designed specifically for broadcasting.

Stations using these units are gaining more than just technically—they are getting a firmer hold on their audiences in the face of heavy competition, as the station stories that follow demonstrate. That makes noise reduction an important tool for many broadcasters.

Dolby's unit, the Model 334, is designed to encode FM broadcasts at the transmitter with the Dolby "B" type of compression, which attacks the highs only. It does not affect operations on the audio signal upstream from it in the plant.

As described in detail in *BM/E* (October, 1974), the unit allows the user to switch the effective FM pre-emphasis to 25 microseconds. The idea, and nearly everybody agrees it is a good one, is to avoid high-frequency overload without the heavy high-frequency peak limiting now used by many stations. The high-frequency situation in FM has worsened greatly in recent years because the highs are getting much stronger in the source material. The pre-emphasis established in the early days of FM for noise reduction now overdoes it a lot of the time.

The receiver for a Dolby-encoded signal ideally includes a Dolby decoder, with 25 microsecond de-emphasis selectable by switch. This will bring the greatest gain in signal quality. But even without the decoder, the signal will generally be acceptable, with a tendency to "brightening" that is a plus on many of the less expensive receivers. Top grade hi-fi systems including an FM tuner currently have the decoder built in a good deal of the time; or any frequency imbalance can be minimized by adjustment of the tone controls.

Dolby "A", which handles the whole spectrum in four separate sections, is used in program production by a number of stations. It can obviously be used in any part of the in-plant handling of the audio signal.

The DBX broadcast unit, Model 142, uses the somewhat different system of compression in one band over the whole spectrum, based on what DBX calls the "true RMS" signal level; the idea is that peaks and transients in one part of the spectrum do not skew the reduction action, which is tied to the "general" level. Each unit has two channels which are independently switchable

from encode to decode.

The DBX broadcast system is for the loop between source input and transmitter within the station or any section of it; it does not include the path through the transmitter RF to the receiver. DBX also makes models specifically for professional recording, which are in use in a large number of recording studios and are aimed at the full bandwidth of recording practice. If a station does a large volume of program production from microphone to open-reel tape, or from any source to tape, a recording-studio noise reduction system may be attractive. However, if the broadcast model is in use (it is tailored to the somewhat restricted frequency response of the average telephone line and cartridge system), having compatibility within the plant would make the Model 142 desirable for all uses.

A main application of the DBX broadcast unit is, in fact, reducing the troublesome noise which is all too common when material is put onto carts, within the station, from mics, discs, open-reel tape or other carts. Stations going to automation will usually come up against this problem, as a couple of the station stories that follow indicate.

Other sections of the audio chain often improved substantially by noise reduction are telephone lines to the transmitter, microwave links to the transmitter, and TV audio tracks between the VTR and transmitter.

Another noise reduction system just coming on the market in this country is made by Telefunken, in Germany, and imported by Gotham Audio in New York. See box below.

## Telefunken Claims 30 dB Range

A totally new compression-expansion noise reduction system for which very advanced characteristics are claimed, the Telefunken Telcom C4D, went on the market in this country in November through Gotham Audio of New York.

Telefunken says that the system will provide about 30 dB of additional dynamic range. It splits into four parts (as does Dolby) and uses a new compression system with three gain-controlled amplifiers in series, all fed the control signal in parallel. Since the compression and expansion slopes are linear over their whole range, says Telefunken, there is no need to align the two ends of the cycle—alignment is automatically assured. Signal-to-noise ratio of the system itself is rated at more than 94 dB, total harmonic distortion at 0.2% or less. Gotham Audio had elements of the system on view at the recent Audio Engineering Society convention in New York.

On a rough count there are a couple of hundred stations using one or the other of the two main noise reduction systems. The following were selected simply because they seemed representative of what is going on in this field. They illustrate some of the reasons that so many broadcasters are swinging over to noise reduction.

## WQXR, New York, Finds Listeners Happy With Noise Reduction

The country's veteran good-music station was the first to encode its broadcasts with the Dolby "B" unit. Chief Engineer Zaven Masoomian says he has never had cause to regret it. As reported in earlier stories in *BM/E*,

continued on page 66

# How did these broadcasters get ahead of the competition?



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"We used the Compositor for the first time on election night. We were very pleased with the clarity and color. I'm sure we had the best election show in town that night."—Donald Loose, Manager WTMJ News Operations

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"...the election went like clockwork--I couldn't have asked for anything better. The Compositor display is clear and easy to read...you just glance at it and you've got it. We were ahead of the competition getting numbers on the air."—Tom Craven, KGW Production Manager

"We were well ahead of the competition election night... the reason, I feel, was in large measure due to the Compositor. It's easy to use, and prevents a great deal of possible error. Where the TM unit really shines is its computer interface with the character generator, which eliminates the extra step of manually entering the election results."—Bill Gill, WOTV News Director



These broadcasters agree: with or without the TED election reporting option, the new Compositor I Titling/Graphics System offers a superior on-air look. With graphic-quality fonts and instant access to any page in memory at any time, the software-based Compositor I provides the fast on-air operation demanded by production personnel, the artistic quality demanded by advertisers, and the competitive edge that broadcast management is looking for. For details, please call Jack Daniels at (801) 972-8000.



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## NOISE REDUCTION

WQXR put the encoded signal on the air for a couple of months without alerting listeners to the fact. There was not a single complaint, and there were a few letters or calls asking, "what have you done? You sound better."

Later, WQXR told its listeners about the Dolby. It periodically sends out the calibration tone for those with out-board decoders. This stimulates a dozen or two letters a week asking what it's all about; and WQXR has a pamphlet that tells the story. Extensive listening tests with a variety of receivers throughout the New York area confirmed Masoomian's high appraisal of the results.

### **KINK, Portland, Pleased Advertisers And Listeners With Noise Reduction.**

Jack McAllen, chief engineer of 100-kW FM'er KINK, in Portland, Oregon, hoped for several advantages from Dolby encoding, and since April, 1976, when the Dolby went officially on the air, the station has realized all of them. (The encoder went in several weeks earlier for a "sneak trial" like that at WQXR—see above—and with similar results: no complaints.)

First McAllen got good press coverage for the station when the system was announced. There was an inauguration night with a transatlantic call from Ray Dolby in London explaining his system and a series of special music numbers for demonstration. The opening night had been preceded by ads in the local papers.

McAllen also got all the local hi-fi dealers on board by making sure they understood the system, and by giving them a pamphlet for customers to whom they were demonstrating receivers with Dolby decoders. The pamphlet identifies KINK as the station that makes the Dolby decoder "work." McAllen also puts out the calibration tone every night, Monday through Friday, at 9 pm; this alerts many listeners to the system and the station gets calls from a lot of them which leads to verbal explanations and further promotion for the station.

Dolby noise reduction is also now tied in many cases, with the station's logo or other identification—it is, McAllen finds, an excellent way of underlining the station's identity in a highly competitive market.

Beyond all that, though, the bread-and-butter of noise reduction for KINK lies in the character of its audience. The format is jazz, the softer rock, folk music, aimed at the 18-34 year old market of educated young adults who are everywhere turned on to fine sound. McAllen says that only the best sound in the area can hold this group against the competition. KINK is near the top: it is No. 1 during a number of time segments and the management is satisfied that high-quality sound is one of the main elements in the station's success.

### **KRE-FM In Berkeley Got Out Of The Processing Trap With Noise Reduction**

The experience of Art Lebermann, CE at KRE-FM in Berkeley, California, parallels that of Jack McAllen in several respects. KRE has a jazz and blues format and a very large following among the college and post-college set. Lebermann, too, points out that these listeners are almost always hi-fi system owners; his station would suffer if it sounded poor compared with "any \$2

record." Using Dolby is just part of a general effort to have an excellent sound.

Lebermann had been dissatisfied with a standard compressor/limiter system: too much distortion, too little dynamic range. With Dolby, the need for processing the signal was drastically reduced. The station now uses mild broadband control, with a peak limiter and Lebermann likes his signal much better: it is cleaner, quieter and has much more dynamic range.

Here too, the encoder went in without public announcement and created absolutely no listener problems: people without decoders thought the signal was "better" because the pre-emphasis reduction allowed for a higher modulation level. Lebermann also worked closely with local hi-fi dealers, gave them full information in pamphlet form for customers thus increasing the identification of the station with a superior signal. The same functions, in addition to the technical one, are carried out by the calibration tone—Lebermann plans to increase calibration broadcasts to two each day, because a number of listeners are always stimulated to call or write and the station gets further chances to explain itself.

Lebermann thus sees noise reduction as helping his station aggressively meet the competition. But what about the "top 40" and "hard rock" stations who have totally given up on dynamic range to get the "loudest signal in town?" Probably noise reduction won't buy them much says Lebermann. Audience sound sophistication will have to start moving past them before they are forced to join up with the future.

### **KGBS, In Los Angeles, Puts Out Better "Gentle Country" Music**

At KGBS, AM and FM, the sound quality problem was complicated by the necessity, under the recent FCC ruling, of separating the programming of the two stations. The management decided to automate the FM station, which meant that the programs would be transferred to carts in the station. The FM station would take with it the "Gentle Country" format that both stations had used; the AM was going to rock.

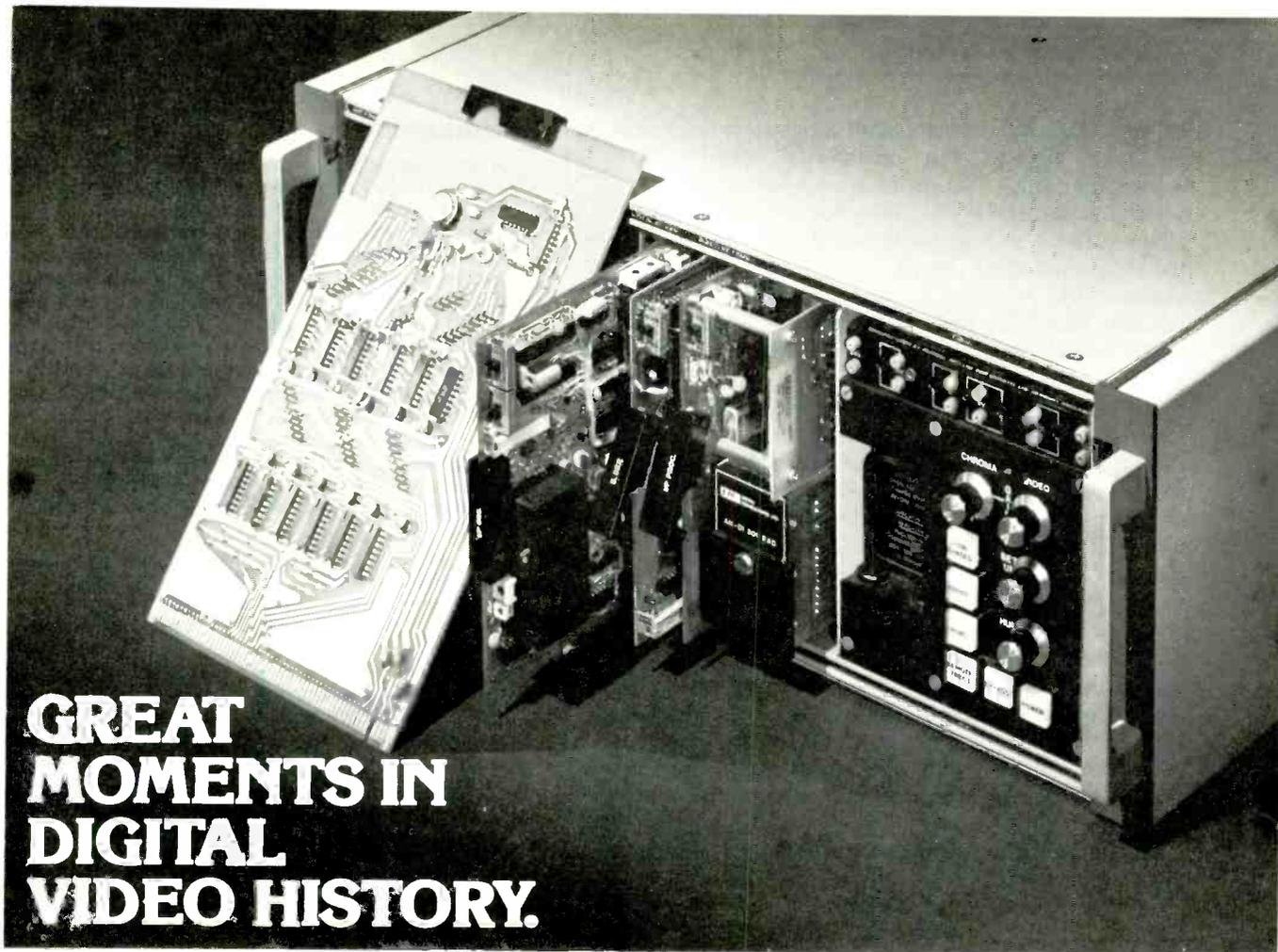
But Jim Noble, CE, tried several cart systems without finding one with noise low enough to satisfy him. So he decided to do all the cart recording through a DBX Model 142; the cart signal would then be decoded just before going into the transmitter. And there the signal would be encoded by a Dolby 334; here is a station using both the main noise reduction systems.

Noble is also going to put a DBX unit at each end of his microwave STL link. He says that his drive toward higher quality, more dynamic range, less noise, is a direct response to the growth of hi-fi sophistication in his audience. Los Angeles, probably the most competitive radio market in the U.S., forces a radio station to be "distinctive" to avoid getting lost in the crowd. KGBS is convinced that a high-quality signal is an essential part of its "character."

### **At WSHE In Fort Lauderdale There Was Another Push For Best-Quality Sound**

Michael Del Fonzo, director of production at WSHE-FM, in Fort Lauderdale, is one more broadcasting executive who is working hard with the "hi-fi"

continued on page 68



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## NOISE REDUCTION

sophistication of his young-adult audience on his mind. He says he can't afford a "second-rate" sound with the competition in his area so the station has put heavy research into finding how to better their sound quality. The album-oriented rock programming all goes onto carts. In the three production rooms, every recording chain includes a DBX Model 142—every cart is encoded. There are additional DBX 142's in live studios and, of course, at the transmitter for decoding: WSHE has six of the units.

Also used is a Burwen dynamic noise filter to cut transmission of the noise in the program source itself (which can't be reached by Dolby or DBX). And the station uses Panasonic SP-10 turntables for playing discs as programs go onto carts (see *BM/E*, October, 1974 on how this turntable has reduced rumble for many stations).

The station uses a UREI 16-band equalizer and LA3A compressor, set for very light gain reduction and a new Thomson-CSF Volumax 4111 at the transmitter for peak control. As further evidence of the determination to have the best possible sound is the practice of sweep-testing every single cart received over the whole frequency range. The number of faulty carts found is relatively small but they would cause an unwanted degree of degradation in signal quality.

Does it pay? The management of WSHE is convinced that without their "good" signal they would not be among the top stations in the area. **BM/E**

## Many Stations Indifferent To Noise Reduction

*A just completed survey of classical music stations conducted by Peter Weiss, engineering editor of Radio Musical Monthly, shows that most general managers and chief engineers feel that there is little to be gained by adopting Dolby B systems. The most likely reason: too few tuners in the market. This reason may not be valid since chief engineers interviewed by BM/E who do employ Dolby B (accompanying article), find it valuable regardless. The impression that there are too few decoder-equipped tuners available may be erroneous. Recent Dolby advertisements show 30. Dolby reports that there are 150 broadcasters with Dolby encoders and that at least 130 are on the air with them. Nonetheless, the RMM survey is interesting as an indication of "what's out there." The following is excerpted, with permission, from Peter Weiss' column.*

The results of our mini-survey on Dolby-B broadcast equipment have come in and been tabulated. Before we go ahead with our evaluation of the results, let's first present them and describe the methods used in obtaining them.

A total of 160 reply cards, prepared by myself, were mailed to the chief engineers of our reader stations. Of the 160 sent out, 79 were returned, giving us a response figure of a touch under 50%. The questions were:

- Q1. Does your station currently use a Dolby type B broadcast encoder? (Yes) (No)
- Q2. If you answered "Yes" to question 1, do you use the 25 microsecond time constant? (Yes) (No)

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## GE large screen color TV projector... PJ5000

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Q2. If you answered "No" to question 1, do you plan to install the system in the foreseeable future? (Yes) (No)

The box score on the results is as follows:

Response	Q1	Q2	Q3
YES	10	7	9
NO	69	3	53
MAYBE			5
NO ANS.			2

In evaluating the results of the survey, one important fact to bear in mind is that the survey was conducted among our readership, being mainly FM stations, and being entirely stations that program concert music for a significant portion, or the entirety, of their broadcast day. Thus the results should only be interpreted as representing the trend among those especially quality-conscious stations. No broader generalization can or should be made from the results obtained.

As the results came in, it became increasingly clear that some sort of direct contact with a few of our respondents was necessary. Therefore, follow-up phone calls were made to a few g.m.'s and c.e.'s.

Of the respondents I spoke to who had replied in the negative to question 1 and 3, the general feeling seemed to be that since the vast majority of their listeners were not equipped with "compatible" receivers or tuners, it would not be helpful to employ the Dolby B system with 25 microsecond time constant. Use of Dolby B with 75 microsecond time constant was ruled out because it was felt that dynamic range and fidelity would be adversely affected.

Among the general managers I spoke to was one who commented that a sister station in his group broadcast a "beautiful music" format and benefitted from using

Dolby B with 75 ms. In their case, the apparent increase in "dial loudness" and moderately restricted dynamic range were desired results that the Dolby B delivered.

A principal of a major engineering consulting firm, one of whose major-market client stations responded to the survey, said that the reason Dolby B was decided against for that particular client was simply lack of need. The majority of listeners were located in an area where the station's signal strength was greater than or equal to 60 dBu and therefore the station was not subject to the ills for which Dolby B offered a cure.

Contrastingly, another major-market respondent indicated that his listeners were very spread out geographically and he installed Dolby B because he is concerned about fringe-area reception and dial loudness.

Some stations were overhauling or replacing all or most of their audio equipment and were waiting to see what improvements were achieved in this way before making a decision on Dolby B.

A New England major-market station is saddled with a poor signal-to-noise ratio in their microwave STL. The engineering staff felt that to employ Dolby B (either 25 or 75 ms) would not help their situation. (We discussed using Dolby A encoding and decoding at appropriate ends of the microwave link but economic factors precluded such a move.)

If there was any universal agreement at all in this survey, it was evidenced in surprise at the results (I told those people I spoke to the general gist of the survey after we finished talking), especially on the part of those respondents already employing Dolby B. It seems that a more complete exchange of ideas and experiences is desirable.

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The modular SK-70 converts easily from a fully equipped, self-contained color studio camera to a modified studio camera. In the field, the studio version of the SK-70 can be connected directly to a VTR with only a co-axial cable. And for hand-held portability, the camera head features a shoulder mount, an auto-iris portable zoom lens, and a 1.5" viewfinder, along with a DC and process pack. The Digital Command Unit (DCU) with up to 3000 feet of single co-axial cable strongly enhances the capability of the SK-70. Another striking option is a 22:1 zoom lens that can be used for the studio version of the SK-70 in the field.

No matter which configuration you choose from those shown in the photo and three diagrams, the Hitachi SK-70 offers the precision and reliability of three 2/3" Saticon tubes in the camera head to insure excellent picture quality, combined with all the latest advances in broadcast camera technology.

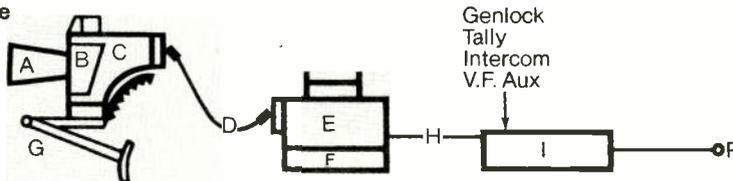
As you can see, our outstanding Hitachi SK-70 is a sound investment for broadcasters, production studios, and universities who need broadcast quality performance in a wide variety of assignments, all for the price of a single camera. We'd be pleased to arrange a demonstration of how the SK-70 can fit the following camera requirements inside or outside your TV studio, and more:



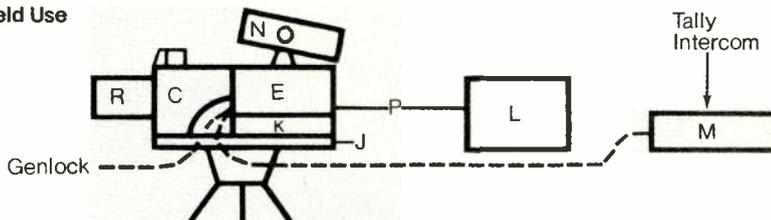
1. Fully studio-equipped

Digital Command Unit (DCU)

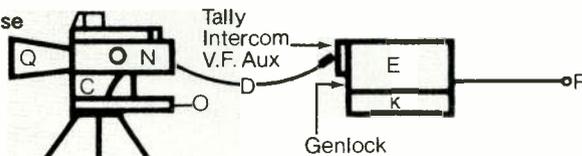
### 2. Portable Use



### 3. Field Use



### 4. Modified Studio Use



A)	Portable lens
B)	1.5" viewfinder
C)	Camera head pack
D)	Camera cable (300 ft.)
E)	Process pack
F)	D.C. pack
G)	Shoulder Mount
H)	Co-axial cable (3000 ft.)
I)	DCU
J)	Mount adapter
K)	A.C. pack
L)	VTR or FPU
M)	Operation panel
N)	5" viewfinder
O)	5" V.F. Mounting Plate
P)	Co-axial cable (video)
Q)	Portable lens w/conversion adapter
R)	Studio lens



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# SMPTE '76: No Revolutions—But ENG Matures And New Formats Take On Film.

The spirit of the conference was bent on sound, fundamental development of the revolution started by ENG.

The expectations for the SMPTE 118th Technical Conference were down to earth. No one was expecting any major new revelations and there were none. What was expected was progress in the areas of recording and editing videotape. And there was that.

One of the early speakers was John A. Schneider, president, CBS/Broadcast Group. He was justly impressed by the rate of development by technologists in the communications field but suggested that sometimes the imaginations of engineers and scientists run ahead of actual need. Or, sometimes, leapfrog actual needs, jumping over some items of immediate importance.

Schneider issued a "shopping list" of items he felt were of immediate concern to the industry. "We don't need any pretty new toys, solutions to problems that we don't have, new techniques that we don't want," said Schneider. Instead, Schneider said that they would like to capitalize on the relationship developed over the years between the production end of the business and the technological end "by offering a shopping list of items

that we need from you—items that will help us do our job better."

Basically, said Schneider, "these needs involve improved quality of service, greater freedom in production, and higher productivity . . . (and) more reliability in operation." The list suggests that they would like self-adjusting and fault correcting procedures such as developed for the space program. Schneider finds the current generation of portable cassette recorders still too heavy at 32 pounds and would prefer to see something in the order of magnitude of about 10 pounds, even if it requires a change in CBS standards.

## Smaller, lighter and more efficient are the criterion

Batteries to operate the equipment are a real sore point to Schneider. He'd like to see smaller, lighter batteries with quick and reliable recharging capability. The power source goal is a battery with a capacity of 50 watt-hours per pound of weight, quick charging, and able to operate over a wide range of temperature.

For overseas operation, Schneider sees a need for smaller, lighter, battery-operated editing equipment. It should fit in a couple of suitcases. If this is possible, the whole field of documentary production in videotape becomes more practical. Already, Schneider sees the effect of being able to shoot at a 30:1 ratio economically.

But at that high shooting ratio, the ability to edit becomes more serious. Here Schneider sees great room for improvement.

Schneider's list went on to include an immediate need for less obtrusive equipment which means smaller cameras, perhaps even wireless; more light sensitivity, down two-steps if possible, thereby reducing the need for lighting, and faster zoom lenses. With the reduction in camera size continuing, it is getting so that the camera has less mass than the lens and this situation has to be improved especially for sports where the current lens might weigh as much as 57 lbs.

Other considerations were cable size and weight and such incidental things as teleprompters. Basically there was no call for anything really new—just better, smaller and lighter.

Schneider pointed out that CBS was well on the way to having an entirely electronic news gathering operation but said that the largest portion of their broadcast production was still in entertainment and outside their sit-coms and variety shows, the nine weekly hours of drama series were still being done in film. Pending "satisfactory labor arrangements, we plan to start using tape at our Studio Center film stages in Hollywood." To do this, a machine capable of making 300 to 400 edits each hour is needed.

Schneider's urgings to the engineers to develop equipment that was "down-to-earth" was apparently well understood by manufacturers for the past year or so.



Cinema Products staffer (left) holds wireless remote control device and explains how it operates CP-16 mounted on Steadicam.



VPR-10 as backpack creates completely portable recording system.

What was being displayed on the floor and explained in technical papers was largely improvements to existing equipment.

### **Optimum editing mix explained**

The specifics of what Schneider wanted in an editing system were clarified by Rupert L. Stow, of CBS, in his paper, "Technology Applied to Television Program Production and Broadcasting." Stow mentioned two categories of editing, "production" editing, that which takes place in real-time studio productions using multiple cameras and switching, and "post-production" editing, that which takes place after the initial recording. Ideally, Stow would like to see a situation where an ideal mix of production and post-production editing could take place.

With the advent of the 1-in. VTRs, Stow sees the practicality of using electronic cameras, each connected to its own VTR and, at the same time, channeled through a switcher so that the director would be able to use production editing techniques whenever suitable and still have the option of using "post-production" techniques when they would be better.

Each format of show is suited to its own optimum form of editing, according to Stow. In the case of sitcoms and game shows, almost all the editing can best be effected using production editing techniques. As a result most of these type are already all-electronic. Variety shows and musical specials, on the other hand, require at least some post-production editing. But since most edits are accomplished in production, the few remaining edits can be, and are, easily accomplished using current electronic editing equipment. In the nine hours of prime-time drama produced each week by CBS, however, each show might involve as many as 300 to 400 post-production edits. For this reason, film is still the predominant recording medium for drama production.

Down on the exhibit floor manufacturers were displaying improved systems that, in some cases, seemed to be immediate responses toward fulfilling Schneider's shopping list.

### **Improvements in equipment emphasized**

In editing, though none of the systems were as yet battery operated, Convergence Corp., Television Research International, Inc., Datatron, Inc., and Sony Broadcast were all showing much improved systems for working with small format videotape. The Convergence ECS-1 system was sporting its new PC-3 programmable edit console, and new tape timers, TT-4 and TT-5.

The add-on accessories have significantly increased the speed of editing on the ECS system. It is now possible to use the keyboard of the PC-3 to punch in a specific edit-in point, using the control-track readout code number, and a precise edit-out point. The machine will search out the edit points, cue the machines and perform the edit on command. This, of course, makes precise insert editing relatively easy. Also program time can be easily kept count of.

Television Research International, Inc. (TRI) brought out their brand new EA-3 system. If Schneider wants compactness in an editing controller, this should be a relatively appropriate answer. The EA-3 measures only

13.5 in. long × 6.25 in. high × 11 in. wide and weighs just 14.5 lbs. The controller is by no means a stripped down version of the EA-5. In addition to being lightweight and compact, the machine claims, and appears to be, relatively rugged. It is a low power consumer (50 watts, maximum) and has a wide range of features equal to, and in most cases surpassing, those offered in comparable machines including TRI's own EA-5. The controller features two search levers, similar to joysticks. It will interface to 14 models of VTRs in six formats and it is possible to mix the VTR formats (i.e. stepping-up from cassette to 1-in.). Though it is a control track editor, a SMPTE time code adapter is available as an option.

TRI also showed a model of the upcoming EA-6, Edit Automator. The \$3995.00 EA-3 is designed as a module for the EA-6 which will sell at about \$3495.00. The EA-3 fits into a space in the EA-6 cabinet and when connected, the EA-6 will provide a whole host of further options such as bi-phase SMPTE time code capability and programmable editing. The EA-6 is expected to be available by this March at NAB in Washington.

Datatron showed their Tempo '76 series of micro-processor-centered editors, which will work on either SMPTE or control track and can control up to three VTRs at the same time.

### **One-inch VTRs score heavily**

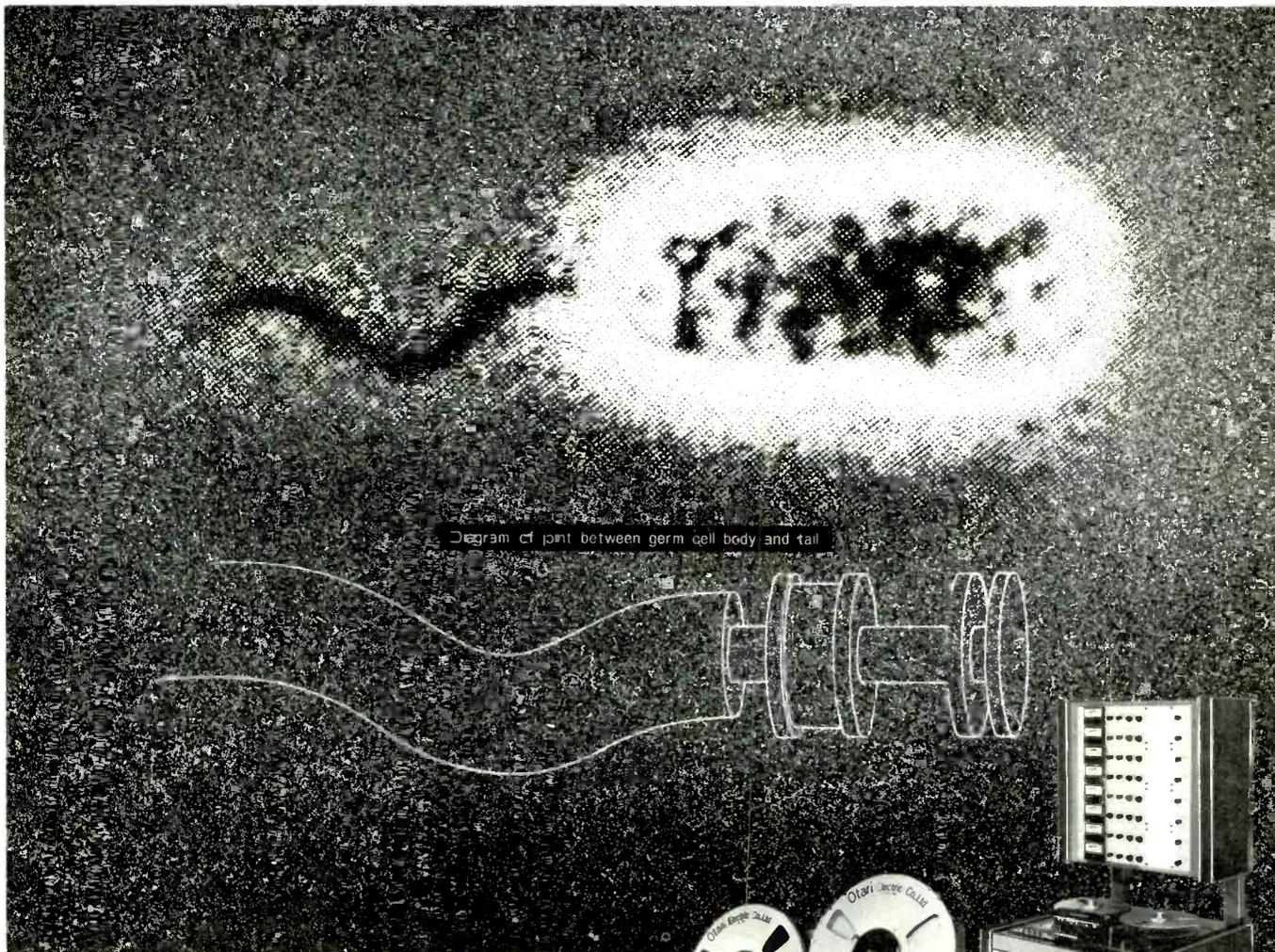
Most other editing advances were related to the 1-in., and quadruplex machines. In fact, the Conference turned out to be the best forum of the season for scoring points on behalf of 1-in. videotape recorders—all at the expense of quads. At NAB, Chicago, broadcasters and producers saw their first demonstrations of these new challengers—the Bosch Fernseh BCN series, the Sony BVH-1000 and the Ampex VPR-1—but it was too early in the game for presentations on the technical program. Although the BCN series had been unveiled at the 9th Montreux International Television Conference earlier, the Sony and Ampex machines were brand new. The choice of three new approaches each vying as a possible successor to quad—on the 25th anniversary of quad supremacy—left those who attended NAB confused to say the least. At SMPTE one could begin to sort out what each of the new systems offered and the role that each might be destined to play.

Whether any of the three emerge to be *the* new standard such as quadruplex has been, remains to be seen. But it is safe to predict that all three will become practical, viable alternatives to quad and will find sufficient market acceptance to survive.

The Bosch Fernseh BCN series, since its introduction in 1975, has already established itself. We heard at the SMPTE meeting that at least eighty systems have been sold. Although most of the customers have been from Europe (Denmark, France, Germany) plus South Africa and the Middle East, at least ten percent of the sales should be credited to Fernseh's Saddlebrook, NJ office. And very significant is the IVC reconfirmation at SMPTE that it is well along in its plans to manufacture BCN units within the U.S. with the first machines coming off the line by NAB time, March '77. (IVC also talked about sales of 12 units already). Add to this the licensing agreements permitting RCA and Philips to produce the BCN models and you can see this new format

continued on page 74

# once is enough!



*It is amazing to see that a zebra cell's tail is connected to its body a rod-like linkage which functions as a smoothly rotating mechanical joint. This perfectly functioning design is a wonder of natural engineering.*

The same joint design is used in Otari equipment. Otari has the long experience and dedication to detail that permits them to make the transition from theory and example to the level of technology which is directly applicable to communication equipment. There is no substitute for such experience and ability, and the fruits of such efforts are evident in the high-technology Otari products now winning high acclaim professional users and manufacturers throughout the world.

***Trust through experience — one encounter with OTARI equipment and from then on, You will trust the OTARI name.***



**MX-5050-2S**

Small-sized tape recorder for professional use.  
Built-in SEL/REP test oscillator.  
4-heads(2-2-2-4), input/output, 3-pin XLR connector.

**MX-7308**

Economically priced for studio use.  
One-inch, 8-channel recorder.  
Direct-drive tension servo. All amplifiers and mechanisms remote controllable.

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will leave its mark.

Papers by Robert Kuhl of IVC and Messrs. H.R. Groll and M.H. Zahn of Bosch Fernseh went a long way in convincing attendees that the BCN is an outstanding system electronically and mechanically. We'll pick up on that shortly. What we must first point out is that although the three new systems being discussed are similar in that all use 1-in. tape, they are by no means alike. It is not a case of which design is best or more reliable but rather are the operating features proper for the job at hand. This was the point Dave MacDonald of Sony made in his presentation and his talk helped to clarify the role that the new machines can play.

The Sony BVH-1000, for example, because of its cost and operational features—principally editing ease—makes it possible to produce TV shows using single camera film techniques. There is no need to go through a fancy switcher and to "create" on the spot under real time pressure. Rather, raw footage is captured at one's convenience on a single portable camera and then edited into a creative masterpiece after taping. This is because film type editing techniques are now possible.

The point is that with non-segmented helical scan machines, single frames can be played back in a stop mode, slow motion forward-, or slow motion backward mode. There is no need to "edit on the fly" as has been necessary with quad or to buy a big computer editing control system to beat the editing problem. Simple film style editing is possible with both the Sony and Ampex

machines. Bosch Fernseh, on the other hand, using a segmented-scan format, is basically similar to quad in this editing ease. This does not mean, however, that Bosch Fernseh is willing to concede an advantage to its competitors. Groll told the SMPTE visitors that in the near future BCN units would be equipped with electronic frame store devices for editing convenience. Although frame store systems are currently very expensive (\$50-60,000), Groll indicated units for editing could be marketed in the \$12-15,000 price range.

#### Features and differences

All three manufacturers came on strong at SMPTE in getting their story across but Bosch Fernseh won the prize in terms of time in the program. Not only were there two papers by Bosch Fernseh speakers (Groll and Zahn) but a third by Bob Kuhl of IVC who got his point across the opening day. All three speakers hammered home these points for BCN: performance comparable to quadruplex but with lower operating costs and lower initial cost; three full-fidelity audio channels; a size 1/3 that of quad; perfect interchangeability between machines; a small drum diameter (possible because of two-head design) which minimizes inertial effects when the recorder is in motion. Groll stressed another virtue of a 2-in. drum diameter: less tape drum contact and therefore less friction and the likelihood of tape information. On a drum size of 6 inches, tape wrap length is 18 inches; on a drum diameter of 2 inches the tape wrap length is only 3.1 inches.

The only theoretical disadvantages of the BCN series design conceded by Groll were the inability to operate



**TR-600A:  
the new  
quad VTR  
with Super  
Highband/  
Pilot Tone.**

slow motion and stop frame and banding. But he said editing will be made easy with the addition of frame store and the banding problem will have been overcome in the design (again the 2-in. head helps). Zahn stressed in his paper that the BCN mechanism is so stable digital TBC are not necessary. Thus, according to Zahn, higher generation dubs are possible since digital TBC do contribute noise. Zahn also pointed out that the two head design also means information on the vertical interval—an inherent weakness with Omega wraps.

MacDonald (of Sony), following Messrs. Groll and Zahn to the lectern, congratulated Bosch Fernseh for its fine mechanical design but classified the BCN as a system for real time application only because of its editing limitation. The Sony BVH-1000 and the VPR-1 make it possible to edit tapes almost as one would edit film, said MacDonald, and this sets the latter two apart from the BCN. MacDonald acknowledged one unusual feature of the Ampex unit—the ability of the automatic scan head to stay on track, even when the tape speed is changing. But that was the end of the concessions. The main weakness of the VPR-1, said MacDonald, is that the original Ampex helical scan format was not changed. Thus one cannot get the high quality audio that is possible with the Sony format. And there is one other telling difference according to MacDonald: the Ampex loses about ten lines in its Omega wrap.\* Sony overcame this disadvantage with a separate synchronizing head to capture vertical interval reference data. In the Sony tape format, the sync track is laid down separately and picked

\*Ampex maintains this is not serious and that it can capture full VIR information.

up separately.

MacDonald declared no tracking problem with the BVH-1000 because of precision parts and sensitive servos. He claimed fifth generation dubs showing no signal degradation and he stressed its ability to fast forward 7 x speed visually and 30 x with time code.

Last on the video tape program to speak of new 1-in. designs was Mark Sanders of Ampex. In tracing the evolution of workable no-quality—sacrifice designs, Sanders dismissed segmented helical as missing the boat because it could not deliver a field-per-scan. He then described how the long scan length of 17 inches can be reliably tracked with the automatic scan head feature of the VPR. He called the system an "electrically programmable video head." It incorporates a micro-positioning servo system to automatically follow the video track. The programmable head can move in two planes simultaneously and has sufficient range to accurately follow a track which actually crosses over to an adjacent track position. A sinusoidal dithering scheme is used to sense track boundaries and a means of track selection and lock-up is incorporated. Sanders showed first-time slides of the mechanism.

The micropositioning capabilities produce broadcastable slow-motion and still framed video without the noise-bar characteristic of helical VTRs (including the Sony unit).

The inescapable conclusion from the SMPTE presentations: quad quality can be equaled at a lower cost but each of the systems offered as alternatives are different and no single one is ideal for all applications: the BCN

continued on page 76

This RCA option substantially improves signal-to-noise ratio, reduces moiré, and corrects banding errors. Master recordings look better than ever so that all your tapes can be produced with consistent high quality.

## The complete quad.

It takes a great VTR to accommodate versatile options. That's the TR-600A. We designed in all-modular electronics. Included desirable features that cost up to \$20,000 to add to other VTRs. The TR-600A offers a raft of options, such as exclusive integral on-line Time Code Editing, AE-600. All housed in a smart cabinet that fits in 7 sq. ft. of van or studio floor. In short, the complete quad at a surprisingly low price.

For the complete story of the TR-600A and all its options, see your RCA Representative now.



# RCA

has editing limitations; only the Ampex can produce broadcastable slow motion and stop motion pictures but it can't offer the audio features or record sync signals as can the Sony; the Sony seems to have an edge on editing features because of its ability to maintain a picture in either fast forward or reverse modes—and infinite speed variation. Ampex offers the unique feature of being able to monitor what is being laid down on tape. You pay your money and you take your choice. It's not an obvious choice.

#### Cameras are more rugged and mobile

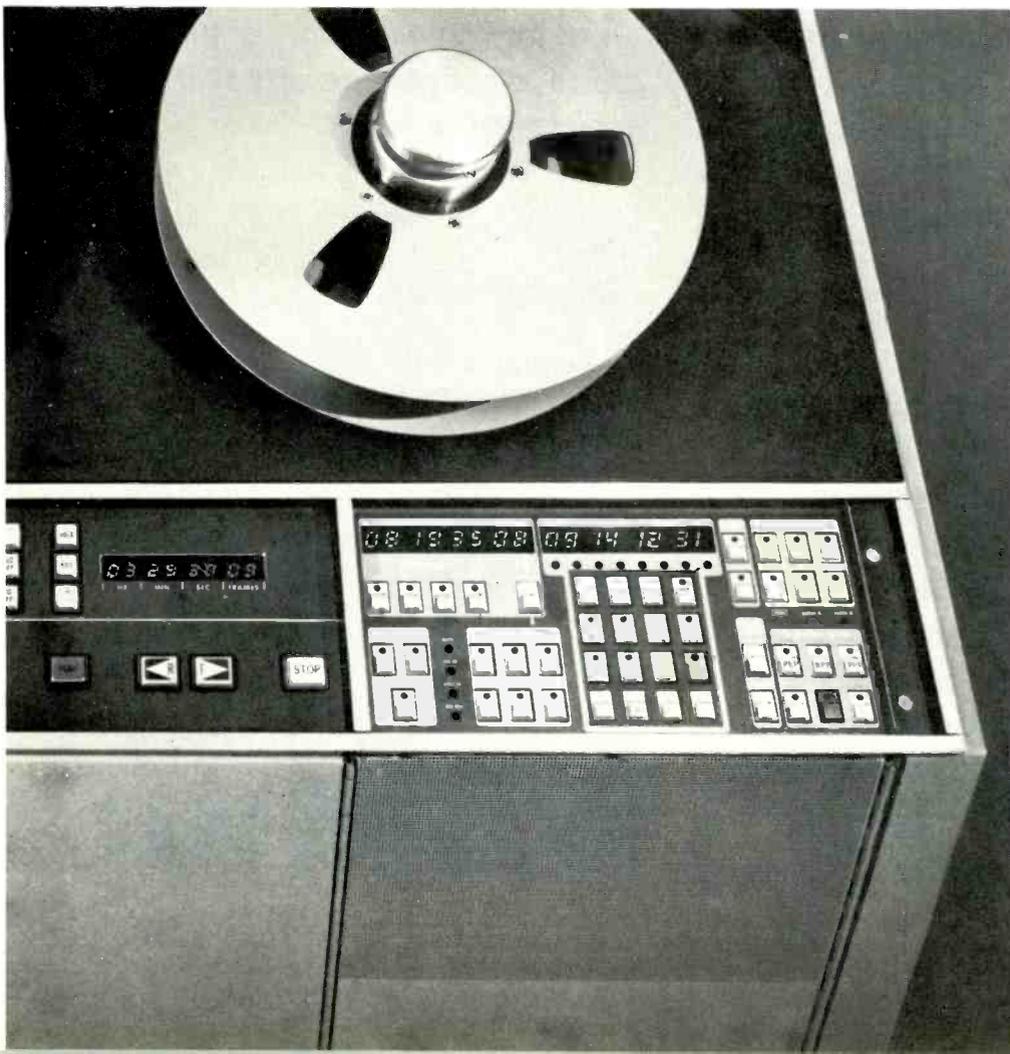
Nothing in cameras yet seemed to approach the desires of producers, but some things have been improved. RCA presented a remarkable demonstration of the ruggedness of their TK-76. In a videotape test the camera was subjected to 2G shocks and vibrated at 50 cycles per second. The image stability was very good due to self-correcting deflection circuits. Moreover, the camera has been improved to register temperature changes in all three channels evenly. RCA was happy to point out that they had determined the theoretical limit for signal-to-noise ratio at 56 dB and the TK-76 comes within one dB of this.

The most dramatic demonstration of new camera technology did not involve the camera at all, but instead, a camera mounting device from Cinema Products. This device, Steadicam, is a great aid in hand-held camera work. The camera, (currently the device can handle either extensively modified Arri IIC, a CP-16, or the

RCA TK-76) is mounted on a support arm attached to a harness-like jacket. The weight of the camera is felt mostly in the hips, and is very well distributed so as to neutralize any tendency to "lean into the camera." The support arm is part of a two segment exoskeletal-type articulated arm which parallels the operator's arm in any position. The segments of the arms are controlled automatically by the relationship of the springs to the positions of the arm segments.

Utilizing a "box" which contains batteries and the viewing monitor to counter balance the camera, the tendency of the camera to rise or lower is virtually neutral. Once the up/down motion is controlled, the lateral motion can be controlled by the slightest touch to the hand grip, located just below the camera support. In fact, both horizontal and vertical motion of the camera can be controlled with hip movement alone after some practice. This writer wore the Steadicam with the CP-16 motion picture camera attached, and literally was able to run, jog, and walk throughout the display area with ease, and experienced only the slightest deviation of picture from the center cross-hairs on the monitor. (In the motion picture version, the monitor is supplied with video from a Cinevid-16 camera system locked into the opticals of the CP-16.) Focus can be controlled by the AC using a wireless, or cable driven, remote control unit.

Arvin Echo and Eigen showed different versions of disc based still-store machines. The Arvin Echo, EFS-1, the favorite of ABC, is strictly a still-store device, each flexible Discassette<sup>®</sup> being capable of storing up to 400 individual color frames (200 per side). The Eigen Color Disc Recorder, on the other hand, is touted as both a



**TR-600A:  
first and  
only quad  
VTR with  
an editor's  
heart.**

still-store and slo-mo machine. The unit shown was a color disc cassette system capable of recording a full field of video for jitter free images. Eigen reports that its first sale to a broadcaster of this unit is very close.

#### New "Flickerless" Projector and things to come

Three truly new products were either demonstrated or discussed at the Conference. The Hologon Optical Systems Corp., showed its shutterless projector. This projector uses a unique multi-faceted polygonal reflector with sprocket teeth along its edge which effects lap dissolves, frame-to-frame. Each film frame is served by a pair of angled reflectors. The light travels in a U-shaped path, from the projection lamp through the condenser lens, then through the film, to one facet of the reflector, to the opposite facet, and then out through the projection lens. The principle advantage of this system is that it delivers an image free of flicker. Since operation is continuous rather than intermittent 100% illumination reaches the screen 100% of the time. By this means, the problems of film to tape transfer associated with the synchronizing problems of video scan rate to film frames per second, is completely bypassed. The film can be run through the projector at any rate from 0 to 500 fps.

Though most of what was shown or discussed in papers represented the here and now, at least one paper and one demonstration dealt with a couple of items for the near future.

Bruce D. Stephens, a television consultant/producer and video experimenter, presented a paper on "Wide Screen Three-Dimensional Video Projection," and later demonstrated a prototype of the process. The process

involved the use of two previously unrelated devices, the General Electric single lens "Light Valve" color television projector and Marks Polarized Corporation's 3-D film projector, the "Polarator." The working demonstration did indeed show stereo relief and a remarkable depth of field, but unfortunately, the picture was somewhat blurry and eye straining. Improvements will be necessary before this 3-D system can be considered viable.

John Lowry of Digital Video Systems, presented a paper on the DVS 402 Special Effects Generator, which when available, will use all-digital techniques to create the illusion of three-dimensional effects. The device will be able to do image rotations, flip-overs, push-throughs, page-turns, and other effects previously possible only in film technology. As yet, all effects take place in the horizontal plane. It will be some time before effects in the vertical plane are possible. Though no working model of the device was at the conference, Lowry expects to present it for SMPTE's Winter Conference in San Francisco, this January.

The upcoming SMPTE Winter Conference, (January 28, 29, St. Francis Hotel, San Francisco) will deal with the themes of "Beyond ENG" and digital video. The ground work for such a conference was laid in New York City, in October. With the papers and exhibits devoted primarily to better, more rugged, more reliable video equipment and to the development of digital techniques, the momentum of the industry towards electronic field production is easily determined. The 11th Annual Winter Conference should be an important forum for the further development and maturation of technology applied to the immediate needs of the broadcast industry. **BM/E**

The new TR-600A is great VTR with a dramatic "first": AE-600, an integral on-line Time Code Editing option with built-in microprocessor control. The TR-600A with AE-600 is an editing system capable of operating one record and up to 8 playback TR-600A VTRs, plus three other sources.

#### More quad per dollar.

A great basic quad VTR is the best foundation for a good editor. The TR-600A has all-modular electronics. Includes desirable features that cost up to \$20,000 to add to other VTRs. Offers a raft of options, including Super Highband/Pilot Tone for automatic picture correction. All housed in a cabinet that fits in 7 sq. ft. of van or studio floor. All at a surprisingly low price.

For the convincing story of the TR-600A, see your RCA Representative.



# RCA

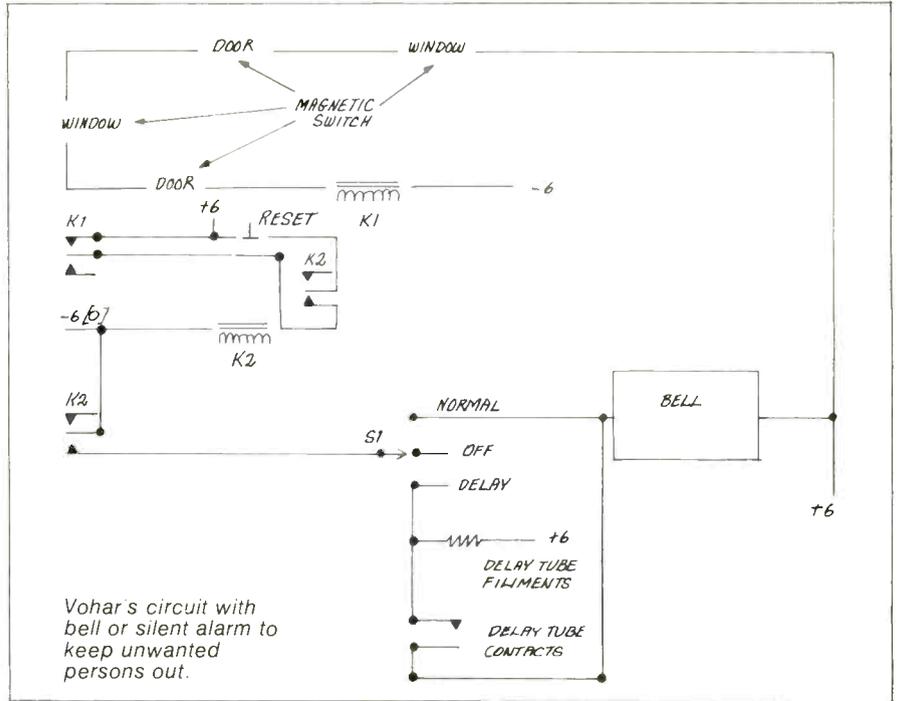
# GREAT IDEA CONTEST

## 36. Inexpensive & Easy To Build Studio Or Transmitter Site Alarm.

Don Vohar, Maintenance Engineer, WMBA Radio, Ambridge, PA

**Problem:** To keep unwanted persons from breaking into your studio or transmitter site.

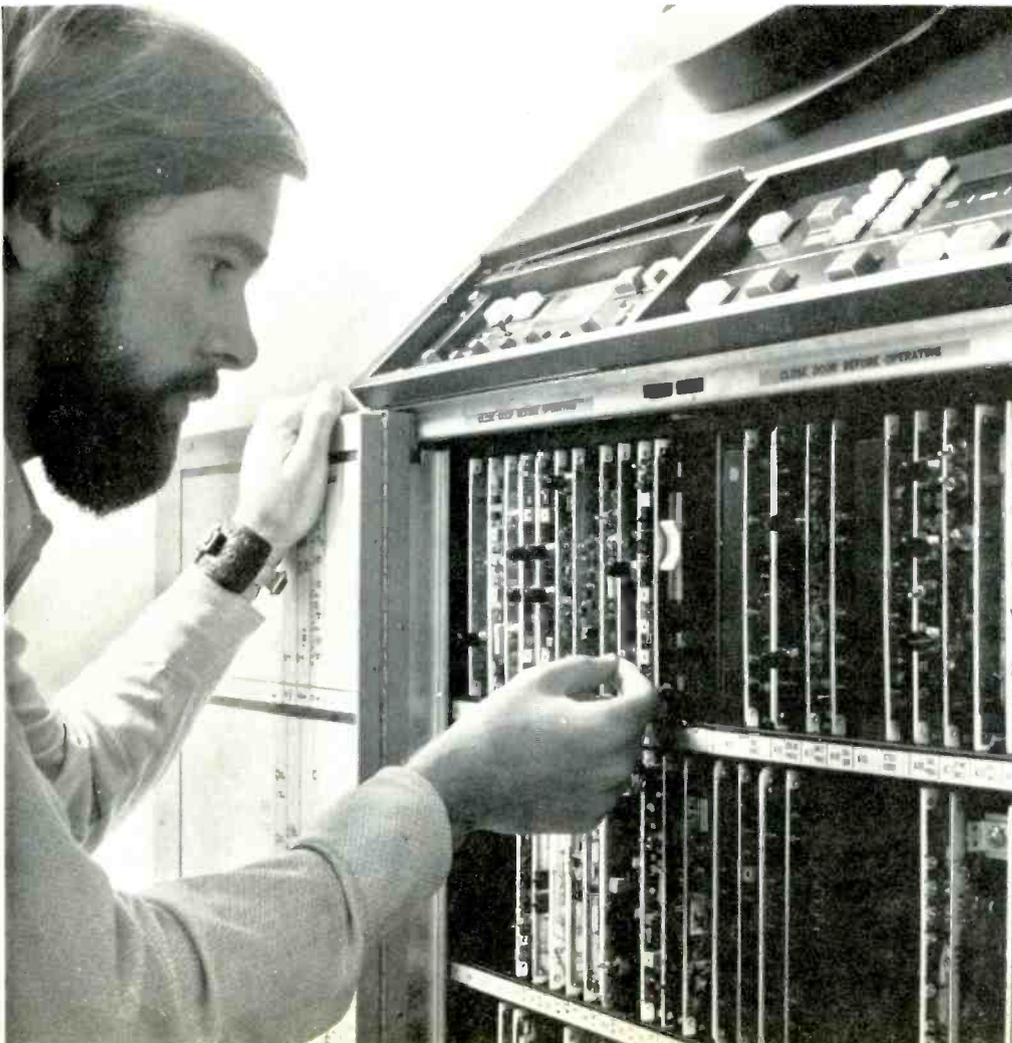
**Solution:** Build this little circuit with either a bell or silent alarm. It's inexpensive, and easy to build. Once



activated it must be turned off by a key or hidden switch. Most less expensive alarms allow the burglar to open and shut the window or door for a short period of time before the delay circuit has completely activated ringing the bell.

If a window or door is open the

magnetic switch breaks contact cutting the voltage out of relay coil K1. K1 contacts act as a switch. As K1 de-energizes, relay coil K2 energizes by the simple latching relay circuit. Negative voltage feeding through the relay contacts of K2 enter switch S1. In the normal position, this voltage goes di-



**TR-600A:  
the quad  
VTR with  
\$20,000  
worth of  
cheering  
extras  
included.**

rectly into the alarm. In the "off" position voltage is completely cut off to the bell, and in the delay position the voltage goes into the filaments of the time delay tube. After the filaments have heated, the delay tubes contacts (NO) will close, causing voltage to enter the bell.

Remember, this unit can only be reset by breaking contact at point X. Use a key or normally closed switch. If you would like to keep the battery from running down add an AC to DC step down power supply.

### 37. Altering Digital Thermometer To Work In RF Fields.

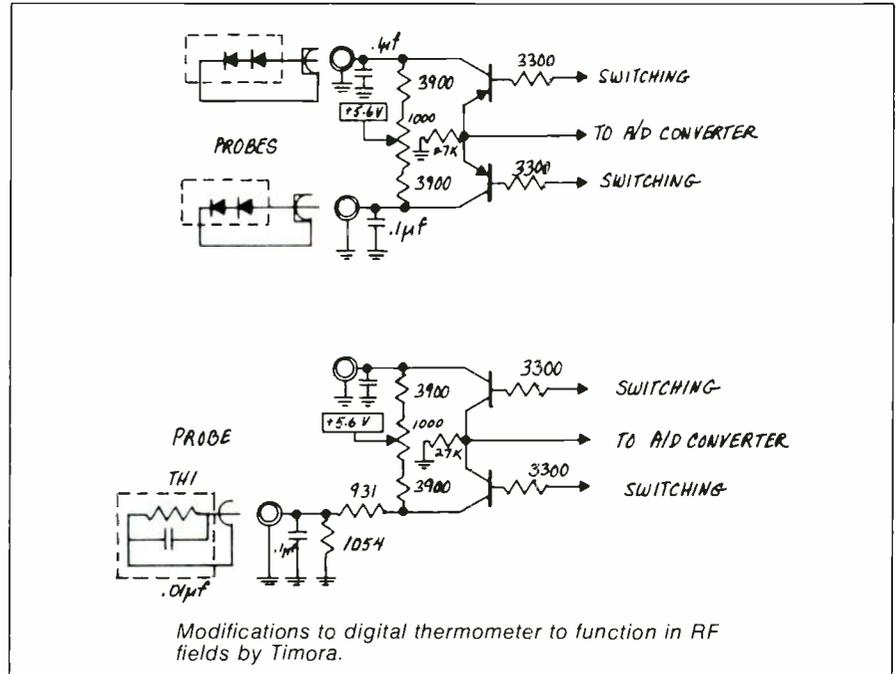
*Tim Timora, Engineer,  
KEPC-FM, Colorado Springs, CO.*

**Problem:** To modify the Heathkit Digital Thermometer to function in RF fields. When we purchased our Heathkit Digital Thermometer (ID-1390) we assembled and calibrated it in the shop. At this location there is no strong RF field, and the thermometer worked perfectly. However, after installing the unit in the control room which is next to the transmitter with a strong RF field, the thermometer

would not function. With a temperature of 70 degrees fahrenheit, the thermometer would read -22 to -60 degrees. The temperature would change with modulation.

**Solution:** First we changed the probe design. I used a thermistor and resistor network in place of the diodes to get the same change in resistance

per degree of temperature as the diodes. The resistors used should be metal film. The second change was putting all of the electronics except the display in an aluminum Bud box for shielding. At first I thought that connecting the chassis to station ground would improve stability, but no change was noted when the ground



Our new quad includes these desired features that would cost up to \$20,000 to add to other machines: Chrominance Amplitude Corrector, Color Dropout Compensator, Automatic Color Framing, Automatic Control Track Phasing, LED diagnostic systems, vacuum guide and reel servos, a presettable tape timer with LED timer display. And more.

### Great options, too.

Among them: Super Highband/Pilot Tone for better master recordings, thanks to improved signal-to-noise ratio and reduced moiré. And AE-600, the first and only on-line Time Code Editing System built into a VTR. It can operate one record and up to 8 playback TR-600As, plus three other sources.

TR-600A is truly the complete quad. At a most attractive price. As your RCA Representative will gladly point out.



# RCA

## GREAT IDEAS

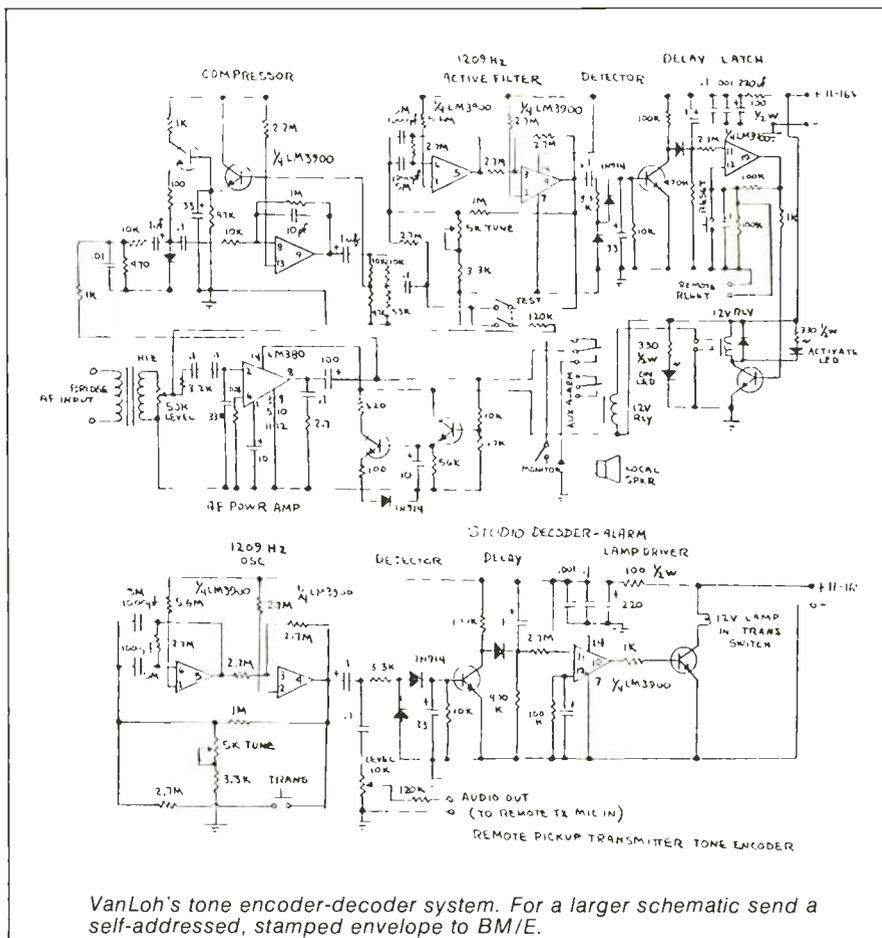
was connected and disconnected. Total cost of the modification was \$10.00.

### 38. Tone System for Alerting Studio To Tune In Remote Pickup Transmitter

Gerry VanLoh, Chief Engineer, FM, KSOO—KPAT-FM, Sioux Falls, S. Dakota

**Problem:** To set up a system allowing the operator a one-way remote pickup transmitter to signal the studio when he wishes to make a transmission.

**Solution:** A tone encoder-decoder system was built to allow calling attention to the remote by the remote operator. We use a Marti system which consists of a transmitter on the remote end and a receiver on the studio end. Our news department uses the system most of the time and the transmitter is usually left installed in our news vehicle. Many times this will occur when contact with the studio is desired to air an unscheduled newsworthy item or situation.



## Perfect Timing calculated for your pocket only \$39.95



Now you can compute Hours, Minutes and Seconds in the palm of your hand!

ESE INTRODUCES THE CANON 8T HIGH SPEED TIME CALCULATOR. Featuring one touch calculation of addition, subtraction, multiplication or division. Unique Time Keys for automatic chain calculations. "Auto" Input Switch for automatic entry of sexagesimal time data. And Conversion Keys which instantly change sexagesimal data to decimal data or vice versa!

SIZE: 2 $\frac{5}{8}$ " x 5 $\frac{5}{16}$ " x 7 $\frac{1}{16}$ "  
POWER SOURCE: 2 penlite dry batteries (size AA)  
AC ADAPTER AVAILABLE: \$5.00

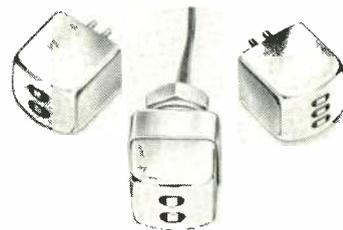


Write, Wire or Call: (213) 674-3021  
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Circle 146 on Reader Service Card

## Audio Heads? Get on the Beau bandwagon.

There must be some reason why the reaction to Beau mono and stereo audio heads has been so enthusiastic and widespread. There is: Quality and price. From the maker of Beau motors and Beucart®



audio cartridge tape machines, Beau heads are equal to anything else on the market. But at \$19.00 for mono models and \$69.50 for stereo units, Beau heads are unquestionably the biggest bargain around. Heads either with no mounts or threaded studs with leads, right from stock, are available for all popular cart machines, including Ampro, ATC, Beucart, Collins, Garron, Harris/Gates, ITC, RCA, Sono-Mag, Sparta, and Spotmaster. And if you can find another quality broadcast cart machine, we'll provide heads for it, too.

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# UMC

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A tone encoder was built and installed in the remote control head in our mobile unit. It generates the proper tone and tells the operator of the remote when he has transmitted the tone long enough to activate the studio unit, since the studio has a 3 second delay built in to prevent falsing.

The studio decoder consists of an audio amplifier with a bridging input across the remote pickup receiver output. This amplifier can be used for a local monitor by switching the speaker on whenever someone wishes to listen. The amplifier feeds audio to a compressor stage which takes care of any level variations to permit the active filter to see a constant level of audio.

The active filter does the work of passing only the required tone on to the detector. The filter is tunable over a small range by the 5K TUNE trimmer. The detector develops a dc turn-on voltage when the tone is present and switches on the delay circuit which has a time constant of about 3 seconds. The latch stage is then turned on and switches on a relay driver which activates a front panel LED and the local speaker. Also, a spare set of relay contacts is used to activate an alarm to call the announcer's attention. He can monitor through the control room console and take necessary

action. This set of contacts can also be used to activate a tape deck which may have been set up previously for recording by the remote operator. The system can be reset from the front panel or remotely if necessary.

This tone system has been tuned to a telephone touch-tone pad frequency of 1209 Hz. and can be tuned to that frequency by listening on a touch tone phone while pressing any two buttons in the first vertical row of the pad. Turning on the TEST switch will cause the filter to generate the tone to which it is tuned and it can be zeroed to 1209 Hz. This allows the receiver decoder to be set up without the encoder by using the standard 1209 Hz. An operator at a remote "base" can reach the studio without using the encoder, by holding a touch tone phone close to the transmitter microphone and pressing a button in the first vertical row.

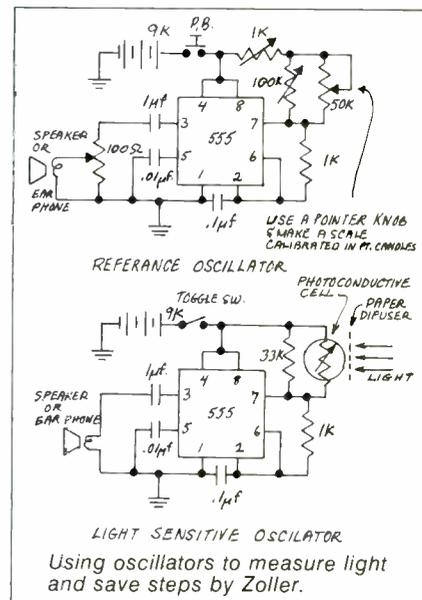
### 39. Oscillators Can Be Used To Measure Light And Save Steps.

Mary Zoller, Video Engineer, KCST, San Diego, CA

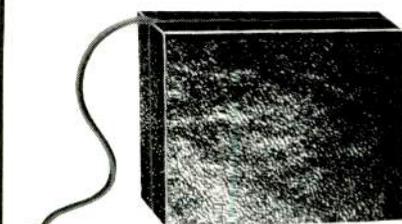
**Problem:** 1) To light a studio set when you're a one man crew and 2) to

remotely measure light falling on a set.

**Solution:** Instead of running up the ladder and aiming a light, running down the ladder, measuring your foot-candles, and back up the ladder to focus the hot spot, etc., consider this: use the following two devices and compare and match the tones emitting from each. The one tone is generated by a light sensitive oscillator and



## Nickel Cadmium BATTERIES for ENG.



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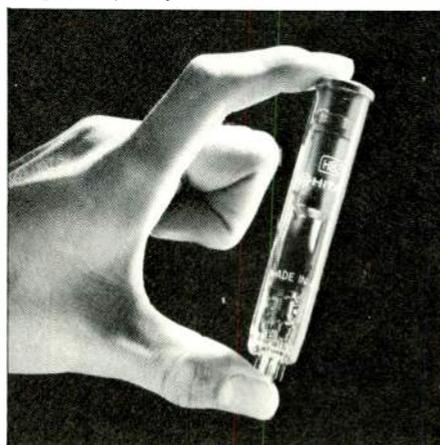
ALEXANDER manufacturing co.

Box 1645 Mason City, Iowa 50401  
Phone (515) 423-8955

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## SATICON\* catches the action live... ...with a small 2/3 inch color tube.

\*Registration pending in U.S.A.



The Hitachi SATICON, a newly-developed camera tube, is characterized by heterojunction target between tin-oxide and selenium doped with arsenic and tellurium in its photo-conductive layer.

Model H8397 is the first in the SATICON series, a small 2/3 inch high-performance tube that is particularly suited for hand-held color television cameras. Size and weight are significantly reduced with no impairment in picture quality or color. In the studio or out on the field. The Hitachi SATICON makes for easy versatile on-site TV broadcasting.

The Hitachi SATICON H8397 offers these excellent features:

High resolution — amplitude response of nominal 45% at 400/TV lines.

Low reflection coefficient of photo conductor throughout the entire visible light range — eliminates flare and the need for a flare tip.

Well-balanced, highly sensitive spectral response — no R.G.B. tube selection required.

Low lag — almost zero with bias light.

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2700 River Road, Des Plaines, Illinois 60018  
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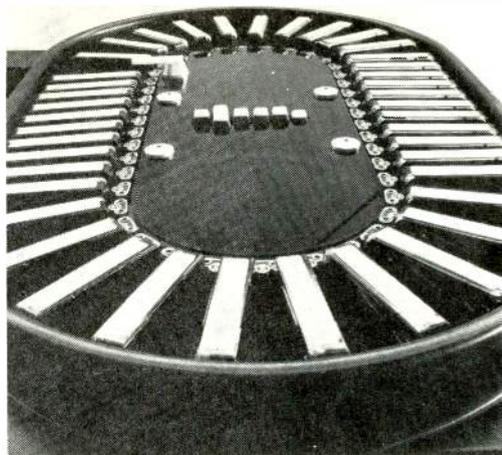
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Circle 150 on Reader Service Card

## GREAT IDEAS

placed in the position to be lit (in a chair, behind a podium, etc.) and the other generated by a calibrated reference oscillator on the ladder with you.

If you want, for instance, 150 fc as a fill, set your reference oscillator to 150 fc and when the tone produced by the light sensitive oscillator in position in the set is the same as the one you've pre-set on the reference oscillator, you have 150 fc. Do the same for your key and back lights.

You can also set the dial for, say, 200 fc and from a remote location adjust a dimmer for the same tone from the light sensitive oscillator. In this way you can have an exact mark for light changes. Everything can be pre-measured with great accuracy and your video ops won't be screaming when the level drops too far or jumps off the scope.

Conversely, you can measure the light remotely by adjusting the reference oscillator to match the tone coming from the light sensitive oscillator. You can readily light an entire set with literally half the effort and a lot more consistency.

Schematics for both units are simple. The total cost is less than \$20.00.

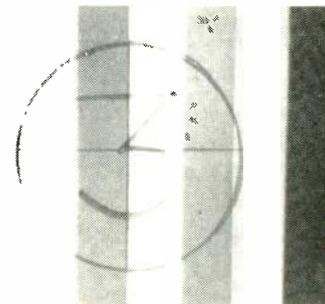
Note: Calibrate your reference oscillator to a known standard like an existing light meter.

## 40. Universal Leader Helps Cue ENG Stories

Harry F. Palmer, WKRG, Mobile, AL

**Problem:** Cueing of ENG stories which playback from Sony cassettes during live newscasts.

**Solution:** We have produced a "Universal Leader" tape with a countdown from TEN to TWO, followed by a first frame marker dot and five minutes of color black. The person editing a story on cassette first transfers the universal leader to the



Palmer: the first frame marker dot appears as a white circle positioned at the upper right corner of the black screen, just as the cue marks are commonly placed on films.

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Model 7400 gives you

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cassette which will be the finished program tape. He then edits the story using the "Insert" mode on our RM-400 editor, beginning by placing the first frame of video exactly on the marker dot which is a part of the universal leader tape. During the news-cast, the tape is easily cued for a five second roll and the director is aware of the tape status at all times. In addition to the countdown, we have color bars on the leader tape as shown in the enclosed drawing. We have remote controls for video level, phase and set-up from our TBC, and the color bars at the head of each story may be a good reference for the video man if he has made unusual variances to correct for discrepancies on an earlier story.

#### 41. A Very Inexpensive High-Quality Mixing Console.

Paul Roehm, Engineer,  
WNAS, New Albany, IN

**Problem:** To build a high quality mixing console on a very limited educational-station budget that would free the master console for production jobs from time to time.

**Solution:** WNAS is an educational station, and as such has an extremely heavy (twenty shows a week) production schedule. Most of our productions are one-person jobs, and these present no problem. But some others are large studio jobs which require more than our present production can give us. In

order for us to do these, it is necessary for us to "free up" our master console. Originally I built the miniconsole to bring the output level of our Ampex 601 up to what's needed to feed our transmitter, but since then I have expanded and improved on it so that it can handle just about any job in the station. Technically the unit doesn't perform badly:

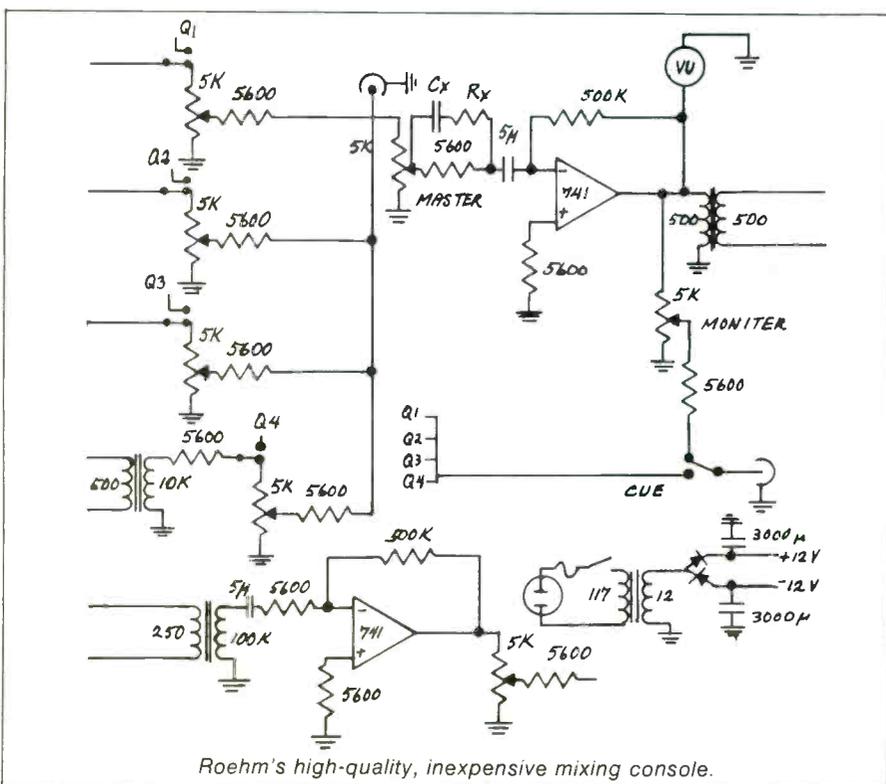
Output Level: +8dBm (av) +18dBm (peak)  
S+N/N: 63 dB  
Harmonic Distortion: 25%  
Input Level: -20dBm (min)  
Z in: 5000 ohms (unbal)  
500 ohms (bal)  
Frequency Response: +0 -2 dB 60-15 kHz

The total cost for the unit, using junk parts, was about \$35.00. We think of new uses for the unit practically every day, one possibility is as a remote mixer, to add a tape player, for breaks and interviews, to our regular remote amplifier.

continued on page 84

## PICK THE WINNER VOTE NOW!

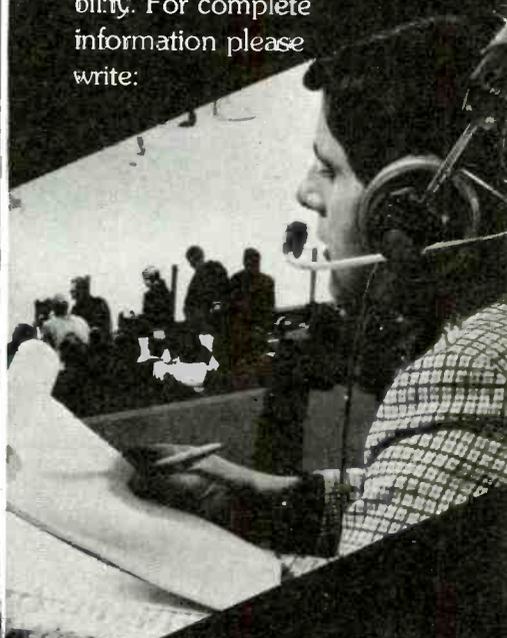
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Roehm's high-quality, inexpensive mixing console.

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Combine the finest omnidirectional dynamic boom mike with an equally high performance bin-aural headphone and you have the superior Sportscaster headset...the Telex CS-90. For live broadcasts, from the station or on remotes, with cue and program monitoring and hands-free convenience. The audience hears every word, clearly, crisply, with crowd noise for background color and atmosphere. Circumaural ear cushions screen out noise in the immediate area so that special acoustic facilities are unnecessary. Supplied with convenient in-line, mike-muting "push-to-cough" switch. The Sportscaster headset. Color, action and hands-free mobility. For complete information please write:



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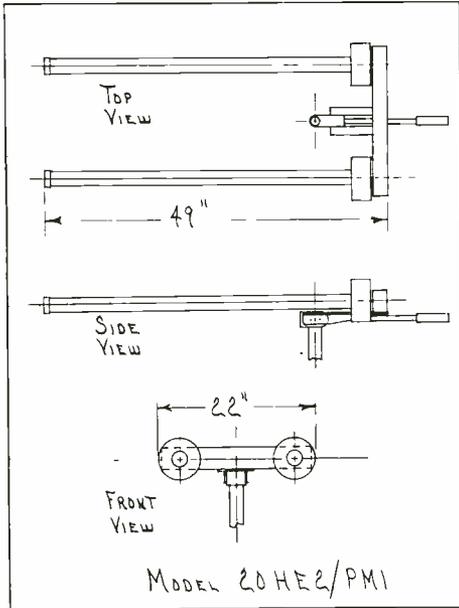
Canada: Telak Electronics, Ltd., Scarborough, Ontario

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## GREAT IDEAS

### 42. Automatic Turn-Off For Bulk Degausser.

*Gordon Sparks, Technical Director, WEXL, Royal Oak, MI.*

**Problem:** On several occasions, inattentive operators left our tape degausser on beyond its duty cycle, burning it up.

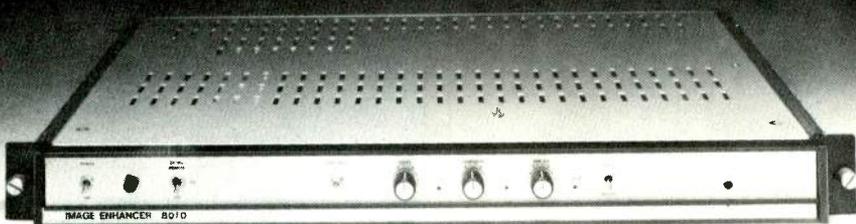
**Solution:** We finally came up with a simple but effective solution. We mounted an electrical box and receptacle on the rear of a heavy duty foot operated switch. The degausser is plugged into the switch. Now, to leave it on, the operator would have to literally fall asleep "on" the switch. I suppose anything is possible!

**ENTER 1977  
GREAT IDEAS  
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(LAST YEAR'S RULES APPLY.)

SEE SEPT., P. 160)

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# BROADCAST EQUIPMENT

**New Time Base Corrector and Combination Stressor Head up This month's Survey of New Broadcast Equipment**

## TBC For Current Helical VTRs 300

TBC-1 is a fifth generation time base corrector that is compatible with all current helical scan videotape recorders and is designed for broadcast, teleproduction, CATV and CCTV recording applications.

The TBC has been developed with the special demands of ENG and microwave transmission in mind and incorporates many performance features both as standard and optional functions.

The TBC-1 operates with capstan-servoed non-segmented helical VTRs and is the only TBC that is compatible with the special electronics and automatic scan tracking (AST) features of the Ampex VPR-1 video production recorder.

An exclusive feature, dynamic correction, combines "averaging," during initial lock-up and severe error overloads and line-by-line correction which is automatically switched to when video is normal. The TBC-1 has an enlarged correction window of more than six full lines (10 lines in PAL/SECAM) which allows it to handle severe overloads without degrading picture quality.

VTR interfacing is built into the device and no VTR modifications are necessary for most popular recorders. Operation is true "single wire" with no "conversational" signals back to the VTR. It will accept either TTL or RF signals from the VTR for optional drop-out compensator. The TBC-1 also provides adjustable advance sync to the

VTR and optional velocity compensator to improve quality of multiple-generation dubs. Other options include high-quality drop-out compensator that replaces dropouts with information from the previously correctly-phased line of video and a heterodyne color processor that is switchable with the standard direct-color recovery system. Basic model: \$12,800. AMPEX.

## Professional 16mm Camera 301

Model FR-16 motion picture camera for single or double system sound weighs only 8 lbs, 7 oz. with camera body and finder; Angenieux 12-120mm



zoom lens; 400 ft. Frezzi/Mitchell magazine; film load; quick-change internal nickel-cadmium battery; Frezzi MCA-16 two channel side-mounted amplifier; sound head; "street" weight is 16½ lbs. Design permits quick plug-in installation of a side-mounted amplifier for single-system sound operation without ex-

continued on page 86

## Cameraman's Headset... Keeps the crew in touch

A professional TV Cameraman's Headset series specifically designed to interface with existing Western Electric circuits. Single side unit receives intercom only. Dual side, binaural unit receives intercom and monitors program. Carbon boom mike with optional push-to-talk switch. Designed for comfort and rugged dependability in every day use. Keeps the crew in touch—in or out of the studio. For complete information please write:



## Eliminates Fade Outs in Wireless Microphone Systems

The Vega Model 63 Diversity Receiving System is designed to virtually eliminate problem noise and signal dropouts that are occasionally encountered when a wireless microphone is used on a set, in studios and in theatres. Send for complete details and specifications.



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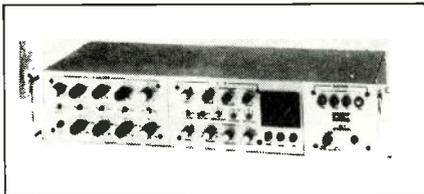
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## BROADCAST EQUIPMENT

ternal or internal modification or re-assembly of camera and vice-versa for double system sound filming. Basic camera body: \$6450. FREZZOLINI ELECTRONICS INC.

### Stressor Tailors Program 302

The OCA VS-1 Stressor provides a novel approach, combining the full functions of the OCACLX Compressor-Limiter-Expander and the OCASEQ Parametric Equalizer.



The VS-1 Stressor is designed to fulfill several requirements. It may be used to process the output of the program chain prior to the microwave or telco line. It may be used at the transmitter site just ahead of the transmitter, acting as a final limiter, or used as a "DJ" or studio microphone enhancer.

A "routing switcher" alters the relationship of the two devices, placing the equalizer either before or after the compressor-limiter-expander. A third position inserts the equalizer into the control circuitry of the compressor section, creating a frequency sensitive compressor or, alternately, a "four band dynamic equalizer." Creates a "... powerful, bright, and 'punchy' signal." \$1,492. ORANGE COUNTY.

### Stereo Program Channel 303

The KM-400 is a new stereo Program Channel that meets all CCITT recommendations "J.21 and J.31" (Geneva 1972). It has been designed with advanced one-step modulation to eliminate noise, reduce maintenance problems, and provide greater reliability.

The KM-400 translates program material in the audio frequency range to carrier frequencies in the 60 to 108 kHz base group for use on microwave, coaxial cable and/or satellite multiplex transmission facilities. Two inputs of program material at audio frequency range are lowpass filtered to eliminate any frequencies above 15 kHz, and then modulated and bandpass filtered to obtain the frequency bands of 86 to 101 kHz and 82 to 67 kHz. These frequency

bands are then combined and bandpass filtered to obtain output within the CCITT Group B, 60 to 108 kHz. Utilizes a 16.8 Pilot for automatic phase correction with 0 deg. error, end-to-end synchronization and a Pilot Alarm according to CCITT recommendations. KARKAR ELECTRONICS, INC.

### Remote Control System 304

A digital remote control system consisting of a TCT-150 Control Transmitter and up to eight TCR-150 Control Receiver(s) provides on/off or normal/alternate remote control of up to 15 functions at each receiver location. These functions can include non-duplication switchers, broadcast transmitters, microwave relays, security systems, and other equipment.

The TCT-150 transmitter will accept either front-panel switch commands or TTL logic/contact closure inputs generated by timers or computers. These signals are transmitted via a two-conductor cable or telephone circuit to the TCR-150 Receiver(s), which in turn are connected to the equipment under remote control. Each TCR-100 can be addressed individually. Telephone connection between the transmitter and

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receiver requires an optional factory-supplied modem. TELEMATION.

**SMPTE Edit Code Reader 305**

The new Model 4200 SMPTE edit code reader is DC coupled and uses an automatically switched low-pass filter to permit the reader to operate accurately at tape speeds as low as 1.5 ips for hand-scan work. Its 500 kHz bandwidth amplifier response is fast enough to read accurately at up to 80 times playing speed.

Unique error detection circuitry outputs only valid data, holds the latest valid entry in memory, and evaluates incoming signals to screen and rejects any illegal codes and prevents erroneous search commands. The Model 4200 is immune to amplitude variations down to -18 dBm, read head misalignment, time stability jitter, and random noise pickup. Superior ability to read at all speeds and ability to read poorly written and/or low level codes and nth generation dupes without error is claimed. \$2,850. BTX.

**Wireless Mic Receive System 306**

A new single-package dual diversity receiving system has been designed to virtually eliminate problem noise and signal dropouts that are occasionally encountered when a wireless mic system is used on a set, in studios and in theatres.

The compact Model 63 measures just 3.7 ins. x 6.8 ins. x 9 ins.—identical to a single Model 58 receiver. It contains two low-distortion, high sensitivity receiver sections and a combiner circuit that silently and electronically switches the audio feed to derive signal from the strongest input. The two receiver sections are connected to antennas separated by 1/2 wavelength; thereby reducing drastically the likelihood of a simultaneous fade or dropout. VEGA.

**Standard Frequency Monitor 307**

The Model 300 Standard Frequency Monitor eliminates the need to subscribe to an independent frequency measurement service. The monitor provides an approved method for measurement of broadcast and television carrier frequencies. A digital counter displays direct readout at an accuracy determined by the received standard frequency transmission of WWV and WWVH. This system complies with sections 73.60, 73.252, 73.552, and 73.690 of the FCC Rules and Regulations. \$395. ELCOM.

# CROSS-TALK

## Reader Feedback

Keep those cards and letters coming, folks—even if you don't get a direct response from us. Last August 17, we received a nice letter from Terence E. Skelton, NBC Radio Network Engineering, Washington, D.C., which began "Imagine my surprise when moved to write my first letter to a magazine only to find BM/E had no 'letters' column . . . I would like to see the inclusion of such an outlet."

We appreciate Mr. Skelton's comments and the many others that come in either in letter form, a note on our Reader Service card or as a phone call. We do run letters when time and space permit but too often when space is at a premium, we decide industry news or a new product announcement is more important. (We've even sacrificed a personal editorial column in favor of more news, more products, more articles).

Are we in error in making these priority decisions? If you were in our seat, what value would you put on news of people changing jobs, financial briefs, FCC briefs, business briefs, etc.?

You can tell us by participating in a little poll which we're devising here and now! Give your answer by rank ordering the following items printed on this month's Reader Service card.

Rank order  
1 through 7

- People in New Positions \_\_\_\_\_
- Financial Briefs \_\_\_\_\_
- (co. profits, losses) \_\_\_\_\_
- FCC Briefs \_\_\_\_\_
- Business Briefs \_\_\_\_\_
- (new company addresses, \_\_\_\_\_
- plant expansions, \_\_\_\_\_
- significant sales) \_\_\_\_\_
- New Literature Items \_\_\_\_\_
- New Product Descriptions \_\_\_\_\_
- Letters \_\_\_\_\_

Assign number one to the editorial topic which is most important in your opinion and number seven to the least important.

Mr. Skelton, incidentally, raised a number of points as can be seen from the following excerpts:

*"I'm writing in response to Paul Lee's article in the August issue on new high-power U.S. stations. For years I have held forth to friends that it was ridiculous that there were such large areas in this country that could receive no radio broadcasts, or possibly only a few, late at night. Anyone living or traveling in the United States should be able to obtain immediate and accurate time, weather, news, and any other messages of local or national importance, preferably on a reasonably priced standard radio. I would propose that the service be run by the Bureau of Standards along the lines of WWV, taking the national*

continued on page 88

## IVC-7000P:



## New Opportunities for CMI

Creative Media Inc (CMI) of Albany, New York was among the first teleproduction companies to take delivery of an IVC-7000P portable broadcast camera. Yet they got it not a moment too soon Says President Rick Trader.

"The 7000P arrived at our shooting site, in its shipping cases, at 6:00 pm. We were set up and taping highband color on the IVC BCN-50 by 6:15. We have since learned that 10 minutes setup time is not unusual for the 7000P—we routinely get perfect pictures in less than 15 minutes. Our client, a very savvy agency man who really knows his pictures, was delighted with the quality we were getting.

"We made our comparisons before ordering the 7000P. It's easier to handle and has more features than other portables. For live supermarket pickups, we just stop a clerk and do white balance with his smock, then do black balance, and get color under fluorescents or mercury vapor lights comparable to what we used to get with expensive lighting setups. I've used the black stretch feature to bring details up out of shadows, and created a convincing autumn scene with the paint controls when we had only a handful of fall-foliage trees in the distance.

"We're so confident in ourselves and in the 7000P that now instead of showing a prospective client a standard demo tape, we put one together on the spot. We do it right out there in the field, and present him with a 21-second demo commercial containing at least ten edits. The 7000P never lets us down. We're now getting business from the major markets around us as our reputation spreads, and we've already ordered a second 7000P."

We can hardly improve on Rick's words.

So if you'd like a full-bore, broadcast studio camera that can go where your luggage goes, give you a complete CCU, set up before you know it, and even rest comfortably on your shoulder (or on a field tripod with studio lenses), please call us.

Insist on a demo. We're sure you'll love it.

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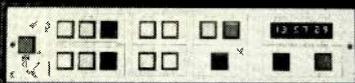


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VIDEO TAPE  
EDITOR-PROGRAMMERS**

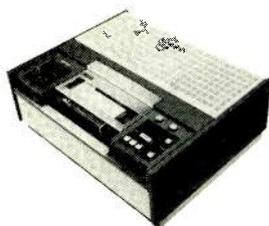
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"POINT-AND-SHOOT"  
PROBLEMS OF ENG EDITING!**

"Point-and-shoot" porta-pak or ENG recording may mean unstable or missing control track right where the action starts. Spectra-Vision Corporation's patented timing system for edits is not compromised by missing or erratic control track pulses. Other editor-programmers are as accurate as the control tracks they monitor. Spectra-Vision's Backspacers offer frame-accurate video editing on any reel-to-reel, 3/4" U-matic, or multiple format system.



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Frame-accurate programmed video editing in any VTR format. Static or rolling preview with automatic re-cue. Edit point selection from flying cue or still frame. Unsurpassed editing accuracy of ±1 frame (TV). U-matic controller features exclusive Frame Search center-loaded controls for speedy edit point location on video cassettes. Digital Insert Memory for programming timed insert edits. Review option automatically replays last edit. An excellent editor-programmer for rapid, versatile ENG editing.



**Sony VP-2000-SVC 3/4" U-matic player**

U-matic cassette player modified for capstan-servo operation and programmed video editing using Spectra-Vision Backspacers. An excellent source VTR for editing onto another U-matic or editing up to quad. Player-only feature means valuable master tapes cannot be accidentally erased. Extremely gentle handling of tape in high speed search mode.

For complete specifications on these and other Spectra-Vision editor-programmers and accessories, call or write:

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news and features on a rotating basis from the four national networks. An obvious second use of these stations could be EBS and emergency weather alerts.

"On another topic, the refusal of all 'professional' industry magazines to review professional products, or even to speak frankly about the manufacturers has been a long-standing irritation to many others besides myself. Even the carefully screened tests of 'consumer' products in magazines such as 'Stereo Review' are of considerable benefit to those with the responsibility of purchasing. If you are afraid of possible retaliation from your advertisers, why not simply publish an open forum on a certain piece of equipment each month and then publish only what comments are forthcoming from your readers? Of course, in many cases, the experiences of the industry with a company in general would be more enlightening.

"Thanks to Mr. Lee for being willing to propose a major change in our broadcasting organization."

Any reaction to Mr. S's comments on a national news service? Let's hear from you.

Publishing critical reviews of professional equipment is a suggestion we often get. There's a real hitch, however, in implementing such a feature. Simply put, chief engineers don't want to sound off in print about a piece of equipment of which they are critical. An engineer has to keep this product operating—even if it is a lemon—and he needs all the help he can get from the manufacturer. He's not anxious to antagonize his sources openly because he realizes he is as dependent on them as they on him.

There is also a real problem in establishing fair test standards and even definitions. Do we have common agreement on what specifications should be evaluated and how tests should be made. Mr. S. suggests an open forum, publishing whatever is forthcoming. How do you react to that? Tell us what equipment, by make and model, you are willing to critique and we'll give it some thought as to how we might start.

**Letters turn into articles**

Sometimes a letter to the editor becomes an article—or part of an article. That's how we intended to handle some comments from Scott Hower, Chief Engineer of KHOS, Tucson, Ariz. when they came in last June. But our plans didn't work out so here's a very belated letter in response to our article last June, "Can a Radio Station Afford High Quality Sound."

"I read with great interest your June article concerning the price to pay for high quality AM. My compliments on covering what must have been an extremely interesting gathering of AES members and broadcast engineers.

"I have a few comments of my own on the subject . . . The battle between those for and against increased dynamic range in AM broadcasting may be a lost cause, as I am sure most in attendance at the AES session now realize. The argument for increasing dynamic range is becoming less and less important as more

and more average listeners 'forget' what good dynamic range sounds like. What with the compression found in records, and all forms of broadcasting (FM, AM, TV), it is no wonder that few people are aware that range is lost.

"However, I am surprised that there exist today, grounds for arguments concerning lack of fidelity and presence of distortion. For some time now there have been more than a few audio processors on the market that yield a very high fidelity sound with a minimum of distortion. I was further surprised to learn that a station the size of WABC . . . uses rather conventional and conservative audio processing chain. Can it be that only the smaller stations are digging up the superior pieces of equipment to produce such a fine sound? If not, how, then, is it possible that we discarded the use of Gates limiters some time ago in search of a better and louder sound?"

"Here at KHOS, we run very little peak limiting preceded by 5 to 10 dB of compression at a ratio of about 2:1. We have negative modulation peaks approaching 100%, with positive peaks never exceeding 115% to insure low distortion. Thanks to careful production, jocks who run levels properly and a limiter made to insure good-to-excellent frequency response, we are the second loudest station in town; the first loudest is a rocker employing almost identical techniques for audio processing. In addition to being loud, we are very clean and very impressive as far as frequency response is concerned.

"I can not understand how we maintain such a loud, high quality signal while others are suffering from distortion and dull sounding air quality. Unless I have got it all wrong, there is a lot that can still be done to improve the quality of AM broadcast stations." **BM/E**

**Addendum:  
The Source '76**

**Source Locator Correction**

In the Instant Source Locator, Category 7, under RF wattmeters, add Bird Electronic (incorrectly located under phase meters.) Under Burst phase meters, add Video Aids of Colorado and eliminate Colorado Video.

In Category 2, under Video Equip. Misc., Telecommunications Industries and Tele-Measurements should have the product code referring to video test charts and slides.

This entire subheading has numbering errors as a result of leaving out number 11, color slide scanner, which is made by Thomson-CSF (and not TEA and Telecommunications). To correct the September issue, add the new number 11 and re-number old 11 through 24 as follows:

11. color slide scanner
12. power packs, portable video camera
13. auto skew corrector
14. large screen projectors
15. video lock to mag. film record
16. video attenuators
17. video test charts & slides
18. V-lock adaptors
19. D/A converters
20. deglitchers
21. color phase equalizers
22. carts, tables
23. mounts, wall
24. screen splitter
25. video line isolator

In category 8, under Studio Design, the service code for Tele-Measurements should be 2 (for TV) instead of 1.

In category 9, under connectors and services, add Magnavox.

## SPEAK OUT

continued from page 30

work like a 35 mm production-editing system is a major difference between the Sony BVH-1000 and everyone else. The design allows the machine to be used in a single camera manner identical to 35 mm film and editing can be done as 100% post production if required.

Once you accept the idea of making tape take on the methods of 35 mm film, you can then stock up a lot of improvements over traditional film editing limitations. The recorder can be adapted to sophisticated computers that allow the preview of edits and immediate "ripple through" of changes. Two audio tracks and SMPTE insure that voice changes can be made with great ease at a much higher quality level than is available to film.

For the small station not using the advanced methods found on a Hollywood sound stage, there are also advantages in a "do-it-like-film" approach. Because editing is simplified and tape is far less costly, it is quite possible that the local station will be able to provide production for local commercial spots at rates that will appeal to local advertisers.

Obviously, the question of tape vs. film and, moreover, quadruplex vs. one-inch, is far more complicated than the simple analogies we can draw from ENG. They are not questions that are likely to be quickly answered because the adoption of any new high band format will be a long term project rather than the quick stroke of ENG. But they are questions that every broadcaster, both in management and engineering, must deal with; the one-inch machines will not go away.

### Feedback on August Speak Out

In our August Speak Out, film camera manufacturer Ed DiGiulio stated that all-ENG news station, KMOX-TV, still buys film for other purposes and it is, therefore, misleading to suggest savings based on the elimination of film equipment. Tom Batista of CBS said not true: "KMOX-TV has *not*, I repeat, has not, purchased any 16mm film raw stock since August 22, 1974." DiGiulio apologized, saying his sources of information were unreliable.

### Feedback on Great Ideas

Great Idea #9 in May 1976 is not original according to Dennis Dunbar. He reports that WDAU-TV in Scranton-Wilkes Barre, PA has run similar ID's for perhaps 20 years. **BM/E**

## ITC's 750 Series open-reel recorder/reproducer



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**STEREO**  
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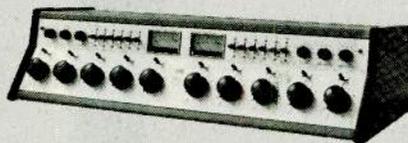
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# TWO WAYS TO MIX 30 INPUTS 10 WAYS...



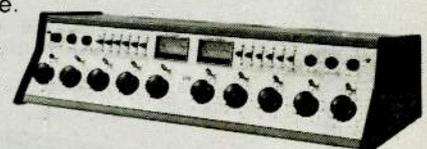
S-21 Ten Mixer Dual Mono Console

One way is the new LPB S-21 Signature II dual mono audio console. Its stereo companion, the S-20, is the other. Either way, you get 30 inputs for 10 mixers.

The S-21, with plug-in capability for up to 30 mics, is ideal for mono broadcast and other professional sound uses, while the S-20, with standard features others offer as options, boasts dual stereo program channels *plus* mono mixdown. Engineered to satisfy the most exacting broadcaster, both are perfect as the centerpiece for the custom designed, wood-grained Dj® 10 studio furniture.

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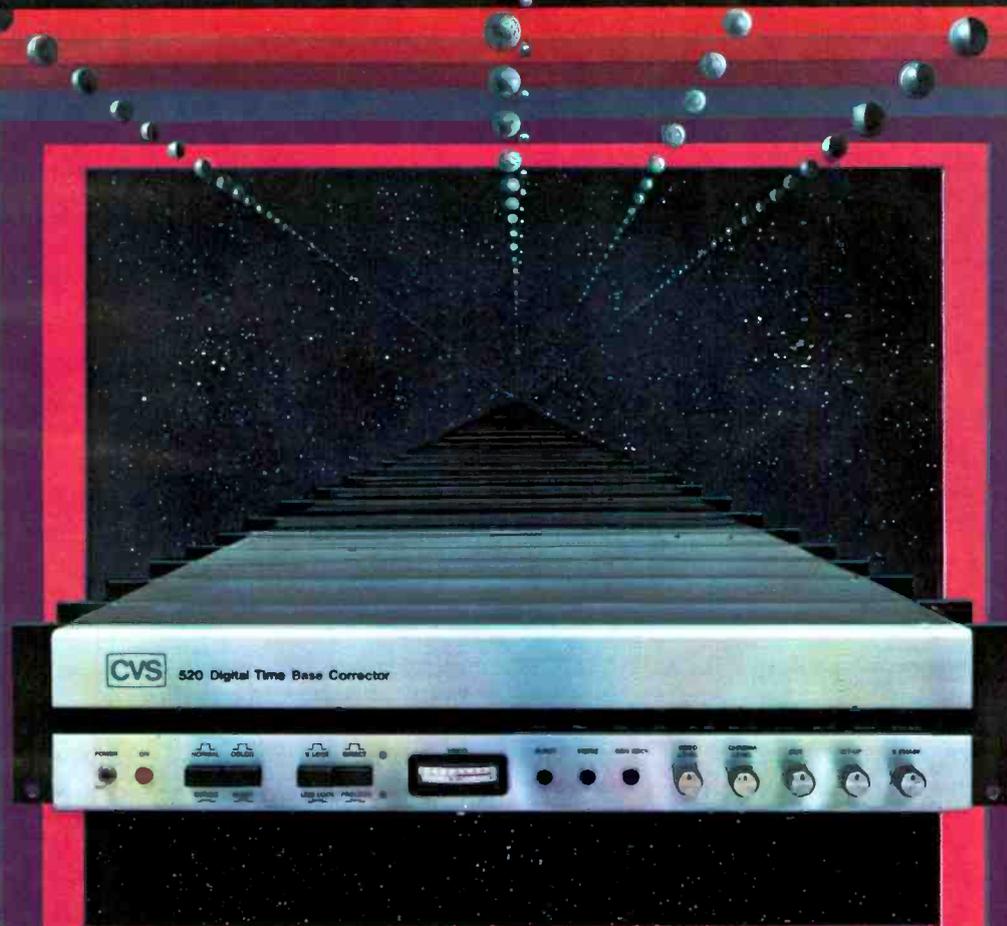
In addition, an automatic burst-add circuit provides burst at the output at all times (unless programmed to

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WBS M1002: 10 channel console.



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