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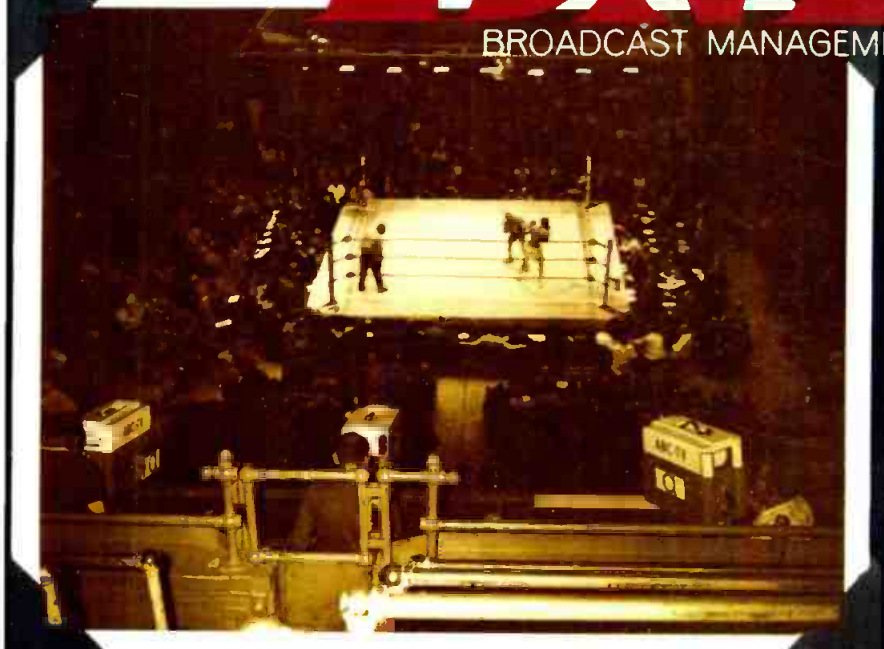
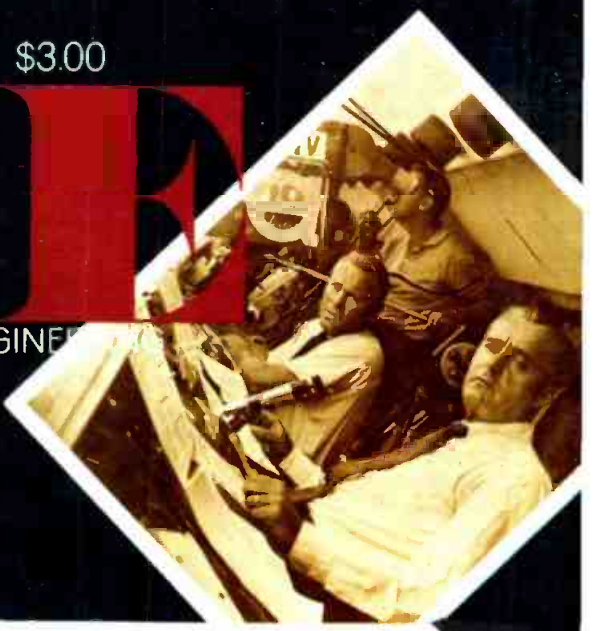
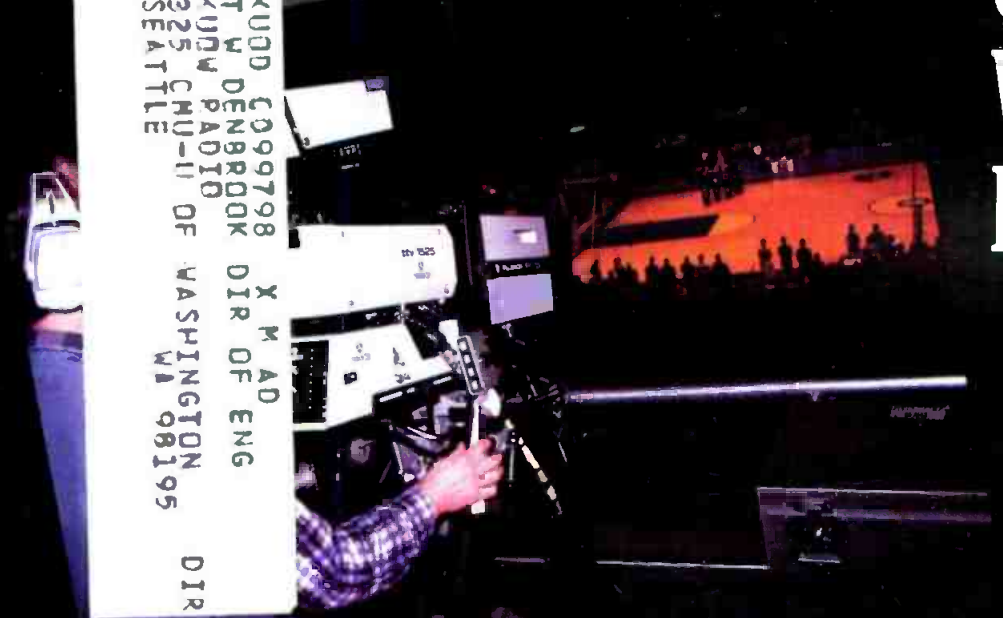
# BME

BROADCAST MANAGEMENT ENGINEERING









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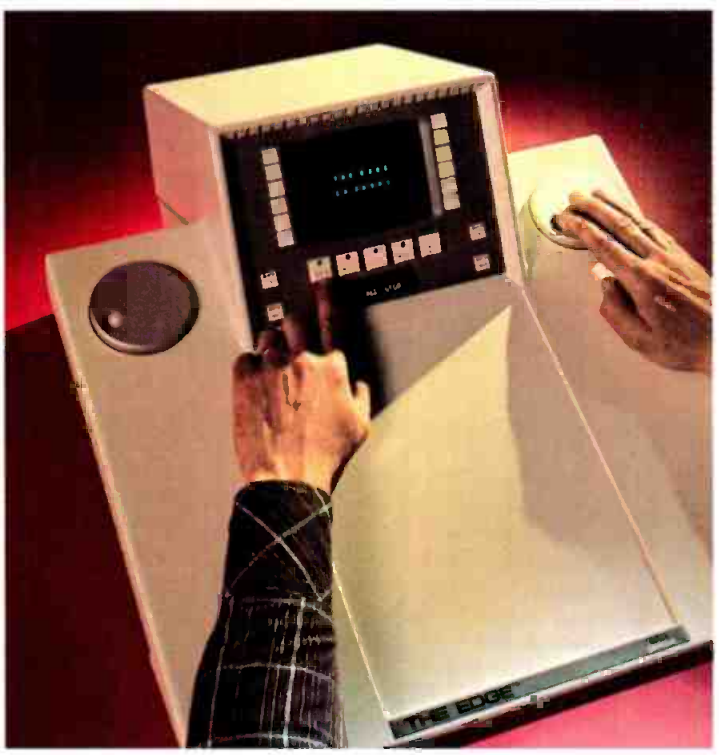

**The Human EDGE** Veteran editors and beginners alike quickly adapt to THE EDGE because its SMART KEYS™ and layered screens take you easily through the editing process as you direct it. You set your own pace. Frame accurate time code or pulse count editing lets you concentrate on creativity and increase your productivity dramatically.

**The Technical EDGE.** Simple plug-in modularity makes THE EDGE expandable. Going from two to three machines? Add a card. Expanding to a floppy disk? Add a card. Forget about stringing out black boxes. Also, servicing has been human-engineered with built-in diagnostics that trouble shoot on the spot. Information on the screen will tell you the story. No more long waits for service calls.

**The CMX EDGE.** With the internal event memory, which features re-editing, list rippling, event deletion and list scrolling, you can essentially do your off-line editing with THE EDGE and build a CMX Edit Decision List. And this can all be done on a cuts-only system, if desired. Through the availability of a variety of optional techniques, such as using THE EDGE audio/video dissolver or auto-transition control of a production switcher, you can complete your final auto-assembly on THE EDGE. If it's a highly sophisticated finished production that requires numerous special effects, you may wish to complete it from THE EDGE EDL on a 340X system. It's this flexibility of choices that gives you the most cost effective solution to your editing needs.

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Circle 100 on Reader Service Card

STUDIO PRODUCTION SHOT WITH AN $85,000 CAMERA.

STUDIO PRODUCTION SHOT WITH THE $35,000 BVP-330.

# CAN YOU SPOT THE $50,000 DIFFERENCE?

Actually there is a difference. But in picture quality, it's not one you can see.

The video on the top was shot with a massive $85,000 stationary camera. While the video on the bottom was shot with a lightweight, $35,000 Sony BVP-330. Which doubles as an EFP/studio production portable.

Both cameras produce sharp, crystal-clear images. Both cameras produce brilliant, true-to-life colors. In fact, both cameras were selected by Michael Werner, Director of Engineering, at Broadway Video, for their production of the musical event of the decade—Simon and Garfunkel's reunion in Central Park.

If you wish to enhance the drama of your production—to capture those elusive, magical moments that only a flexible production portable camera can capture—consider this:

The Sony Broadcast Products Company has just improved the 330 with the introduction of the new Sony 330A.

It offers advanced deflection yokes and dynamic focus for an even better picture over the entire screen area. The corner resolution is sharp. The pictures are even closer to the natural crispness of film.

The result is the highest performance portable camera package available.

For more information on cameras that are worth a lot more than you pay for, as well as Sony's complete line of ½", ¾" and 1" broadcast VTR's, editors, Digital Time Base Correctors, and high-performance monitors, call Sony in New York/New Jersey at (201) 368-5085; in Chicago at (312) 860-7800; in Los Angeles at (213) 841-8711; in Atlanta at (404) 451-7671; or in Dallas at (214) 659-3600.

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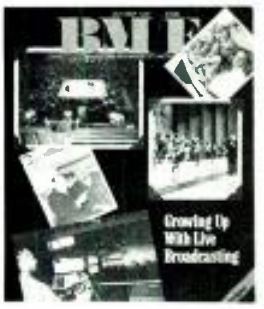
OCTOBER 1982 VOLUME 18/NUMBER 10






**SPECIAL REPORT: LIVE BROADCASTING**





**SMPTE PREVIEW**



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# The Performance of a World-Class Studio Console.


## With a Four Year Warranty & a Price That Makes Sense.

You're looking at our DC-38-8S. Built tough & engineered to perform like big, expensive boards you'll find in world-class recording studios. Its flexibility and features give you the ultimate broadcast production and on-air board.

Its price keeps you (and your accountant) smiling.

**D.C. CONTROL— WE INTRODUCED IT FIRST!**

While a lot of imitators are still playing catch-up, we're moving ahead: by subtly improving upon a design we pioneered in 1975; by maintaining our reputation for reliability; by realistic and affordable pricing. We figure we're still way ahead. Which means you can be too.

The Ramko DC-38 Series consoles are known to be highly interference free because we don't let RF and scratchy pots and switches attack the audio. All audio functions, from switching through attenuation are done via D.C. control.

**NOT ONLY QUIET. CLEANER AND MORE ACCURATE.**

All inputs/outputs have the benefits of solid-state, transformerless design. We discarded the problems that come with bulky, unforgiving and expensive transformers. Like distortion due to impedance mismatching and compromised frequency response. Not to mention hum that sticks to a transformer like a magnet.

We give you a solid-state, L.E.D. metering for much greater accuracy. A cleaner, tighter sound can be yours too because the slower responding, mechanical V.U. meter belongs to another era—not on a Ramko console.

**FEATURES FOR THE REAL WORLD.**

There's a dual cue mode that works by normal "potting-down" or by pushing a button so you don't have to change the mixer setting. All the pushbuttons are super-quiet. They route audio through error-free, solid-state logic without program-killing pops, clicks or momentary feedback associated with loud, clanking, short-lived mechanical switches.

Our exclusive electronic patch panels make selection of input gain extraordinarily flexible. From mic through line levels, and anywhere in between on each and every input. You have over four million combinations to accommodate any channel.

**THE SECRET TO A FOUR YEAR WARRANTY WITH PARTS AND LABOR.**

In the DC-38 you get three power supplies. L.E.D.s and lamps with an 11 year life expectancy. Pushbuttons spec'd at 20 million operations. Wear-resistant, crud-forgiving conductive plastic mixer pots that also take the heaviest of hands. In addition, all the critical electronic circuitry is burned-in so it doesn't burn-out.

And, no console made is easier to service.

**THERE'S MORE.**

Like over a dozen specific models in addition to our DC-38-8S. With spec's that compare to the ones on your left. Mono-Stereo. 5 inputs to 12, dual. Optional solid-state clock/timers and remote machine control interface.

We also have a free, two-week trial. So you can put our claims, and our reputation to the test.

Give us a call, now. Collect. Discover the performance and versatility of a world-class broadcast studio board.

Discover the pricing that's also made Ramko's radio equipment reputation red-hot.

**DC-38 Series' Numbers**

| | |
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| **Output:** | +21dBm max. |
| **Signal-To-Noise Ratio:** | −70dB |
| **Frequency Response:** | +0, −2dB 20Hz to 20kHz |
| **Distortion:** | 0.3% or less |
| **Crosstalk:** | −70dB @ 1kHz |
| **Inputs:** | Up to 4 per mixer, balanced bridging |
| **Price:** | Single channel 5 mixer mono (SC-5R) thru dual channel 8 mixer stereo (DC-8Ms). $1808* to $3509.* |
| | Dual channel 5 mixer mono thru 10 mixer stereo (DC-38 series shown). $3632* to $6762.* |
| | Dual channel 12 mixer, slide atten., remote control. Mono $6432.* Stereo $7998.* |

*Prices subject to change without notice.

*Engineered For Your Bottom Line.*

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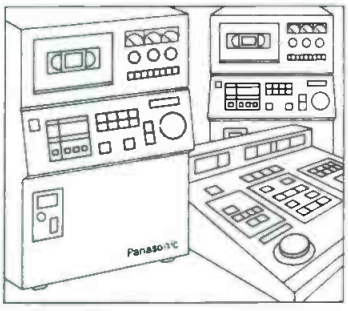
Circle 103 on Reader Service Card


# The brilliance in its design shows up in its picture. Introducing Panasonic Recam.

Total freedom from video cables isn't the most important reason to buy Panasonic Recam. Recam's exciting combination of a new recording system and a 3-tube prism optics camera is. Especially when you consider the result: Broadcast quality from ½" VHS™ recording tape.

## Recam: The System

The Recam system consists of the AU-100 portable VCR, the AK-100 3-tube prism optics camera and the AU-300 playback editing system. Together they add a new dimension



to ENG and EFP.

Here's how: Unlike conventional recording systems, Recam records frequency modulated luminance signals on a single-slant track. At the same time, I and Q signals are recorded on another parallel track. By assigning separate FM frequencies to the I and Q signals, color noise, streaking and other two-phase color problems are eliminated because only the final product is NTSC encoded.

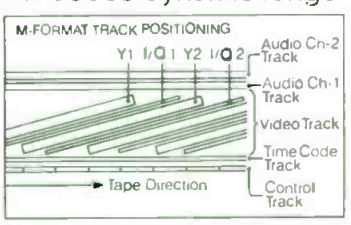
The AU-100 has a direct-drive motor for precise tape movement and a capstan motor designed for reduced gyro effect. And for accurate assembly edits after every shot, the AU-100 backspaces 30 frames every time the VTR trigger is released.

The AU-100 also records audio on two longitudinal tracks and time code on a third track. The AU-100 supplies a constant readout of vital operating conditions including drum and capstan lock status, slack tape detection, dew warning detection and a lot more.

## Proven Prism Optics Performance

The AK-100 camera gives you the choice of ⅔" diode-gun Plumbicon® tubes or ⅔" Saticon® tubes. So you can shoot under a wide variety of lighting conditions without worrying about lag, blooming or burn-in.

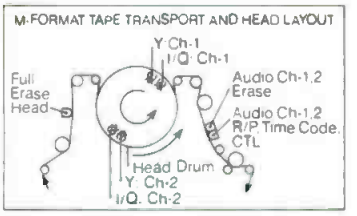

Resolution with the Plumbicon configuration is 600 lines with a S/N ratio of 59dB, while the Saticon version produces 550 lines and a S/N ratio of 58dB. For added dynamic range




and reduced comet tailing, the AK-100 includes feedback beam control. Dynamic focus and corner registration compensation circuitry add to picture quality as do horizontal and 2-line vertical contouring. There's also switchable black stretch and knee circuits for detail retention in dark or bright areas of the image. An eight-bit A/D and D/A converter with memory automatically adjusts white and black balance.

## Better Chrominance Than ¾"

Recam looks even better when you look at the AU-300 playback editing system. In fact, a Recam dub is actually superior to a ¾" master. The reason: The AU-300's six-head scanner plays and records the separate Y and I/Q tracks so there's virtually no loss of luminance or chroma information during




dubbing or insert and assembly editing. At the same time, two rotary erase heads and vertical head switching make for clean, accurate edits.

Panasonic Recam. It gives you the convenience of a recorder/ camera with the picture to measure all recorder/cameras by.

Plumbicon is a registered trademark of N.V. Philips for TV camera tubes. Saticon is a registered trademark of NHK (Japan Broadcasting Corp.).

**Panasonic.**
VIDEO SYSTEMS DIVISION

For additional information on the Panasonic Recam, mail to:

Panasonic Industrial Company
Video Systems Division
One Panasonic Way
Secaucus, N.J. 07094

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BME 1082

**Circle 104 on Reader Service Card**

# EDITORIAL

# AM Stereo: Signing on

A funny thing happened to AM stereo on the way to the marketplace. While radio broadcasters were getting over their initial consternation about the FCC's decision to throw the selection of a single system into the "marketplace," it appeared that the receiver makers would make the choice. Now, with the first stations going on the air using type-approved Kahn and Harris systems, it looks like the ball is back in the broadcasters' court. It appears that the radio receiver makers are taking a wait-and-see stance until the broadcasters settle on a system or systems.

The situation is still not settled by a long shot, but we certainly approve of the AM broadcasters taking the lead rather than the receiver makers, a point *BM/E* made editorially some months ago. Let's not forget that the auto companies are also a factor. Sometime in the next couple of months the Delco division of General Motors is expected to make public the results of its field and bench tests of the AM stereo systems—minus Kahn, who chose not to participate. Ford has also conducted tests, though not as elaborate as Delco's. Some thirty years ago a secretary of defense became famous for saying that what's good for General Motors is good for the country. But that is not the case for AM stereo. Because the situation has changed since April when the auto companies announced their plans to test the competing systems, it is now necessary for the car manufacturers to include in their decision-making process how the broadcasters are leaning.

Right now that is not an easy task. The BM/E straw poll which essentially dates back to May does provide some guidance though (see page 109). The results indicate a preference for the Harris system over the Kahn system with Magnavox (the FCC's original choice before the marketplace cop-out) and Motorola well back of the front runners.

Assuming that the station managers and chief engineers who took the time to submit Reader Service Cards are those with the strongest feelings on the subject, it is not surprising to find—between the lines—rather strong loyalties to the systems of choice. Both Kahn and Harris supporters who said they have ordered or are about to order AM stereo equipment indicated solid commitments. Given this brand loyalty, we wonder how easy it would be to turn these stations around to another system—no matter what receivers the auto companies finally pick.

So the race is on to line up the most radio stations and thereby influence the receiver makers to design around the system with the largest audiences. If the FCC had selected one system—the bite-the-bullet route—broadcasters would not be plagued with such uncertainty.

But we see no point in lamenting the nondecision. Broadcasters have the obligation to choose or even not to choose. This is a crucial time; a time that will decide AM stereo's future. Will it be an important new service? Or will AM stereo disappear in a cloud of confusion like quadraphonic sound before it?

# A DIGITAL EFFECTS SYSTEM SO ADVANCED, EVEN WE DON'T KNOW ALL IT CAN DO.

Maybe we'd better explain.

We do know the limits of our new E-FLEX DVE® system.

It's just that those limits are so theoretical, they have almost no impact on what E-FLEX can do in the studio.

And what it can do in the studio is virtually limitless.

To start with, E-FLEX has some of the most sophisticated effects ever offered in a digital video system. Like a new, two-channel reciprocal function. Our mosaic and posterization effects. Multi-move, so you can put up to 16 copies of a moving image on the same screen. And a trajectory function that lets you control the movement of an image along a curved path.

But E-FLEX is so advanced, you can also combine our "basic" effects in new, unheard-of ways. And this is where the theoretical limits come in. There are so many possible combinations, no one will ever know what they all look like.

That makes E-FLEX the most potent creative video tool ever. Every time you turn it on, you can create an effect no one has ever dreamed of. And when you've got what you want, you can store it permanently on a bubble memory cartridge that never wears out.

Yet while E-FLEX's capabilities may approach infinity, the price doesn't. It'll fit comfortably into your studio budget.

And that's all the more reason to call for a demonstration tape today. Because once you've seen a little of what E-FLEX can do, nothing will stop you from discovering the rest on your own.

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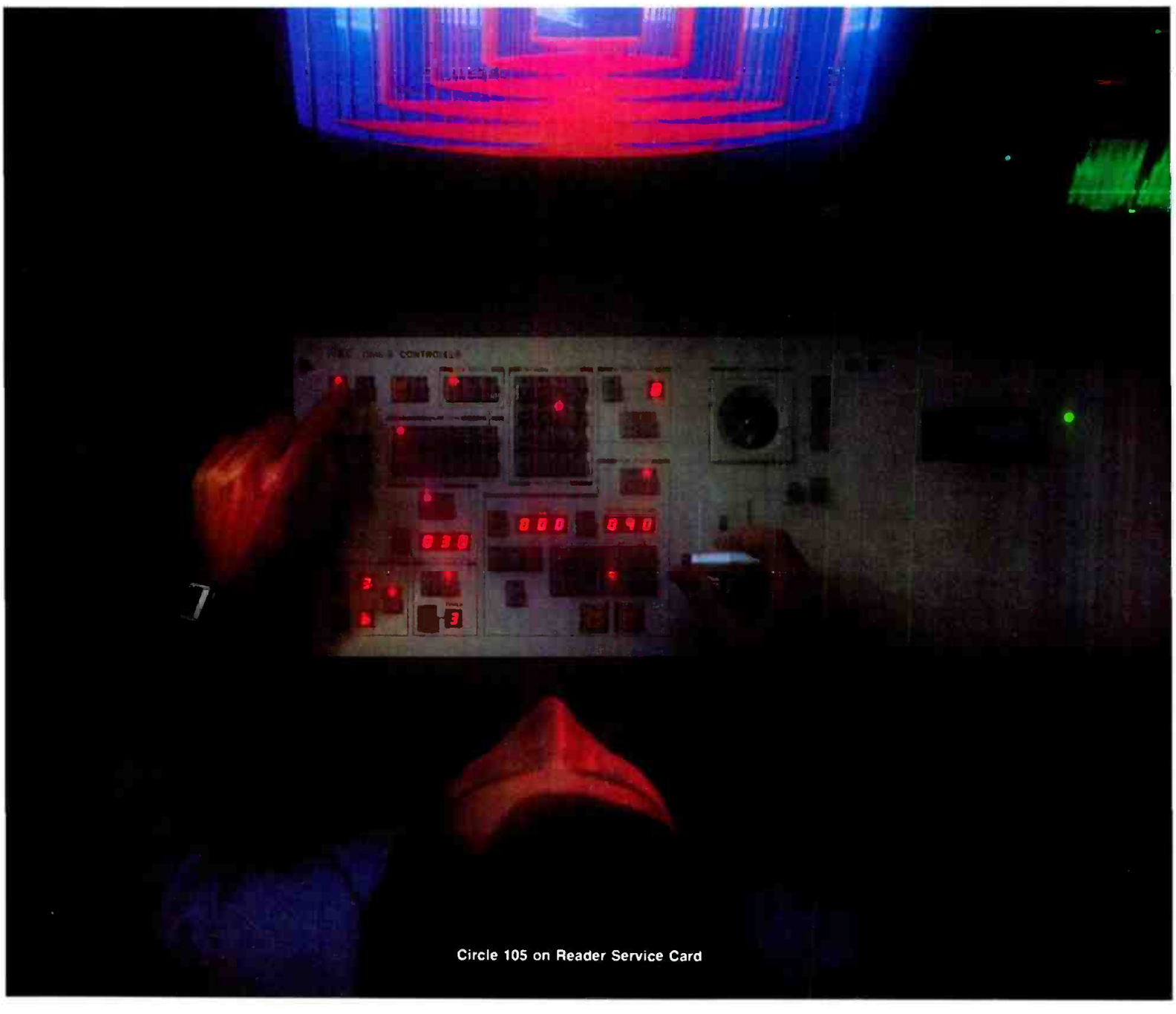
**IMAGINE WHAT WE'LL DO NEXT**

NEC America, Inc. Broadcast Equipment Division, 130 Martin Lane, Elk Grove Village, IL 60007. Call toll-free 1-800-323-6656. In Illinois, 312-640-3792.



Circle 105 on Reader Service Card

# LETTERS

neer has to constantly ride gain, control feedback, follow the performers with mics or control the RF system, add any special effects and reverb, and control everything with just two hands.

State-of-the-art audio equipment may exist; but it's designed for those who sit in concrete-lined recording studios. Equipment that works in that environment, however, is just not practical for field recording.

What we who do field recording need is as follows: (1) A mic with switchable pattern sensitivity (fortunately already in existence); (2) a good noise reduction mic with two elements wired out-of-phase but which still looks attractive; (3) a portable ATR with at least six to eight channels of built-in mixing, lots of headroom, and high tape speed with large reel sizes; (4) a mobile EQ/amp/reverb unit and lightweight speakers and stands for providing a "house mix" for the PA system; and (5) a vehicle and transportation system that can be used to move all this easily.

The state-of-the-art for radio field production is still circa 1969. No one in the industry has yet addressed the real needs of the on-location audio engineer/producer.

Gary Kaufhold
Dayton, OH

### Cable origination

To the Editor:
In reading your July 1982 story "Cable TV Becomes a Broadcast Service" it appeared that other areas of the country are as dedicated to quality as we in Dallas/Ft. Worth.

Sammons of Ft. Worth is currently producing some of the finest local sports programming outside WFAA-TV. The slant is local people making it good in a variety of sports settings and events. For example, Sammons recently covered the regional rollerskating championships that lead to the Olympics finals. It has also covered such events as motorcycle racing, hockey, and the Colonial Golf Tournament.

For all of this coverage, Sammons hired professionals instead of interns or college rookies. As a result, more and more people will be watching cable and turning to it for more in-depth local coverage.

Patricia Martin,
Coordinator,
Instructional TV,
Bishop Sheen
Center, Dallas, TX

**Address letters to:** The Editor, BM/E, 295 Madison Ave., New York, NY 10017. Names withheld by request.

# THE RESULT OF SEVEN YEARS OF INNOVATION AND EXPERIENCE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For almost a decade, RTS Systems has been quietly and effectively advancing the quality and scope of professional intercommunications. Innovating. Refining. Perfecting. Our research, experience and continuing success have resulted in a remarkably sophisticated and powerful communication control center...the new RTS Model 802 Master Station.

The 802 is a unique, *microprocessor-assisted* communications network providing 22 independent signal paths operating in up to six separate modes. It offers an impressive array of features including intercom, squawk, IFB/SA, station-iso and signaling. An intelligent combination of hardware and software programmability allows the user to conveniently structure an individualized operating format.


The Model 802 does not require space-consuming central electronics, yet it features a sensible front panel layout, unique momentary/latching action buttons, individual channel listen level controls, and stereo headset source assignment.

The RTS Model 802 can mark the beginning of effective, efficient, smooth intercommunications.

For more information, please call Bob Tourkow, Sales Manager. The Model 802 Master Station...imagine the possibilities.

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# OUR NEW ½" TAPE GIVES YOU COLOR

For professional tape users, it used to be that stepping down to half-inch video tape also meant stepping down in color quality.

But that was before Scotch® half-inch videocassettes with Color Plus oxide.

Now you can give your productions bright, brilliant color that no other half-inch tape can beat. Not even competitive high grade tapes.

3M's Color Plus oxide sets a standard for the industry for color signal-to-noise and broadband signal-to-noise. The result is better picture quality, more brilliant color and more realism. We've got the test results to prove it.

But the advantages of our half-inch tape go beyond color. You'll also get professional recording features like fewer dropouts, low headwear and extended stop motion capability. The same characteristics that have made our 2", 1" and ¾" tapes the leaders in the professional market.

New packaging plus a convenient labelling and hanger/storage system make our half-inch tape professional right down to the last detail.

But to get the true picture of our improved half-inch videocassettes you just have to try them. They're available in both Beta and VHS formats from your authorized dealer of Scotch Video Tape.


Or ask your 3M Sales Representative for more information and test results on Color Plus half-inch tape. You'll get a free Color Plus painters hat as a bonus.

Magnetic A/V Products Division/3M

# AS VIVID AS YOUR IMAGINATION.


**SCOTCH HALF-INCH VIDEOCASSETTES.**
**NOW WITH COLOR PLUS.**

3M hears you . . .

**3M**

## WNEV Chooses Half-Inch for Daily Magazine Show

Making what may be the country's first large-scale commitment to broadcast-quality half-inch video, Boston's WNEV-TV has purchased over $1.5 million of equipment for a local two-hour program scheduled to debut next month.

Entitled *Look* (exclusive video rights to the name were purchased from the New Sound Organization), the show will stay in the Matsushita/RCA-developed format "from shooting through editing to airing," according to WNEV director of engineering Karl Renwanz. Of the 43 half-inch recorders the station has purchased, 31 are Panasonic AU-300 studio models and 12 are Ikegami HM-100s; 14 Ikegami HL-83 cameras that attach to the field recorders to form single-piece recorder/cameras round out the package.

In going ahead with half-inch on such a scale, the station encountered several stumbling blocks—first being the choice of format. "We chose the modified VHS because most manufacturers had endorsed it," Renwanz explains, adding that the competing Sony Betacam format is not technically inferior although it has been slower in gaining acceptance. (Sony recently announced that Thomson-CSF has adopted its Betacam format.)

Another problem was the lack of edit interfaces for the half-inch recorders. CMX, Convergence, and Datatron all showed great interest in supplying interfaces, Renwanz says, and the station finally decided to go with Convergence, purchasing six ECS-103B editors and one ECS-103A. The editors will be installed in the seven edit suites WNEV is building in a facility it has leased next door to its headquarters. Six of the suites will have three VCRs (these will be capable of A/B dissolves and equipped with frame synchronizers for still frames); the seventh will be a two-VCR, cuts-only room for simpler segments.

Another special piece of equipment needed for the edit suites was a time base corrector with YIQ output. The station found the Fortel YIQ-34 TBC to be most closely fitted to its needs; the model has a 32-line memory, which Renwanz says is necessary to correct the large time base errors possible in the format, and Fortel supplied the station's 14 units with time base corrected YIQ outputs.

"The TBCs allow us to do dissolves and effects in the half-inch mode," Renwanz says, "and by staying out of NTSC we don't gain noise." Half-inch has tremendous advantages over ¾-inch in its noise performance, Renwanz states. He adds, "Subjectively, most people can't tell the difference between half-inch and one-inch."

Response to the station's call for bids was "incredible," Renwanz says, with

## Radio with Vision

Proclaiming itself the first radio station in the country to set up a video studio within its facilities for televising local news, WELI-AM, New Haven, CT, recently inaugurated its RadioVision News Service. Once an hour, while the rest of the country is watching Cable News Network's "Two-Minute Newscast," the Broad Street Communications station airs a two-minute local news-and-commercial package to the 46,500 subscribers of the local Storer-owned cable system.

Though several newspaper groups and local TV stations around the country offer similar services, no radio station has yet attempted it. Broad Street considered the situation perfect for WELI, however, because the station normally airs an Adult Contemporary format with regular, locally prepared newscasts. The televised version is simply an expansion of the local radio news, with the same on-air talent handling both functions.

The financial package—in which CNN released its two-minute avail to Storer, which in turn made it available to WELI—has triggered speculation that CNN, Storer, and Broad Street might be looking at a much larger, nationwide hook up. The event was important enough to bring Ted Turner himself to New Haven.

For the moment, Broad Street plans to package the time slots to a group of some 15 local advertisers, each of whom will pay $30–$50 per 30-second spot. The format is a 45-second newscast, 60 seconds of commercials, and a 15-second close.

*Newscaster Karen Carson awaits RadioVision sign-on with (left to right) CNN's Ted Turner; Al Primo, president of Primo Newservice; and Richard L. Geismar and Fred E. Walker, chairman and president, respectively, of Broad Street Communications.*

In addition to the revenue from the spots, the newscasts provide wide exposure for WELI, which is clearly identified as the originator of the material. Storer benefits from the inclusion of local material within its nationally created CNN format. And Turner is presumably proving that national cable services and local news services are not incompatible.

The studio setup was designed by Albert Primo, with an equipment package supplied by Lines Video. Engineering was provided by WELI chief engineer Fred Santore and Broad Street VP of engineering Herb Korte, with some consultation from Storer. The television studio installation coincides with a completely done-over radio facility.

A JVC KY-1900U camera, which will be permanently installed on a remotely controlled pan/tilt head, is controlled by the on-air talent once the signal tone on the CNN network switches Storer's headend over for the local feed. The talent not only controls the camera positioning but, in true radio style, mixes audio on the station's new Auditronics 200 Series board, cuts back and forth between tape and live using a Crosspoint Latch production switcher, and operates the Sony BVU-800 VCR for originating the commercials.

# HAVE IT YOUR WAY WITH HAWKEYE

several of the competing companies sending prototypes of brand-new equipment. Most of the gear was finally supplied by Landy Associates of Cherry Hill, NJ.

## USTV DBS Service Aimed for 1983 ANIK-C Launch

U.S. television viewers could be receiving direct broadcasting satellite signals by next year if all proceeds as planned with United Satellite Television's proposed DBS service. USTV, a joint venture of General Instrument Corp., Allstar Satellite Network, Inc., and Pop Satellite, Inc., will broadcast on 10 transponders of the Canadian ANIK-C2 satellite due for launch next April.

The transponders will be made available to USTV through GTE Satellite Corp. (GSAT), which received FCC approval to lease them just days before USTV made its announcement. GSAT's own GSTAR satellite system, scheduled for mid-1984 launch, will host USTV when it becomes operational, with six transponders dedicated to the service. ANIK and GSTAR are both medium-power Ku-band satellites (11.7–12.2 GHz).

Predicting 3.75 million subscribers by the end of 1987, USTV says it will concentrate on rural areas not served by cable. The four-channel service will cost subscribers about $30 a month, plus installation of receiving equipment and purchase price or monthly leasing fee. Dishes for the Ku-band transmissions are smaller than those needed for C-band broadcasts, but larger than the extra-small dishes planned for the high-powered DBS satellites yet to be built by a number of applicants.

Additional news in the DBS area has been Oak Satellite Corp.'s filing, similar to USTV's in that it plans to initiate its service on ANIK-C. The original two channels will grow to 12 when the entire four-satellite system is in place—but that isn't scheduled to happen until 1994. Oak plans to launch its first satellite in 1986, at which time the service will increase to six channels.

Meanwhile, the FCC has been proceeding apace with its DBS work and was expected to issue construction permits for DBS systems in September. NAB, which had already appealed FCC's authorization of DBS with the U.S. Court of Appeals (see *BM/E*, August, 1982, p. 12), asked the Commission to hold off on granting CPs "until the policies supporting and guiding those grants have been fully affirmed or refashioned."

## Congress Slices FCC to Five Seats

The FCC will shrink from seven to five members next June 30 under a provision of the Omnibus Budget Reconciliation Act of 1982, passed by both houses of Congress late in the summer. President Reagan had not signed the bill at press time, but was expected to do so.

Some observers believed the move to be motivated by more than cost-cutting, the official reason. Congress has resisted White House attempts to install Stephen A. Sharp, FCC general counsel, on the Commission in the seat now held by Abbott Washburn. Although the candidate favored by the Senate Commerce Committee (Marvin Weatherly of the Alaska Public Utilities Commission) had been withdrawn, the committee was still reported to view Sharp with disfavor.

Under the terms of the provision, Joseph Fogarty's seat will be eliminated when his term expires June 30. At that time, the seat held by Washburn will also be dropped. Washburn has re-

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- in triax, multicore and genlock operations.
- but, most importantly, the HC-1 becomes...

(turn page)

RCA

mained in his post, which expired last June 30, pending the confirmation of Sharp.

## Cuban Backlash Precedes Radio Marti Inauguration

With the fate of Radio Marti still locked in Congressional debate, retaliatory broadcasts by the Cuban government caused serious interference to U.S. radio stations late in the summer.

The English-language news and music broadcasts from Cuba were aired on several AM frequencies, including 1040 kHz, the dial position of WHO, Des Moines (and the suggested frequency for Radio Marti), and 1160 kHz, used by clear channel KSL, Salt Lake City. Both WHO and KSL reported interference problems. The Cuban programs were also heard on 570 kHz, 670 kHz, and 1380 kHz.

NAB's Vincent Wasilewski, nearing the end of his tenure as NAB president, called the Cuban action "an affront to the United States listening public as well as to American broadcasters." Describing Cuba as "a renegade nation," Wasilewski said the problem was a political one best solved by diplomatic means.

Cuba's move is the latest act in the Radio Marti drama, which has been enjoying a long run on Capitol Hill. The House handily passed a resolution calling for the broadcasts to Cuba last summer, and the Senate Foreign Relations Committee passed the measure early last month, just in time for the October Congressional recess.

Broadcasters have opposed Radio Marti all along on the grounds, now backed by evidence, that Cuban retaliation would harm U.S. stations. Both NAB and NRBA have been vocal in the fight, and NAB recently named an All-Industry Cuban Interference Task Force to keep the issue before legislators, the administration, the FCC, the State Department, and the public. Cullie M. Tarleton of Jefferson Pilot Broadcasting Co. is committee chairperson; Robert G. Engelhardt of Palmer Communications, licensee of WHO, is also a member.

## Beleaguered RKO Seeks Jersey Move for WOR-TV

RKO General, hit hard by a court decision opening its remaining broadcast licenses to challenge, is taking advantage of a legislative amendment to insure its hold on WOR-TV, its New York City outlet.

The amendment, sponsored by New Jersey senator Bill Bradley (D) and passed as part of the recent tax bill, orders automatic license renewal for any VHF station that moves to a state that currently has no VHF outlet. New Jersey and Delaware are the only two states that receive VHF signals only from across their borders.

The amendment came just after the U.S. Court of Appeals for the District of Columbia Circuit had invalidated an FCC plan not to accept challenges to RKO's one remaining TV and 12 radio licenses until it had resolved the effect of its 1980 disqualification of RKO as licensee of WNAC-TV, Boston (now WNEV). At that time, the FCC also denied the renewals of WOR-TV and KHJ-TV, Los Angeles. The WNAC decision was confirmed on appeal.

In its decision, the court ruled that closing out prospective applicants for the RKO stations "is no longer reasonable," pointing out that almost all of the licenses in question have already expired. The appeal had been brought by three potential applicants for RKO licenses, New South Media Corp., Future Broadcasting, Inc., and Gold Coast Broadcasting, Inc.

# A RECORDING CAMERA WHEN YOU CHOOSE


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A tough, lightweight camera that delivers the performance and features you demand. That works with your present cameras and recorders. That adapts to your triax, multicore and genlock applications with a simple change of adaptors. Plus, offers you all the advantages of the HCR-1 recording camera system...mobility, reliability and the superior video quality of the ChromaTrak recording format. Advantages you choose when you want.

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RCA

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William S. Paley is expected to step down as chairman of **CBS,** Inc. by the end of this year, or at the CBS annual spring meeting, and is planning to become a general partner of Whitney Communications.

**Mutual Broadcasting** has become the first American satellite user to operate a calibrated downlink system in support of radio network satellite broadcasting. Mutual also now has 10 SCPC (19 dBw) satellite channels on Westar IV available for broadcast and nonbroadcast use.

**Harris** announced the FCC approval of the company's on-the-air use of its AM stereo system . . . . Motorola has filed an application with the FCC for type acceptance of its AM stereo broadcasting exciter.

**Nielsen** Cable Universe Estimates has put cable penetration for the country at about 34 percent, a two percent increase from May and a 25 percent increase from July 1981 . . . . **C-SPAN,** Communications Satellite Public Affairs Network, has now wired Washington, DC and Capitol Hill with its cable news station, providing 16-hour-a-day House coverage.

WCBS-TV, New York, to bolster its capabilities for producing news specials for the upcoming sweeps period, has signed a 15-month lease with **The Camera Mart,** which will supply a complete editing suite consisting of Sony VCRs and editor, **Datametrics** time code systems, and **Shure** audio mixers. Though profitable, the station has faced severe capital expenditure cutbacks precluding the purchase of the necessary equipment.

USC has announced the completion of the first mid-summer Institute in Broadcast Management for ethnic and racial minorities employed in radio and TV . . . . The Central **Canada Broadcasters' Association** in cooperation with the CAB will present "Perspectives '83," billed as the largest gathering of broadcast professionals ever held in Canada, November 14-16.

The **NAB** will hold its remaining Radio Management Training Seminars in Atlanta (October 13-15) and Oklahoma City (November 8-10) . . . . According to the NAB the average radio station in 1981 had gross time sales of $465,000 and net revenues of $457,000, up 19.9 percent and 21.5 percent respectively . . . . NAB has told the FCC that sharing of the 947-952 MHz band with government fixed services is not feasible and would have a detrimental impact on ABSTLs and ICRs . . . . the **RTNDA** and the NAB have offered support for the American Bar Association's decision to repeal the 45-year-old law preventing radio, television, and still photographic coverage in the nation's courtrooms.

The **NRBA** set a new record in July when 70 members were added to the NRBA membership rolls . . . . the **IRTS** has presented President Reagan with a special gold medal at the Oval Office, recognizing Reagan as "America's most accomplished communicator."

The **Independent Television News Association** has developed its first satellite news service, "Pacific Exchange," beginning in September . . . . the Associated Press has adopted the RTNDA guidelines for wire service news transmission . . . . **CBS radio** network signed WGST, Atlanta as a new affiliate . . . . **RKO radio** network will acquire and install its own audio digital distribution system with **RCA** and **Scientific-Atlanta** . . . . the National Institute for **Low Power Television,** after being formed in February 1982, and naming its advisory board in April, held its LPTV East Conference October 1-3 at the Shoreham Hotel in Washington.

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## The MICROTIME 2525 Video Signal Synchronizer


Process any video source with this cool-running synchronizer that stays on the job longer. The 2525 synchronizes the broadest range of input signals and provides optimum time base correction of signals from any VTR source. The latest in digital video processing technology at a surprisingly affordable price.

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Plus the 2525 SP, an optional processing amplifier with multiple inputs, allows presetting of video parameters for each input. The addition of this "Smart Proc" extends the capability of the basic 2525 to form the highly versatile 2525 SP System.

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# BUSINESS BRIEFS

**Microwave Filter,** which in the past has specialized in filters for cable and TVRO satellite stations, has now added custom manufacturing of filters for broadcast TV.

**RCA** has set up four TK-76s in the Washington Zoo to record the birth of the first panda to be born in captivity in the U.S. The entire closed circuit television system set up by RCA was designed to be compatible with broadcast standards for later use on TV networks.

**WPVI** in Philadelphia has ordered a **Harris IRIS II** digital still store system valued at $330,640. The system will be used to support the station's newly formed electronic graphics group . . . . CBS TV has ordered a large number of **Schneider** 14X zoom lenses for use with the **Ikegami** HL-79A and **Sony** BVP-330 cameras in the station's news bureaus and production departments.

**Anixter Mark** now has a contract with the state of Alaska for 50 earth station antennas for one-way network television processed through the state's satellite relay center in Anchorage.

**EECO** has signed **A.F. Associates** to an OEM purchasing agreement whereby A.F. Associates will incorporate EECO video equipment into its systems . . . . **Lerro Electrical Corp.** has been signed by EECO to distribute its computer controls for video production in Pennsylvania, New Jersey, and Delaware. **Custom Video Systems** will be responsible for distributing EECO equipment in Oregon, Washington, and Alaska . . . . **EDCOR** has appointed Moulthrop Sales to be its representative in northern California and northern Nevada.

**JSL Video** in New York has recently purchased a **Bosch** KCP-60 studio camera while adding new capabilities to its post-production facilities . . . . The independent "Breakfast Television" franchise has selected **Basys** to provide computer systems for its news and current affairs programming.

**Dolby Labs** and Electro Sound announced that **Electro Sound** has become the first manufacturer of high-speed cassette duplicating equipment licensed to incorporate Dolby HX professional headroom extension in its products.

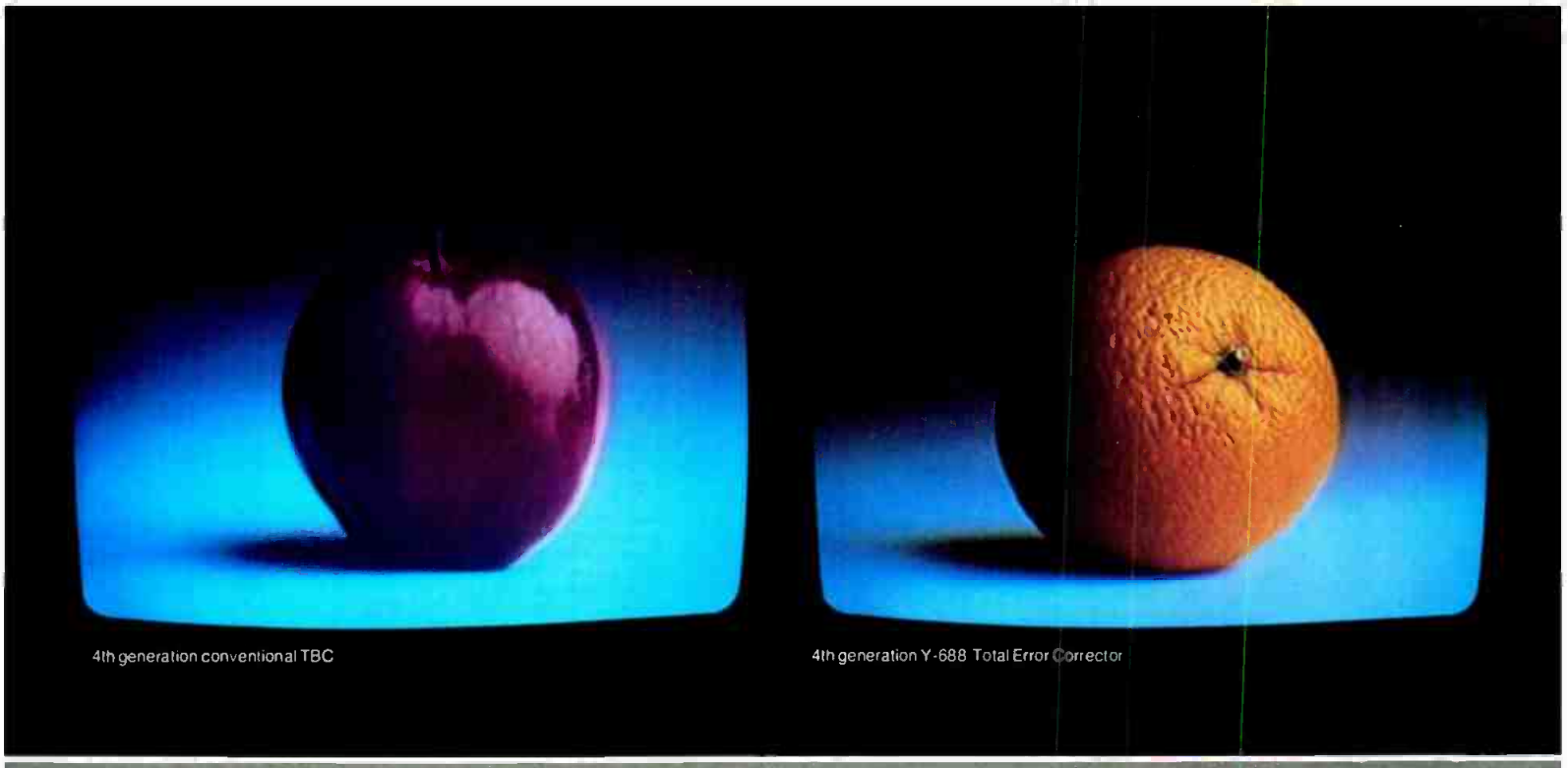
**Valtec** has promoted W.R. Bruce to the position of national sales manager from regional sales of optical fiber and cables . . . . **Comprehensive Video** has announced the appointment of Gus Livanis to VP operations. **Tele-Measurements** has appointed Douglas Cook and Carl Ceragno as VPs of the Clifton, NJ-based firm . . . . William Chambers has joined **Altec Lansing** as VP marketing and planning.

**Toby Arnold & Assoc.** now has available a new audio production library for television called "The Production Bank" . . . . **KNXT** has used **MBB's** twin-engine safety helicopter for ENG coverage for the first time.

**Electronic Field Productions** has moved, after its first year of operation, into larger facilities at 11 College Drive, Suite K, Arlington Heights, IL.

**Image Transform** has expanded its services to include 35 and 16 mm negative processing and 35, 16 and super-8 mm release prints . . . . **Angenieux** has expanded its worldwide sales and marketing team and Joseph Martinez will assume responsibility for all marketing and technical liaison in the U.S.

**Station Business Systems,** a division of Control Data Corp., has opened three new regional offices to serve the expanding markets in the west and southwest. New offices are in San Francisco and Irvine, CA, and in Dallas . . . . **Riviera Capital Corp.,** a financial service for the broadcast industry, has opened its new main office at 220 Avenue I, Redondo Beach, CA.




# NO COMPARISON

Comparing video from a conventional TBC to video from a Y-688[32] Total Error Corrector is like comparing apples to oranges. A time base corrector, as the name implies, corrects timing errors. The Y-688[32] Total Error Corrector corrects timing errors and virtually all VTR induced errors.

The major cause of video quality loss in 3/4 VTR's is inherent in the color under process. This process separates the input color video signal into its luma and chroma components, converts the chroma frequency for recording and playback and recombines the luma and chroma for color video output. The worst part is that this quality loss is cumulative, in that it is compounded with each pass through a VTR or conventional TBC.

## Total Error Correction

The Y-688[32] TEC is designed specifically to overcome multiple generation quality loss from color under VTR's. The Y-688[32] TEC utilizes "dub" (Y-688) input and output as well as encoded video. The "dub" mode allows processing of component (Y-688) video bypassing the separation, frequency conversion and recombination cycle. "Dub" signals processed through the Y-688[32] TEC are better than encoded video signals because they contain more information and are less degraded.

The Y-688[32] TEC also utilizes advanced signal processing techniques, some manufactured under exclusive license from Faroudja Laboratories. These techniques reduce chroma noise by up to 20dB, correct luma/chroma timing automatically, reduce luma noise by up to 10dB, improve chroma rise times, reduce second order ringing and eliminate luma/chroma crosstalk. Some processing is used during each pass through the Y-688, while the balance of the processing is used for the last copy or for broadcast to correct any minor degradations which have occurred.

## A Difference You Can See

The improved quality of Y-688[32] TEC video can be seen in first generation playback. It becomes more obvious in successive generations. It is particularly noticeable in third and fourth generations because conventional TBC video has gotten worse with each pass, while fourth generation Y-688[32] TEC video approximates original quality.

The Y-688[32] TEC is simply the most powerful tool available for extending multi-generation quality from color under VTR's.

For more information on the Y-688[32] TEC or an on-site demonstration, circle the reader's card. For immediate response write or call Fortel today.

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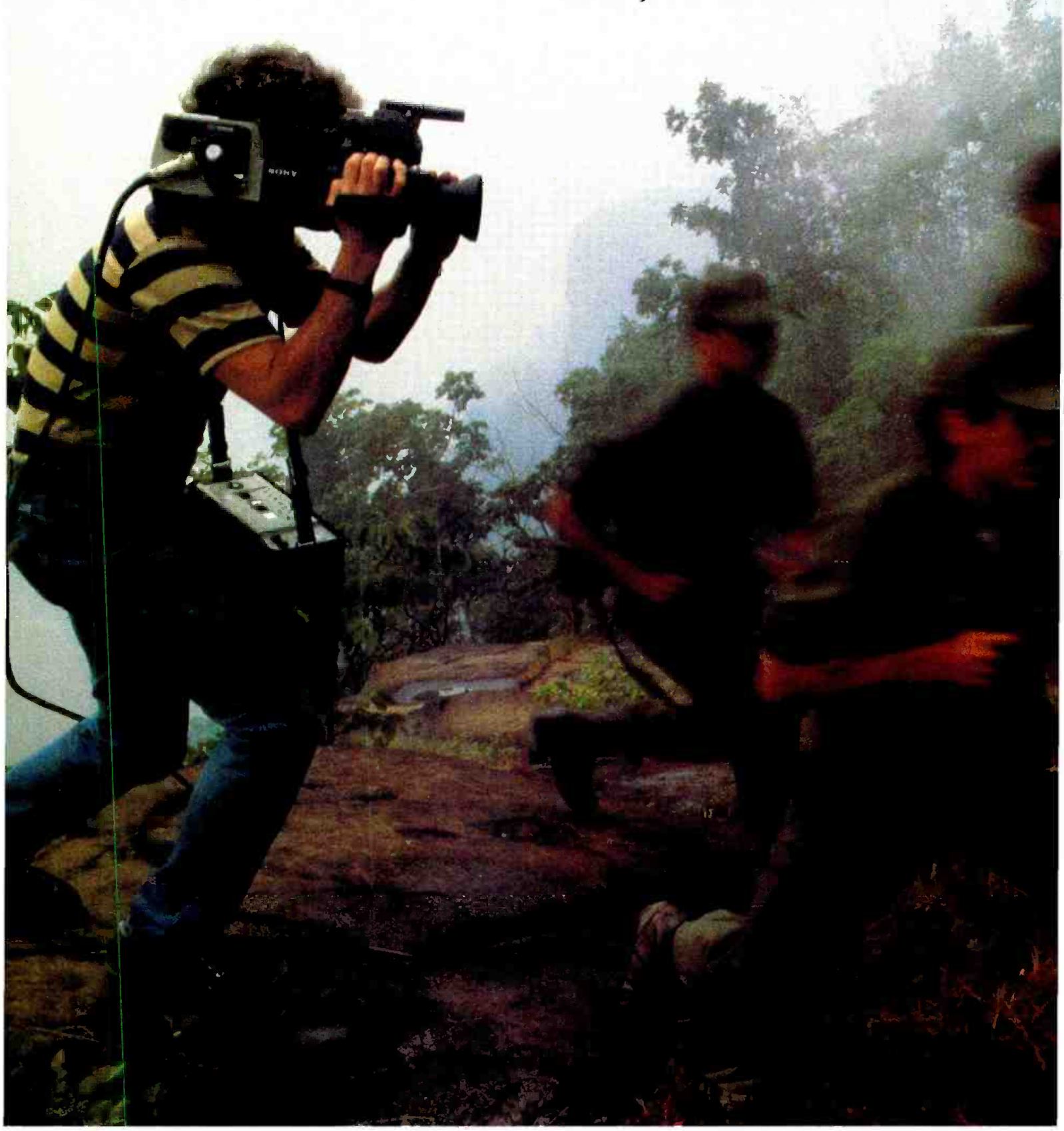

If your cameramen don't mind packing 30 pounds on their shoulder, you can stop reading right now.

But if they're like most cameramen, mere mortals, they'd much prefer taking on the likes of El Salvador, Beirut or even downtown Topeka shouldering one-third the weight.

Which is precisely why Sony engineered the BVP-110.

Weighing in at just 9½ pounds and measuring only 14" x 3½" x 5", the BVP-110 is the industry's smallest, lightest, most compact full-fledged video camera. (In fact, it's so small, one network actually strapped it to a sky diver's helmet, while another fastened it to a snow skier traveling at 70 mph, with the results of both being super video.)

The Sony BVP-110 offers distinct advantages beyond compactness. Because it's a one-tube, you're free of the single most difficult and aggravating problem associated with three-tubes: registration error.

You're also free of color drift and black balance errors.

And the Sony one-tube frees you of something else—

toting around loads of extra batteries. This rugged, dependable camera has the lowest power consumption of any broadcast-quality camera in the industry. It'll operate for more than two hours on a single battery pack.

So if you're looking to stay out in front of the news, instead of behind it, and you can't get bigger cameramen, get the next best thing. The Sony BVP-110.

Sony makes a complete line of cameras as well as ½", ¾" and 1" broadcast VTR's, editors, Digital Timebase Correctors, and high-performance monitors.

For more information, call Sony Broadcast Company, in New York/New Jersey at (201) 368-5085; in Chicago at (312) 860-7800; in Los Angeles at (213) 537-4300; in Atlanta at (404) 451-7671; or in Dallas at (214) 659-3600.

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Broadcast

# ARE YOU GOING TO BROADCAST THE KIND OF AM STEREO THAT NO ONE LISTENS TO?

Motorola's AM Stereo system has one attribute you can't afford to overlook. It's designed to deliver superb quality sound to the most modestly priced receivers.

And after all is said and done, your ratings may be entirely dependent on how many people can listen to you on AM Stereo radios. AM Stereo is a lot more than a promotional opportunity—it's a chance to pull ahead of your competition, if you jump on the right bandwagon.

Motorola is really rolling on AM Stereo. FCC type acceptance is expected in October. Call Chris Payne at (202) 862-1549 or Dick Harasek at (312) 576-3591.

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AM Stereo. A system designed to be heard.

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# Business Is Everyone's Business

LEARNING TO COPE in today's tough economy is something everybody is interested in. Producing a program that tells small businessmen how to survive, while providing a station with the opportunity to make money at the same time, is how Narwood Productions of New York City is making its impact felt.

Called *Minding Your Business*, the 90-second show is sponsored by Zenith Data Systems, and is produced in association with Inc. Magazine. Inc.'s feature stories are used to generate *Minding Your Business*'s material, and the magazine's editor, Milton Stewart, is also the radio program's presenter.

This is the first venture into the radio business for both the sponsor and the publication and it has made for an enthusiastic approach to a type of program which, in the past, has often been presented in a dry, uninteresting, or sometimes condescending way.

The formula is evidently working. When the show first went on the air on June 1, 1982, it had 30 stations subscribing. Now the number has risen to 80, with more signing on every day, according to the show's founder and executive producer Ted LeVan. Over 100 stations are expected by the end of the year.

A major factor in the show's success, LeVan feels, is having the right combination of personnel. Says LeVan, "With Milton Stewart we have one of the most knowledgeable business minds in the country and, since it's his first time in radio, he approaches it with great enthusiasm.

"Zenith Data was so excited by the show that they entered into their first full one-year contract to underwrite a syndicated radio program."

Zenith's sponsorship is critical to the program's business formula, since it is only heard in those markets where Zenith wants exposure for its ads. LeVan tries to recruit only those news/talk stations with top ratings in the top 150 markets.

Two shows are offered twice daily (morning and afternoon), 10 per week, with Zenith retaining the 60-second spot on the morning show and the station getting the minute in the afternoon. The show goes free to the station for this exchange, with the ads being tagged locally. Though there may be some geographic overlap, Narwood guarantees market exclusivity.

To help in transforming the articles into a useable radio script and to enhance the immediate production value of each taping session, LeVan hired radio consultant Jim Cameron. Cameron, formerly director of NBC's *The Source* syndicated radio show, and on-air personality at WLIR on Long Island and WQIV in New York City, was paying a social call on someone at Narwood when he was asked to sit in on a demo for the show; he hasn't left since. As with editor Stewart and sponsor Zenith, Cameron offered the right mix to the chemistry of the show.

The recording sessions take place every two weeks, with 20 90-second shows being produced in about two hours. Most of the time the work is done in Narwood's studio in New York using a custom Teac console and Scully 280 B quarter-inch tape machines.

A problem developed in the taping schedule, however, because Stewart lives in Phoenix. Radio station KHEP, which takes one of Narwood's many syndicated programs, suggested the use of Robert Miller Productions, a recording studio right in Phoenix.

*Executive producer Ted LeVan (standing) and radio consultant Jim Cameron (center) producing a "Minding Your Business" show.*

In the intercity hookups, Stewart reads his script while sitting in a booth at the Miller facility in Arizona, his voice recorded on tape. Through a set of headphones he can hear Cameron's comments on his presentation, carried by standard phone link from the Narwood studios in New York. In the Narwood studios, Cameron monitors by phone Stewart's presentation through an output on Miller's mixing board, offering whatever advice is necessary. Approximately 25 percent of the shows are taped in this manner.


*LeVan, Cameron, and host Milton Stewart discussing show in production studio in New York.*

One of the more notable production features of *Minding Your Business* is the way financial tips and business features are extended into week-long series. One of these money-saving ideas, "Buck Stoppers," is often run on successive days, with a tease each day suggesting the content of the next program. The business news series are also scheduled horizontally, one after the other on subsequent days, rather than vertically on morning and afternoon shows. The intent, of course, is to keep the listeners coming back for more.

All of the post-production work is done in New York. The tape of the session is sent by Federal Express to Narwood where it is edited by one of the staff engineers, sometimes overseen by Cameron.

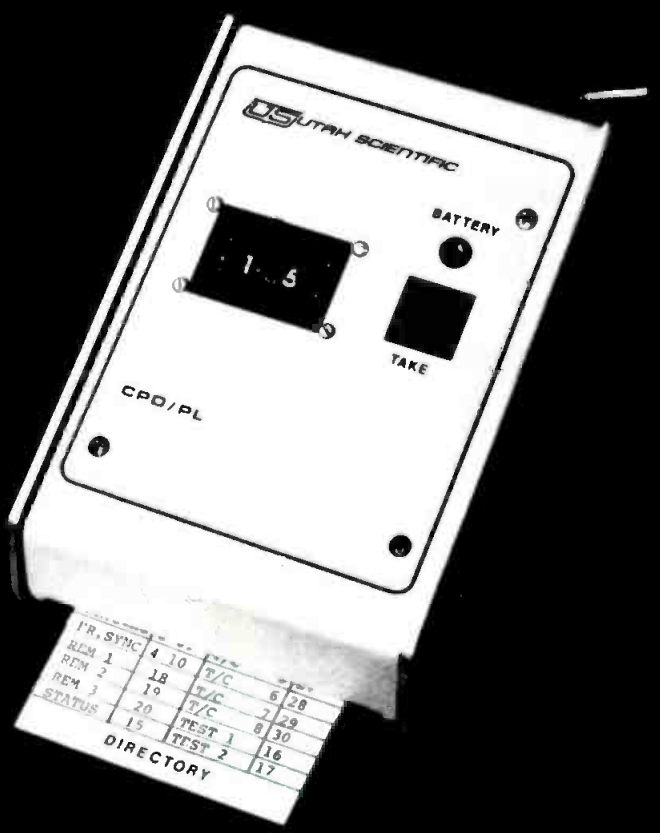
Like most small businesses, success certainly didn't come overnight for Narwood. LeVan started the company in 1957 doing the *Eddie Fisher Coke Time* show live, and continued with music specials, promotions for the U.S. government, and live shows in the 1960s with famous DJ Martin Block. Before his own company got underway, LeVan was an engineer at NBC working on some of the live Big Band broadcasts.

In fact, *Minding Your Business* is a major departure for Narwood which, till now, has specialized in music shows hosted by stars such as Glen Campbell with *Country Closeup*, and Skitch Henderson's Big Band show *The Music Makers*.

With today's economy showing few signs of improving, it might be possible to pick up few helpful hints from this radio experience. Comments Cameron, "In a time of depression, it's interesting that a business show is succeeding so well." But for Stewart, the marriage between small business and radio offered by the program is perfectly natural. "Radio itself, on the local level, is a small business," he concludes. And what better way to provide information to the nation's small businessmen anxious for all the help they can get?

# TIRED OF PATCHING FEEDS TO THE GM'S OFFICE?

## (OR TO OTHER OFFICES, CLIENT VIEWING ROOMS, EDIT SUITES, ETC.?)




**Give them one of these Utah Scientific Routing Switcher Controllers and let them do their own patching.**

Utah Scientific's new CPD/PL control is a **Party Line** panel with a single coax control connection — no bulky cables to install. It is powered by a transistor radio battery providing many years life expectancy. It features a pull-out directory to aid the operator in source selection.

Since multiple CPD/PL's can all be connected to a single party line, many stations are installing coax drops throughout their plants giving them complete flexibility for present and future routing switcher control using these versatile panels.

SINGLE COAX CONNECTION — BATTERY POWERED — UNOBTRUSIVE

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# Studio Standards

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# You *Can* Get There From Here—Live!

LIVE BROADCASTING has always been a part of television, and it will likely continue to be so—particularly as the public's appetite for sports continues to increase. Now, thanks to the development of transportable satellite earth stations, it's possible to go live even from areas which are not serviced by telco or fixed earth station links.

For KTTV, Los Angeles, a Metromedia station, the transportable earth station has not meant feeding local spots directly to a nationally networked group of stations, as is becoming commonplace with groups that set up ad hoc networks to cover special events or local/regional sports. Rather, KTTV uses the dish to get signals back to its own facilities.

KTTV broadcasts approximately 50 games of the Dodger baseball schedule, many of them employing the services of a transportable earth station, supplied by Wold Communications, to help KTTV send the output from its remote truck to the satellite and back down to its own nine-meter Harris dish in the KTTV parking lot in Los Angeles.

According to Bob Heistand, KTTV producer for Dodger baseball, working with Wold is extremely simple: "All we do is hand them a coax and an audio cable. They diplex the audio, and that's it. Sometimes they can even park the equipment right next to us on location."

Prior to using the transportables, KTTV, like most other stations, used the facilities of the phone company. Even now it still leases extra AT&T lines for emergency audio backup in case of failure, but the lines have yet to be used. Indeed, one of the reasons the station management decided to go with the transportable satellite antenna is that it is more reliable than the phone service in some areas of the country and is even cheaper when it is available.

The first time Heistand was involved with the system for the Dodger games was during the 1982 spring training. Wold's services were employed to arrange for satellite transponder time and to supply the actual antenna transmit/receive equipment. (Wold handles the booking and trafficking details in selecting the satellite and channel on which to put the service, then checks with KTTV to verify engineering parameters and make sure all systems are compatible).

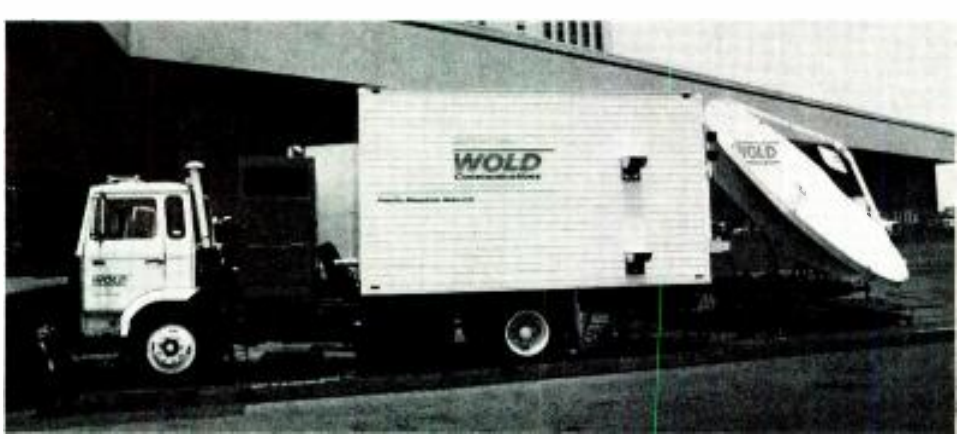
Before the equipment can actually be set up at the site, a large amount of planning goes into the venture. First, a frequency clearance check is done with the services of Compucon which uses a computer to check which satellites are booked using what channels, and at what time they are booked. This avoids any overbooking problems or interference with microwave or other types of transmissions which may be taking place at the same time in the same area.

Once this process is complete, the OK is given for Wold to go ahead and book the station for the desired time. KTTV books 15 extra minutes before air to allow time to run enough checks so there are no problems while on line. Wold will book at least a half hour in advance for its own equipment check.

Three separate checks on signal quality are performed by Heistand and the Wold engineers. First they check the signal coming out of the mobile unit to ensure clean feeds. The signal being transmitted is also monitored continuously. And then, because the same antenna used to transmit from the site can be used to receive the signal, a check can also be maintained on the signal coming back from the satellite. All this is monitored on location and at the Wold operations center in Los Angeles.

Two of the transportables used by Wold were obtained from Dalsat in Dallas which manufactures and modifies both permanent and transportable satellite systems for broadcast and data transmission.

For the antennas to be moved from place to place in a truck they have to be small, so nothing larger than a five-




*Wold transportable antenna and truck, with diesel powered generator, prepares for transmission.*

meter dish can be used. According to Dewayne Gray of Dalsat, the company buys the Andrew 4.6-meter dish "because we feel it's the best quality in that size." Dalsat then levels the surface of the dish as much as possible and reinforces the new shape with a back-up structure. After this process, the antenna is measured at 180 different locations for precision and then cut vertically in half so it can be more easily folded up for transportation.

Different kinds of mounts can be used, but the two Wold units used by KTTV are hydraulically mounted.

Dalsat also makes its own trailers for better performance in greater windload. The whole transportable system is ergonomically designed so that from the time of arrival at a location, one man can completely set up the antenna and be broadcasting in 30 minutes.

Like a production which can lease a mobile unit with camera and tape equipment ready for action, satellite services such as Wold have an arrangement with various local contractors that allow them to simply come in and set up. In places where Wold does not have its own transportables, it leases a standard set of equipment from a local company with which it has a long-term agreement. In this way, standard quality and price can be guaranteed as much as possible for every location.

*Control area of the truck where transmit/receive functions are executed.*

On the other hand, Heistand himself is limited in what he can get at different ball parks by what equipment is available locally—and who else is televising the same game.

Even if the equipment is available, often there isn't room for KTTV's additional cameras, and Heistand is forced to use some other station's set-up "which detracts from the flavor of the local broadcast that the people back home are hoping to see. It's no longer Dodger Baseball in the way we would normally do it."

Some of this problem is alleviated by using KTTV's own announcers and getting one camera in the booth for the high shots and the on-air personalities, and at least one additional ENG/EFP camera on the ground for post-game interviews and the wrap-up show. The rest of the feed, both video and audio, has to come from the local facilities which may cut back on the number and type of replays and highlights that are applicable to a local home audience.

With the state of satellite technology advancing daily, it seems the old problems with telco transmissions are becoming more scarce. Often, as in the case with KTTV, the standard remote broadcast logistics are presently more of a problem than dealing with satellites and earth stations. It's time to roll up the trailer, unfold your dish, and let's play ball! **BM/E**

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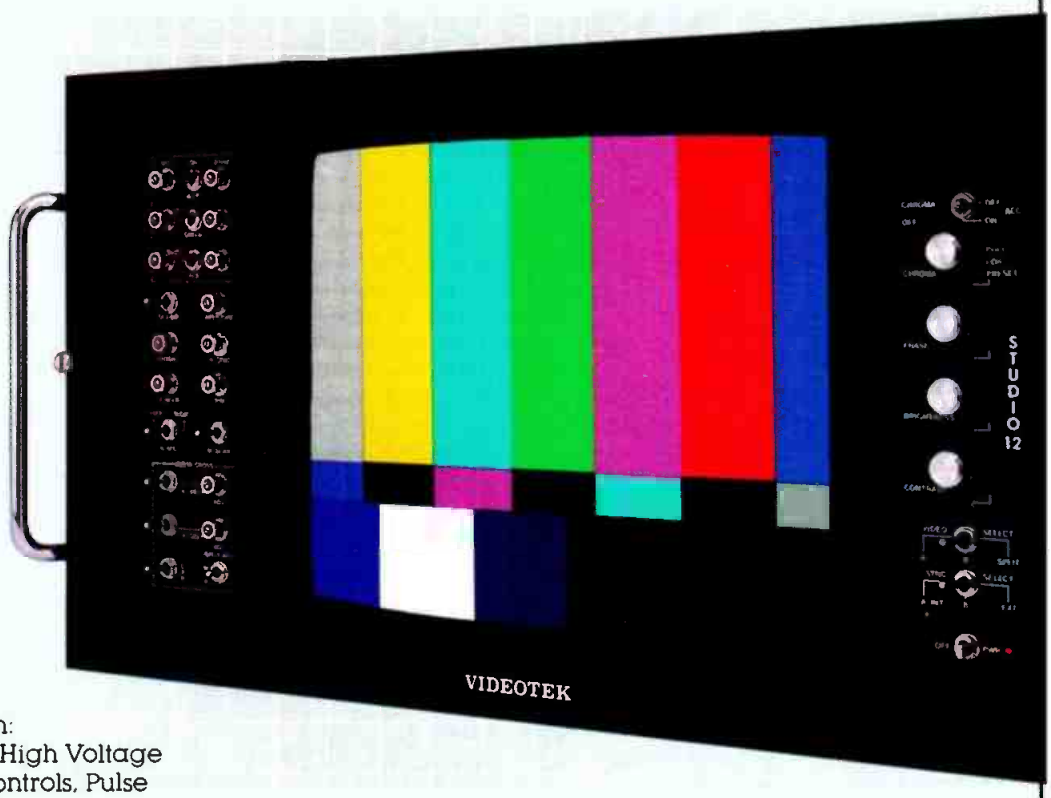



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# Special Report: Live Broadcasting

# ABC's View from the Inside Out

New technological developments from ABC's Engineering Lab have yielded a flexible, inexpensive POV camera for use in sports and special events remotes.

By Bebe F. McClain

WHEN ABC's engineering lab, under the direction of Phil Godfrey, undertook the development of a system to transmit live pictures from inside a racecar travelling over 150 mph, the problems at first seemed almost insurmountable. Several races and extensive first-hand experience later, the system is finally up and running.

The task, simply stated, was to fully remote control the pan, tilt, zoom, and focus of a low-cost camera installed in the back seat area of a NASCAR Grand National racecar, and to microwave a picture, via a hovering helicopter, to a nearby ABC production van at the raceway. A second camera, fixed under the dashboard, could be remotely switched to provide shots of the driver's face.

At the same time, a second project was undertaken for ABC's *American Sportsman* series to install a lightweight, low-cost camera in the rigging of a motorized ultralightweight aircraft to provide pictures of condors flying in Peru's Andes (see *BM/E*, June, p. 14). Both projects are part of a larger plan by ABC to develop a low-cost point-of-view camera which might be used in areas where a person-operated camera is impractical.

Earlier this year, a system devised by the Australian Television Network, using a high-priced broadcast camera, had been used by CBS inside a racecar at the Daytona 500 race. However, according to Larry Kamm, a director at *ABC Sports*, since ABC eventually wants to place a camera in several of the cars of the top drivers, ABC set out to see if conventional, off-the-shelf, unmodified equipment could be used with minimal effort.

The final choice of the TV camera was made after extensive side-by-side comparisons of several cameras, including a single-tube three-stripe camera, a one-chip CCD camera, and several low-cost three-tube cameras. The Panasonic AK-710 with a Canon 13x9 lens was eventually chosen because of its performance, weight, cost, and the fact that its profile best suited the needs of the racecar and hang-glider projects. A small Hitachi VKC-1000 consumer camera was also selected for dashboard mounting.

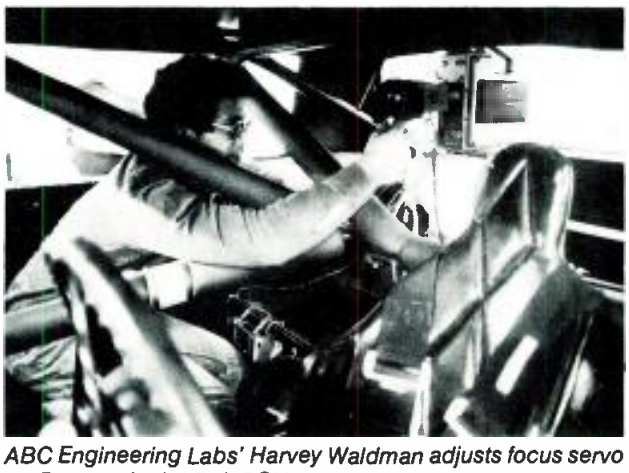
The remote control and microwave systems were fairly complex. For the former, a Sony data transmission system was put into service, an off-the-shelf package consisting of a WRT-27A 950 MHz transmitter coupled with a 500-milliwatt power amplifier located at the production van, and a WRR-37 receiver mounted in the car. Feeding the command information to the system was a Teledesigns TD-780 triax remote control unit for basic camera functions such as iris, pedestal, gain, and so forth. The same 950 MHz remote control system was also used to operate the pan/tilt head mounted in the car, again an off-the-shelf system which was modified by ABC to include joystick control of the camera movements from the production van.

Two different 2 GHz microwave systems were in operation. Mounted inside the car, ABC used a Farinon unit. For the helicopter repeater, an RF Technology receiver and transmitter were put into service.

The entire electronics package, except for the camera heads, was designed to fit into the car's trunk.

Equipment for the motorized hang-glider project was essentially the same, except that only the Panasonic camera was used. Two parallel microwave systems from Terra-Com and RF Technology were set up to receive signals from a 20-ounce Tayburn transmitter attached to the aircraft's wing, one slightly more sensitive than the other and therefore giving technical manager Jon Partyka a choice of signals to feed to the one-inch VTR. In the case of the aircraft, where weight was so important, a special pouch was built under the seat to handle the batteries used to power the camera and microwave transmitter.

The electrical design was coordinated by Godfrey,



*ABC Engineering Labs' Harvey Waldman adjusts focus servo on Panasonic AK-710 POV camera.*

**Bebe F. McClain,** head of her own production and equipment company, B.F. McClain Productions, Asheville, NC, is also a writer specializing in television-related subjects.

*Camera operator controls remote pan/tilt head and various camera controls from specially designed panel.*

while the mechanical aspects of the project were handled by Verne Kerrick, technical manager of field operations for ABC.

According to Kerrick, "The difficult aspects of putting a camera into a racecar are the environmental considerations of RF interference and vibration." Kerrick's experience with television and racecars spans several decades. In fact, over 10 years ago he worked with the same ABC director, Larry Kamm, to place one of the first film cameras in a NASCAR racecar.

In order to control the video camera from the production van, Kerrick started with an off-the-shelf remotely controllable pan and tilt mount that he completely remachined before installing between the crossbars in the back area of the racecar. A hard mount was used with no shock mounting device in hopes that the gear reduction in the pan head would eliminate camera vibration.

After brief testing of the system in the lab, the time had come to take all of the pieces into the field—the hang-glider camera to Albuquerque, NM for testing by American Aeroflights, Inc., the designer of the hang-glider. The camera operated well and the microwaved images were received well. However, the tests indicated that the camera required shock mounting.

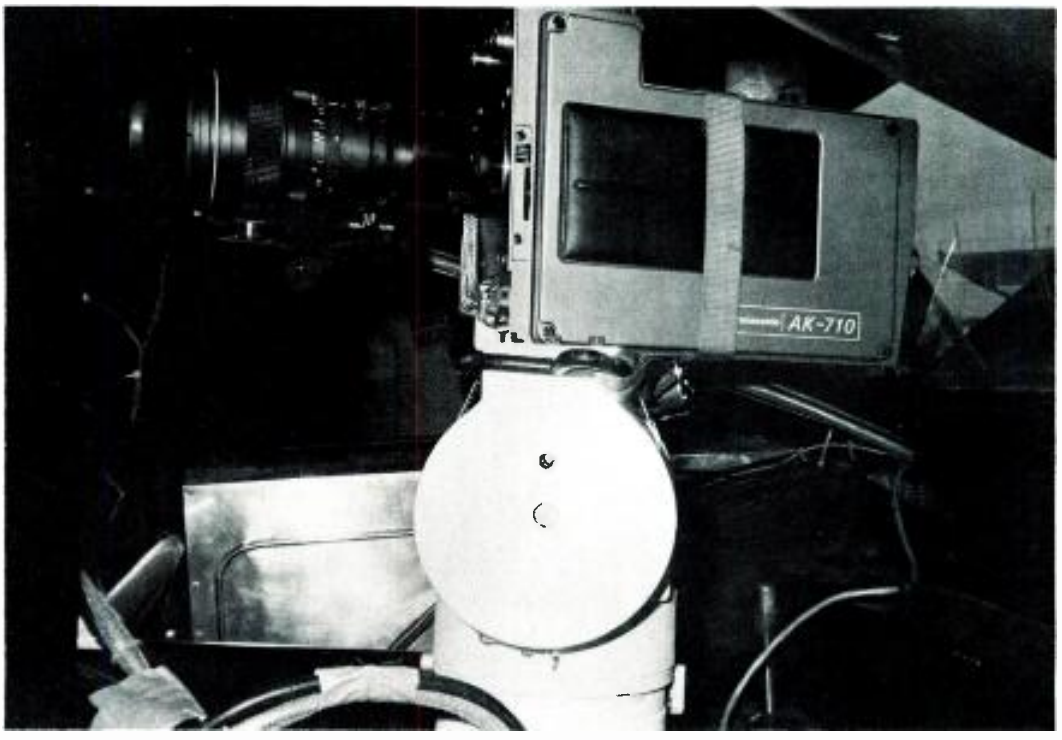
Almost at the same time, the second, more complex point-of-view camera system was taken to the raceway at Rockingham, NC, which ABC had rented for a few days to test out the system.

To see what the environment was really like, Harvey Waldman, test engineer at the ABC lab, crouched inside a racecar and held a VTR that was connected to the AK-710 mounted in the rear area of the car. (No helicopter was used to relay the signals during this test.) He recalls that riding around the track at 150 mph was "quite an experience." Especially noticeable to Waldman was the tremendous vibration inside the car. As suspected, this proved to be a major problem.

Next, he rode the track holding an antenna out the window, microwaving the signal to another antenna held by fellow test engineer Howard Sornstein in the nearby stands. Again the major problem was the intense vibration when the car reached full speed.

Another problem involved the RF interference from the car's ignition system. By shielding the regulator and the coil, however, and making a direct connection to the battery rather than going through the car's regulator, the glitches were eliminated from the picture.

By the time the Atlanta 500 arrived two weeks later, all the equipment had been installed in rookie driver Mark Martin's race car. The Panasonic AK-710 was secured in multiple ways to the mount. The Sony 950 MHz command system for the remote pan and tilt was installed in the trunk of the car along with the RF Technology 2 GHz microwave system. A whip radio antenna for the command system was installed near the rear window and a hole was cut out of the trunk lid to accommodate the 2 GHz antenna that would microwave the image up to the Bell JetRanger helicopter that had been hired to hover




*Side view of remotely controlled Panasonic camera and 13x9 Canon lens mounted in racecar.*

above the track. Inside the helicopter was the Farinon duplex microwave system and mounted on the outside was a special omnidirectional antenna. Under the dashboard was mounted the one-chip MOS camera from Hitachi pointed toward the driver. And the Panasonic AK-710, with almost 360° pan and tilt capability, was mounted in the rear seat area.

Modifications were made up to the last minute, for even though the ABC engineers had tried to anticipate every problem, there was a huge number of variables. For instance, they had never tried the system with a helicopter or tried it in a race with more than one car. The outside temperature was at least 30 degrees warmer than any place the system had been tested. And if the driver did anything to the car to affect his power output, it could seriously affect the system (often a driver will do things such as turn off the alternator to increase horsepower during the last few laps of the race).

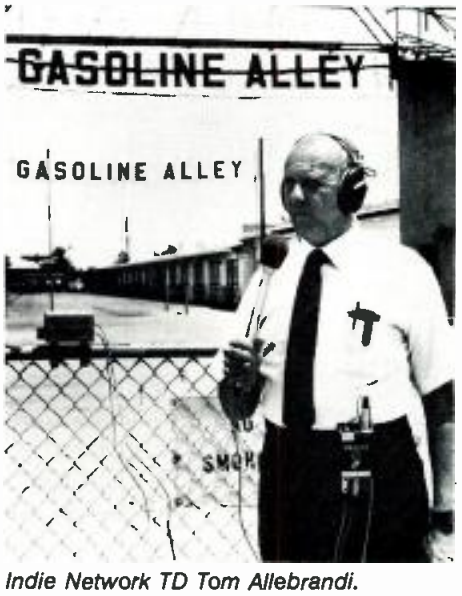
Unfortunately, the NASCAR officials would not allow ABC to test out the system at the Atlanta Raceway and it proved impossible to gather together the driver, the car, and the helicopter at the same time.

Finally the race began and the remote camera operator began switching between the face camera and the pan camera. But suddenly the cameras started switching by themselves. Next, color was lost intermittently, and then the pan and tilt began reacting slower and slower. An engineer was dispatched to the top of the stands in an attempt

## Indy Accelerates with Custom Intercom System

The high-speed, high-noise environment of the Indianapolis Motor Speedway creates special problems for the vital communications that link the master control tower with the various parts of the speedway. At last April's NAB show, Tom Allebrandi, technical director of the Indianapolis Motor Speedway Radio Network, met with Bob Cohen, president of Clear-Com Intercom Systems of San Francisco, to see if the company could develop a system to meet the unusual requirements for the big Memorial Day race.

Clear-Com's solution combined standard units with modified and custom units. A custom-designed Special Balanced Interface Device converted the signal from the speedway's existing two-wire dry lines—in a balanced configuration—to the unbalanced configuration used by Clear-Com's equipment. Another special piece of equipment was a transformer assembly at the control tower that duplexed the dc voltage on the same line that carried the program signal.




*Indie Network TD Tom Allebrandi.*

The MS-400 four-channel main station allowed the technical director to collectively and selectively address all necessary personnel while simultaneously providing on-air program to all intercom users. Intercom stations used standard attenuating double-muff headsets, although the TD wore a Beyer DT-109 binaural headset with program in one ear and intecom in the other. Shure MS-82 line-level mics were the intercom and on-air mics.

In addition, the system interfaced with a power amplifier to drive headsets worn by radio announcers in the control tower, as well as with a remote pickup receiver for the wireless transmission sets carried by the five members of the roving pit crew.

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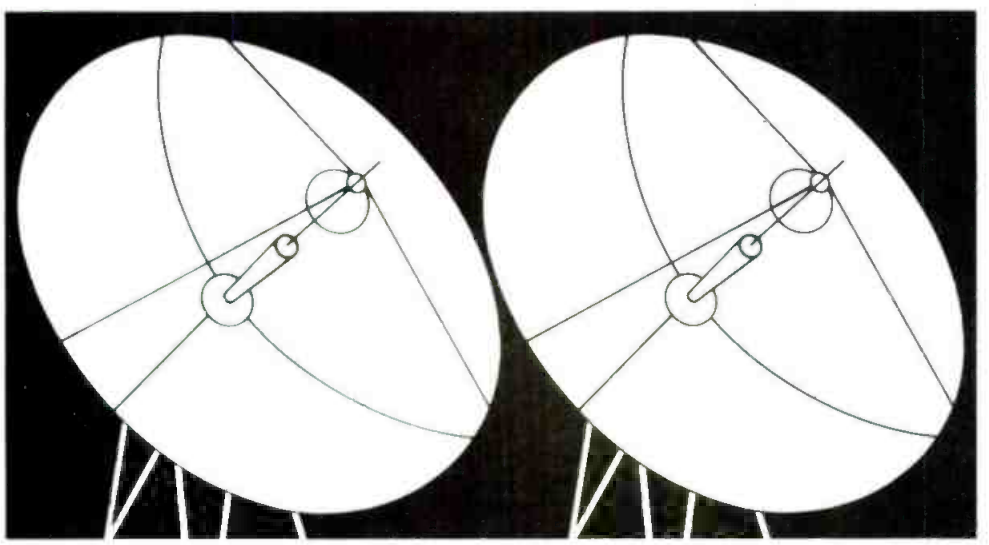

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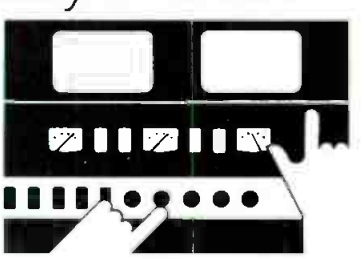

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to use a hand-held antenna to track the car and transmit the RF commands. But even though this seemed to help for a while, in the end there was no response at all. The command system had died.

After the race a complete post-mortem was performed. First, the AK-710 was removed. It had survived the vibration and seemed to operate perfectly. Next, the small Hitachi MOS camera was checked. It was discovered that the vibration had rendered it completely inoperative, the consumer-oriented plastic housing evidently being unsuited for the rough environment. When the command system was removed, it was found that heat was the main culprit. Inside the trunk, in the 80-degree Atlanta weather, the system evidently became so hot that the dc/ac inverter, used to power the pan head motors, had failed.

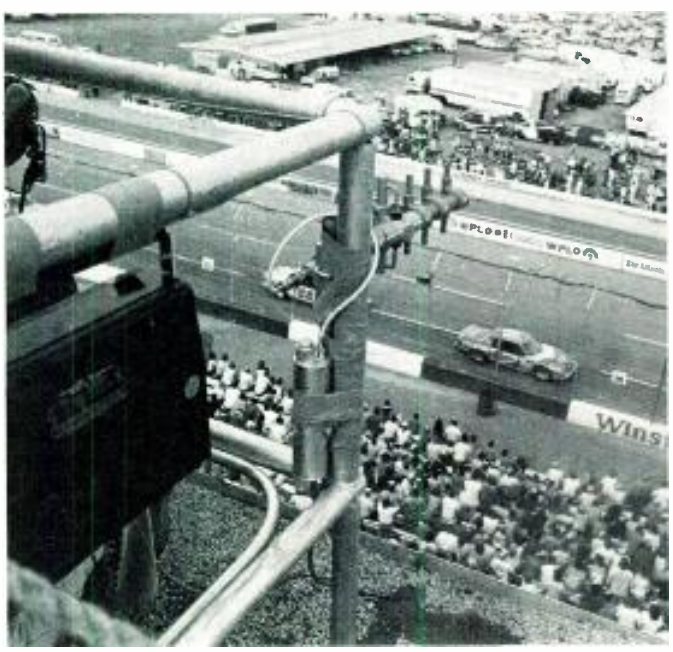
During the next two weeks modifications were made in preparation for the Darlington Race on April 3. A new pan head was purchased which eliminated the need for an inverter. Gears were changed to improve the panning speed.

By the time the ABC engineering crew arrived at Darlington, the car was already there with the equipment installed in the rear seat compartment, leaving the trunk free for gas tank inspection by NASCAR officials.

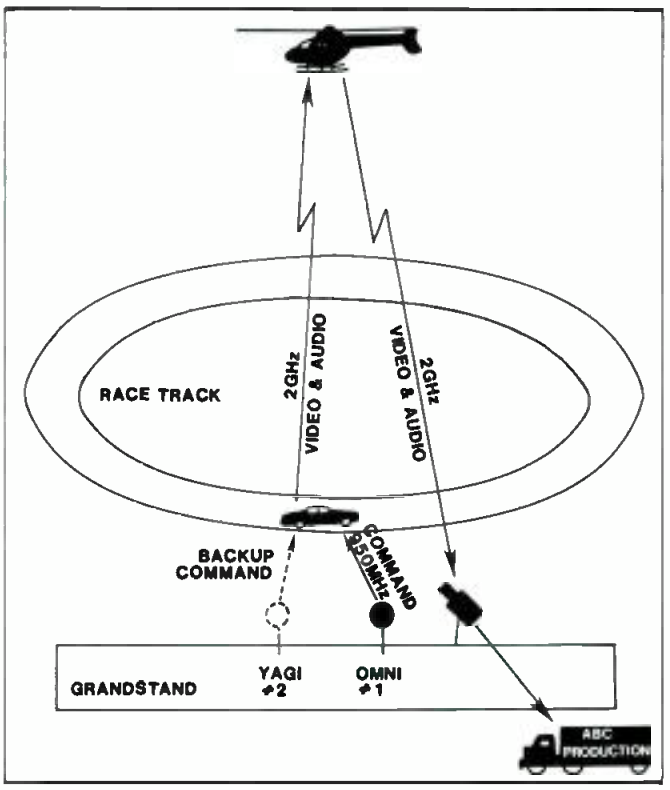
Because there was time to do so, the modifications were tested at Darlington a few days prior to the race. It became apparent that the vibration was still too severe. Therefore, a new 0.095 wall thickness mounting bar was ordered to replace the 0.065 mounting bar which was thought to be the cause of the problem.

Further testing of equipment caused a failure of the pan and tilt head; the plastic buffer gear in the pan gear box had been sheared. However, a decision was made to go ahead anyway—with a static camera. This meant there would be no remote pan or tilt control, although remote control of zoom and focus was still functional. The new 0.095 mounting bar and solid mount were installed in the car, but no further testing could be done because of time limitation.

When the race began, it was noted that the vibration



*The transmit/receive antenna and electronics unit for the remote control telecommand system.*




*Race track point-of-view RF camera system.*

was still present, although it had been reduced. The AK-710 performed fairly well. However, what appeared to be spurious command signals caused the lens to zoom and focus by itself as the car passed through different areas of the track.

After approximately an hour and a half of racing, before any changes to the equipment could be made and a signal put on the air, the car was withdrawn from the race because of engine failure. While removing the equipment from the car, the ABC engineers discovered that it was not the camera but its lens and mount that was the cause of the remaining vibration.

By now, ABC engineering had attempted twice to broadcast from inside a racecar during an actual race, and from these experiences they had solved, one at a time, the various problems involved. To prove to themselves that everything could work, ABC returned to the Rockingham, NC raceway where the original tests were done.

The AK-710 was installed in Buck Baker's racecar using a 0.095 mounting bar and solid mount. The lens and mount were secured with steel wire to the body of the camera. A BVU-100 VTR was used to record the pictures of this test, which proved that the vibration problem was solved. The ABC engineering crew felt they were finally ready to broadcast live from inside a racecar.

## POV Camera Finally Set

*By Phil Godfrey, Manager, ABC Engineering Lab*

At the Southern 500 Race, held in Darlington, SC on Labor Day, ABC planned again to install a point-of-view camera in the rear of one of the racecars. The plan was to remotely control a Panasonic AK-710 camera and broadcast scenes of the race just as they were seen by the driver.

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*Final adjustments being made on camera, lens control, and pan/tilt head at ABC Engineering Labs, New York City.*

This race was the culmination of months of work, including several tries where technical problems in our system and/or the racecar's system rendered the pictures unusable. In one case, the car equipped with our camera dropped out of the race; and in others there were technical problems with our equipment.

Each time the camera has been used we have gained experience and have, one by one, solved the numerous problems encountered by attempting to broadcast from a racecar travelling at over 150 mph.

From the first attempt in Atlanta at the Coca Cola 500 in March, there have been no major problems with the camera itself. The main problems concerned the peripheral equipment such as the remote pan and tilt and the radio command link.

After the Rebel 500 race on April 4 in Darlington, SC, consideration was given to solving several problems. We determined that the jitter we were seeing in the picture was due to vibration in the lens mount. Since the lens is quite long, we felt it needed to be supported from the baseplate to its body. By using such a support we no longer had to rely solely upon the bayonet mount for support to eliminate vibration between the lens and the camera head.

Another problem concerned the pan and tilt motors which continually slipped during the Atlanta race and which required additional support to survive the racecar vibration. The camera is fastened to a box that houses the pan and tilt motor. That box is bolted to a bar in the rear seat area which is in turn clamped to the car's roll bar in the rear seat area. The pan head we chose was one designed to operate on a continuous pan and tilt basis for closed circuit operation, not to handle the vibrations encountered in a racecar. For the race on Labor Day many of the mechanical parts were either remade or remachined to withstand a racecar environment and improve its performance.

Other changes were also made. After the race in Atlanta it was decided it would be best to install all of our equipment (command system and so forth), not just the camera, in the rear seat area of the racecar instead of the trunk. By doing this we avoided the problems of having to remove the equipment from the trunk in order for NASCAR officials to inspect the interior of the gas tank for compliance to volume/capacity rules.

A new telecommand system, the type used for radio control of model airplanes, was to be used. This technique was chosen because the previous method required that continuous data be transmitted in order to provide the required functions.

If multipath reflections or blockage of the signal occured, the digital-to-analog circuitry could give erroneous results, causing any one or all of the functions being remote controlled to react in an erratic fashion. Because of this, it was decided to utilize a more secure system whereby only changes are transmitted. With this type of system, if for any reason the RF path is disturbed, the functions being remotely controlled will not move from their last position, or, if they do, it will only be by a very small amount.

Normally, radio-controlled transmitters operate in the 72 MHz band, but since the Daytona Race track was located near an airport that uses 75 MHz beacons, we decided to use a channel in the 450 MHz band, utilizing Motorola transmitting and receiving equipment. For the Labor Day race at Darlington, we planned to use 950 MHz again, but at a much higher power level, 6 W.

Going into that Daytona race on Independence Day, we hoped to put many of our improvements to the acid test. The complete camera system was installed in car #90, a Ford-type racing car driven by Jody Ridley. The Panasonic AK-710 camera and pan/tilt head functioned well for the first 20 laps. At that point the car developed alternator problems (low output).

Since we derive power from the car's electrical system, any malfunction in that system would affect our ability to provide full RF output, resulting in break-up of video.

When the alternator ceased to function, the driver only had the power remaining in the battery to continue the race. Consequently, the crew chief asked us to turn off our equipment—allowing the driver to finish the race with no additional demands being made on the battery power.

As the Labor Day race approached, we made final preparations to again install the Panasonic camera in a racecar. It had become increasingly clear that there were many variables, some of which were beyond our control since they involved the racecar's system and the actions of the driver. We prepared for the upcoming race already knowing that the original challenge given to us by ABC Sports, to place inside a racecar a low-cost broadcast-quality camera like the Panasonic AK-710, had been accomplished.

Unfortunately, ABC scheduling problems forced cancellation of the shoot. But the excitement of watching scenes coming from a camera inside a racecar has encouraged us to persist in spite of setbacks, and we are determined to do what is necessary to insure that we ultimately prevail in this project and that the ABC POV camera, the first such system to be developed by a U.S. network, becomes a permanent broadcast reality. **BM/E**

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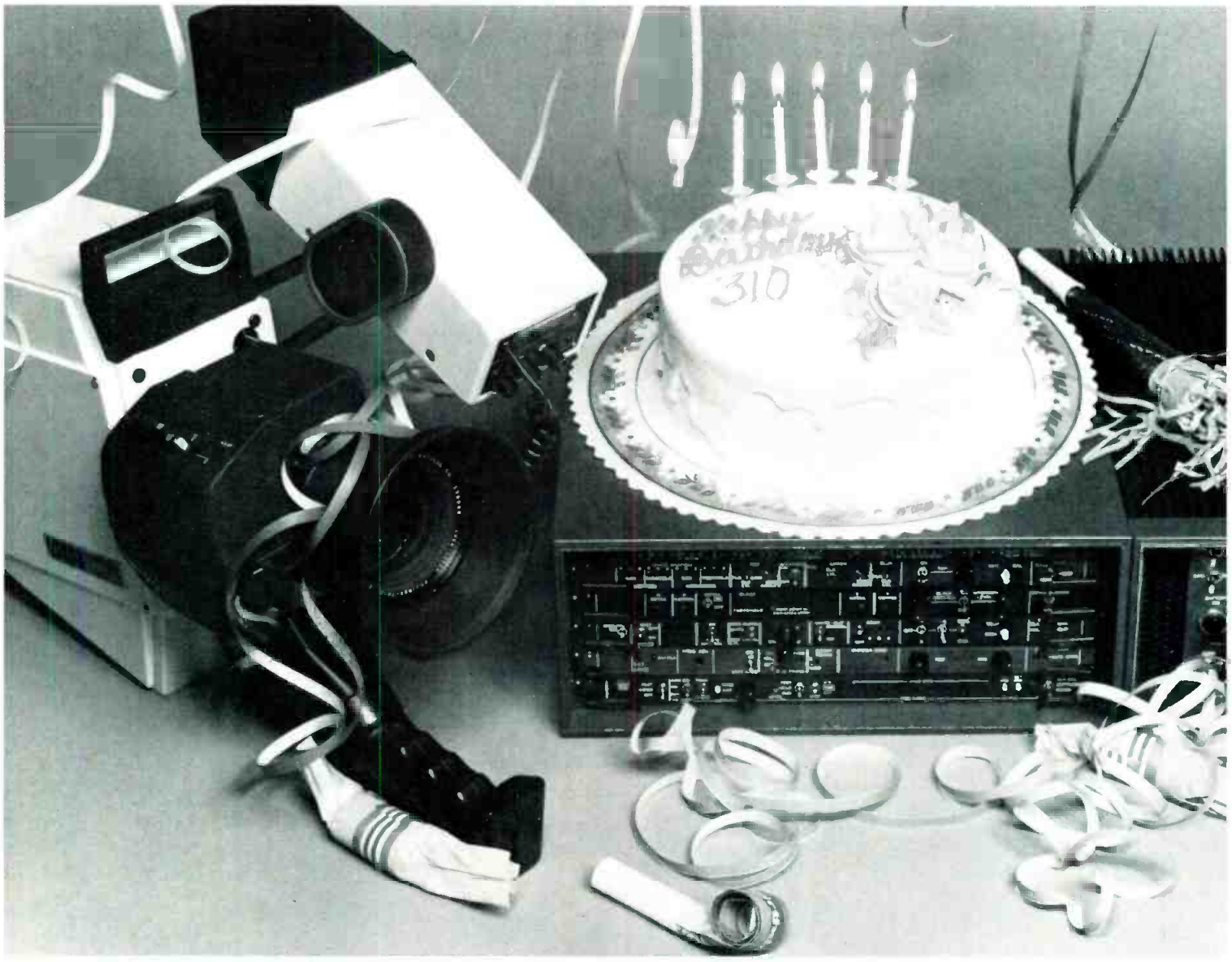


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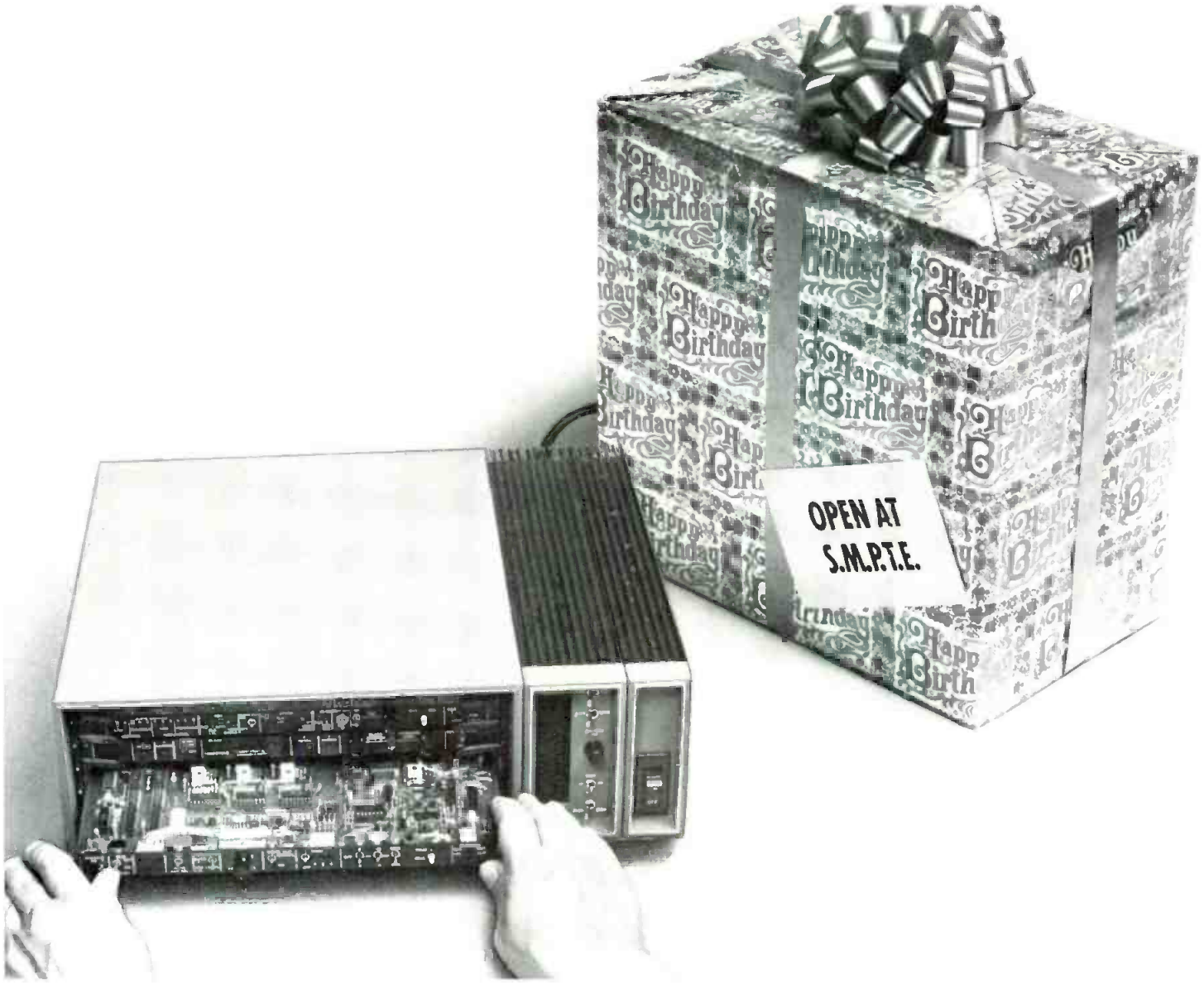


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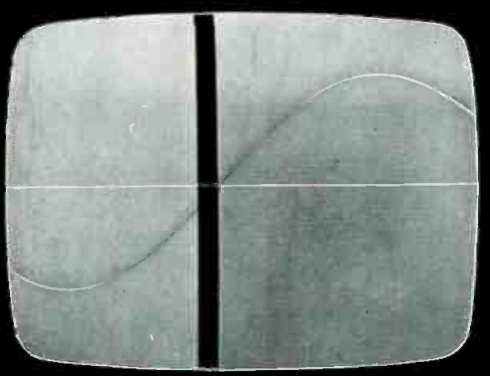
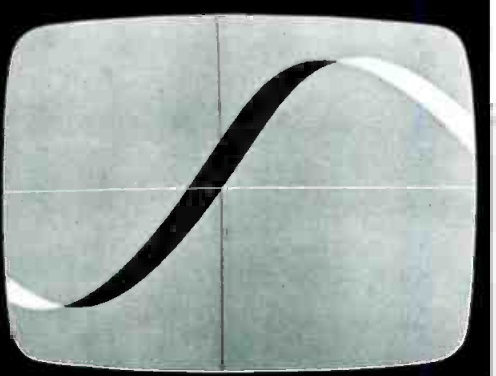


Set system timing.



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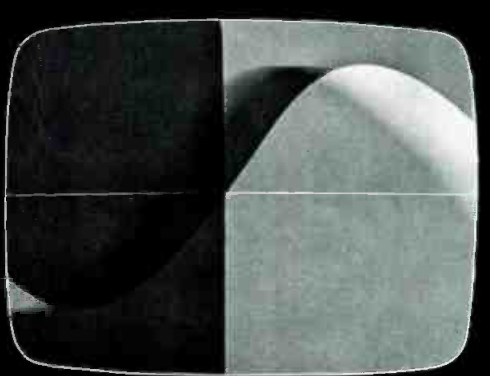
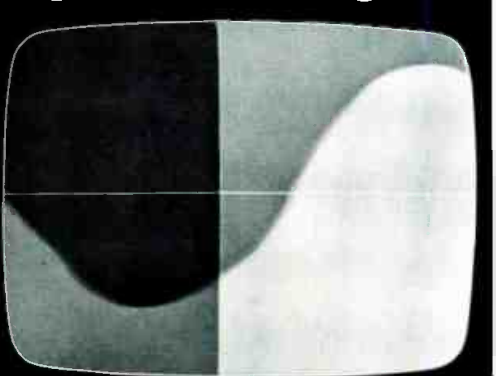
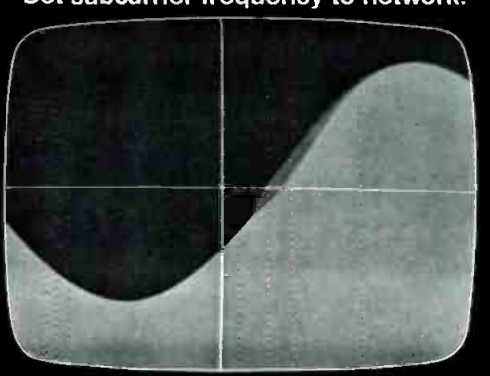


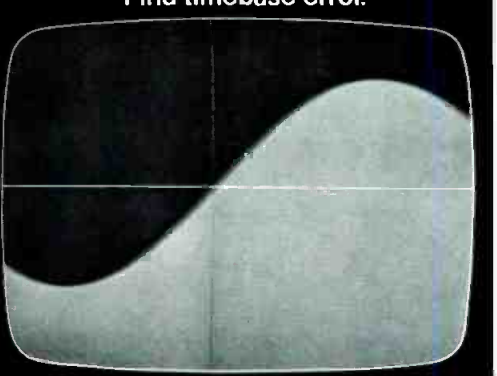
Set subcarrier frequency to network.



Find timebase error.



Pinpoint sync to subcarrier jitter.



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# Mic Technology Keeps Pace With Changing Broadcast Environment

Live broadcasting is making increased demands on microphone technology to come up with designs that are high in quality, rugged, yet smaller and smaller.

THE MICROPHONE, born in Bell's primordial room-to-room telephone line in 1876, is anything but a waning oldster. It is vigorously occupying a spot among advancing communications techniques, stimulated by the emphasis on live broadcasting signalized in this issue and by other developments in broadcasting.

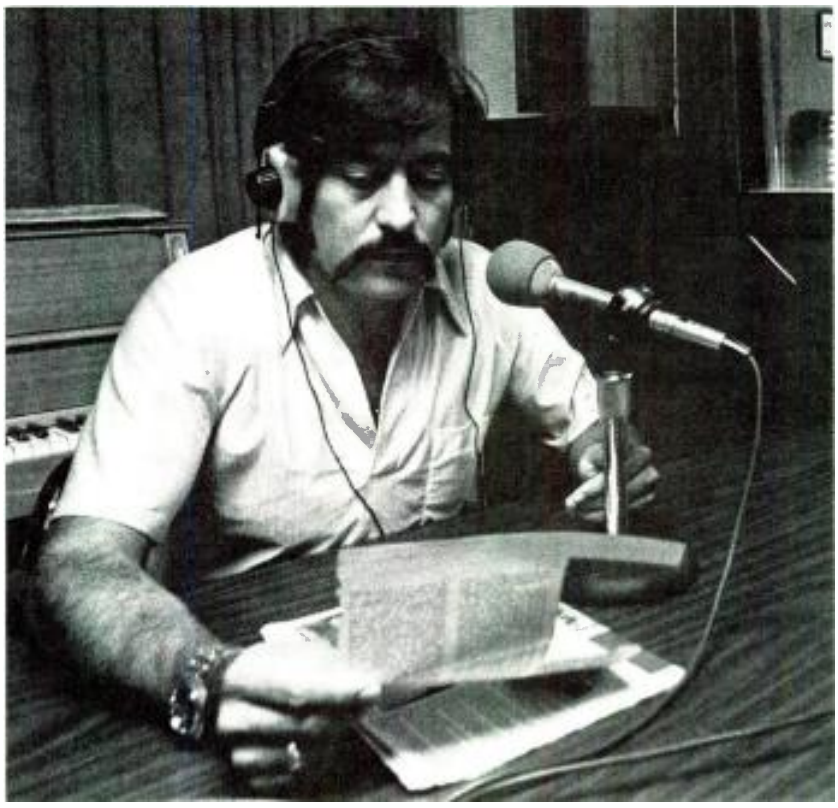
The operating principles of microphones have been established for a long time. The dynamic mic, with a circular voice coil attached to the diaphragm, has been a broadcasting workhorse for decades and is still carrying a large share of the load. Dynamics can be very rugged, very reliable, and high-class performers, too.

The ribbon mic, the special dynamic with the thin metal ribbon acting as both diaphragm and voice coil, was heavily used for many years but is now much less so, largely because of its vulnerability to wind and shock and its very low output. But broadcasting and recording technicians easily develop personal attachments for specific mics and some still favor the ribbon mic in studio use because of its excellent sonic qualities.

The condenser microphone, which converts into electrical signals the changes in capacitance between a vibrating metalized diaphragm and a fixed back plate, is also an old system. But in the last decade it has greatly increased its share of the market. This upswing comes from improvements in the reliability and convenience of the condenser microphone, and from heavier demand for the excellent performance of the best designs.

Important in the last few years has been the "electret" condenser mic, which has a permanently charged back plate and thus does not need the polarizing voltage of the older condenser models. The electret mic is compact, very reliable, and easy to use.

It has also reduced the complexity of the power supply (with the high polarizing voltage, this used to be a frequent source of misbehavior). Now only the preamplifier next to the mic needs power. This is low-voltage power, easily supplied in various ways. Batteries are one way. "Phantom" power, which comes over the mic leads from a console, recorder, or other remote source, is another popular way. Many condenser mics give the user a choice between battery and phantom power.



*Announcer at KPBS-FM, San Diego NPR affiliate. The controlled acoustics of a broadcasting studio simplify mic operations.*


*Lavalier mics such as those sported by Chuck Roberts and Rick Brown have played an important role in curing some of the "ambience" problems at CNN Headline News.*

### Directionality and other characteristics

A main way in which one mic differs from another is directionality, the difference in response to sounds from different directions. Directionality is a basic tool of microphone technique.

Another aspect of mics is the physical shape and size of the housing, which can be designed to make the mic nearly invisible when it is fastened onto a user's clothes. A third division of mic designs is the RF, or wireless, mic, which includes a small transmitter in the user's pocket to send the mic signals to a nearby receiver.

For the omnidirectional ("omni") mic, the sound is allowed to reach the front of the diaphragm only. The diaphragm responds to the variations of pressure next to it, so this is a "pressure" mic. It responds about equally, no matter what direction the sound comes from.

Generally speaking, the omni mic will give the most precise handling of music (if all elements of the design are first-rate).

If some of the sound is channeled to the back of the diaphragm as well as to the front, the unit is a "pressure gradient" mic, with the diaphragm responding to the difference in pressure between the front and the back. The pressure gradient mic can be given various degrees of directionality. One main technique is the delay of the rear-arriving sounds just enough so that they reach the back at the same time as they reach the front, and cancel out.

This technique is the usual way of getting the familiar cardioid response patterns (see drawings), which include a difference between front and back response which ranges up to about 20 dB. But the user should always be aware that the pattern is never perfectly regular—it changes somewhat with frequency, may include a sizeable "lobe" at the rear or sides (especially in the supercardioid and hyper-cardioid), and in most cases involves some coloration of the sound.

The "shotgun" mic, with its long tube in front of the diaphragm, has the largest degree of directionality (at least in the high frequencies, up to about 25 dB). The tube is an acoustic filter which lets front sounds through but not those from the side. However, this does not operate efficiently in the low frequencies, and off-side lows may be reduced only 3 to 4 dB. Again, the user of a shotgun mic must study the polar response pattern of each particular model to find out exactly what it will do for him. Because the directional pattern is so skewed with frequency, the shotgun mic colors the sound quite strongly and will not win any praise as a pickup device for fine music.

### Figure eight—dead at the sides

The ribbon mic has a different polar pattern entirely, a figure eight with strong response front and back but none at the sides. Side sounds reach both sides of the open ribbon simultaneously, and so produce no vibration.

This pattern can be useful and is still available, even though the ribbon mic is nearly gone from the scene. Some condenser mics now on the market have special construction for several different directional patterns in one unit, each selectable by switch. The AKG C-414, for example, can operate as an omni, a cardioid, a supercardioid, or a figure eight. Neumann, Shure, Electro-Voice and several others have multi-pattern units. This fairly recent development is a response to the need for mic performance at a more precise level than in earlier years. Since a multi-pattern mic is a more elaborate design than a single-pattern model, sometimes with more than one diaphragm, the multi-pattern will generally be more expensive than a single-pattern of comparable quality.

### Picking up studio voices

One of the most frequently encountered standard mic settings is in the radio studio, where the job is putting talent on the air. This is usually the easiest of mic operations since the acoustic conditions are likely to be well under control, most noise is excluded, and the mic users are probably professionals who know how to handle themselves and the instruments. The dynamic range is moderate.

This implies that the studios are fairly dead, without high levels of reverberation. If ambient sound (noise or reverb) causes trouble, a cardioid is attractive. The cardioid has long had a major following among studio users for another quality, too—the proximity effect yielding a sizeable boost in bass response, inherent in the design, when the sound source is two feet or less from the mic. Numberless DJs, and pop singers as well, depend on the proximity effect for a fuller, more "manly" quality. Many current cardioids include a switchable roll-off filter to remove the proximity effect when the extra bass is not wanted.

When visitors sit around a table in a radio studio the mic job naturally gets more complicated. A standing mic in front of each visitor is often the plan, but this means that the visitors must be instructed to lean forward, to within about the same distance from the mic, whenever they speak. A lot of interview programs are successfully carried out this way.

A different method, of course, is a "personal" mic on each visitor, and here enters the lavalier, a main factor on the broadcasting scene today. We have had the lavalier mic for a long time, but recently there has been considerable change in its design, spurred by the needs of live broadcasting at higher quality levels than in the past.

For example, Countryman Associates has been working on a range of directional lavaliers, with various patterns from cardioid to figure eight. The directionality has

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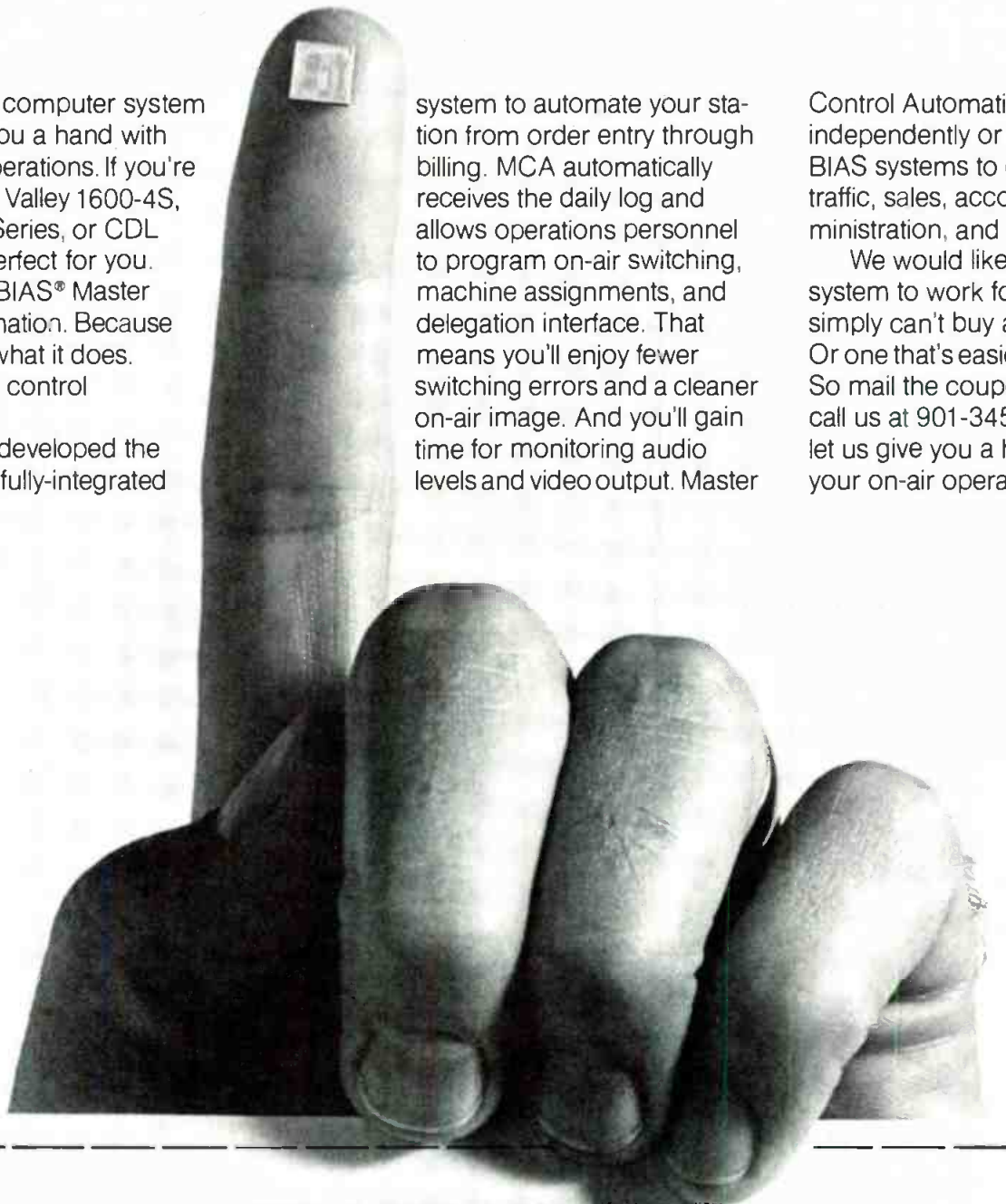

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*Mike Ambrose, anchor and staff meteorologist at San Diego's KGTV-TV, wears a wireless HME System 22E dynamic expanded lavalier that allows him to shuttle between anchor desk, satellite picture, and weather map.*

a number of attractive advantages—one is for the newscaster who is likely to be moving papers on a desk in front of him. The flak from the paper shuffling can be greatly reduced, as can other ambient sounds, leading to the adoption of these mics by news organizations such as CNN.

Crown has recently developed a "tie-bar" lavalier, with the cable coming out the rear, for great unobtrusiveness (especially important in television). Crown also just brought out a two-mic lavalier system, at the request of network news operators, to supply redundancy in active news operations.*

Sony's widely used ECM-50 has undergone refinement. Electro-Voice, using a new testing system, has also refined some lavalier designs for more precise sonic performance. Neumann and Audio-Technica have new lavalier designs. Beyer's new MCE-50 may well be the smallest "personal" mic on the market: it looks like a miniature tie clip of near invisibility.

### Freedom outside the studio

Also with us for a long time, the RF mic finds its greatest usefulness when moving out of the studio for ENG and remote sound pickup. The difficulties with RF mics, now the subject of much development effort, have been the vulnerability to RF interference and noise, and the unreliability in difficult coverage situations. One response to the RF problem is the use of 950 MHz as a carrier frequency, well away from the frequencies of most of the RF "stew" blanketing large cities. Another solution is the development of diversity reception systems that allow the automatic selection or creation of the best possible signal in difficult reception situations.

It is notable that RF mics, which originated mainly as voice carriers, are moving up to the precision needed for high-grade music coverage.

When the TV camera enters the studio operation, invisibility becomes a prime mic requisite. The only exception might be a group interview scene in which table mics could be part of the decor.

Nearly all motion picture production is now done with RF mics on the actors. The movie makers like the total freedom of motion this provides. But they are concerned with the variations in frequency response that come from putting the mic inside the user's clothes, and the noise from clothing rustles that often occurs.

### News and sports coverage

A very important part of broadcasting today, of course, is live news and sports from outside. The conditions under which the mics must operate in outdoor TV vary tremendously from job to job, and the solutions to the mic problems are correspondingly varied.

Mics on cables are used whenever possible for the greater reliability. At a baseball game, for example, the umpire's calls may be picked up by using a cable mic with a parabolic reflector which can be aimed toward his position. The commentators in the stands, of course, have mics on cables feeding into the control center.

For football, though, the referees move around so much and so fast that the RF mic becomes necessary to get the calls. The good RF systems are usually adequate for coverage of the football field, but in some cases it may be necessary to get the receiver closer to the field than the control room to reduce noise and RF interference, then feed the signals to the control center by cable.

In another arrangement, an RF mic is used by an announcer in golf or other similar sports, with the receiver on the camera which is kept as close to the announcer as possible, preferably no more than 30 or 40 feet away. At the camera the voice signals are fed to the microwave system that carries the video back to the control center. This gives greater assurance than would using the RF mic signal for the entire hop.

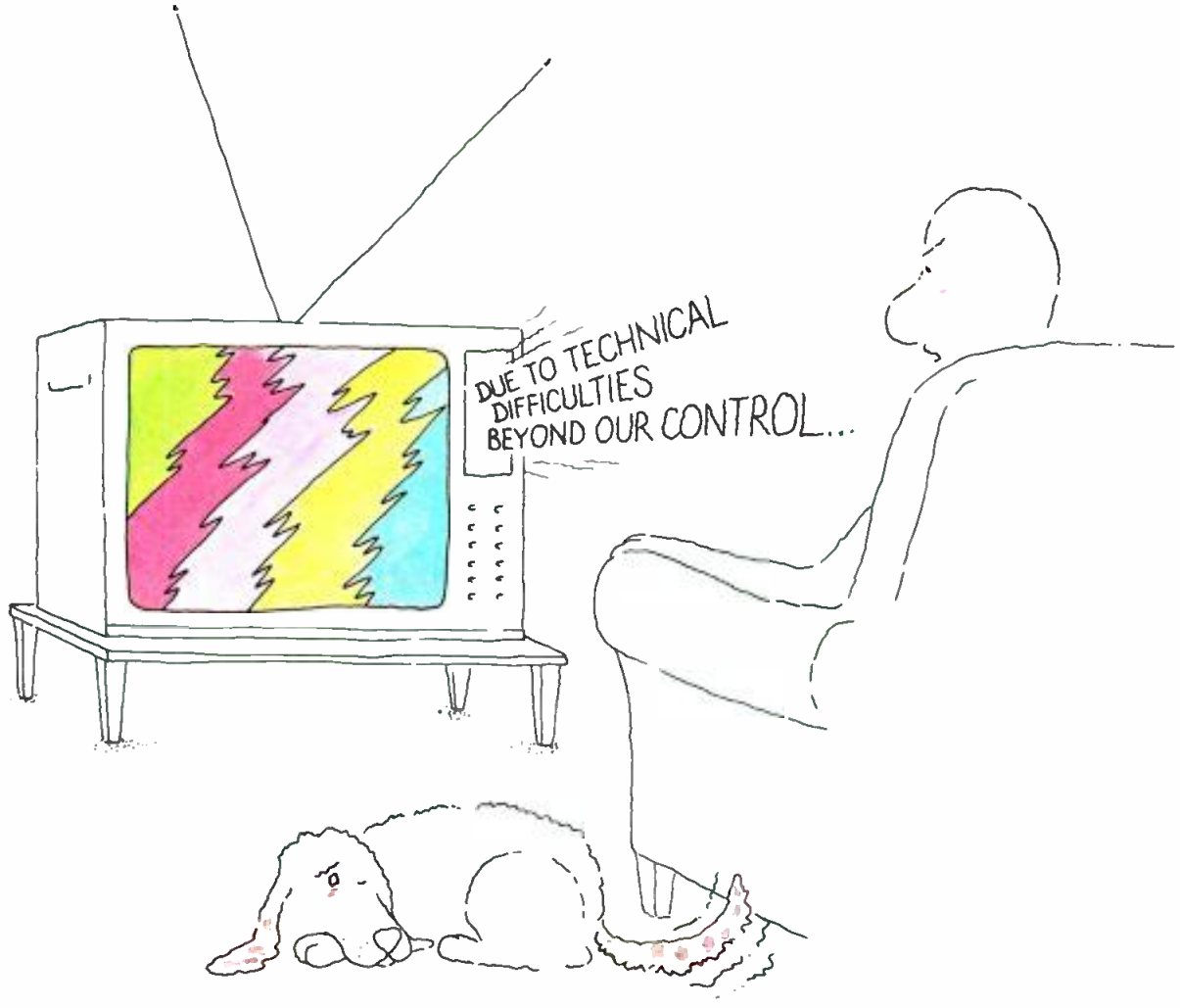
### Live music: another world

The pickup of live music has, in the past, been a very small part of radio and television broadcasting, but it is becoming an important growth area today. For high-grade pickup of live music, mic technique becomes a central issue as the means, sometimes with the help of mixing, of making all the instruments in a group audible to the listener. Mic technique also establishes the vital ratio between direct and reflected sound, and determines whether or not the stereo effect is strong and pleasing.

These are matters of operational skill, but the most skillful mic technician must have top-grade instruments to work with. Extremely flat frequency response, extremely low distortion, ability to handle a wide dynamic range, are all essential.

Today the mic designers are producing a fair number of instruments in this class. Nearly every one of the mic makers important in broadcasting and recording has at least one model that qualifies. Shure, Electro-Voice, Sennheiser, Neumann, Schoeps, Sony, are all in the game and others may be joining currently. Neumann has long had a strong position in recording, and Schoeps is a favor-

**Editor's note: The pressure-zone mic, a main product of Crown, will be considered at length in a future article.*

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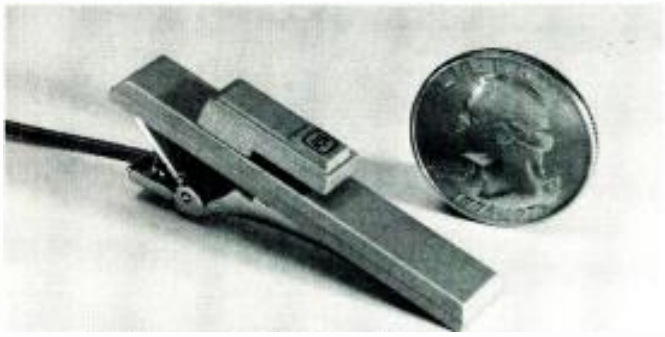

*Crown's PZM-3LV pressure zone mic, one of the tiny lavaliers now available.*

ite among some of the experts in concert music pickup. "Favorite" is the operative word here, because mic technicians tend to have strong personal attachments to particular models.

An interesting, and expensive, mic choice for top-grade music pickup is an instrumentation mic such as those of Bruel & Kjaer, which by definition have the widest and flattest response that can be produced today.

As to directional types, the omni, for reasons already noted, is the favorite for concert music pickup, but top-grade cardioids are also widely used, especially for popular music.

Live music mic skills depend so much on musical taste, on long experience, and on personal judgments and predilections that they cannot be pinned down in a few hard and fast rules. But there are some general guidelines that can give the broadcaster a good overall view of the problems and their solutions. In popular music the imperatives are, get all the instruments in and *loud*, spread the mics far apart for a startling stereo effect, and keep noise down. The best way to do all these things is to have many microphones, one for each two or three instruments and in some cases one for each single instrument. Cardioids are essential to allow concentration of each mic on the particular group or instrument wanted.

### Few mics or many?

For concert music there are two opposing schools of mic technique. The first, the "many mic" school, with large groups of musicians, puts mics throughout the group so that all the instruments can be brought in by careful mixing, as in popular music. There also must be attention to reverberation in the concert music pickups, for the right amount of reverb is essential to the full effect of serious music. The reverb pickup in concert halls is largely dependent on mic placement, the distance from the instruments. However, each hall has its own quirks and the mic technician has to find what they are and work with them. That is one reason settling on a single pickup location is very helpful to success with live music pickup.

The other mic technique, the "few mics" school, works toward using as few mics as possible, even coming down to just two, one for each stereo channel. The main reason for cutting down is the phenomenon of "mic interference." If a sound reaches two mics over paths of different lengths, the sounds will be mixed out of phase, and comb filter effects, very ragged frequency response, will result.

Mic interference can be controlled with large groups of

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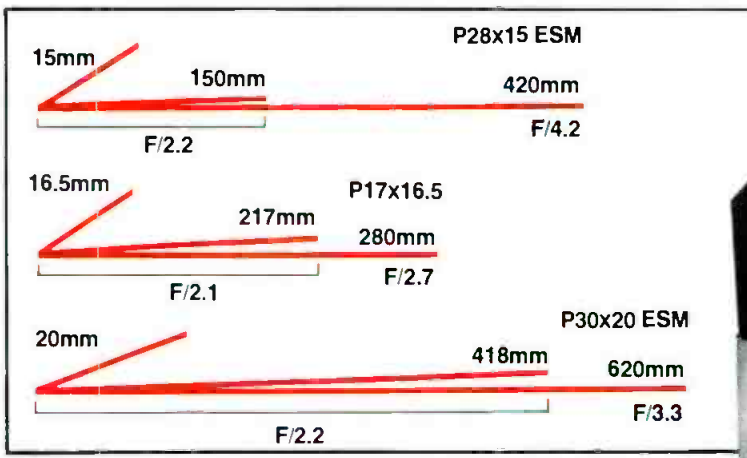





| Specifications: | 1¼" format | | | 1" format | | |
|---|---|---|---|---|---|---|
| | P28x15 ESM | 17x16.5 ESM | 30x20 ESM | R28x11 ESM | R17x12.5 ESM | R30x16 ESM |
| Focal Length | 15–420mm | 16.5–280mm | 20–620mm | 11–310mm | 12.5–212mm | 16–500mm |
| Zoom Ratio | 28X | 17X | 30X | 28X | 17X | 30X |
| Max. Aperture | F/2.2 | F/2.1 | F/2.2 | F/1.6 | F/1.6 | F/1.8 |
| M.O.D. | .95m | .75m | 2.5m | .95m | .75m | 2.5m |
| Range Extender | 1.7X | 1.5X, 2X | 2X | 1.7X | 1.5X, 2X | 2X |

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mics but it becomes very difficult. The main technique is to keep any second mic at least three times as far away from an instrument as the first mic. The mic technician may not have the time to work this all out in a given setting.

Thus all the top experts in mic technique say, in one way or another, "the fewer the better." The few-mic user has to get his instruments balanced with mic placement, since each of his mics is picking up many instruments: he cannot adjust relative levels with mixing. He has to get a good ratio of reverb to direct sound also with mic placement.

### The stereo microphone

To produce a good stereo effect, there are again two different approaches, but actual practice tends to move a little between the two. The first uses microphones well separated for the two sides, and may employ mixing to increase the separation effect. This approach, very widespread in American record production, often gets a sense of big "space" in the pickup but may be somewhat imprecise in the assignment of the apparent positions of the instruments across the stage.

The other extreme in stereo pickup uses "coincident mics," two mics in exactly the same horizontal position in front of the musicians, with the directional pattern of one oriented toward the left and the other oriented toward the right. Coincident mics avoid all problems with interference and phase irregularities, and moreover are very "pure" in the assignment of apparent locations to the instruments.

Finally, how does the video camera affect microphone technique for live music? For popular music being televised, virtually every form of low-visibility mic has been used. Many pop groups are using RF mics, concealed on the musicians or blocked from camera view near them. Lavaliers can also do the job. Lavaliers are now, in some cases, being clipped directly on the instruments, and this can be a successful concealment plan: the ultimate is probably the lavalier inside a drum.

Some pop music shows, of course, use on-stage mics as part of the show, and mic visibility becomes a plus factor.

For serious music there are also many solutions to the problem. On large stages there are often ways of concealing mics from view. Those will ordinarily be standard omnis or cardioids: the RF mics and lavaliers have not yet won a large following here, although some use has appeared. Ingenuity in mic concealment has become the rule in most large-music television programs. For example, a leading producer used very small condenser mics on the ends of thin cables hanging from the ceiling for a TV opera. The mics were no bigger than the cables; these were black in color and faded into the background. Without being told that the mic cables were there, the viewer would never see them.

In conclusion, mic designers *are* meeting the many challenges of live broadcasting. They constantly keep improving the technology as broadcasting's needs proliferate. **BM/E**

*Editor's Note: An excellent guide to microphone design and use is "The Microphone Handbook," by John Eargle, Elar Publishing Company, Plainview, NY.*

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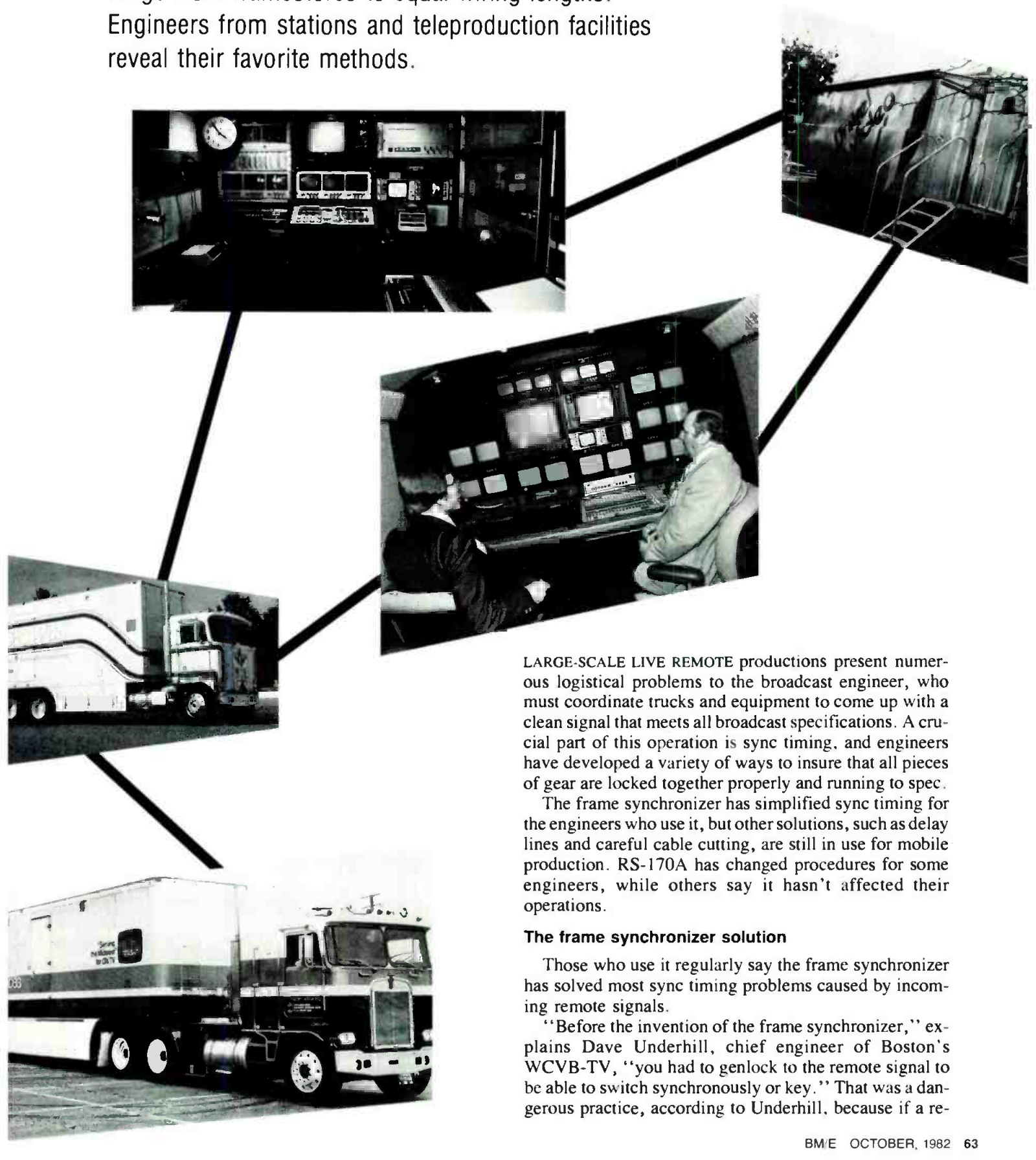
# Sync Timing the Live Remote

Engineering solutions to timing live remote productions range from framestores to equal wiring lengths. Engineers from stations and teleproduction facilities reveal their favorite methods.



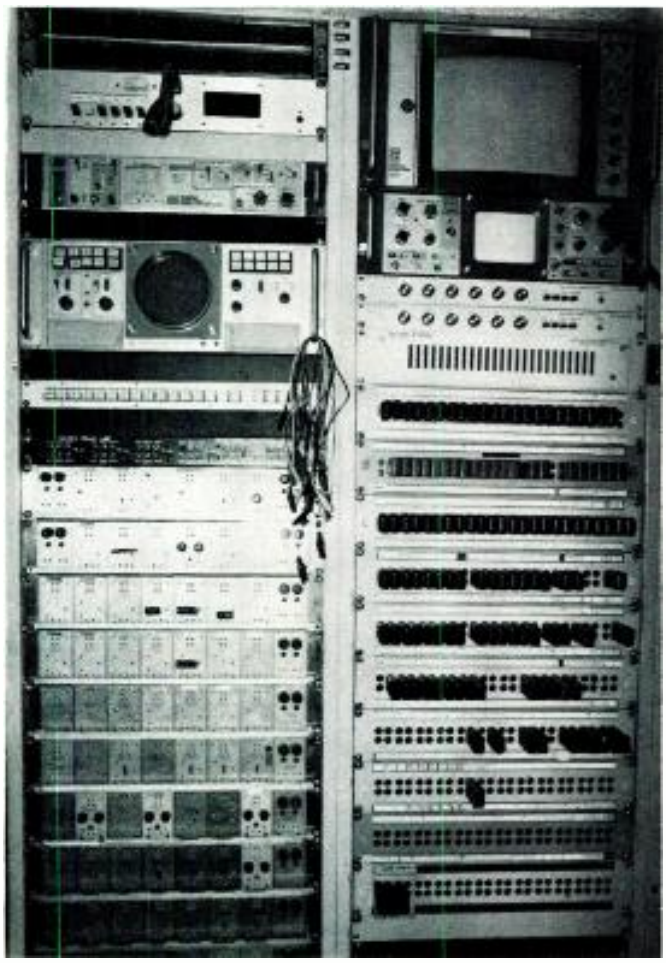
LARGE-SCALE LIVE REMOTE productions present numerous logistical problems to the broadcast engineer, who must coordinate trucks and equipment to come up with a clean signal that meets all broadcast specifications. A crucial part of this operation is sync timing, and engineers have developed a variety of ways to insure that all pieces of gear are locked together properly and running to spec.

The frame synchronizer has simplified sync timing for the engineers who use it, but other solutions, such as delay lines and careful cable cutting, are still in use for mobile production. RS-170A has changed procedures for some engineers, while others say it hasn't affected their operations.

### The frame synchronizer solution

Those who use it regularly say the frame synchronizer has solved most sync timing problems caused by incoming remote signals.

"Before the invention of the frame synchronizer," explains Dave Underhill, chief engineer of Boston's WCVB-TV, "you had to genlock to the remote signal to be able to switch synchronously or key." That was a dangerous practice, according to Underhill, because if a re-



*Sync rack in NEP's SuperShooter II truck holds Tektronix 850 matrix monitor, 149A NTSC test signal generator, Type 520 NTSC vectorscope, and 1480R waveform monitor; Microtime delay line; and Fernseh TVP-1000 video proc amp and RC-1000 processor remote control units.*

mote signal started to break up due to microwave fade or interference, in-house equipment could be affected. Frame synchronizers have done away with that, Underhill says, and WCVB has six MCI/Quantel frame and field synchronizers that are used almost interchangeably. Another item Underhill swears by is the Sony BVX-30, a frame synchronizer that incorporates color correction and video noise reduction to clean up microwave fade and help reduce video noise. Joining MCI/Quantel in the frame and field sync area are Microtime, Harris Video Systems, Digital Video Systems (now being acquired by Scientific-Atlanta), Fortel, Apert-Herzog, and Toshiba, all of whom introduced new units at April's NAB; ADDA, For-A, Grumman, NEC, and Thomson-CSF are other names in the field.

The station used the Sony unit along with Quantel synchronizers for its live coverage of the last Boston Marathon. Complicating sync timing problems was the large number of remote cameras: single units at various points along the route, one at the start, four at the finish line, one in a truck just ahead of the lead runner, and one in a helicopter circling above the runners. (The helicopter belonged to WBZ and was used for pool coverage, as was the lead camera.)

"The obvious way to handle all these unrelated remote signals is to route them through frame synchronizers," asserts Underhill. Two frame syncs are sufficient for this kind of operation, he says, allowing the station to switch easily between microwaved remote sources, which come out of the frame sync perfectly timed and ready to integrate with in-house material.

Underhill pointed out one drawback of frame synchronizers, fortunately correctable. Since the frame sync delays video by one frame, if several are cascaded in a system a noticeable "lip flap" can occur, with audio starting just before the video. The answer, of course, is to parallel each frame synchronizer with a thirtieth of a second of audio delay. (No doubt motivated by this, Quantel introduced a digital audio delay at April's NAB show as a companion unit to its video frame syncs. Other makers of audio/video sync delays include Lexicon, Advanced Music, and MCI/Quantel.)

Other engineers agree that frame synchronizers are the way to go for handling remote signals. Reggie Thomas, VP for engineering for the Entertainment Sports Programming Network (ESPN), says, "If we have an outside source coming into the truck, such as an HL-79A camera, we run it through a Quantel framestore system, which is automatically timed to our truck. That locks the camera to the truck so that we can dissolve and fade and so forth." ESPN's truck also carries two ADDA frame synchronizers. Thomas uses the frame syncs frequently because of the increased control he finds they give him.

Dave Bird, manager of engineering at Video West in Salt Lake City, also regularly uses frame and field synchronizers. "They're useful when you're bringing in a signal that you can't time or phase because you don't have a reference to it, such as an ENG camera, a microwave remote, or possibly a signal from another remote truck that you want to tie in," Bird comments. For Bird, frame synchronizers are called for most often if a client wishes to use one of his own cameras that is not normally configured into the truck, or lacks a proper camera control unit. In such a situation the frame synchronizer lets Bird handle the extra camera as "just another source."

One piece of remote gear that causes few headaches, Bird points out, is the triax ENG camera. "Provisions in the triax systems allow you to time them regardless of how far away the camera is," he explains. "In fact, auto timing circuits in the camera control units themselves will make the adjustments to bring the camera back into time regardless of its length." Video West's Ikegami HL-79A triax cameras automatically retime themselves if cables are changed, as do most triax systems, according to Bird.

### Costs vs. benefits

One New York production company, Unitel, tends not to use framestores except on customer request. Although he concedes the framestore's many advantages, Unitel's chief engineer, Norman Rosenshein, points out one disadvantage.

"You can't time code through a framestore," Rosenshein claims. "If you're time coding on both sides of the framestore, the two sides will be different; if you're only doing it on the output side it doesn't matter." Of course, this disadvantage affects mainly videotaped material, not live broadcasts.

Roger Stevenson, engineer at New York's Continental Colour Recording (CCR), concurs on the usefulness of frame syncs but seldom uses them.

"They're an expensive item," Stevenson complains.

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*Inside Unitel Video truck, operator checks camera outputs on monitor wall.*

"If we were a network we'd have a lot of them, but we don't have enough need for them to justify buying one. But they're a catchall for everything—a very good device to have on any truck when you're doing remote operations."

Stevenson has his own ways of working without frame synchronizers, even in complex situations like the Islanders hockey games at Nassau Coliseum, at which CCR serves several clients at once.

"We'll have three or four different clients doing their own shows in two or three of our trucks simultaneously," Stevenson relates. The main client in recent years has been the Canadian Broadcasting Corporation, which uses the main truck for its *Hockey Night in Canada* feed. The other clients have been cable companies, such as Cablevision and USA Network, Stevenson says.

The remote is further complicated by the fact that the different clients share cameras from each other's trucks, and also sometimes share tape machines for the videotaped material. "Things have to be timed back and forth, and you run out of ways to time them," Stevenson sighs. "Frame syncs are the best way, but if the budget doesn't call for it we use delay lines. Sometimes we've just taken coax cable and cut it to the proper length to make things time in properly, but that's really fudging it.

"If the Canadians are taking two or three cameras from another truck, we can lock those two trucks together and have the cameras come in time. But if they decide to take program from that other truck, it won't be in time with the cameras because the cameras are coming directly from the truck and not through the switcher." In that situation Stevenson times program to feed the other truck, then adjusts the encoders on the cameras to make them come in time. If that isn't possible, he adds or subtracts cable or uses delay lines.

### Unavoidable delays

Delay lines remain an often-used way of correcting for slightly out-of-sync signals, and most engineers we talked to said they used them at least occasionally.

"There are still times when you have to add delay lines to get everything to time in," admits Curtis Allin, engineer at AVT Television Productions of Knoxville, TN. Allin says he carries about a dozen Matthey and Allen Avionics delay lines on The Performer, AVT's large production truck, and moves them around as needed to clean up signals. The delays are used most often with outboarded Chyron character generators or other graphics units.

"On the graphics especially," Allin notes, "the key signal and the video signal have to go into the system in time, or the border or edge will be early or late compared to the video." Delay lines, he says, provide a simple solution.

ESPN's Thomas concurs. "The major timing problem we incur is an outboarded character generator," Thomas explains, "or where we marry two or three trucks together. One truck is designated as master control and everything is timed to that truck, and that's where the delay lines come in, either going to or coming from the other units."

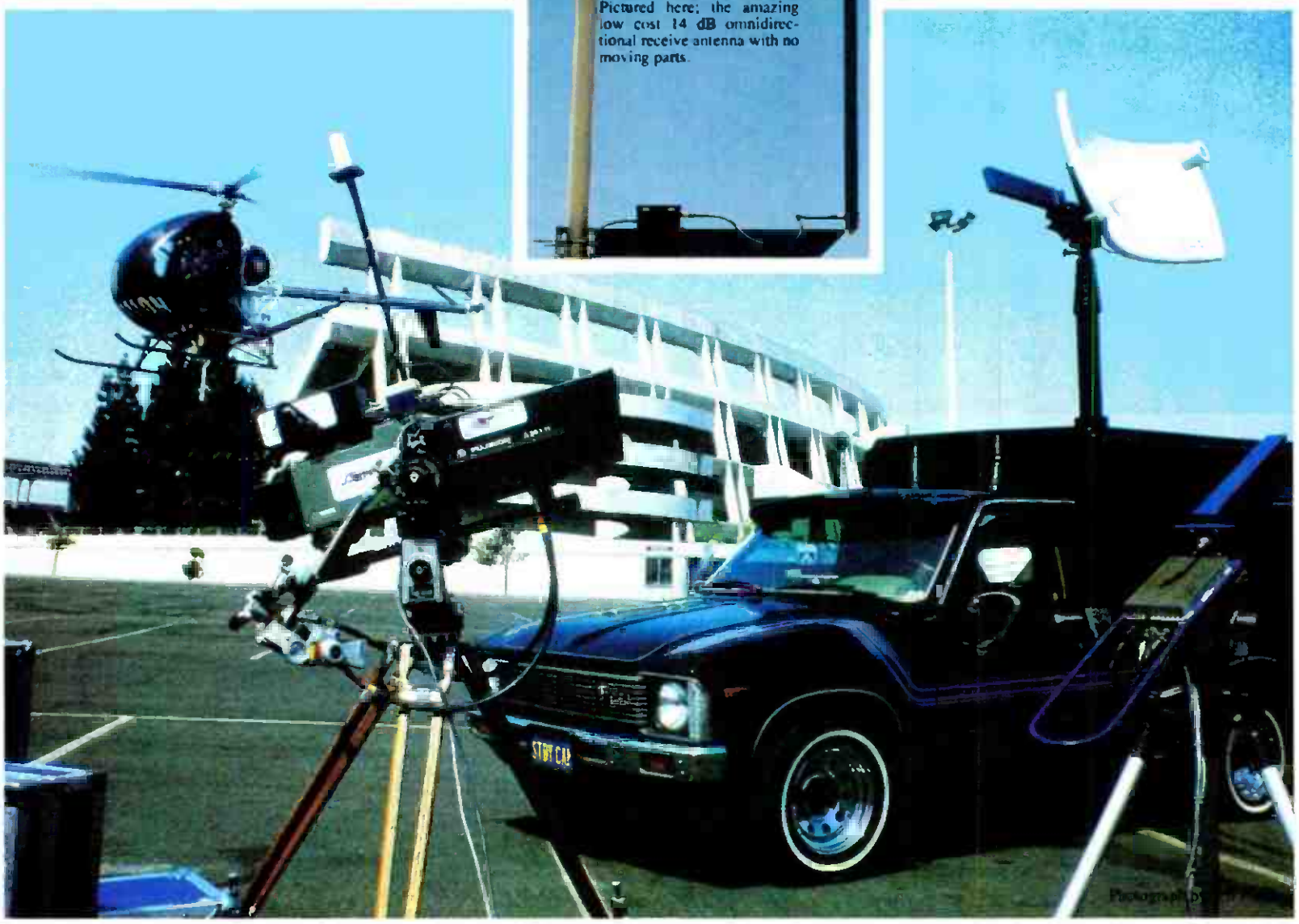
Tying together all the trucks used in a large-scale remote production, engineers agreed, involves designating one truck as the main sync source and feeding its sync to sync generators on the other units.

"The easiest way to do it," explains CCR's Stevenson, "is for each truck to have a sync generator that locks to a common source of sync from the main switcher. The feeds from the other trucks can then be sent to the main truck, and their sync timing compared to the local timing. Then their individual sync generators can be adjusted so that everything is in time when it gets back to the main truck. It's more or less a closed-loop system."

### RS-170A: last word in sync?

Timing everything is a necessary routine for the engineer setting up for a remote. The standard procedure for Joe Balkan, mobile systems engineer for Northeast Productions (NEP) of Avoca, PA, involves letting equipment settle down for at least an hour after it's been turned on, setting the levels for each piece on individual video DAs, timing black from the Grass Valley 1600 7K production switcher to the Tektronix 1900 test generator, and then timing all the equipment to black and comparing their out-

# The News & Sports Microwave People

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puts on a Tektronix 1480R waveform monitor. More tests follow, then a double check of the whole system and running the final output signal through a proc amp to strip sync and burst and regenerate them according to the amp's reference.

The timing procedure for NEP's new truck, now being built by Lerro Electrical Corp. of Philadelphia, will be much streamlined, Balkan reports. The entire truck will be compatible with RS-170A, which Balkan says "will be the latest in sync systems." It will allow him to replace his present method of monitoring sync with a waveform monitor or vectorscope with a simpler system involving only one instrument, the Lenco Videoscope, which allows the user to certify the correct sc/h phase relationship, comparing two signals on a monitor with a sine wave and a straight line.

"Our business is largely renting to the networks," Balkan explains, "and network crews often are not familiar with your equipment or your way of doing things. The Videoscope simplifies things because it's plain black-and-white in front of you—something you cannot misjudge."

As a side note, Balkan suggests that many engineers make the mistake of comparing sources on the auxiliary bus of the switcher in the transmission area of the truck. "Most people will say this is fine," he states, "but I have found that in comparing the output of this auxiliary bus with the actual program output from the switcher, it may be about a degree off. A degree doesn't matter much to 99 percent of the people, but if you're going to do it you might as well do it right."

Allin of AVT also checks all timing for the RS-170A-compatible Performer with a Videoscope. He notes that although the signal that goes out of his truck always meets the spec, it may not always be RS-170A when it reaches network headquarters. The other problem he had when he built the truck was that at the time, no RS-170A proc amp was available.

"I believe Grass Valley has now come out with one," Allin says, "and I plan to put in about half a dozen to clean everything up as it leaves the truck."

Most of the advantage of RS-170A, however, comes in post-production, where it simplifies color frame editing. Mixing RS-170A and RS-170 equipment can lead to problems, though.

"The biggest problem that comes with mixed RS-170 and RS-170A systems," asserts Bird, "is that you will find certain horizontal shifts that you can't get rid of. You can get everything subcarrier timed, but when it comes to horizontal timing of all the sources you may have problems." Because the master sync generator on Video West's truck is not RS-170A, Bird has occasionally had to force it to the new spec by carefully setting up its sync burst relationship to match newer tape machines.

Timing methods vary from engineer to engineer and from situation to situation. Whatever the method, though, the central theme remains constant: to get the cleanest possible signal out of that mobile truck. **BM/E**

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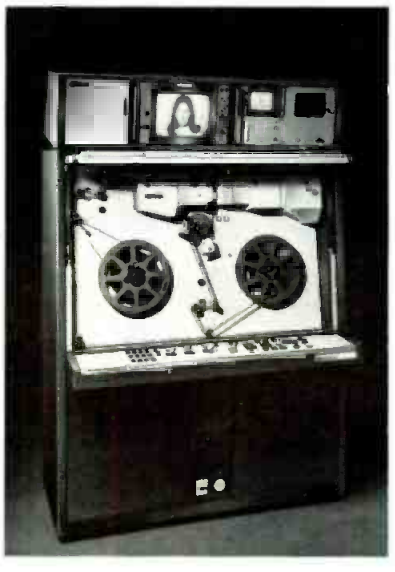

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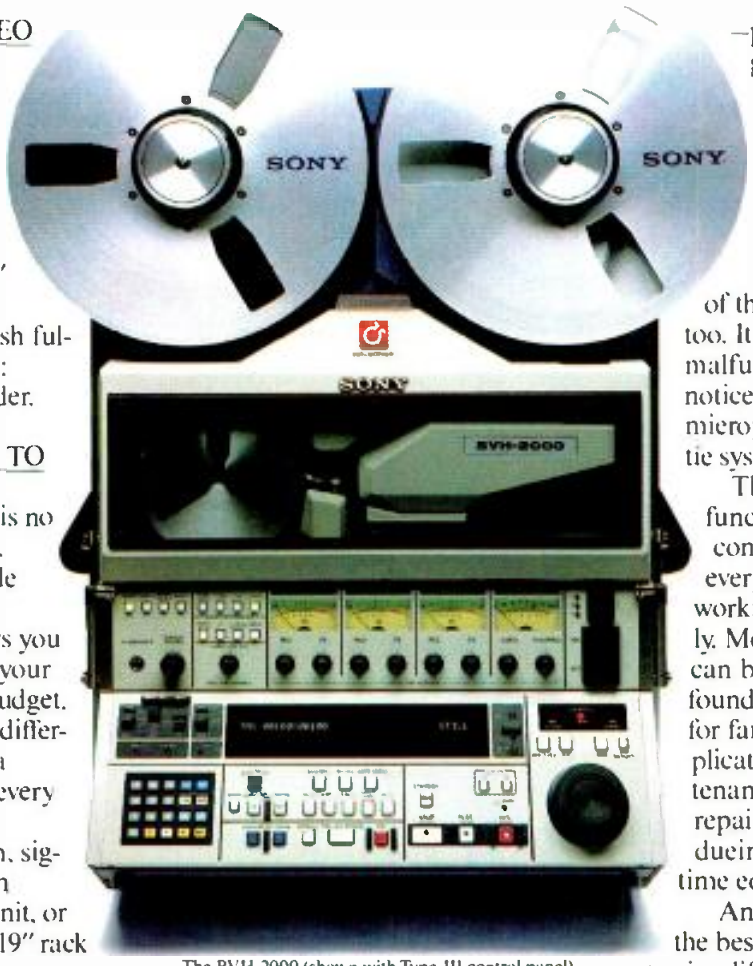

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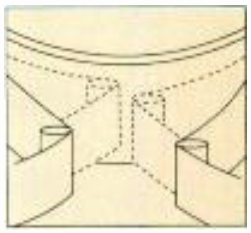
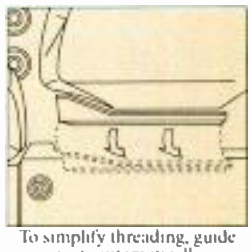
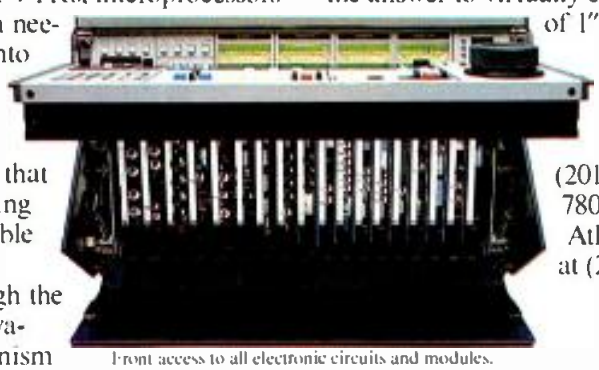


To simplify threading, guide posts automatically move away from drum, and audio head cover opens.

And because the best way to simplify maintenance is by lessening the need for it, the Sony BVH-2000 has been designed to be virtually maintenance-free down to the last detail. For example, only brushless DC motors are used, and all incandescent lamps have been replaced with high-brightness LED's.

Other welcome advances include a greatly expanded dynamic tracking range (from reverse at normal speed to forward at 3 times normal); programmed play (allowing you to vary playback speed across a range of ±20% of normal speed); and video and audio confidence.

Display board for self-diagnostics and other data-processing functions.

Remarkably, these are only some of the Sony BVH-2000's innovations. All of them add up to form the answer to virtually every need ever expressed by the users of 1" video.


Front access to all electronic circuits and modules.

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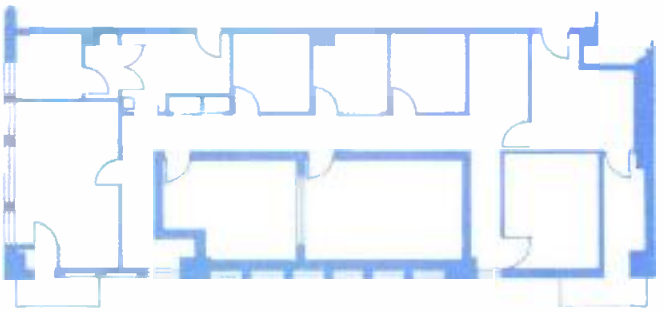
FACILITIES DESIGN AND ENGINEERING

PART 4



# HOW TO BUILD THEM— RADIO STUDIOS THAT LIFT THE OPERATION

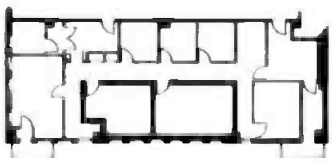
BY RICHARD P. SCHUMEYER

A SET OF STUDIOS for a radio broadcasting plant can be put together like a pick-up team for sandlot baseball, one item of equipment after another added and hooked to the others without much advance planning for compatibility or total effect. But a "pick-up" plant is most likely to cause many problems. It will almost surely be inefficient and costly to operate, with frequent down-time. And, without careful system planning and equipment selection, the signal quality will be poor by today's standards and the station will be unable to win the listeners it needs to stay in the game.

There is, moreover, no excuse today for poor planning of radio studios. The enormous expansion in the radio industry of the past 15 years has provided a great amount of experience in studio building. The advances in radio broadcasting technology have brought equipment and systems to a level of refinement well above that of a decade ago. As a result, systems planning has replaced the "pick-up team" approach when constructing a radio studio.

**Richard P. Schumeyer** is assistant director of engineering, Capital Cities Communications, Inc., owners and operators of 14 radio stations.

**Operator, from his seat, easily starts cart machines or turntables or operates console (close on left).**



# FACILITIES DESIGN AND ENGINEERING

## WHAT STUDIOS DO YOU NEED?

The format and mode of operation you have chosen and the intended scale of the operation determine the kinds and the number of studios for the plant. A basic popular music station, with roughly an hour a day of local news, plus top-of-the-hour five-minute national and international news, could operate with the following:

- On-air control/music studio;
- Production control room;
- Production/conference room;
- News editing/preparation room;
- News announce booth;
- Terminal/interconnect/tech operations room.

Additions to this basic set may be necessary for more elaborate operations.

For example, for an expanded local news operation, two or three hours a day, plus frequent documentaries and interview programs, add another news announce room, provide a separate news interview and conference room, and enlarge the news editing room. For large-scale production of commercials you need an enlarged production room with separate complete control facilities and a large announce room.

## CHOOSING THE EQUIPMENT

The next step in the planning, in most cases, should be choosing the equipment that will go into each studio. The particular choices should follow a detailed engineering plan of the station, which will most likely have been worked out by the chief engineer or an engineering consultant. Today any radio station in a market with strong competitors must have state-of-the-art audio equipment throughout the studios.

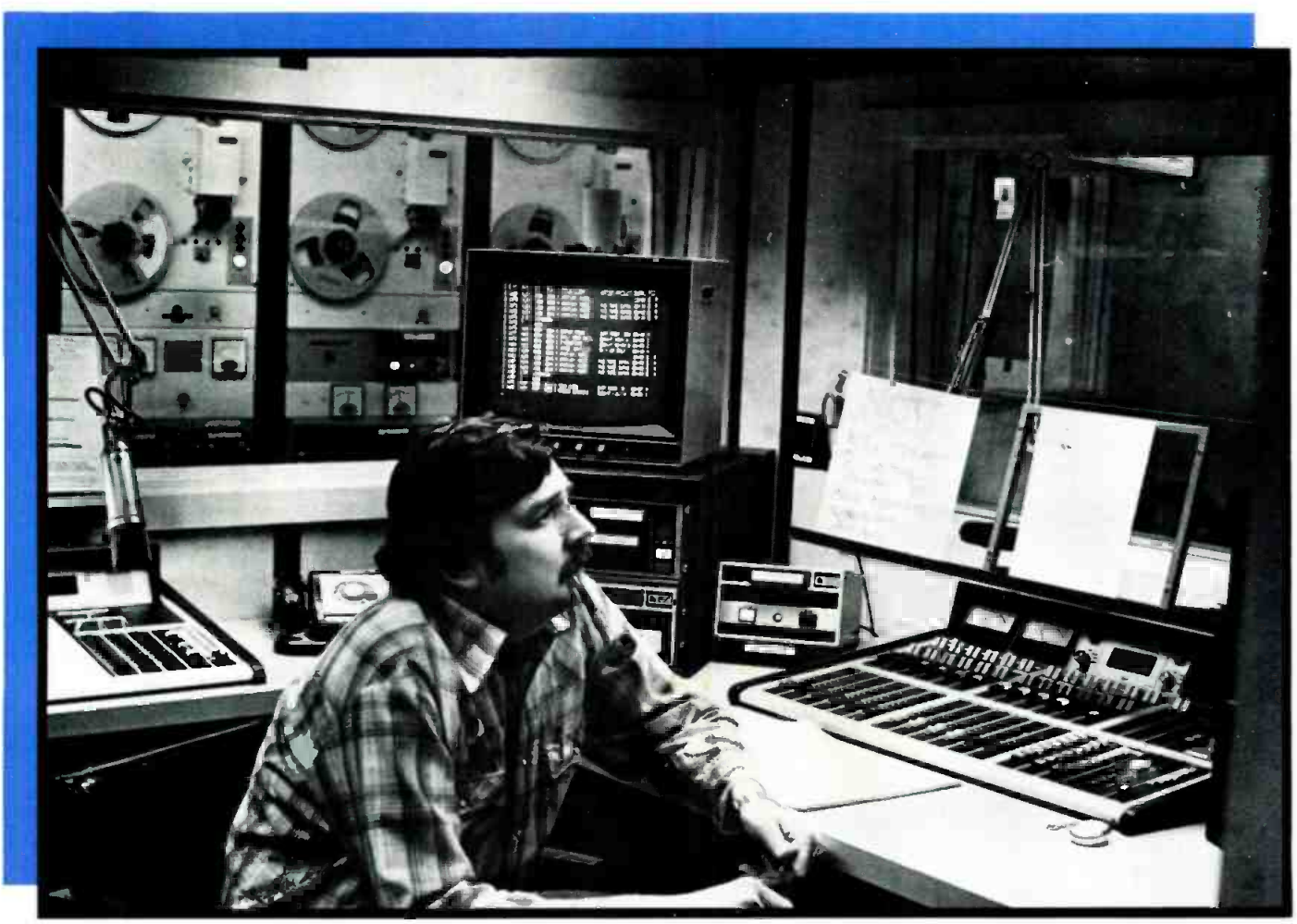
It no longer makes sense to split hairs over the exact percentage of distortion that is audible. You may ask, is there really any difference between 0.1 percent intermodulation and 0.01 percent intermodulation? The point today is that the lower figure costs little if any more than the higher figure, and the lower figure positions you firmly for the digital audio era.

## FITTING THE STUDIOS TO THE EQUIPMENT

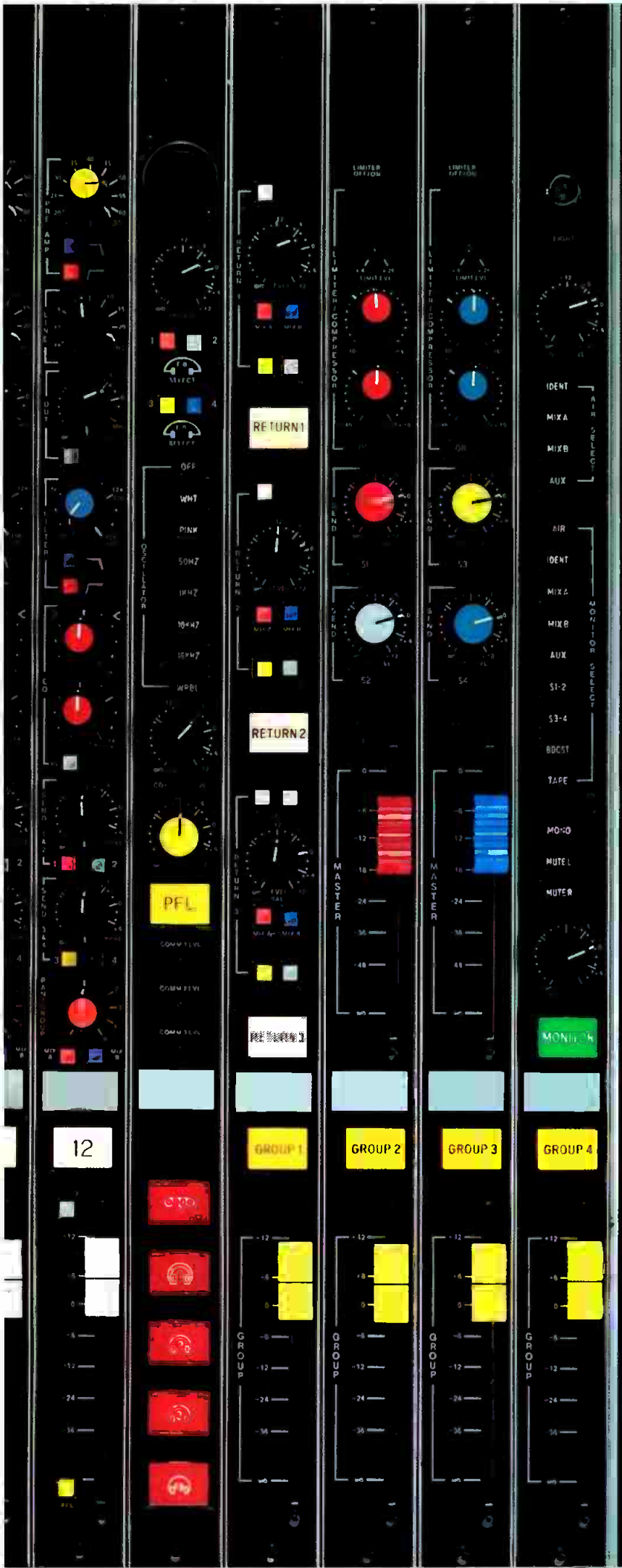
With the main large items of equipment chosen and assigned to each studio, it is extremely desirable, as recommended in an earlier article in this series, to prepare flat scale models of each item of equipment and fit them into scale drawings of the studios. This procedure defines the space needed in each studio, and avoids problems that would be very costly or impossible to correct later.

You must include in the space calculation not only equipment but *people:* how many will work in the room? Can each person move freely without getting in the others' way? Will there be a comfortable and efficient place for each person to work?

On this last point, very careful and detailed planning is essential for true efficiency in the studio. Before settling on the final disposition of equipment and working spaces the planner should study a text on human factors in engineering. An on-air studio is a lot like the cockpit of a large airplane. There is a small space and many devices to oper-



**On-air room at Cap Cities' WPAT has all equipment in easy reach; studio is viewed in the front, automation at left.**

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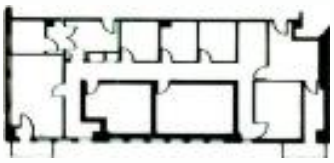

# FACILITIES DESIGN AND ENGINEERING

ate quickly and accurately. The disposition of the equipment must enhance human reaction times, vision, reach, and so forth.

Will the studio be for sitting or standing operation? The two have very different requirements and the design should not try to straddle or compromise. The sitdown plan is inherently more efficient because the operator can reach farther. The sight lines obviously are different for the two modes as well.

In sum, the operating position must be fitted to the *operator*, to his or her reach and vision, with the maximum of comfort. The operator must have within easy view everything necessary to do the job. Material to read while working must be positioned at eye level, and well-lit (more on lighting later).

In getting the space in the studio worked out, don't forget storage cabinets, desks, cart racks, equipment racks and other subsidiary equipment. The final layout of every studio is unique and related to the operation plan of the station, including the work relations of people in the room.

An element of the studio too often skimped on is "white space," tables and countertops for the many smaller items that the operator uses, such as logs, schedules, copy material, telephones, two-way radio equipment, video read-out for automation, and weather equipment. Figure the white space the operator is likely to need, and then, to avoid later clutter, add at least 50 percent more.

## COMFORTABLE MAINTENANCE

Every piece of operating equipment must be placed so there is ample space for maintenance and repair, a principle universally understood but too often ignored. Furthermore, the maintenance access should be *comfortable* and easy for the technician to use, an element of efficiency in studio operation that is not an extra, but a necessary condition. The telephone company never puts a telco repairman on his back in a dark space, and this is not from concern for the repairman's emotional well-being, but for the cost-effectiveness of the job.

## WHERE TO PUT THE STUDIOS

The disposition of the studios on the operations floor will be guided mainly by work flow patterns and by noise control considerations. As recommended in an earlier article in this series, prepare a rough layout of the proposed studio placements, and enter on it lines indicating the main work flows. The data for this diagram must be developed in consultation with working personnel.

When an approximate work flow pattern has been laid out, the studio planners can see immediately whether any rooms are badly placed, and whether the main work flows are well accommodated with short-distance passageways. The rough layout can be revised as necessary.

## ACOUSTICS: SOME SOUND IDEAS

As an aid to noise control, it is helpful to have "loud" rooms, spaces with high-level monitoring, separated by quiet rooms or passageways. As a prime aid to resonance-free sound, any room in which a live microphone will be used should be of an irregular shape to minimize the room modes that can seriously degrade the sound reaching the microphone.

Use as much sound-absorbing material on the inner surfaces of live-microphone rooms as you can afford. If the sound comes out too dead, it is much better to add reverb electronically downstream.

A further goal of acoustic design is to get all on-air studios to sound as much alike as possible. It is disturbing to the listener to have the acoustic quality change sharply when the program feed shifts from one studio to another.

Other elements of the studio that must be chosen for proper acoustic performance are the glass in viewing windows and the doors. It makes no sense to install expensive specially designed walls to isolate sound only to have easy noise entry through the glass and the doors. The doors should not be side by side on adjacent walls, flanking each other, nor directly opposite each other in facing walls.

These principles of acoustic design may require complex handling in individual cases and an acoustic consultant will often be an excellent investment for the studio builder. That is especially true if there are difficult-to-control sources of noise either inside or outside the building.

## PUTTING THE MUSIC ON THE AIR

Probably most stations programming popular music today use carts to put the music on the air. If this is your means of operation, be sure you have enough cart machines at each on-air station to play a cluster of events (say seven to 10) without dead air and frantic cart shifting if a machine goes down. There should be extra cart capacity that can go on the air in a couple of seconds if needed.

If all music is to be aired from carts, you will not need a turntable in the on-air studio. If you want one there for occasional disc play, have a flat tabletop that covers it to add to white space when the turntable is idle.

Your production room will need at least two turntables, mounted on shocks to isolate them from room vibration and acoustic feedback. The feedback may be masked during recording, but will show up when the recording is played as a muddied, indistinct quality in midfrequency sound. The turntables must load the shock mounts to their design weight, or vibration will not be kept out. We have found sterilized "play sand" in plastic bags a handy way to do this.

## WHAT GOES ON IN THE NEWS AREA

The separate news preparation and on-air rooms allow editing and recording to go on without interfering with the on-air newscasts. Before assigning space to the news operation, decide how many people will be needed. The editing and preparation room must have a separate work station for every person who will be on duty at any given time. At each work station you must install at least a tape recorder, one cart machine, a line switcher (multiple input selector) for connection to all news sources, inside and outside the plant, a decent monitoring system so the person at the editing station can hear how the material sounds on the air, and a decent telco interface. He also needs a typewriter for preparing copy.

However, incoming news feeds of actualities or other live material should not be heavily equalized, compressed, or otherwise strongly processed on their way into a newscast. A light AGC can be used to reduce the great

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variation in level of actualities, but heavy processing at the news input is likely to fight the downstream processing you may use, with very bad results. Besides, if you spoil news material in the initial processing you cannot replace it. And there will usually be no time in a news operation for careful processing of the input material.

The on-air news room should have its own mixing console, a microphone for each announcer, and at least three cart machines so the news man can put on the air his own show with all the inserts he has to play—actualities, jingles, public service announcements—without tying up other equipment in the plant. The news room can appear on the main on-air console as single switchable source. This production independence in the news operation is especially important if you will put on such news shows as "The Week In Review" or documentaries. If a substantial quantity of extended news-show production is in your plan, you will probably need two completely equipped on-air news-production rooms.

Some radio managements equip the news operation with consoles, cart machines, tape recorders or other equipment that are no longer "good enough" for the music programming. It is a serious error. For many stations a strong, attractive news operation is an essential part of profit making. Top-grade sound and efficient operation are just as necessary in producing news as in music programming. The news crew needs the same quality of equipment you give the music programmers, and today that means the best you can get.

In some ways, in fact, the requirements are more stringent in the news operation than in the music programming. You often need better control of noise and more headroom in newscasting because the material coming in has wild variation in levels and in noise content, and your equipment can easily be overloaded. The material used in music programming has already been leveled with a good signal-to-noise ratio maintained, often with compression that simplifies putting it on the air.

## LIGHTING DESIGN

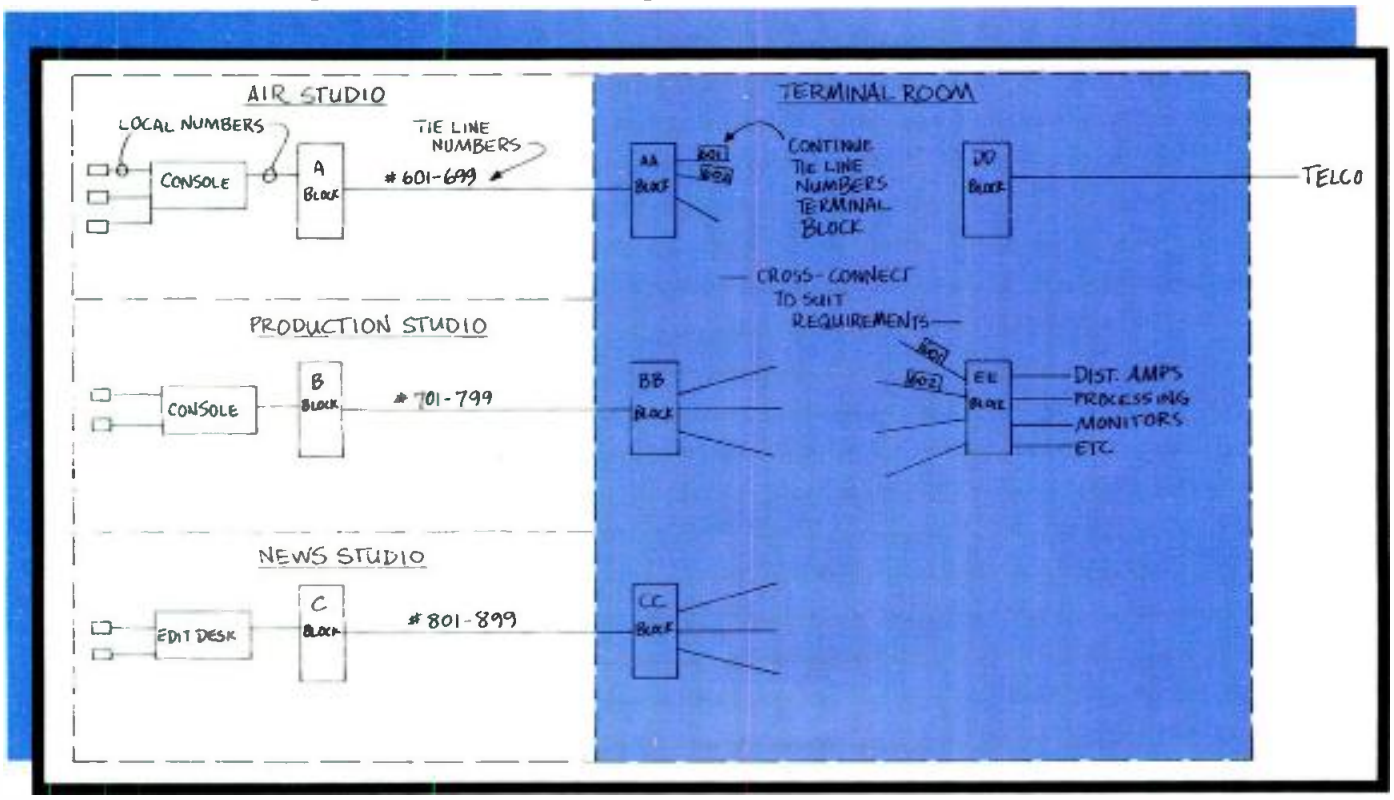
The lighting in studios is often poor, which can seriously hamper work. Efficiency suffers not only from poor visibility, but also from an uncongenial ambience. On-air personnel work much better in pleasant surroundings and proper lighting is a vital part of it.

Fluorescent lighting to some is too "cold," in which case incandescent lights on tracks are better. With a dimmer control in each studio, the operator can adjust both the position and the intensity of the lights to his taste. Inexpensive color filters can also help set the mood for the operator, a strong factor in performance. In most studios two 150-watt spots to light the console and copy areas, with side lights for the rest of the equipment, are adequate. Also it is better not to have sharp changes in lighting from one studio to another.

## CONNECTING THE STUDIOS

We have settled on the use of a "terminal room," an engineering center, as the hub of a hub-and-spoke system that connects studios into an operating whole. Audio cabling from each studio runs only to the terminal room and all interstudio connections are made there. In this way the terminal room becomes a very efficient technical operations center, where all audio processing can be done, all tests and adjustments carried out. The stereo generator and the studio transmitter link can be installed there as well.

For making the connections, you need a reliable high-density termination system. Christmas tree blocks are good, but they take considerable time to install and require extra soldering work. Barrier strips are also good, but you have to put a lug on each conductor end, the system takes a lot of room, and also takes extra time to install.




**Overall block diagram shows "terminal room" system, with groups of cable numbers assigned.**

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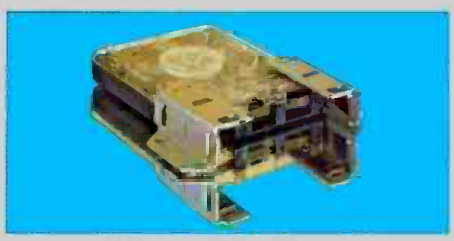
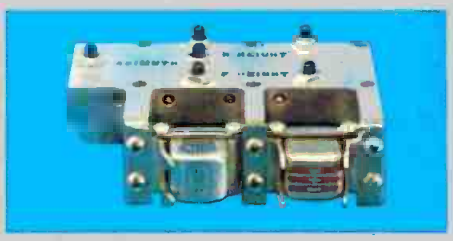
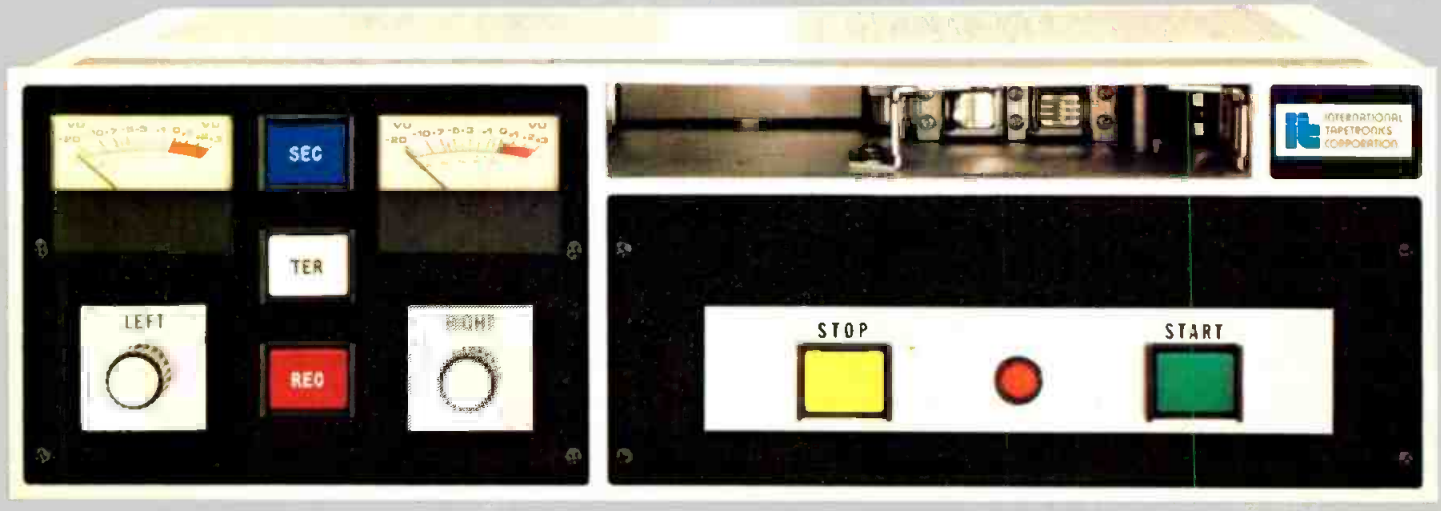

New Cart Hold Down


New Head Design


New Pressure Roller


New Removable Head Module

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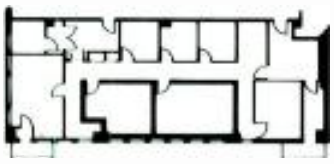

# FACILITIES DESIGN AND ENGINEERING

Telephone-style punch blocks cut the insulation and make a tight contact with the conductor. They are very easy to change, and you can keep shield continuity if you want. They handle solid or stranded wire equally well, with excellent reliability.

## PLANNING THE CABLING

Putting in 40 to 50 pairs of audio cables between each studio and the terminal room sounds excessive, but you will never be sorry later that you have spare cables in place. Use individual pairs, not multi-cables with many pairs in one casing. The latter are less flexible, harder to put in, and harder to terminate than individual pairs.

However, before a single cable is pulled, the whole cable scheme must be completely documented. Use good-sized drawing paper, at least 17 inches x 22 inches. The first part of the documentation is a large drawing showing every major item in the studios, with the main cable runs indicated by single lines on the drawing.

After the overall diagram is complete, take each area and expand it into a complete, detailed block diagram. Then you can number every cable in the plant, with the numbers shown at each end next to the equipment the cable connects to. Also show the terminal numbers of each device in the system.

With every cable numbered, you then prepare cable sheets, which are lists of all the cables showing for each one the number, the source, the termination, any intermediate connection, the function and the circuit name. You can also show on the cable sheets the handling of shields.

All ac and telephone lines, and control circuits, should be documented on separate sheets in the same way. You need a wire marker showing the number at each end of each cable before you start. It is a good idea to have a double set of numbers so you can immediately replace any that get lost or destroyed when the cable is dressed and the final connection made.

For the audio cables shallow, broad trenches in the floor with the cable coming up into the equipment, for example into the pedestal of a console, are effective. This is less flexible than the raised floor, but large consoles and other main items of equipment are rarely moved after initial installation. Even if you change consoles or cabinets, the room dimensions usually dictate where the consoles must go, and require that the large items stay in the same relative positions. Some disadvantages of the raised floor are the changes in level, with ramps necessary at various points, plus the comparatively high cost.

A wide shallow trench about 2 inches deep by 6 inches wide reduces sound transmission from room to room through the trench. Plan straight runs so that intermediate pull boxes will not be needed. By eliminating the need for top access, the trench can be covered.

A multiple-compartment duct will give space for telephone, ac, and control circuits. Do not run the duct from one room through another operating room on the way to the terminal room. Instead, use the hallways or other nonoperating passages to get the duct to the terminal room. All the duct runs, again, come from each room where the ac and so forth is delivered into the terminal room—there is no "looping" from operating room to operating room.

## THE "HOUSE STANDARD" SIGNAL

Whatever the engineering design of the studios, it is most desirable to have a uniform audio level maintained throughout the distribution system and at each interface. The popular way to do this now is with constant voltage distribution, that is, the source impedance at each interconnection is quite low, on the order of a few ohms, but the terminating impedance is at least 10 times as large, for maximum voltage transfer. Nearly all modern broadcast equipment units follow this system. Thus there is little need for power-matching in modern studios, unless there are cable runs of 1000 feet or more.

The usual choice of the standard level is +8 dBm, referred to a 600-ohm load impedance. Every unit should be set to produce a signal at this level. With the system thus uniformly set, units can be interchanged or replaced for service, or bridged into the system, with no matching problems.

All major system circuits, as well as signal sources that come from the outside, should be fed to distribution amplifiers that will bring the signal to the standard level and isolate each signal from other circuits.

## AC POWER DESIGN

Everybody knows that ac power cannot be run into a set of studios like temporary lights into a building under construction. The placement of the ac conduits must be part of the wiring plan from the beginning, with good separation from audio lines, and conduits placed for convenient delivery where the power will be needed.

Branch circuit isolation is very important. Critical circuits should be split over several circuit breakers so that one unit going down will not take out several others. For example, split the row of outlets on the back of a rack between two or three breakers, and always have a good proportion of extra outlets. Then if one unit takes out a circuit, you can plug other units into good outlets while you run down the trouble.

Every console should have a separate circuit, and a group of cart machines should be spread over two or three circuits. The lights should all be on entirely different circuits from the equipment, so a lighting failure will not take out any part of the studio.

When wiring the ac, always use the green wire, insulated from everything else, for ac ground. Never use the conduit or BX shield for ac ground. Run the green wire separately to an isolated grounding bar in the circuit breaker panel. Connect the bar to station ground there. Do not bond the neutral wire to the case, conduit, or any other ground in the system. The neutral wire is connected to ground by the power company at the service entrance *only*.

Do not connect a ground to the neutral wire anywhere else in the plant. The neutral wire in complex installations can be as much as 10 volts above ground, and a ground loop will feed this into audio circuits.

If you put the care and effort into designing and building your studios that they deserve, you get not only efficiency and top-grade sound but also peace of mind about the technical instrument in your hands. In the coming decade, with the pressures on radio stations certain to increase, that peace of mind will let you put maximum force into the creativity, the programming and business initiatives that will be necessary. **BM/E**

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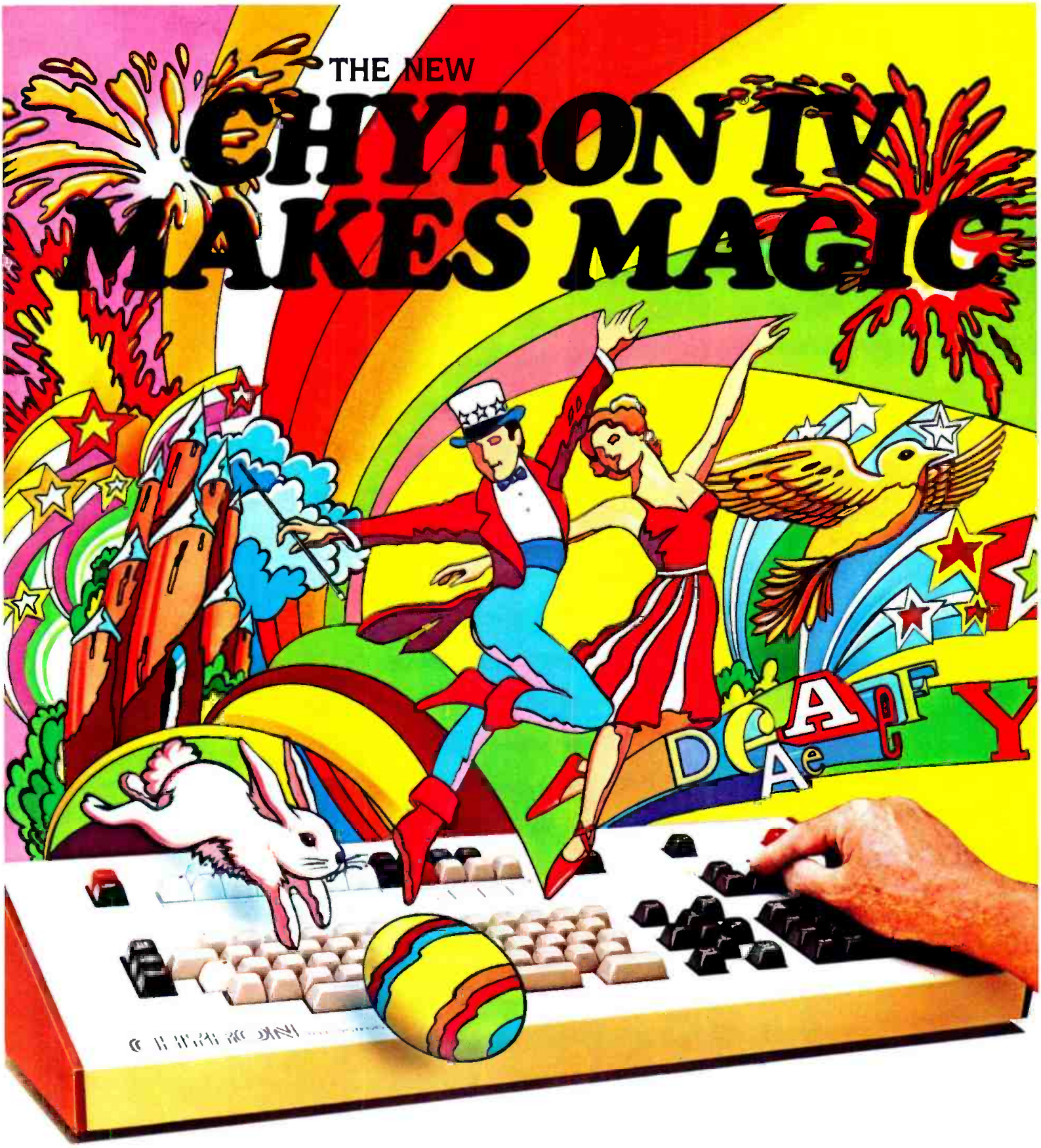


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# TELECINES: A POSITIVE EXPERIENCE WITH NEGATIVES

**Advances in telecine technology now enable programs to be shot on film, then inexpensively transferred to tape for editing.**

By Frank Reinking and Brad Hunt

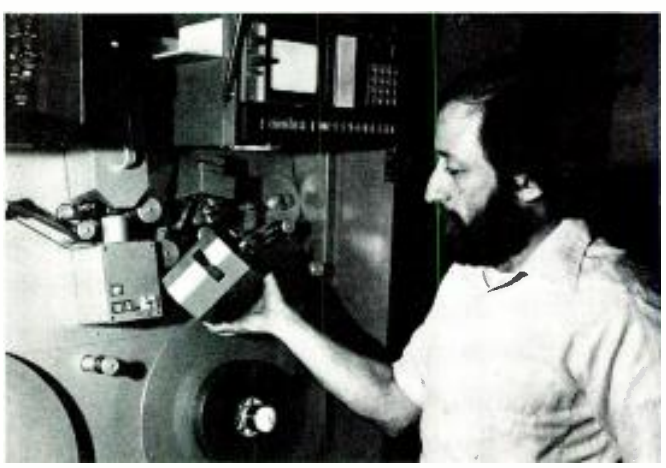
THE QUESTION USED to be "film or videotape?" and could the two media for recording, post-production, and displaying programs co-exist? New developments in improved film-to-video interface devices have made that question moot.

If you can successfully interface film and video, then the most appropriate medium can be selected for each stage—origination, editing, and display—needed to bring programming to viewers. There is strong evidence that the wind is blowing in this direction, and that it is picking up velocity every day. During the past several years approximately 50 post-production centers have installed state-of-the-art equipment for transferring film to video. These installations include film labs and video editing facilities. Also during this same period, many broadcasting centers and TV stations invested capital in upgrading or replacing older telecines with new electronic equipment which significantly improves the on-air look of film.

The pace of these activities is accelerating. Rank Cintel is generally credited with providing the spark which ignited renewed interest in film-to-video transfer technology. The London-based company has been selling telecines, primarily to television stations in the western world, for nearly 40 years.

Neil Kempt, who heads the company's operations in the U.S., reports that Rank Cintel currently has more than 600 telecines in worldwide use, primarily at TV stations and broadcast centers. However, the company didn't penetrate the American marketplace until after it exhibited a flying spot scanner modified for post-production use in the United States (i.e., for 525-line scan) at the Chicago NAB Show in 1976.

Even then, Kempt is quick to admit, there weren't herds of buyers beating a path to his doorstep. However,



*An engineer checks the scanner assembly for the Bosch CCD telecine. Film—16 or 35 mm, positive or negative — is moved continuously past the solid state elements.*

the flying spot scanner that Rank Cintel showed at that NAB did have several features which caught people's attention. Instead of being sprocket-driven, it used a capstan to move film. This eliminated the possibility of torn sprocket holes and reduced the potential for film scratches. Also, the film was scanned while it was in continuous motion rather than being moved intermittently; the smooth motion further assured safe handling of film.

Add to these design features a capability for switching the telecine between "positive-to-positive" and "negative-to-positive" modes, and you have the stuff that technological revolutions are made of. The bottom line is that it convinced some people that the Rank Cintel flying spot scanner could logically be used to transfer original color negative film to first-generation quality video. That, when combined with other features, could lead to a quantitive leap forward in the quality of the film-to-video interface.

The first of these units was delivered to Rombex, in New York City, in the summer of 1977. It took some time for most filmmakers to digest the concept of using an orig-

**Frank Reinking** is a product associate and **Brad Hunt** is a product specialist with the Motion Picture and A/V Markets Division of the Eastman Kodak Company.

inal negative (or even a color reversal intermediate) for making a video transfer. In fact, the idea is still difficult for some to accept.

Nevertheless, success is a powerful motivation. The video transfers made directly from the original negative looked terrific, and it didn't take too long for the news to spread. Sometime in mid 1981, Rank Cintel installed its sixtieth machine in the U.S.; all are now being used for post-production work, commonly with original color negative film.

Even while Rank was establishing its beachhead, parallel film-to-tape transfer devices were being developed by a number of other companies using charge coupled device (CCD) solid-state image sensing. Fernseh was the first out of the starting gate. The company delivered its initial four units in 1981, and its latest model, the FDL-60A, is generally being rated on a par with the Rank Mark III as far as image quality and special features are concerned. Like the Mark III, the FDL-60A also uses a capstan drive and transfers images from the film while it is in continuous motion. The capstan drive has completely dispelled early fears about potential original film damage.

Even more recently, at the 1981 NAB, Marconi introduced its CCD solid-state telecine, again advancing the state of the art. Variable speed operation is a standard feature of this system so that not only can film shot at 24 frames-per-second be automatically converted to the 30 fps video rate, but time compression and expansion can be introduced *while the negative is being transferred* to speed up or slow down the action and introduce special effects.

Despite the advances being made in television and electronics technology, the use of film is continuing. This is neither an accident nor the result of a tradition that is dying hard. Some 75 percent of the 25,000 national and regional commercials made in the United States every year are originated on film. This represents slippage of only around six or seven percent since Kodak surveyed ad agencies and TV stations in 1968. These figures come from surveys and analyses of film sales.

When you consider all of the hundreds of millions of dollars that have been invested in equipment for video origination and posting during this same period, you also have to ask why so much commercial production is still being done on film. One measure is the Clio awards, where the statistics speak for themselves. Year after year, when the people who make commercials select the best, 95 to 100 percent of the winners are film-originated. And this holds true even in the low-budget local commercial competitions, where much more video is being originated than film.

The percentages are much the same for prime-time entertainment programming. Some 75 to 80 percent of prime-time network shows have been originated on film year in, year out for the past decade. Prior to that, the percentage of film-originated programming was generally lower, since there used to be more game and variety shows. Now, when the percentages are nudged a point or two in favor of film or video origination, it generally reflects a shift in program content rather than a movement toward the use of one medium or another.

*Color corrector for a scene being converted on a Rank Cintel MK3B telecine. The equipment permits the operator to pick out a single item in a scene by its color, then modify it without affecting the rest of the scene.*

The reality is that there are types of production which can be done better and more efficiently on film. This includes action-adventure series, movies, mini-series, westerns, and many sit-coms where the humor is visual. There are also certain types of programming where video production techniques are more convenient. These include live sports, variety, game and other panel shows, and sit-coms where the action is more static or controlled.

Though camera mobility is a key factor, much more than that is involved. There is such a thing as a "film look" and, for that matter, a "video look." Many times, the look and the impact it has on the way that an audience perceives a program or a commercial is the critical factor. The "film look" is generally described as having more depth, and making people seem warmer and more human. The "video look" generally is associated with having a harder edge. It is like comparing the movie with a stage play, fantasy to reality.

These differences have been a motivating force behind the emerging technologies for transferring the film look to video, which, in turn, allows producers to take advantage

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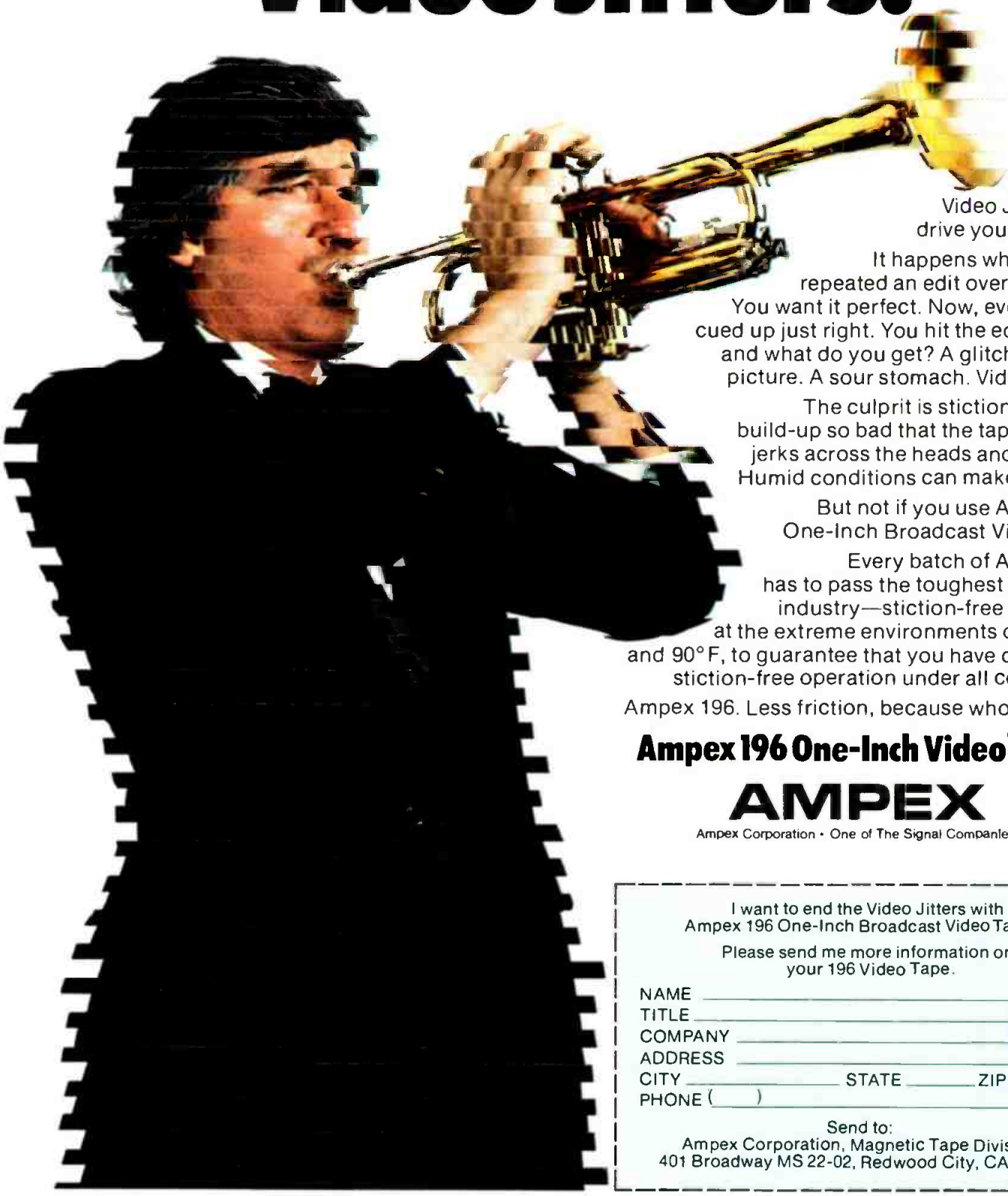

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*Steve Michelson of San Francisco's One Pass Film and Video stands by his Rank MK3B telecine. An early pioneer in video post-production, the company has custom 24-to-30 fps conversion programs.*

of new technologies for electronic image manipulation (editing). It is now a reasonable choice for a producer to opt for the creative flexibility, cost efficiencies, and look of film without sacrificing his or her ability to finish in video when that is desirable.

This analysis accounts for the present and the immediate future of television. But how about the long term? As the video executive who predicted that "film is dead" in a Daily Variety headline 25 years ago discovered, a little prognostication can be a dangerous thing. However, there are some things already apparent. One is that the demand for competitive programming will increase with the emergence of new display technologies and TV delivery systems, including cable and pay TV, HDTV, and home video centers. Where is this programming going to come from, and how will it be originated?

Keep in mind that the most profitable programs produced today are the ones that will be paying dividends years from now when many or most homes are expected to have HDTV. Consumers who pay for HDTV are going to demand suitable images. Consider what happened to most black-and-white syndicated programs after color TV receivers became popular. As a result, some producers are already becoming sensitized to the need to record images which will satisfy the information-packing potential of the 1125-line display that NHK and other companies are promising. The only way to achieve this goal, today, is to originate on 35 mm color negative film. HDTV and electronic cinematography can simply emulate the film look.

### The film look

Assuming that technology continues to advance and it eventually becomes possible to develop the state of the art to the point where videographers will be able to emulate film production methods, will the film look and the video look then be interchangeable? First one needs to ask: "What is the film look, and where does it come from?"

There are many definitions, each with some validity because of the number of variables involved. For example, much has been said about the film look being a function of resolution. Researchers in the Kodak lab have compared the information-packing potential (resolution) of today's negative film with the best of the proposed HDTV display systems, and have found that film has many times the storage capabilities needed. This suggests that the resolution gap could be closed by designing video imaging systems that record an amount of information at least equal to film. But that is more easily said than done because film technology will continue to advance. Also, Kodak thinks there is more to "resolution" than only how much information can be "packed," for instance, the quantity of light it takes to differentiate between two bits of information.

Today's highly sensitive film emulsions provide tremendous exposure latitude, which gives the cinematographer a medium for rendering very fine differences in values at both ends of the scale—where the light is lowest and where it is highest. The photographic response of film is described as the "D log E curve," which is a graph of the density produced on the film versus the log of the exposure—in other words, how much density you get for a little light, how much for a lot, and the range in between. That explains how shadow details, highlight details, and midtones are recorded by a film emulsion.

There are areas at both ends of a particular curve where an emulsion isn't able to record changes in density no matter how much one reduces or increases light levels. Of course, you can select these areas by choosing faster films or slower films. The primary challenge has been to find methods of achieving faster films while retaining the favorable image characteristics of sharpness and fine grain.

The recent introduction of Eastman color high-speed negative film evoked an enthusiastic response in the production industry because it achieved the objective of providing a much faster emulsion without a noticeable sacrifice in image structure. This contributes to making high-speed film compatible with Eastman color negative II, giving cinematographers the flexibility of selecting the appropriate emulsion for each situation and later intercutting them without jarring the perceptions of viewers.

What this means is that in order to emulate the resolution of film, in addition to packing much more information, videotape and video equipment manufacturers must improve the sensitivity range of their recording medium in the highlight and shadow areas. To some extent, this range (or latitude) is what establishes the texture seen in

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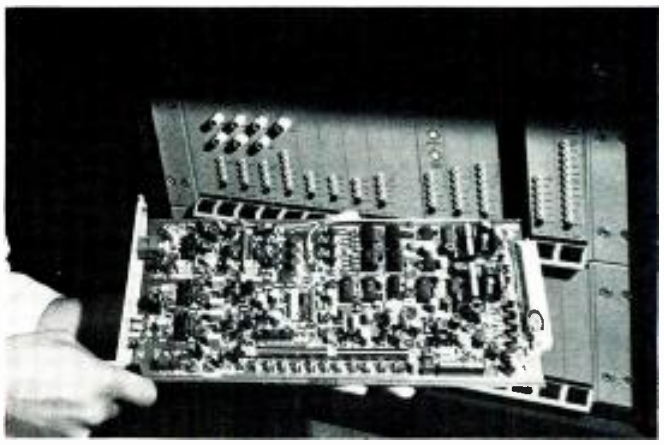
images recorded on film. Because of inherent limitations in video recording systems, it hasn't been possible for electronic cameras to emulate the information recording range of today's films.

Furthermore, even if this problem is solved, it still won't resolve all of the differences between the way that the video and film mediums see things. There are also significant variances in tone scale and color reproduction as well as in image structure. In large part, these differences are functions of the way the two mediums record images.

In fact, consider the homogenous structure of the video camera tube versus film, where each film frame has random characteristics in grain structure. Certainly this random design is an essential component of the texture which gives film its unique look.



*A servo control board from the Bosch FDL-60 film-to-tape transfer system.*

### Telecines in the Picture

While no one can discount the feasibility of video equipment manufacturers someday emulating a film look, it is going to be neither a simple nor an inexpensive undertaking. That raises an interesting question: If, in fact, there proved to be viable technologies for emulating a film look and the creative flexibility and cost-efficiencies that film production methods provide, is there a *need,* and can it be *financially* justified?

The answer may become a moot point because of the progress that has already been made in film-to-video transfer technology. Most people working in the broadcasting industry are probably well acquainted with the three primary methods in use for making film-to-video transfers: the flying spot scanner, solid-state linear-array CCD sensors, and the use of photoconductive tubes in a telecine.

The flying spot scanner (e.g., the Rank Cintel unit) creates a raster, or finger of light, by focusing a spot from a CRT through an objective lens. This spot rapidly scans the film one line at a time. The film modulates this beam of light which is directed by a series of dichroic mirrors onto appropriate light-sensitive tubes corresponding to the three primary colors. The light intensity measured by each tube is then converted into a time-varying electrical output, which is the video signal.

With CCD telecines, light from a tungsten halogen light source illuminates the film which is moved continuously. A beam splitter is used to direct the light into the red, green, and blue linear-array CCD sensors. As the light is scanned in a line-by-line manner by the CCD array, the electrical output is converted into the video signal.

While the methods are different, the results are very similar. Very few people can view an image on a TV screen and determine whether it was made by transferring film with a flying spot scanner or a solid-state CCD scanner. If one of these technologies eventually prevails, it will most likely be because of new developments related to ease of operation, cost of operation, equipment sophistication, or manufacturing economies influencing the price of equipment.

At the same time, new and modified photoconductive telecines using low capacitance Saticon tubes are allowing users to close the image quality gap when it comes to improved signal-to-noise, color saturation, and tone scale reproduction. In addition, the use of improved photoconductive film chains also provides additional flexibility in the broadcast station environment. For example, slides can be broadcast or integrated with film and/or video very efficiently. This is particularly important for TV stations. A survey that Kodak conducted several years ago indicated approximately 90 percent of the estimated 500,000 local commercials produced annually are made by TV stations. About 22 percent of these commercials are originated on slides—approximately 100,000 commercials a year. When one adds in all of the other uses that broadcasters have for slides for news and promos and other purposes, this alone is a strong motivation for upgrading to the new generation of film chains.

Also, according to Kodak studies, approximately 30 percent of national and regional commercials are being distributed on film, as is much syndicated programming, many movie packages, and a great deal of public service material. As new electronic technologies develop, there could be a reduction in film distribution in all of these areas. However, many stations are either starting or considering more local origination of nonnews programming. In part, this is being inspired by the prospect of being able to sell programs to cablecasters.

We believe that much of this local origination is going to be done in the 16 mm color negative format. There is a large pool of production talent already trained and equipped to work in this medium. It provides substantial creative inducements and cost incentives. The laboratories—approximately 100, as we said earlier—are already in place, as are post-production facilities for transferring to video for people who prefer finishing this way.

There are other areas where we at Kodak have been working to improve the film-to-video interface. Kodak is in the midst of an in-depth survey of telecine post-production operations as part of a research project which should lead to improved uniformity of quality in making film-to-video transfers.

In the end, the decision to use film or videotape will be made by consumers. As they invest more dollars in home video receivers, whether for large projection screens, video-playback systems, or even HDTV, they are likely to become increasingly sensitive to the quality of the image that they are buying. For our part, we are and will continue to work on improving the film-to-video interface and, ultimately, the image quality on those TV screens. **BM/E**

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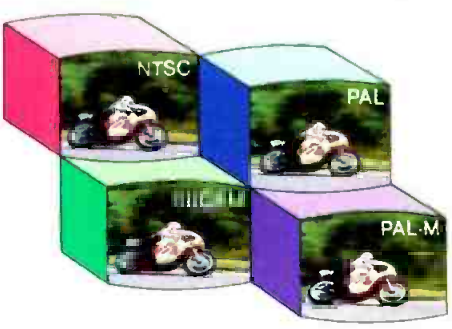


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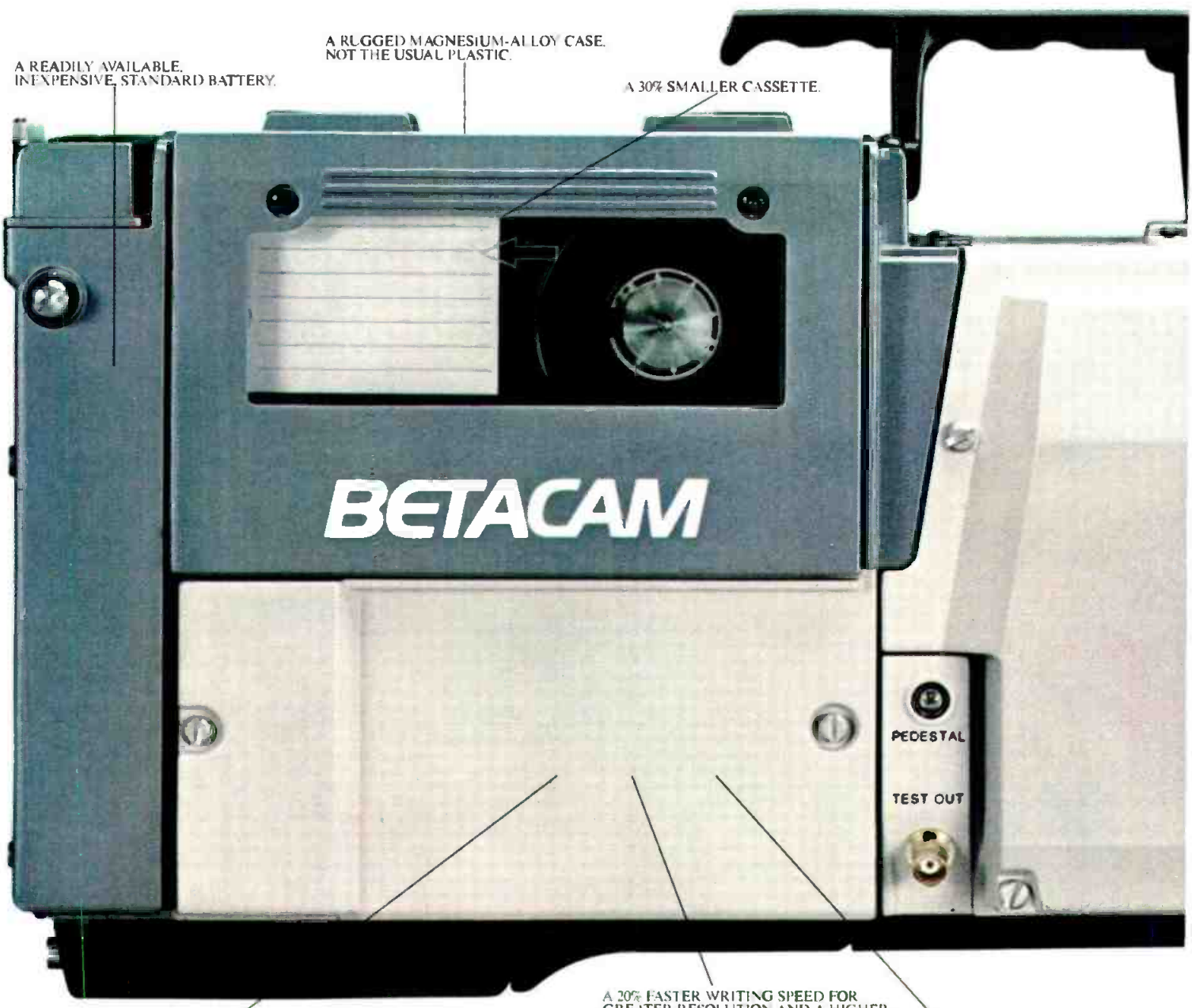

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# SMPTE PREVIEW

## SMPTE, on Eve of Conference, Still Confused Over Digital Standards

NOWHERE IS THE DILEMMA over digital standards more clearly expressed than in the promise "We'll be able to go down 100 generations with no degredation of signal quality" made by those who hope to one day implement an all-digital TV or teleproduction plant, and the "Who cares?" response heard more often than not. Even within SMPTE itself, though manufacturers and network engineering executives continue to debate digital standards, few outside the working and study groups have any immediate practical concern with digital, except that some of their equipment may be digitally based.

Less than a year ago in Geneva, Switzerland, committees from around the world, including SMPTE, ratified the now familiar draft standard for "Encoding Parameters of Digital Television in Studios." As written up in CCIR document AA-11, dated October 7, 1981, the video signal format consists of three components (Y, R-Y, and B-Y) derived from the basic R, G, and B camera output signals. Sampling frequency for Y (luminance) is set at 13.5 MHz.

In the first of a family of formats to be implemented, "4:2:2," the two color difference components will be sampled at 6.75 MHz each, half the frequency of the luminance component. Later, a 4:4:4 sampling scheme may be developed for high-quality studio mastering, and a 2:1:1 scheme for digital ENG/EFP. (The number four is the basis of these schemes since it is nominally four times the PAL, SECAM and NTSC subcarrier frequencies.)

With the basic guideline standards set, however, the real work has only

## Exhibitors

(Equipment exhibits are divided between the New York Hilton hotel, at 1335 Avenue of the Americas at the corner of 53 Street, and the Sheraton Centre hotel, at 801 7 Avenue at the corner of 52 Street.)

| EXHIBITOR | BOOTH (H = Hilton, S = Sheraton) | PRODUCT CATEGORIES |
|---|---|---|
| Adams-Smith | S821 | Time code systems |
| ADDA Corp. | H201-204 | Digital processing, still stores |
| A.F. Assoc. | S841 | Mobile vehicles, telecines, cameras |
| Agfa | H94 | Video, audio tape, film stock |
| Allen Products Co. | H56 | Film lab equipment |
| Amperex | H194 | Plumbicon pickup tubes |
| Ampex Corp. | H254-255, 260-262 | Video production & post-production |
| Amtel | S847-849 | Racks, cabinets, furniture |
| Angenieux | H233 | Lenses |
| Anton/Bauer | H175-176 | Power supplies, lighting |
| Arriflex | H145-152 | Cine cameras & lenses; lighting |
| Asaca/Shibasoku | H215-217 | Production switchers, test gear |
| Audico | S840 | Videotape, cassette loaders |
| Audio Kinetics | S831-832 | Time code synchronizers |
| Belden Comm. | H163-164 | Lighting fixtures & control |
| Bell & Howell | H61-62 | Film lab equipment |
| BIAS | S807 | Master control automation |
| Bolex | H173 | Cine cameras |
| Bosch | H84-86 | Video production & post-production |
| Calzone | S826 | Transportation cases |
| Camera Mart | H59-60, 70-71 | Production & post-production equipment rentals |
| Canon | H43-44 | Lenses |
| CEI | S800B | Video cameras |
| Central Dynamics | H66-69 | Production switchers, video cameras |
| Century Precision | H268-270 | Lenses |
| Cetec Vega | H207 | RF mics, intercoms |
| Chryon | H158 | Character generators, graphics |
| Cinema Products | H177-184 | Camera remote control, lighting, camera support, cine equipment |

| EXHIBITOR | BOOTH (H = Hilton, S = Sheraton) | PRODUCT CATEGORIES |
|---|---|---|
| Cinemills | H102A | Lighting |
| Cine 60 | H213-214 | Lighting, camera support, batteries |
| CMX/Orrox | H247-250 | Video post-production, film/video interface |
| Coherent Comm. | H229-230 | Equipment distributor |
| Colortran | H91-92 | Lighting |
| Comprehensive Video | S817-818 | Equipment distributor |
| Control Video | S827 | Video post-production |
| Convergence Corp. | H24, 79-82 | Video post-production, video animation |
| Corporate Comm. | H159-160 | Telecine color correctors |
| Crosspoint Latch | S110-111 | Production switchers |
| Datatron | H231-232 | Video post-production |
| Digital Video Syst. | H138-140 | Video processing |
| Dolby | H245-246 | Audio noise reduction |
| Dubner | S829-830 | Character generators, graphics, color correctors |
| Eastman Kodak | H251-252 | Film stock |
| Echolab | S808 | Production switchers |
| EECO | S824-825 | Time code systems |
| EEV | H174 | Leddicon camera pickup tubes |
| Elmo | H99 | Film projectors |
| Feathercam | H259 | Cine cameras |
| For-A | S845-846 | Digital processing, character generators |
| Fortel | H107-108 | Digital processing |
| Frezzolini | H63-64 | Cine cameras, batteries, lighting |
| Fuji Photo | H57-58 | Videotape, cassettes |
| Fujinon | H72-73 | Lenses |
| General Electric | S842-843 | Lighting, projection TV |
| Goldberg Bros. | H185-186 | Reels, cases, supplies |
| Grass Valley | H238-241 | Production & routing switchers, digital efx |
| Grumman | S800A | Digital processing |
| Harris | H165-168 | Digital processing, still stores |
| Hazeltine | H133-134 | Film lab equipment |
| Karl Heitz | S109 | Camera support |
| HEDCO | S839 | Routing switchers |
| Hitachi | H87-90, 96-97 | Video production & post-production |
| Hollywood Film Co. | H135-136 | Film lab equipment |
| Hudson Photo | H142 | Film lab supplies |
| Ikegami | H116-127 | Video cameras, telecines |
| Image Video | S820 | Routing & production switchers |
| ISI | S822 | Production switchers |
| JVC | H256 | Video production & post-production |
| Kinotone | S852 | Film lab equipment |
| Kliegl Bros. | H205-206 | Lighting |
| KLM/Odelft | H169-172 | Cine editing systems |
| Lake Systems | H217 | Video equipment distributor |
| LaVezzi | H11 | Film lab equipment |
| Lenco | H257-258 | Video test & measurement, monitors |
| Lexicon | S850-851 | Audio processing, efx, time compression |
| Listec | H143 | Camera support, teleprompters |
| Lowel-Light | H30-31 | Lighting |
| LTM | H112-114 | Lighting |
| L-W Intl. | H161 | Telecines |
| 3M | H187-192 | ATRs & VTRs, character generators, videotape, magnetic film |
| Magnasync/Moviola | H95 | Telecines, dubbers |
| Magna-Tech | H195-197 | Dubbers |
| Marconi | H55 | Telecines, cameras, video testing |
| Matthews Studio | H83 | Lighting, support |
| MCI/Quantel | H220-221 | Digital processing, digital efx, still stores, digital art |
| Merlin | H93 | VTR modifications |
| Microtime | H223-224 | Digital processing |
| Midwest Corp. | S809 | Mobile vehicles |
| MM Editing | H227-228 | Cine editing systems |
| Mole-Richardson | H265-267 | Lighting |
| Motorola | S814 | Intercoms, two-way communications |
| MPE | H244 | Cine supplies |
| Multi-Track Magnetics | H45-48 | Dubers, film/video interface |
| Nagra | H157 | ATRs |
| NEC | H198-200 | Video production & post-production |
| Neumade | H115 | Cine editing equipment |
| NTI | S817 | Video test & measurement |
| O'Connor | H28-29 | Camera, microwave support |
| Osram | H222 | Lighting |
| Otari | S810-811 | ATRs |
| Oxberry | H156 | Film lab equipment |
| Panasonic | H253 | Video & audio production & post-production |
| PEP | H98 | Power supplies |
| Philips T&M | S803 | Video test & measurement |
| Plastic Reel | H32-33 | Reels, cases, supplies |
| Precision Echo | H144 | Slow motion disc recorders |
| Quanta Corp. | H104-106 | Character generators |
| Rank Cintel | H34-37, 39-42 | Telecines |
| RCA | H19-21, 25-27, 49-54, 76-78 | Video production & post-production |
| R-Columbia | H162 | RF intercoms |
| Rohde & Schwarz | H22-23 | Test equipment, monitors |
| Rosco Labs. | S833-834 | Lighting |
| RTI/Lipsner-Smith | H16-18 | Film, tape cleaning/inspection |
| RTS | H242-243 | Intercom & IFB systems |
| Sachtler | S804-806 | Camera support |
| Sennheiser | H212 | Microphones, mixers |
| Sharp | H208-209 | Video cameras |
| Skotel | H141 | Time code systems |
| Sony | H1-10, 38, 65 | Video & audio production & post-production |
| Steenbeck | H128-132 | Cine editing systems |
| Stellavox | S844 | ATRs |
| Strand Century | H12-15 | Lighting |

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|---|---|---|
| Sylvania/GTE | H74-75 | Lighting |
| Tele-Cine Corp. | H101-102 | Lenses |
| Tayloreel | S828 | Film reels, cases |
| Telescript | H153 | Telecines |
| Telex | S801 | RF mics, intercoms; ATRs |
| TV Equipment Assoc. | H234-237 | Tape cleaner/evaluators, intercoms |
| Tiffen | H264 | Lens filters |
| Universal Lighting | S838 | Lighting |
| Union Connector | H103 | Plugs * connectors |
| Via Video | S836 | Digital art, color correctors |
| Videotek | H100 | Video monitors, testing |
| Vital | H263 | Production switchers, digital efx |
| Westrex | H259 | Dubbers |
| Winsted | H154-155 | Equipment consoles |
| Xetron | S823 | Cine editing systems |
| Zellan | H193 | Cine cameras |

just begun, and it is progress towards this that will be reported at the SMPTE Conference. How will the digital signal be recorded? How will various pieces of equipment in the digital facility interface? How can digital audio and video data be transmitted?

There are no less than seven groups within SMPTE itself currently working on aspects of the problem: Working Group on Digital Video Standards, Study Group of Digital Television Tape Recorders, Working Group on Digital Control of Television Equipment, Study Group on Digital Studio Implementation, Study Group on Digital Television, Committee on Television Video Technology, and Committee on Video Recording and Reproduction Technology, to say nothing of the Study Groups on HDTV and Videodisc. There is also the simultaneous effort being made by AES to define a compatible digital audio standard.

It is Ken Davies' Working Group on Digital Video Standards, however, under the watchful eyes of SMPTE's engineering VP Roland Zavada and SMPTE engineering services manager Alex Alden, that appears to be leading the way. And it is specifically this group which was mandated to present its findings at the fall conference—a specific set of proposals for a practical studio-level interface using the 4:2:2 coding format.

The group's work has admittedly not been easy, a kind of juggling act between trying to define what end users might want and need versus the realities of what the digital system can deliver effectively versus what the various costs and trade-offs might be. At one point a questionnaire to be circulated among *BM/E's* readers was considered, then rejected. Wrote Davies:

"I don't think it would be useful at this point to carry out a formal

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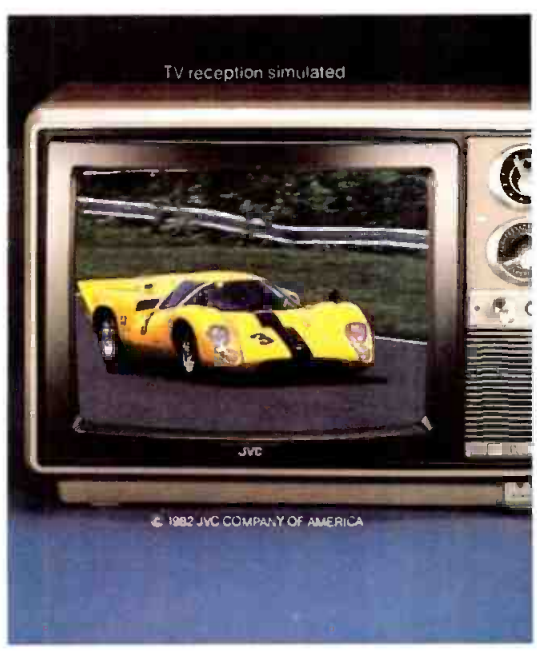


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survey of potential users concerning relatively low-level details of the digital video activity . . . . [since it] would, in all probability, prove quite meaningless as few [of *BM/E*'s] readers are likely to be at all familiar with the various trade-offs involved unless they have actively participated in the Working Group."

### Cost factors

Besides the various technical tradeoffs there is an even more thorny question to be resolved in the debate over the digital studio: the costs of digital, and whether the probable increase in equipment prices will be worth the potential benefits of converting from A to D. Simply stated, why should the industry possibly want to spend more to produce material when there already is a video recording standard (one-inch tape) which is at the outer limits of the resolving power of the medium, and can already go as many as 10 generations in post-production, be controlled for slow-motion effects, be time base corrected for integration with other video signals, and carry a reasonable facisimile of high-fidelity stereo sound in a recorder package which is light enough to be easily transformed into a portable recorder and whose dimensions and cost are actually decreasing (as witnessed by the recent introduction of a whole new generation of one-inch decks at the recent NAB)?

It's not clear how many of these considerations went into the Working Group's deliberations, or whether the group has simply sought to define the ideal interface in an ideal environment in which cost is not a factor. The full report will not be released until the conference, but some of its impact can be gathered from the interim position report issued in June.

### The studio digital video interface

The raison d'etre of the working group's study is to define specific aspects of the interface that will allow the interconnection of various pieces of equipment within the digital facility—necessitating a definition of both the type of interface and also the form of digital data to pass through it. One of the principal requirements, obviously, is that the interface be transparent, and that it be able to handle, in real time, the component-coded 4:2:2 signal. For the studio application, the group has defined 3-1000 feet as an appropriate interconnect length.

As for the form of the data to pass through the interface, a number of proposals have been suggested, and it's not clear which the group will recommend. In addition to the 4:2:2 signal, some want composite coded data as well—particularly those manufacturers who have no immediate plans for switching over to component coding and want their current digital systems to be compatible. Those with an eye on the future are suggesting a bit rate reduction scheme to allow a 4:4:4 coded signal to pass through the 4:2:2 interface, and a parallel plan to allow 2:1:1 signals for ENG.

To carry the 4:2:2 format itself, various proposals have been advanced. The group appears to have reached a general consensus on the plan to use "picture packets" in which lines or groups of lines are transmitted together with control information that identifies their position within the raster; priority would be given, in the real-time system, to data carrying the actual video information. Luminance and chrominance would be multiplexed in the data stream, as would synchronization data.

In addition to the video itself, other


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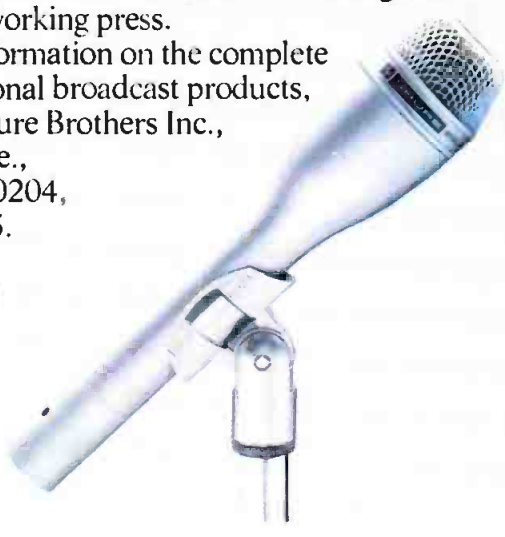

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signals will also probably be included. Under consideration are:

- Digitized audio (at least two, but perhaps three or four channels)
- SMPTE time code
- Teletext, videotex, viewdata, etc.
- User information for production notes
- VITS and VIRS
- Other control and data signals

As for the form of the interface, the interim report says the following: "A single interface is conceptually appealing but may not be realistic in the near term unless logic capable of operation at rates near 500 Mb/s (megabytes per second) become rapidly economical. Logic cost/performance considerations favor an eight-bit-plus clock bit-parallel form operating near 30 Mb/s.

"An economical all-serial approach is limited by LSI logic speeds to about 130 Mb/s, and the extension to 230 Mb/s adds considerable complexity and cost."

The debate between parallel and serial here mirrors, of course, the discussions taking place throughout the industry. The serial interface is more elegant, more easily installed (over single coax lines or fiberoptic systems), and obviously easier to care for than twisted-pair parallel interface wiring. Costs of a serial system, however, particularly at the high bit rates needed for the component coded signal, make it a rather costly system to implement. The SMPTE group is therefore avoiding making a decision, suggesting that while the serial interface would be the most appealing, a parallel interface must also be added as an auxilliary system—the two as compatible as possible.

A major unresolved question concerns synchronization of the various pieces of connected equipment. Proposals include serial and/or parallel interfaces built into the equipment, digital DAs and black burst distribution, standalone parallel/serial and serial/parallel interface units, and synchronization at switch points using digital frame buffers.

Another area under discussion is digital error correction methods, and exactly how much error (and at what cost) needs to be corrected and/or flagged.

Despite all the unresolved questions, however, the Working Group is perhaps as close as it can be to proposing standards—part of its mandate, to be carried out at the conference. The first draft of the proposed recommended interface standard will almost certainly be presented then, in a session which might see end users more involved than the Working Group has previously imagined. **BM/E**

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# SMPTE PREVIEW

## PROGRAM

The 124th SMPTE exhibit, being held at New York's Hilton and Sheraton Centre hotels November 7-12, will undoubtedly be one of the most significant trade shows in recent history. Not only is the equipment exhibit shaping up to be of major proportions (the Society outgrew the traditional Hilton Hotel exhibit area, necessitating the addition of the Sheraton Centre space as well), but the program promises to be equally full of the excitement which broadcasters have become accustomed to.

The program, as usual, is fairly clearly divided into those sessions of interest to the motion picture industry (lab and projection practices, motion pictures sound, etc.), and sessions devoted to TV-related subjects. A person with interests solely in electronic images and sound might want to attend the opening session on Monday morning, and the session on new lighting developments on Tuesday morning, but skip the rest of the sessions until Wednesday morning. This leaves Tuesday available for touring the equipment exhibits.

This year a thematic approach to the conference which has characterized the past couple of SMPTEs (the historical slant of the 1980 program, the "future technology" emphasis of last year's show) has apparently given way to a more practical approach to technology. "Commitment to Tomorrow's Technologies" is the theme of the conference, with many of the papers talking about how to actually implement the various technological developments (HDTV, digital audio and video, and so forth) which have come along in recent years.

In general, there is going to be a *lot* of talk about digital technology—everything from reports on the progress of groups working on video and audio recording standards to the latest in thinking on how the digital studio of the future may evolve. Sessions of particular interest here are Future TV Studio Design (Wednesday morning), TV Audio (Wednesday afternoon), New Technology for Television (Friday morning), and Videotape Recording (Friday afternoon). SMPTE has once again scheduled its most potentially interesting sessions for Friday, the most interesting of all for Friday afternoon—so plan to stick around.

Sessions on video production and post-production have been conveniently arranged on Thursday morning and afternoon respectively, with an interesting lineup of papers on all aspects from development of new camera imaging systems to various new editing units coming onto the market. The afternoon session is noteworthy for containing several discussions on audio as well as video post-production.

Two other sessions which should be of considerable interest are both unfor-

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## SMPTE Preview

tunately scheduled for Friday morning. Future Television Technologies promises all sorts of excitement with its papers on HDTV, teletext, videodiscs, and satellites, with a report on recent developments at NHK in Japan. At the same time, the session on International TV Technology will be exploring digital effects, laser transfer of video to film, and implementation of international digital video standards. Some adept schedule juggling may be in order.

### THE PROGRAM

**SUNDAY, NOVEMBER 7**

**Afternoon**
Registration
**Evening**
Reception for registrants

**MONDAY, NOVEMBER 8**

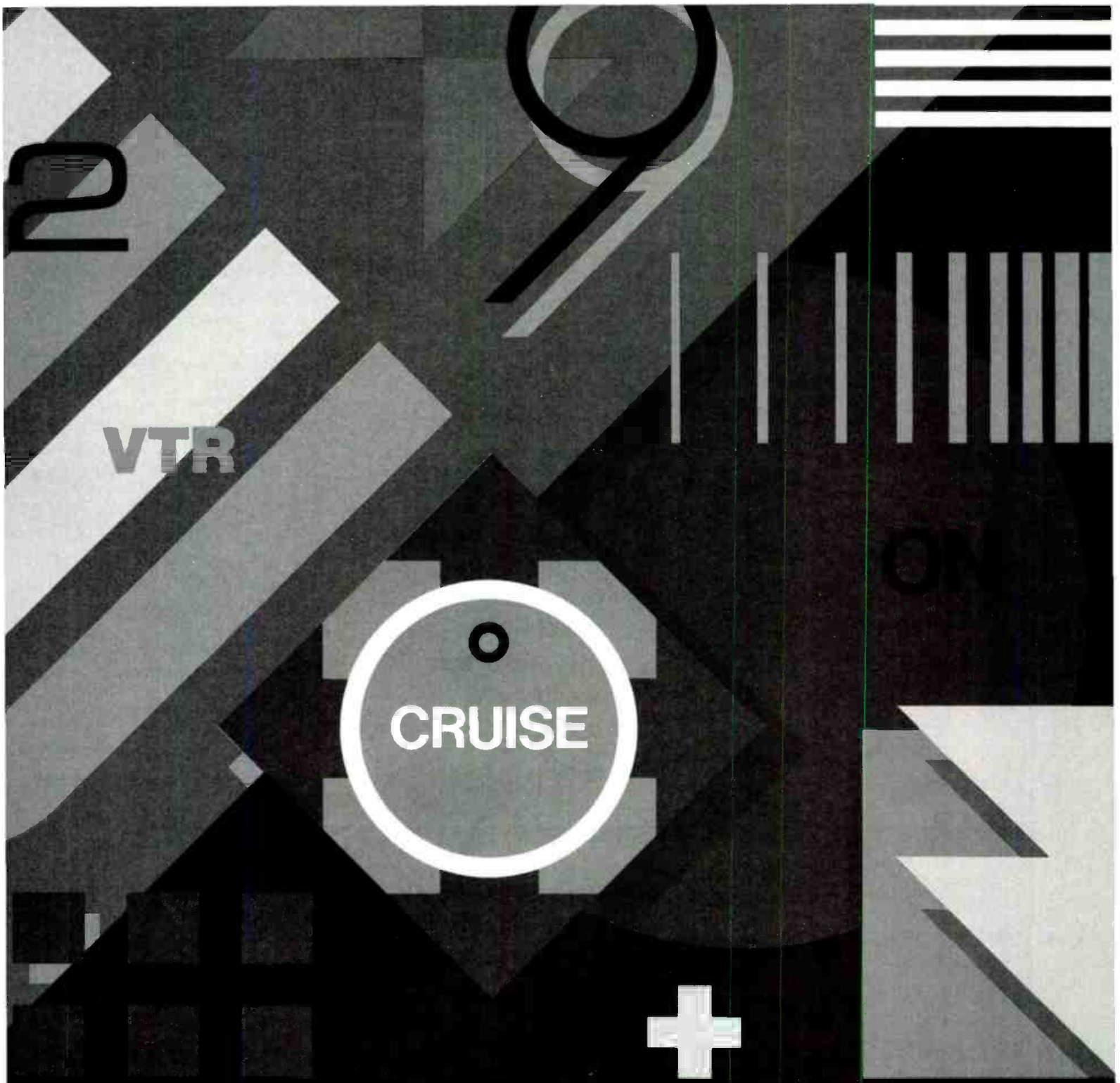
**Morning**
Opening Session: Commitment to Tomorrow's Technologies
**Noon**
Honors and Awards Luncheon
**Afternoon**
Laboratory Practices
Annual Meeting of Voting Members

**TUESDAY, NOVEMBER 9**

**Morning**
EXHIBIT HALLS OPEN
*New Technology of Lighting—
Focus on some of the latest technology in lighting hardware and techniques, including some demonstrations of brand-new and prototype lights.
Laboratory Practices, cont.
**Noon**
Fellows Luncheon
**Afternoon**
Motion Picture Production and Special Effects
Laboratory Practices, cont.

**WEDNESDAY, NOVEMBER 10**

**Morning**
EXHIBIT HALLS OPEN
*Future Television Studio Design—
Session devoted to many different ideas about how both

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analog and digital facilities will develop in the future.

Motion Picture Sound

**Afternoon**

*Television Audio—
Tentative subjects: Report from the AES on digital audio interfacing, plus recent progress in digital audio recording; a new generation of voltage-controlled gain elements and their impact.

*Film-to-Tape Interface—
Papers on both film-to-tape and tape-to-film technology.

**THURSDAY, NOVEMBER 11**

**Morning**

EXHIBIT HALLS OPEN

*Television Production—
Tentative subjects: The new diode gun Saticon III; the use of sealed lead-acid battery systems; the Camraprompter in television production; development of a three-chip MOS color camera.

Projection Practices

**Afternoon**

*Television Post-Production—
Tentative subjects: A new, synergistic approach to video post-production; a computer-controlled system for stereo audio post-production; Unitel's post-production facilities; SMPTE time code and automation in audio post-production; editing systems, friend or foe?; a cost-effective video compressor; post-production equipment in the news environment; time compression/expansion.

*Television Image and Signal Evaluation Technologies—
Tentative subjects: Dual video transmission utilizing horizontal time sharing; the digital encoding and decoding of NTSC.

**FRIDAY, NOVEMBER 12**

**Morning**

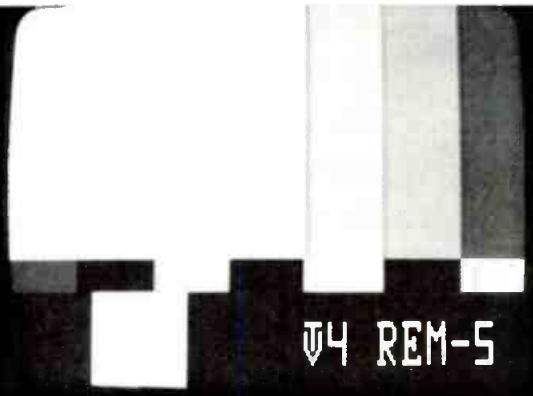
*New Technology for Television—
Tentative subjects: Videodisc technology and applications; Teletext standards; development of a solid-state chip camera; new TV technology in Japan; videotex in America; current and future applications of satellite communications; perceptual requirements for HDTV.

*International Television Technology—
Tentative subjects: Digital effects, new tools or new traps?; some experiences of the RAI; implementation of digital coding standards; 70 mm video-to-film transfers for HDTV.

**Afternoon**

*Videotape Recording—
Tentative subjects: Digital video recording based on the proposed format from Sony; a study on variable-speed digital recording; wideband FM recording for a high-definition VTR; SMPTE time code recording on quarter-inch tape.

(* = of special interest to broadcasters)

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BM/E

NEWS FEATURE

# Harris AM Stereo Favored in Straw Poll

RESULTS OF AN INFORMAL SURVEY conducted by *BM/E* using the Reader Service Card indicate that the Harris Corp. AM stereo system is the favored technique among broadcasters.

To provide a guide to how radio stations are leaning in selecting an AM stereo system, BM/E asked readers to circle their choice and comment on the subject. This makeshift "ballot" was published in the May issue, well before the Kahn system received FCC type approval and the first stations began to broadcast in stereo using the Kahn equipment (see *BM/E*, Sept. '82, p. 14). However, at the time of the poll it was expected that Kahn would be the first off the blocks. It would be difficult to say if being first will influence others, judging from the strong commitments indicated on the returns.

Harris and Kahn were well ahead of the rest of the competition. Of those choosing a system, not quite 44 percent favored Harris; just over 30 percent, Kahn. Magnavox and Motorola were tied with 12.6 percent each. Belar got about one-half of one percent.

The fact that almost 40 percent of the total returns came from readers who either had no plans for AM stereo, did not know, or simply returned the card with comments (no vote) might seem ominous. However, a large proportion of the no vote cards came from FM stations, TV stations, and production facilities. Obviously the issues underlying the AM stereo competition are important enough to cause "nonparticipants" to comment.

The issues most mentioned were the FCC's on-again-off-again marketplace decision regarding AM stereo and, perhaps more basic, the question of whether there is a real need for AM stereo. The comments were quite telling, dramatizing that a technical issue can raise emotions. An overwhelming majority of responses came from management and chief engineers, which indicates that the decision-makers have been involved in a difficult period of determining what to do.

Looking only at the comments, there was an almost even split of positive versus negative statements regarding the future of AM stereo. As for the FCC decision, the comments were almost unanimously critical, most pointing out that technical standards must be set, not decided by the marketplace.

Typical of the "let's get going" attitude was the comment from the president of an Oregon station: "We are committed to AM stereo and have already ordered the Harris system."

A chief engineer for a Massachusetts AM/FM station states, "All major markets will have Kahn stereo months before any other system is on the air. Who's going to try to buck that?"

But a chief engineer for an AM/FM station in Minnesota claims, "Motorola offers compatibility and low noise and distortion." Counters the vice president of a Tennessee station, "It appears that the Magnavox system is all the receiver manufacturers are prepared to build at this time."

The president of a Louisiana station is not so sure. "I know we'll have a good system once all is said and done . . . but when can we expect to have receivers on the market?" he asks.

In general the comments favoring Harris centered around this system's linear design and those supporting Kahn stressed the ability to get on the air quickly.

On the negative side, a number of engineers wondered if the AM stereo signal is technically able to match FM stereo. "AM stereo is a novelty that will soon pass," says the chief engineer of a Texas AM/FM station. "What the public wants is the quality of sound available on FM. Unless we can compress a 15 KHz response into our AM channels, AM will die as a music medium."

The chief engineer at a Washington facility adds, "I see no advantage to a stereo signal that rolls off a 5 KHz frequency response, not to mention AM noise."

The comments concerning the FCC's AM stereo decisions were often tinged with anger. "What a screwed-up mess!" exclaimed one.

A frustrated AM/FM station chief engineer in Illinois suggests, "FCC really blew it with marketplace nondecision. Best thing would be for AM station engineers, receiver manufacturers and system proponents to get together. Fat chance of that, however."

Another remark along this line: "FCC decision stinks! Harris should take lots of Japanese receiver makers out to many fancy lunches and convince them that synchronous detectors aren't too expensive."

Finally, a tongue-in-cheek response from the director of engineering for a Wisconsin station seems to sum it all up: "The FCC's marketplace decision was the best thing to happen to FM since [the development of] stereo. I'm glad public lynching is out of style."

Not much doubt over what type of station this reader represents. **BM/E**

## How They Voted

Here's how the BM/E Reader Response Card straw poll turned out. Percentages are for those who marked a choice.

| SYSTEM | % CHOOSING |
|---|---|
| Harris | 43.95 |
| Kahn | 30.22 |
| Magnavox | 12.64 |
| Motorola | 12.64 |
| Belar | 0.55 |

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# Logging Requirements to be Eliminated, Further AM Daytime and SCA Activity

By Harry Cole, FCC Counsel

IF THE FCC were a farm, and its rules and regulations were its crop, the middle of the summer would be a prime planting time; but as almost everyone knows, the FCC usually shifts itself into neutral during August.

Before doing so, however, it generally issues a fairly wide range of proposals for comment by the public. This past summer was no different, as the FCC proposed significant changes in a variety of areas.

The most sweeping change in progress is the proposed elimination of the requirement that broadcasters keep detailed operating and maintenance logs. At first, this may seem like a positive step. After all, the logging requirements were first developed over 50 years ago when the available broadcasting equipment was infinitely less sophisticated than today's.

Yet, while the reliability of broadcast equipment has increased enormously, the logging rules have not kept pace; indeed, the logging rules have hardly changed at all. Broadcasters could easily question the need for making, recording, and filing readings every couple of hours when those readings seldom, if ever, vary. As the Commission put it, it is possible to "question whether state-of-the-art communications technology makes the periodic recording of specific transmission system information unnecessary."

The FCC has questioned the matter so intently that it has proposed nothing less than the total elimination of all technical logging obligations, including both operating logs containing periodic recordings of transmission system data, and maintenance logs for records of transmitter tests, meter calibrations, equipment malfunctions, and the like. The exception to this rule would be experimental stations who have to keep logs to help the FCC assess new methods of operation.

Of course, the elimination of the logging requirements would not alter the underlying obligation to maintain each station's technical operation within its licensed limits and any additional tolerances imposed by FCC rules. In this respect, the proposal is similar to most of the Commission's other recent deregulatory actions: broadcasters are still required to operate within definite limits, but they no longer have to engage in exhaustive documentation of their compliance with these restrictions.

The underlying theory is also similar to that of other deregulatory steps: in the Commission's view, marketplace forces will compel broadcasters to maintain the technical standards set by the Commission.

The trouble with this approach is that, in the technical sphere, marketplace forces will, at best, probably encourage each broadcaster to provide the clearest, most consistent signal possible, conceivably without regard to what the specifics of the FCC rules might require. In other words, the broadcast consumer probably will expect only decent reception. As broadcasters must recognize, there are a number of technical components involved in providing "good reception" and, in some instances, improvements in a station's signal may entail violations of applicable rules. Thus, there would appear to be at least some possible incentive, from the marketplace perspective, for technical violations. Pressure from other stations, who would be interested in making sure that their competitors were playing by the rules, might tend to counteract this effect. In any event, elimination of all technical logging requirements would make it more difficult for the FCC to establish whether technical violations are occurring and, if so, their nature and extent.

Similarly, it must be noted that, while the FCC's faith in the reliability of state-of-the-art equipment is no doubt well-placed, there are substantial numbers of stations operating with older, less reliable transmission systems. Further, in view of the Commission's deregulation of its first class radiotelephone operator requirements, it could be argued that there is less assurance that the technical

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staffs in charge of operating and maintaining the older equipment will be able to keep it in compliance with the various regulations. Again, the technical logging rules would not necessarily provide such assurance either, but they might increase the ability of each station's chief to identify and cure problems which exist.

This is not to say that, on balance, the elimination, or substantial modification, of the technical logging rules may not be a good idea. It is to say, however, that the wholesale elimination of those rules should not be embraced uncritically and without reservation.

### FM SCA regs to be overhauled

Meanwhile, as we forecasted two issues ago, the Commission has opened a proceeding which could lead to the dramatic expansion of the use by FM licensees of their subsidiary communications potential. As you may know, FM licensees can now obtain subsidiary communications authorizations (SCAs) very routinely, but they can only use them for quasi-broadcast uses or utility load management purposes. The FCC now thinks the restrictions may "needlessly or unreasonably encumber new and innovative services." With this in mind, it has proposed a top-to-bottom overhaul of the FM SCA rules.

The proposed rule revisions relate to virtually all aspects of SCA use, including the application procedure, the applicable technical standards, the nature of permissible uses, and even the amount of daily SCA use to be permitted.

On the procedural side, the FCC has proposed to eliminate the requirements that formal applications for SCAs be submitted, and that program logs reflecting SCA content be maintained. While obviously desirable from a convenience standpoint, neither of these proposed changes would significantly alter the nature or amount of SCA use.

On the technical side, however, the FCC is considering expanding the SCA baseband and permissible injection levels. The idea is to increase overall SCA capability, whether it's used for additional subscription services or for the improvement of the main channel signal. Such enhanced capability could, in the Commission's view, provide incentive for FM licensees to institute new SCA service or to expand their existing service.

To further induce licensees, the FCC is proposing to eliminate the restrictions it has historically imposed on the content of SCA transmissions. Until recently, those restrictions limited SCA use to broadcast-related purposes such as transmission data telemetry, or subscription services. In January, 1982, a new permissible use—utility fuel load management—was added (see *BM/E*, August 1982, p. 85). It now looks like virtually any use may be permitted. The result could be the enhancement of the main broadcast service through the addition of an SCA signal triggering, say, a receiver's noise reduction function. It could also provide a wide variety of non-broadcast-related services, such as paging, electronic mail delivery, and even the coordination of traffic signals.

Finally, to make SCA use even more desirable, the

FCC has proposed that such use be permitted 24 hours per day, regardless of whether or not the station's main channel is being used. Elimination of the current rule could convince some licensees to experiment with various SCA uses, which seems to be just what the FCC has in mind.

The SCA rulemaking is extremely broad in its scope and potential effect. Indeed, it is directed at both commercial and noncommercial stations, although until a companion rulemaking proceeding launched earlier this year is resolved, noncommercial licensees would still be prohibited from realizing any profit from SCA use.

The importance of these proposals lies in the extent to which they demonstrate the Commission's willingness to consider innovative uses for radio signals, knowing that such uses do not fit comfortably into any of the traditional spectrum allocation pigeon holes. It appears that the FCC, frustrated at the amount of unused SCA space currently available despite the growing demand for a wide variety of radio services, is ready to have that space put to use for just about any purpose as long as each station's main signal is not adversely affected. As with the operating/maintenance log proposal, comments on the SCA proposals have been invited by the Commission.

**Daytime AM rules to be relaxed**

The operator/maintenance log proposal appears to have arisen from the FCC's own desire for deregulation, and the SCA proposals from its desire to maximize the efficient use of spectrum space. One additional set of proposals advanced by the Commission in the late summer seems to be the result of old-fashioned lobbying. In response to requests from a number of groups, the FCC has also proposed to relax rules restricting operation of daytime-only AM stations. AM daytimers have been one of the most vocal of the special interest groups in their long-running fight to obtain some greater measure of parity with fulltime AM licensees. Those efforts may well be paying off.

The FCC's proposals fall into two categories. First, there are a number of proposed amendments which the Commission is presently inclined to adopt. These include: permitting Class II stations located east of co-channel Class I-A stations to obtain pre-sunrise authorizations (PSAs); establishing 6:00 a.m. local time as the commencement time for PSAs for Class II stations which are located both outside the .5 mV/m 50 percent skywave contour of their co-channel Class I-A station and to the east of that Class I-A station; establishing a "post sunset authorization" permitting Class II stations outside the .5 mV/m 50 percent skywave contour of their co-channel Class I-A stations to operate past sunset until 6:00 p.m. local time, with maximum power of 500 watts; and permitting Class III daytimers to operate past sunset until 6:00 p.m. local time with 500 watts of power and without having to protect other Class III stations. These and other limited proposed amendments represent significant concessions by the FCC, which has thus far been firm in its adherence to the purely daytime-only nature of daytime

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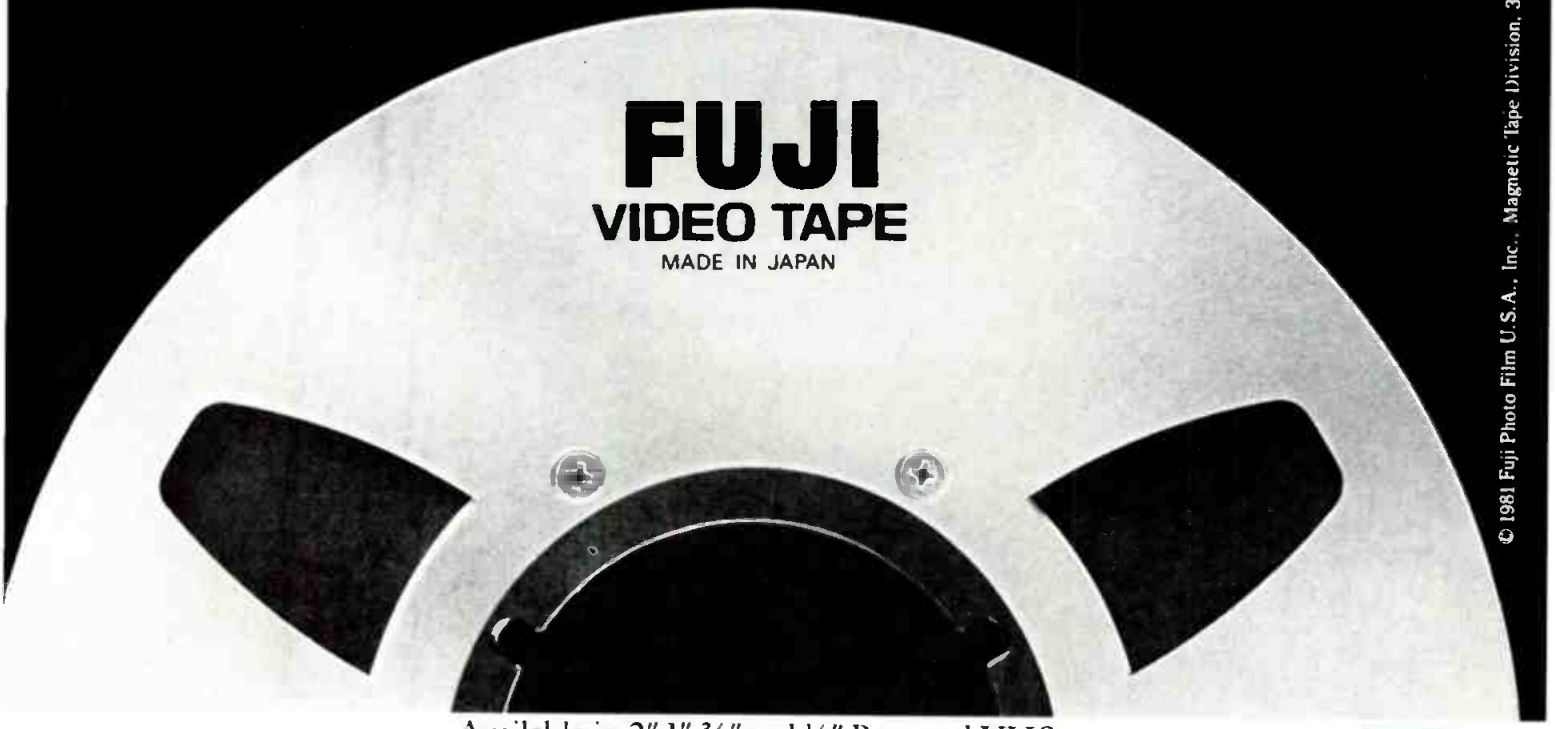




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licensees. These proposals are fairly straightforward, predictable, and in general, tame.

The second batch of proposed changes is much more intriguing. They include the possibility of giving daytimers "preference" in seeking FM and unlimited-time AM licenses, and the more radical suggestion that daytimers simply be permitted to operate all night, with power not exceeding 500 watts, and with the understanding that they would not cause interference to other stations. Even more radical is the suggestion that daytimers be permitted to switch to local channels at sunset, or that they be permitted to apply for "low power FM outlets."

This last proposal appears to be a reference to a proposal, advanced about a year ago, to create a low power FM service similar to the low power television service (LPTV), but using FM translators instead of TV translators. In view of the FCC's unfortunate experience with LPTV, it is curious that it would even consider the establishment of an "LPFM" service.

It should be emphasized that this second batch of suggestions is not ready for adoption. Proposals in the second batch are merely the subject of a Notice of Inquiry (NOI), rather than a Notice of Proposed Rulemaking (NPRM). This means that, before it can adopt any of these ideas, the FCC will have to issue a further NPRM. The first batch of proposals described above (the 6:00 a.m. PSA concept, etc.) are already the subject of an NPRM and they can be adopted after comments are submitted and reviewed.

While the various daytimer-related proposals may appear at first glance to be responsive to the difficult situation of daytime-only operators, further reflection suggests that they are not all that responsive. While the extension of the normal broadcast day to include 6:00 a.m. to 6:00 p.m. would doubtless be welcomed by daytimers, it would still leave them in an essentially daytime-only status.

Similarly, all of the other proposals in both the NPRM and the NOI appear to have as their unstated predicate the idea that there will always be such things as daytime-only stations. However, many daytimers have the desire to achieve full-time status.

As indicated above, none of these various proceedings is likely to be concluded before the winter or early spring. Chances are good that the proposed elimination of operating and maintenance logs will be adopted relatively quickly, primarily because it fits conveniently into the deregulatory pattern already established by the Fowler Commission. Similarly, the FM SCA proposals are likely to be adopted with little debate, although some affected groups (most notably the sight-impaired) who benefit from existing SCA service are likely to lobby hard to try to make sure that they don't lose any ground.

The AM daytimer proposals, however, may be in for some rough sledding. While the FCC may be sincere in its desire to assist daytimers, even some of the basic changes proposed involve the potential of interference, a potential which is sure to generate controversy and, very likely, delays. **BM/E**

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| Freeze Frame or Freeze Field | YES | | | | |
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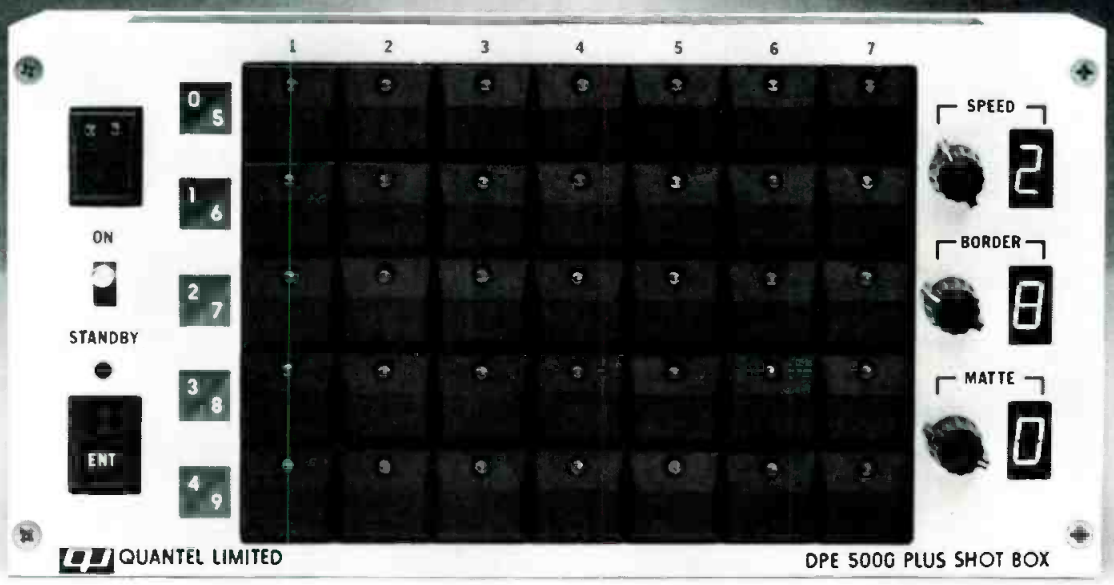


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# TAX TIPS for stations

# Legal Costs

By Mark E. Battersby, Financial Consultant

MANY BROADCASTERS have long since discovered that it is sometimes necessary to resort to the legal system in order to settle outstanding problems or grievances. Admittedly, going into court, whatever the reason, is never pleasant, but it doesn't necessarily have to be expensive—not even when you are butting heads with the federal government. The financial relief, suprisingly, comes from Congress and our tax laws.

When it comes to station managements that battle successfully to reverse decisions made by federal bureaucrats, the financial aid is provided by the Equal Access To Justice Act which took effect October 1, 1981. That largely unpublicized law requires Uncle Sam to pay the legal costs of small businesspeople, nonprofit corporations, and any individuals who can show that they were unjustly treated by the federal government on matters ranging all the way from federal contracting to paying taxes.

Prior to the passage of the Equal Access To Justice Act, broadcasters were permitted to recover attorney's fees and related expenses only if they qualified under the Civil Rights Attorney's Fees Awards Act of 1976. Unfortunately, the requirements for recovery under that law were extremely strict. For instance, under those old rules, taxpayers were required to qualify as "prevailing defendants" in an action or proceeding brought by or on behalf of the government in order to recover their legal fees.

With the enactment of the Equal Access To Justice Act, however, broadcasters will find it much easier to qualify for recovery. Although the act does not apply to litigation in the U.S. Tax Court, state courts, or Internal Revenue Service Administrative proceedings, it does apply to administrative or court proceedings brought in any federal court or the Court of Claims so long as the position taken by the government is not substantially justified.

Reportedly, Congress felt that that former standard (requiring litigants to prove that the government's conduct was arbitrary, frivilous, unreasonable, or groundless) was too restrictive and made awards too difficult for most broadcasters to obtain. Under the "not substantially justified" standard of last year's act, the interests of both the government and the public seem to be balanced because the test of whether a government action is substantially justified is one of reasonableness. If the government can show that its case has a reasonable basis both in law and fact, no award to a broadcaster nor to anyone else will be made.

In addition to eliminating the broadcaster's need to establish the government's "bad faith," Congress increased everyone's opportunity to qualify as a "prevailing party" by permitting legal fee recoveries to stations which obtain a favorable settlement of their cases, even though they may have lost on some issues.

So far the awards total only a trickle amounting to less than $50,000. But some federal officials have publicly expressed the fear that this trickle might swell to a $120 million-a-year flood as small companies once reluctant to take on Uncle Sam because of litigation costs discover this new financial safety net.

It isn't yet clear just which agencies will trigger the most costs under the Equal Access To Justice Act. The U.S. Chamber of Commerce contends that the Equal Employment Opportunity Commission will be a leader. Others predict farmers, timber companies, and small oil and gas drillers will be early collectors based on pending battles against the Farmers Home Administration foreclosures and Interior Department land-use decisions. And, of course, there is the one target almost certain to become a favorite of most broadcasters—the Internal Revenue Service.

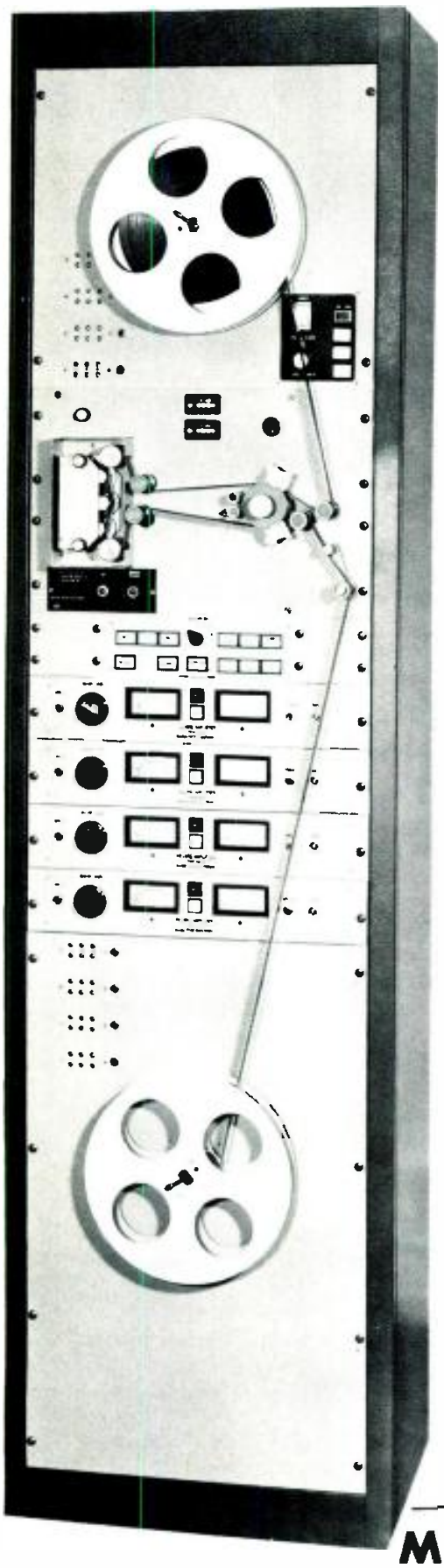
Shortly before this new act became effective, the IRS issued guidelines to all of its field offices advising its employees of the provisions of the Act and its possible implications. Those guidelines acknowledged that there will be judicial proceedings in which taxpayers will prevail, but it urged its employees to strictly adhere to existing IRS principles to insure against judicial determinations that an employee acted in bad faith or that the IRS had taken an unreasonable position.

Since the Internal Revenue Service doesn't seem overly intimidated by the fact that they will have to pay a taxpayer's legal fees out of their own operating budget if the taxpayer successfully proves "unreasonable basis" for their actions, perhaps the average broadcaster's legal actions won't be directed only against the government. Fortunately, here too, financial assistance is available, this time in the form of income tax deductions for legal expenses.

Quite simply, a legal fee paid or incurred in connection with any business transaction, or made primarily to preserve an existing business reputation or goodwill, is ordinarily deductible. The tests for determining deductibility are substantially the same as those for business expenses in general, which means that those tests would preclude a current deduction for a legal expense incurred in the acquisition of goodwill or some other depreciable capital asset.

Naturally an expense resulting partly from business and partly from nonbusiness activities (as in the case of a settlement of claims involving both a corporate business and its controlling stockholder's liabilities) must be allocated between the two.

The following are a few examples of what has been al-



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lowed as immediately deductible expenses incurred in a trade or business:

- Defense against FCC-initiated proceedings that would have resulted in revocation of radio broadcasting licenses.
- Compromise settlements merely to avoid possible injurious litigation publicity.
- An employer's defense of a claim arising out of an employee's action done in the scope of employment.
- Settlement of litigation involving the alleged negligent use of a business-owned vehicle by the son of one of the officer/shareholders of the corporation.
- Tax fraud charges against a business predecessor.
- Collection of business debt.
- Action to reduce the amount of a special assessment.
- Successful prosecution of a suit to invalidate a municipal ordinance prohibiting the operation of the taxpayer's business.

Of course, if the legal expense corresponds to an expenditure for the purpose of acquiring or improving a capital asset, it, too, is a capital expenditure. It should be noted in this connection, however, that the book value or basis of land is separate and apart from that of improvements or buildings. In other words, an expenditure related to the acquisition of land is reflected only in the cost or other basis of that land, apart from any improvements constructed on such land.

Legal expenses involving the following have been ruled capital expenditures:

- The successful prosecution of a suit to invalidate an ordinance prohibiting the expansion of a broadcasting business as well as the unsuccessful challenge of a municipally established building line that adversely affected the station's business property.
- Sale of assets incident to the business's liquidation.
- Defense of condemnation proceedings.
- Right to use a trade name.
- Procurement or defense of the title to land.
- Patent infringement.
- Stock-appraisal proceedings.
- Change of title registration.
- Deed of correction.
- Clearance of transferor's title.

Aside from counsel fees, other legally related costs that may be legitimately deducted as legal expenses include the fees paid to, or expenses incurred in procuring the services of accountants, expert witnesses, or other persons involved in the preparation and prosecution of the defense or support of your position; court charges, stenographic and printing charges, and even the travel expenses of the taxpayer/defendant.

An income tax deduction for legal and related expenses incurred in defending a legal business against charges of illegal acts or practices is usually allowed regardless of whether the defense is successful.

With legal expenses being so much a part of all of our lives, it is nice to know that at least a portion of the tab will be picked up by the government in the form of income tax deductions. It is even more comforting to know that the government will at last be forced to pick up any legal bills that you incur because of an overzealous or malicious bureaucrat's interference in your broadcasting businesses' activities. **BM/E**

# "The Electro-Voice Sentry® 500 is a monitor by design."

## Greg Silsby talks about the New Sentry® 500 studio monitor...

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The Sentry 500 is another no-nonsense Electro-Voice Sentry design with the incredible performance and credible price you've learned to expect from EV. I'd like to tell you the rest of the Sentry 500 story and send you the complete Engineering Data Sheet. Write to me: Greg Silsby, Market Development Manager/Professional Markets, Electro-Voice, Inc., 600 Cecil Street, Buchanan, Michigan 49107.

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## Problem 12: Microphone Switching

In our typical combination control/interview room, the operator/interviewer needs fast control of four mics placed around the table and plugged into connectors on the front of the console. In some situations, the operator may want to open only one mic at a time. Design a simple pushbutton or other system for fast, easy switching of the mics without introducing switching noise into the on-air signal.

**Solutions to Problem 12 must be received by November 16, 1982, and will be printed in the January, 1983 issue**

## Problem 13: Automatic Power Control

In many parts of the country, particularly during peak usage periods, commercial power line voltages vary almost hour to hour requiring operators to continually adjust the transmitter output. What is your design for an automatic power control for a transmitter that doesn't already have one? (Problem submitted by Tom McGrane, CE, KCAW FM, Sitka, AK)

**Solutions to Problem 13 must be received by December 15, 1982, and will be printed in the February 1983 issue**

### CONTEST RULES

1. **How to Enter:** Submit your ideas on how to solve the problems, together with any schematic diagrams, photographs, or other supporting material. Entries should be roughly 500 words long. Mail the entries to *BM/E's* Great Ideas Contest, 295 Madison Avenue, New York, NY 10017. Use the official entry form or a separate piece of paper with your name, station or facility, address, and telephone number.
2. **Voting and Prizes:** *BM/E's* editors will read all entries and select some for publication; the decision of the editors is final. Those selected for publication will receive a $10 honorarium. Each month, readers will have an opportunity to vote for the solution they consider the best by using the Reader Service Card. *BM/E* will announce the solution receiving the most votes and will award the winner of each month's competition a $50.00 check.
3. **Eligibility:** All station and production facility personnel are eligible to enter solutions based on equipment already built or on ideas of how the problem should be solved. Consultants are welcome to submit ideas if they indicate at which facility the idea is in use. Manufacturers of equipment are not eligible to enter. Those submitting solutions are urged to think through their ideas carefully to be certain ideas conform to FCC specs and are in line with manufacturers' warranty guidelines.

Mail Official Entry Form to:

**BM/E's Great Ideas Contest**
295 Madison Avenue, New York, NY 10017

*Solution to Problem #* _____

Your Name: _____

Title: _____

Station or Facility: _____

Address: _____

_____

Telephone: (_____) _____

I assert that, to the best of my knowledge, the idea submitted is original with this station or facility, and I hereby give *BM/E* permission to publish the material.

Signed _____

Date _____

# SOLUTIONS to problem 9: 10 Bells Alarm

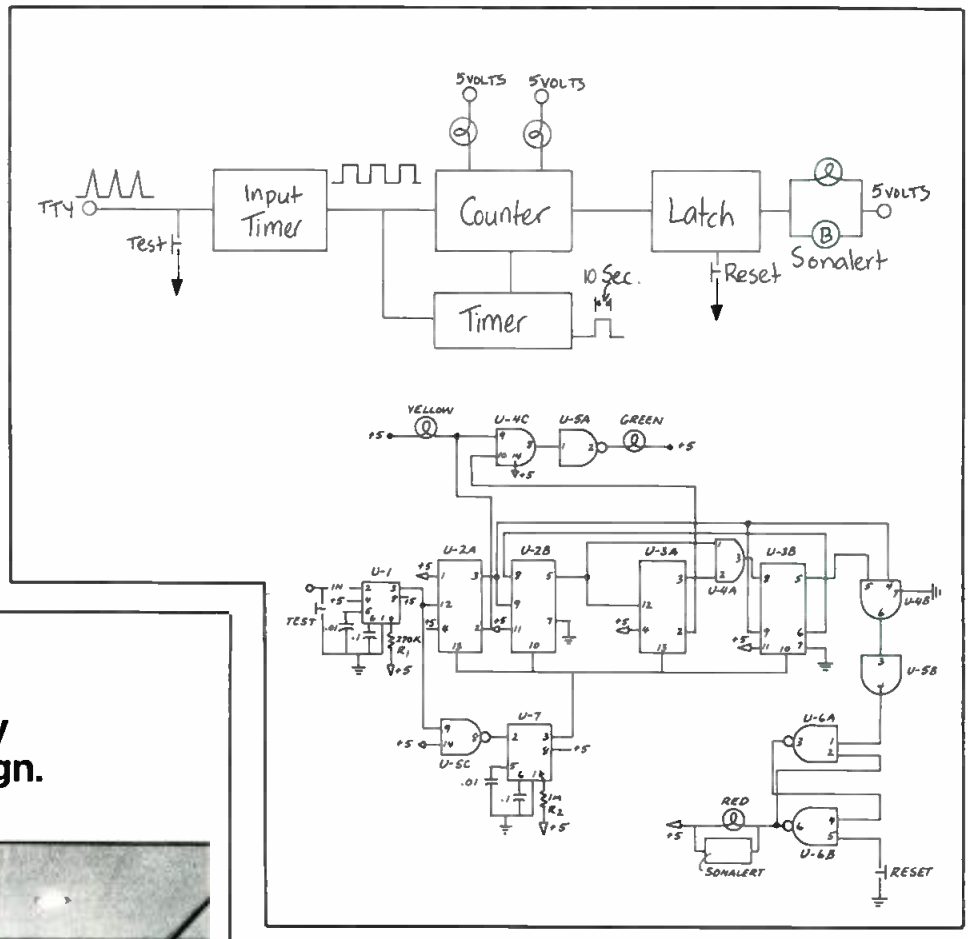
EBS uses 10 bells on wire service machines to alert operators to an incoming emergency message. Ten engineers sent in circuits designed to trigger remote alarms when the signal comes in. Here are the finalists, as selected by BM/E's editors.

## SOLUTION A

Larry Blandford, Staff Engineer
WLUC-TV, Marquette, MI

This circuit has been in operation here at WLUC-TV for approximately two months, and we have found it very effective in triggering on the 10 bells from the machine. Upon receiving a relay closure from the TTY machine, the input timer shapes pulses to constant length. The counter circuit counts up to nine pulses before sending a pulse to the latch circuit, which turns on an LED and Sonalert buzzer. (Having the counter count nine before sending latch pulse prevents false alarms.) The buzzer and light will remain lit and active until reset. The second timer, with a duration of 10 seconds, is used to reset the counter if the required number of pulses is not counted in this time period. The manual test switch is used to test without incoming signal. The green LED indicates the circuit is ready for count and the yellow LED indicates active circuit function.

Parts list: U-1, U-7: 555; U-2, U-3: 74107; U-4: 7408; U-5: 7404; U-6: MC846P. R1 may vary with model of TTY.



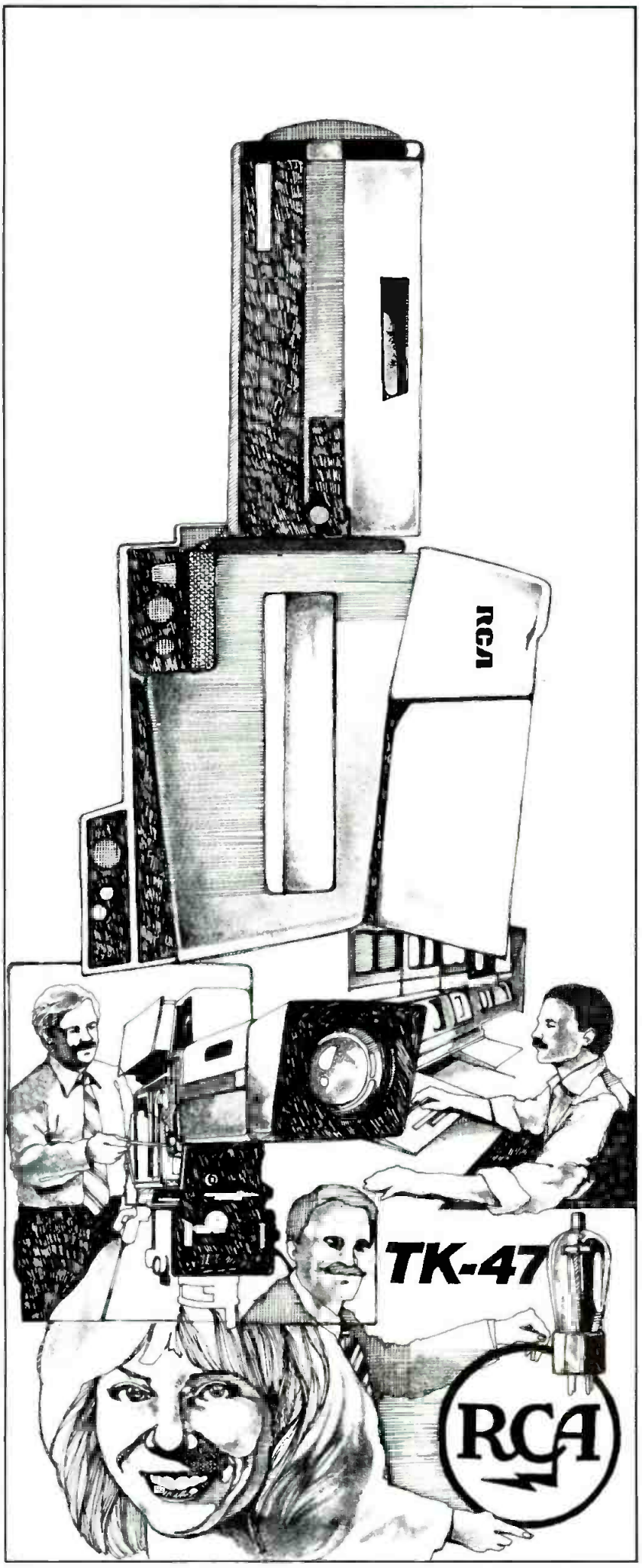

## SOLUTION B

John Collinson, Chief Engineer
KOFO/KKKX, Ottawa, KS

This circuit is simple and uses a minimum of components. U1 is a pulse shaper to eliminate contact bounce. The one meg pot in the timing circuit is somewhat excessive, but it allows a wide range of adjustment. For use with a Model 15 printer at 66 words per minute, the pulse at pin 3 of U1 should be around 60–80 ms. Just be sure it is longer than the duration of contact closure, but does not overlap into the next closure.

U3 and U4 are simple shift registers, hardwired so they increment up one with each clock pulse. U5C and U5D form an S–R flip-flop that is set when pin 4 of U4 goes high (after 10 pulses). The numbers in parentheses indicate the pin that goes high with that number pulse.

The key to the circuit is the reset clock, U2. Random bell strikes would eventually trigger the alarm if not reset. U2 is free-running at approximately one pulse each eight seconds, which resets U3 and U4. However, we don't want to reset right in the middle of a real alert, so each pulse from U1 resets U2 to allow a new time delay. Q1 is used as an inverter that resets

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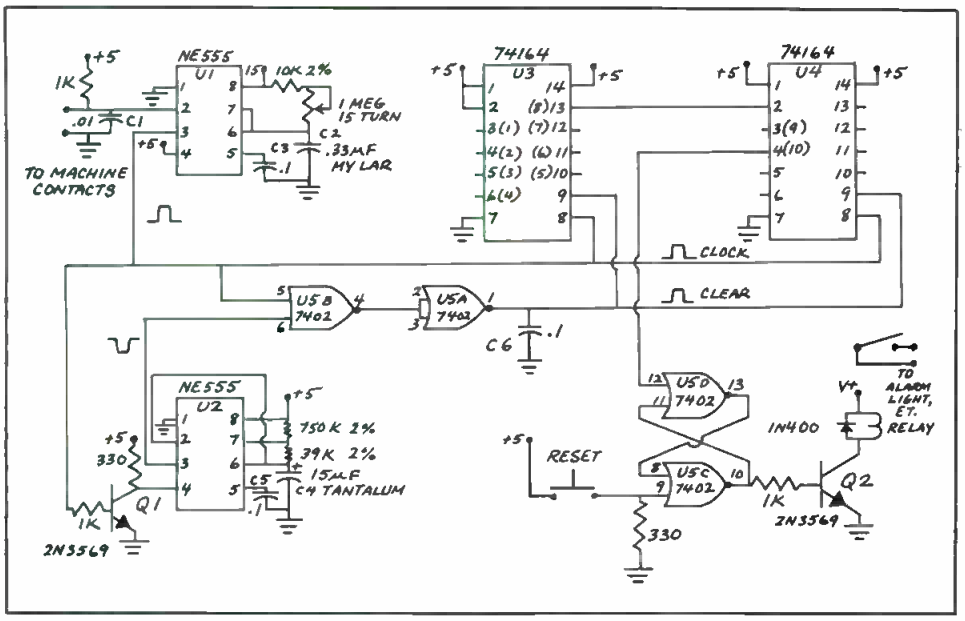



U2. Since U2 goes low when reset, U5B prevents it from resetting U3 and U4. U5A is used as an inverter.

As drawn, it is impossible to reset the output flip-flop until U2 has reset U4. If this is undesirable, just use a double-pole reset button and use the other pole to ground pin 4 of U2. Use a clean 5 V supply; despiking capacitors should be used if any instability occurs. All resistors are 0.25 W 10 percent, unless noted. Capacitors are 50 V ceramic disc, unless noted. All capacitor values are given in μF.

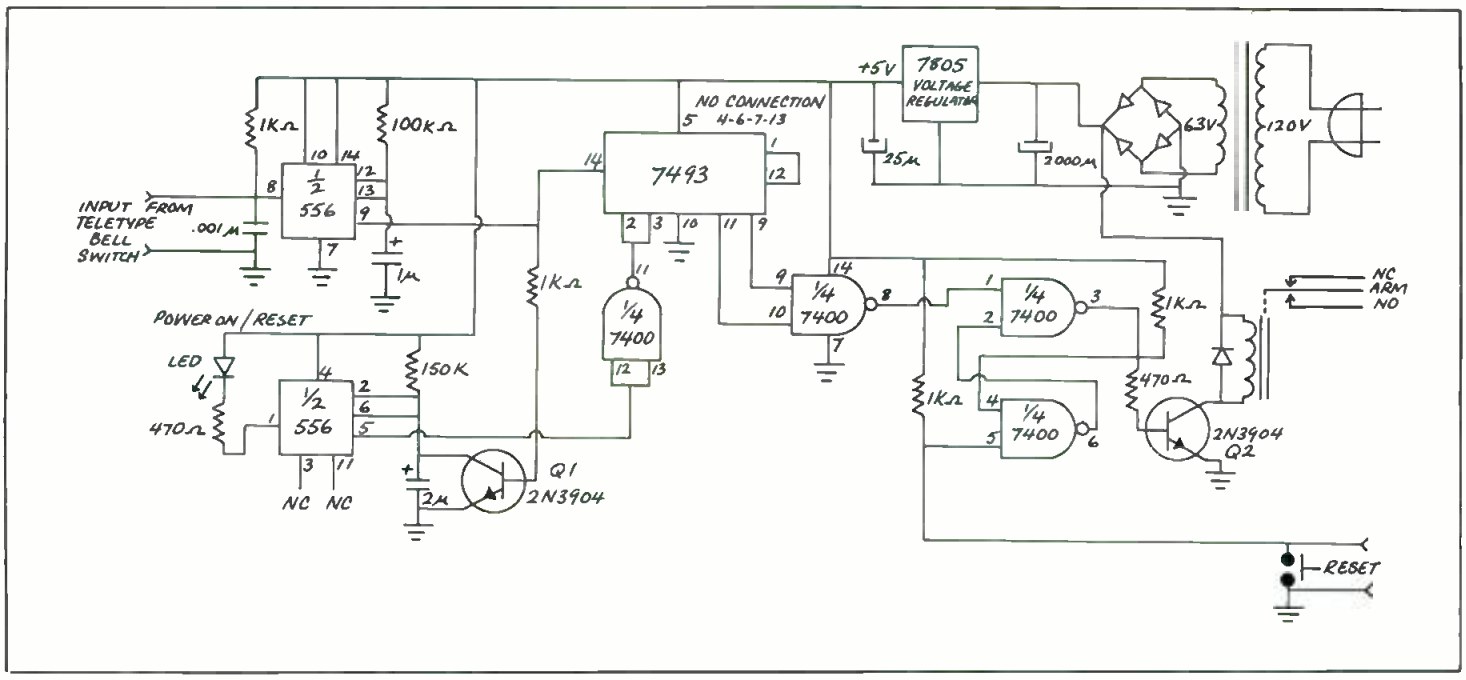


## SOLUTION C

Glenn P. Smith, Chief Operator
WEOL, Elyria, OH

This circuit has been in use at WEOL since July 1981 and has proven very reliable. We used the wire wrap method of construction; the circuit is housed in a mini box (two by 3.5 by six inches) with plenty of room.

The contact closure provided by the wire service machine triggers one half of a 556 timer IC. This part of the circuit debounces the input signal and provides a pulse out of its pin 9 of about 110 ms. The 100K ohm resistor and 1 μF capacitor determine this pulse length, and the value of the resistor can be adjusted if necessary. For a machine operating at 60 words per minute, a pulse length of 100 to 160 ms will work. This pulse goes to two places: first, Q1 starts conducting when the teleprinter bell switch closes and pin 9 of the 556 goes high. The 2 μF capacitor is discharged by Q1 and the output at pin 5 of the 556 goes high. This half of the 556 is wired as a missing pulse detector. Pin 5 will remain high as long as the voltage across the 2 μF capacitor remains below 3 V. The 150K ohm resistor is the charge path for the 2 μF ca-




pacitor and sets the charge time to reach 3 V to about 330 ms. If another bell ring is received before this time is up, the 2 μF capacitor is again discharged by Q1 and the output at pin 5 of the 556 remains high. This high is inverted by one quarter of the 7400 IC and is applied to the 7493 counter pins 2 and 3 as a low. This allows the counter to advance one count each time the signal at pin 14 of the 7493 goes low. This happens at the end of the 110 ms pulse out of pin 9 of the 556 each time the bell rings. If the count of 10 is reached, it is detected by the gate connected to the 7493 IC pins 9 and 11, and the output latch formed by the last two nand gates of the 7400 is set. This energizes the relay for an external alarm. Once energized, the relay will remain so until the reset button is pushed to reset the output latch.

When the bell stops ringing, the missing pulse detector times out and its pin 5 will return to a low. This puts a high on pins 2 and 3 of the 7493 and resets the count to zero. Thus, the circuit is ready to count the next series of bell rings. The POWER ON/RESET LED is not needed for circuit operation. It indicates that the missing pulse detector circuit is working by going out when the bill rings and remaining on the rest of the time. At WEOL, this unit is mounted near the wire service machine and a remote reset button is *not* connected. Thus, the alarm will not get reset and forgotten. By duplicating the circuit after the 7493 and connecting it to the proper pins of the 7493, other counts can be detected. We also detect the count of five for a news bulletin, as provided by the wire service we use.

Parts list: two 470 ohm 0.25 W resistors; four 1K ohm 0.25 W resistors; one 100K ohm 0.25 W resistor; one 150K ohm 0.25 W resistor; one 0.001 μ capacitor; one 1 μF capacitor; one 2 μF capacitor; one 25 μF capacitor; one 2000 μF 15 V capacitor; one 556 dual timer; one 7400 TTL IC; one 7493 TTL counter; one 7805 5 V voltage regulator; five 1 A 50 V diodes; one LED; two 2N3904 transistors; one 6–9 V relay (Radio Shack 275-004); one 6.3 V 300 mA transformer.

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# broadcast EQUIPMENT

## Audio Test System from Crown 250

The BDP-2 is a software-based 5.25-inch EIA rack-mountable package for audio testing of equipment and environment, mono or stereo. All programs are written on plug-in boards so that the capabilities of the unit can be updated as required. It offers full NTSC compatible color display for RTA and RT60 measurements.

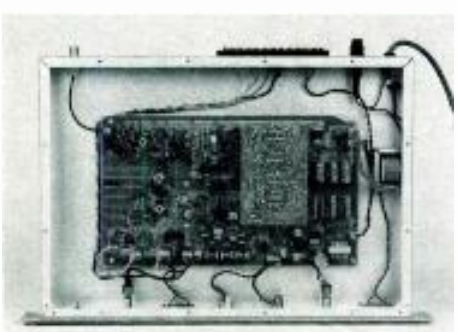

In the BDP-2, all input data is processed through, and stored in, memory. This allows the user to display any part, or all of the data, or to scroll up or down to select the most meaningful displays. Stored data can be recalled for extended analysis, and can be transferred to cassettes for permanent storage.

The 12 function keys on the front panel are software defined, allowing a different function for each, depending on which program is being used. The function of each key can be called up on the CRT at any point in the program. The display range of the screen is 80 dB with operational range up to 130 dB.

The system can also display up to 64 discrete channels and, depending on the program, these could be one-third octave frequency response readouts, or up to 64 input levels for multitrack monitoring. Another feature of this unit is the noise floor measurement.

## IF Demodulator from McMartin 251

The McMartin SPR-3 program demodulator is designed for continuous-duty reception of frequency-modulated signals in the 52-88 MHz range. This rack-mounted unit can operate on three separate frequencies within a 2 MHz bandwidth, activated by changing the configuration of settings on the back panel and requiring no internal realignment.



To track the carrier over a ± 40 kHz range, a frequency lock loop is used. The presence of a carrier of suitable level to produce a frequency lock is indicated by a light on the front panel. An RF carrier-activated relay provides NO or NC contacts in the absence or presence of the carrier. Each SPR-3 is provided with an audio expandor card to reproduce the original audio signal. Two versions are available, 2x1 and 3x1, and each can be modified to match a specialized audio response curve.

## Otari Has New Workhorse 252

The Otari MTR-10 Series are quarter- and half-inch reel-to-reel tape recorders in full-, two-, and four-track versions. The four-channel model can be converted into quarter-inch operation with a plug-in head assembly and transport conversion kit. All machine versions are available unmounted for custom installation, or in a choice of two roll-around cabinets.

Audio and transport control circuit boards are in a separate card frame. The power supply is also contained in a separate modular unit. Transport control and editing functions are located on the top transport operating surface while audio control switching is contained on a master audio control card. In connection with this series' design for interface with video editing systems, there are three optional choices of remote control available.

Model CB-109 is an auto-locator with ten assignable memories, varispeed control, and dual LED displays for tape and location timing. The CB-102 is for remote transport control only, and the CB-111 is a remote transport controller with cue, variable speed, and return-to-zero.

Three speeds with full dc servo PLL capstan drives are standard, as are microprocessor timing functions, variable speed control, and adjustable record phase compensation.

**■ FOR MORE INFORMATION ■**

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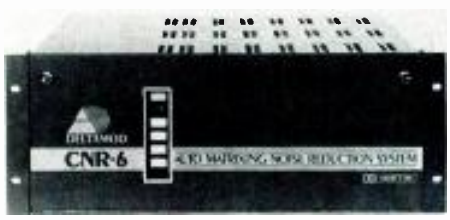
## Noise Reduction from Deltamod 253

The new Model CNR-6 is an automatic matrixing noise reduction system accommodating up to six stereo programs in a rack-mount or tabletop frame. The system offers 20 dB of Dolby C noise reduction with sum and difference matrixing for broadcast cart machines.




After initial calibration, the CNR-6 automatically switches matrix noise reduction in or out. Carts recorded with noise reduction are automatically cue-track encoded. If the noise reduction is switched off, there is no encoding and no cue tones of cart machines are sacrificed. The unit accepts up to six stereo encode or decode modules with additional space for a bypass card. This noise reduction unit is also suitable for video recorders.

## Power Amplifier from BGW 254

The BGW Model 150 is a stereo power amplifier with precision step attenuator level controls, LED metering, separate circuit and chassis grounds, and both

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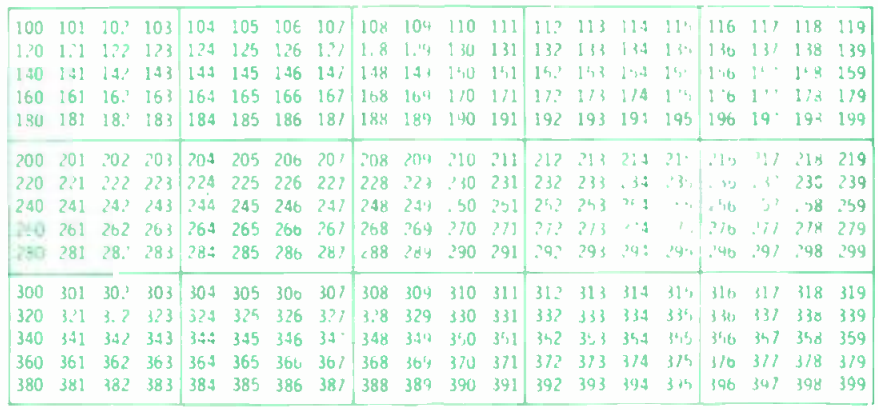


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XLR and quarter-inch input connectors with transformer sockets.

The amp produces 150 watts minimum sine wave continuous average power output, monaural (75 per channel stereo), driving an eight-ohm load over a power band from 20 Hz to 20 kHz. THD is measured, at any power level from 250 mW to 150 watts, at no more than 0.08 percent. Design features include all-steel chassis and covers, metal case output transistors, and modular construction. The opamp is a high-speed, 10 MHz unit and is followed by a discrete complementary pair acting as an active current source/sink and providing voltage gain.

## Kempner Unveils Telephone Poll 255

The Telephone Poll is a new rack-mountable device which responds to audience call-in voting with a synthesized voice explaining how callers can vote on questions which have been presented on-air. The unit then records and tabulates the votes and gives a digital readout showing running totals or percentages. With six rotary lines, this unit will handle 2160 calls an hour.

## Videocassette from Agfa 256

A new ¾-inch U-matic videocassette for broadcast use has been introduced by Agfa-Gevaert. The cassettes have a black anti-static backcoating for improved transport and winding properties.

The video performance specifications show S/N at 51 dB, chroma S/N at +3 dB, and a five MHz RF output of +2 dB. The manufacturer claims still frame capability of over three hours, and tape life in excess of 2000 passes. The audio performance figures are equally high with S/N at 52 dB; audio output uniformity is ± 1 dB, with relative frequency response at 1 dB. The tapes come in 20-, 30-, and 60-minute playing times.


## DA from Broadcast Technology 257

The new Model AD 3108 distribution amplifier contains a low-noise opamp in a differential input configuration with a common mode trim as well as a gain trim to drive a pair of high-output OA 400 opamps. Distortion is less than one percent at operating level, 20 Hz to 20 kHz, and the frequency response over the same range is +.25 dB.

Up to four of the AD 3108 DAs can be housed in BTI's CF 9101 self-powered ¾-inch high, 19-inch wide card enclosure. With the screw type wire terminals on the rear of the enclosure and a matching front panel, a DA system of 1x8 can be created with combinations to 32 out. The AD 3108 is listed at $134.

## Weather Graphics System from Synsat 258

The Stormscan weather graphics computer incorporates software systems which, according to the manufacturer, eliminate problems associated with computer system interfacing in the control room. Standard NTSC sync and video connections allow the engineer to connect the video image remoting console (VIRCON) so the weathercaster/producer can operate all functions from the console at a remote location. A second optional keyboard for the control room can be used so the operator can enter station IDs and other information.

The software supports multiple

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screen operation, screen storage on disk or tape, and screen retrieval. Screen editing is accomplished with a built-in joystick or keyboard editor. The system also permits single-button control of color, graphics, animation, and sound effects.

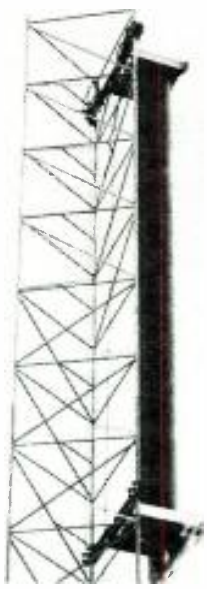
## Audio Processor from Orban 259

The new 422A/424A gated compressor/limiter/de-esser features a full-function, variable compressor/limiter with adjustable attack and release times followed by an independent de-esser. A unique feature is the presence of a defeatable gate with adjustable threshold. During pauses or during program material below threshold, the gain moves toward user-adjustable value, preventing noise rush-up, pumping, or breathing.

An output trim control allows the user either to purposely cause or prevent peak clipping in the VCA, and a true peak-reading VCA level meter provides monitoring. Important specifications include THD at less than 0.05 percent, system S/N 90 dB typical, and absolute peak output level of +26 dBm. The mono 422A is priced at $569; the stereo 424A sells for $899.

## Antennas from Andrew 260

The new TRASAR standby and LPTV transmitting antennas have a travelling wave, slotted array design which results in smooth elevation patterns with null fill and low VSWR. The first antenna in this series is side-mounted with a skull azimuth pattern. It is fed by HELIAX air-dielectric coaxial cable. All antennas are enclosed in a pressurized fiberglass radome for environmental protection and low windload.



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## Compact IRIS II from Harris 262

Harris Video has announced a new configuration of its IRIS II digital still store system that is compact enough for mobile van use and can still be expanded for larger studio production. The new system uses Control Data Corp.'s lightweight, low power RSD disk drives and portable disk data cartridges which are small and light enough to fit into a briefcase. The disk cartridges are interchangeable between systems, and each can store up to 260 stills.

Because of this interchangeability,

stills can be created ahead of time, at the studio, then delivered to mobile production sites in time for live broadcast. All of the user features on the previous IRIS II system are preserved in the new version. It uses a 4:1:1 component-coded digital framestore, and is designed so that the system can be upgraded with new features.

## New Lens from Arriflex 263

The new Zeiss 10-100 mm macro zoom lens offers a constant f/1.8 aperture at all focal lengths. The macro setting is engaged with a single button, and offers a 1:4 image ratio. All glass-to-air surfaces feature multilayer coating, and both focus and zoom controls come

prefitted with gear rings. The lens's front element does not rotate, enabling the user to attach filter frames or rectangular matte boxes directly to the lens.

The Zeiss lens can be used with the Aspheron super wide-angle supplementary lens in the macro setting for extreme wide-angle shooting. The lens measures 7.25 inches long, and weighs 3.25 pounds.

## PAR Lamp from GTE 264

GTE's new Sylvania Brite Beam lamp is rated at 1200 watts and is available in the PAR 64 bulb shape. This lamp, designed for television and film use, produces 100,000 lumens, or 84 lumens per watt. Intended for daylight fill for studio applications, the color temperature is 5600 K, making color correcting filters unnecessary. The lamp comes in four lens patterns: very narrow spot, narrow spot, medium flood, and wide flood. Its average rated life is 1000 hours.

## Duplicating System from Telex 265

The Model 6120 is a new, high-speed audio tape duplicating system with modules for both cassette and open-reel tape. The modules can be used simultaneously when connected to a common control center. Two- or four-channel designs with track selection are available with the reel modules accepting both the standard 178 mm and larger broadcast type 267 mm reels, running at speeds of 152 and 305 cm/s. The cassette modules operate at 76 cm/s, constituting a duplicating speed of 16:1.

Volume and bias slide controls have a preset position or can be adjusted by monitoring continuous LED readouts. All maintenance, including head alignment and electronic adjustments, can be made directly through the front panels.

■ FOR MORE INFORMATION ■

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## Great American Market Unveils Scenery 266

Instaset is detailed, vacuum-formed scenery especially intended for use in television studio sets. It will accept any type of acrylic or vinyl wall paint and comes in a variety of materials and designs. All Instaset materials carry a 94 V-O self-extinguishing flame classification.

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All metalwork is of welded, heavy-gauge steel construction with durable, textured epoxy paint. Dark blue finish.

cCurdy turntables are gineered for broad- st use, incorporating gged construction, ecialized features d weighted, isolating eck mounts.

Convenient housings in matching woodwork are available in a range of sizes for cart machines, auxiliary equipment and jackfields.

This modular stereo audio console (SS8670) is available in 16, 20 and 22 channel standard versions. Custom designs can be produced to meet specific requirements. The control panel is made of mar-resistant, heavy gauge, vinyl-coated steel strips, set into aluminum extrusions.

Sloping, front-hinged mounting panels are available for all popular reel tape machines.

High quality woodwork and trim is custom built to your specifications. Choose from solid oak or walnut.

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Technical harmony is essential to clear professional audio. All the components have to get along before the system can deliver its full potential.

At McCurdy, we strongly believe in technical harmony. It's the basis on which we've built all our dependable, quality audio systems for over 30 years. And because McCurdy can supply the complete system, we can guarantee that it will work together and work right.

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