ADM®
The Audio Company

ST Series II

High marks in everything

The ratings are in on our ST Series AM/FM Broadcast Consoles—and they're number one. They rate high for versatility, reliability and overall excellence.

But we know that even the finest products can be made better—that's why we've introduced the new ST Series II. These new consoles incorporate even more features to insure greater capability and performance.

The new ST consoles offer a series of modular frames that can be equipped to meet your specific needs. A wide range of input, output and signal processing modules is available to cover your present requirements and provide for future expansion.

At ADM we're never content to stand still—the new ST Series II consoles are impressive proof of that. We're so confident of their excellence that they're backed by an exclusive 5-year warranty.

Contact us now! ADM Technology, Inc.—*The Audio Company*—
1626 E. Big Beaver Road, Troy, MI 48084, Phone (313) 524-2100.
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THE EVOLUTION OF EDITING

We installed the first 340X over six years ago. Today, over 500 systems later, we continue to adhere to the critical commitment that has made the name CMX synonymous with videotape editing. Our customers' investment must be protected.

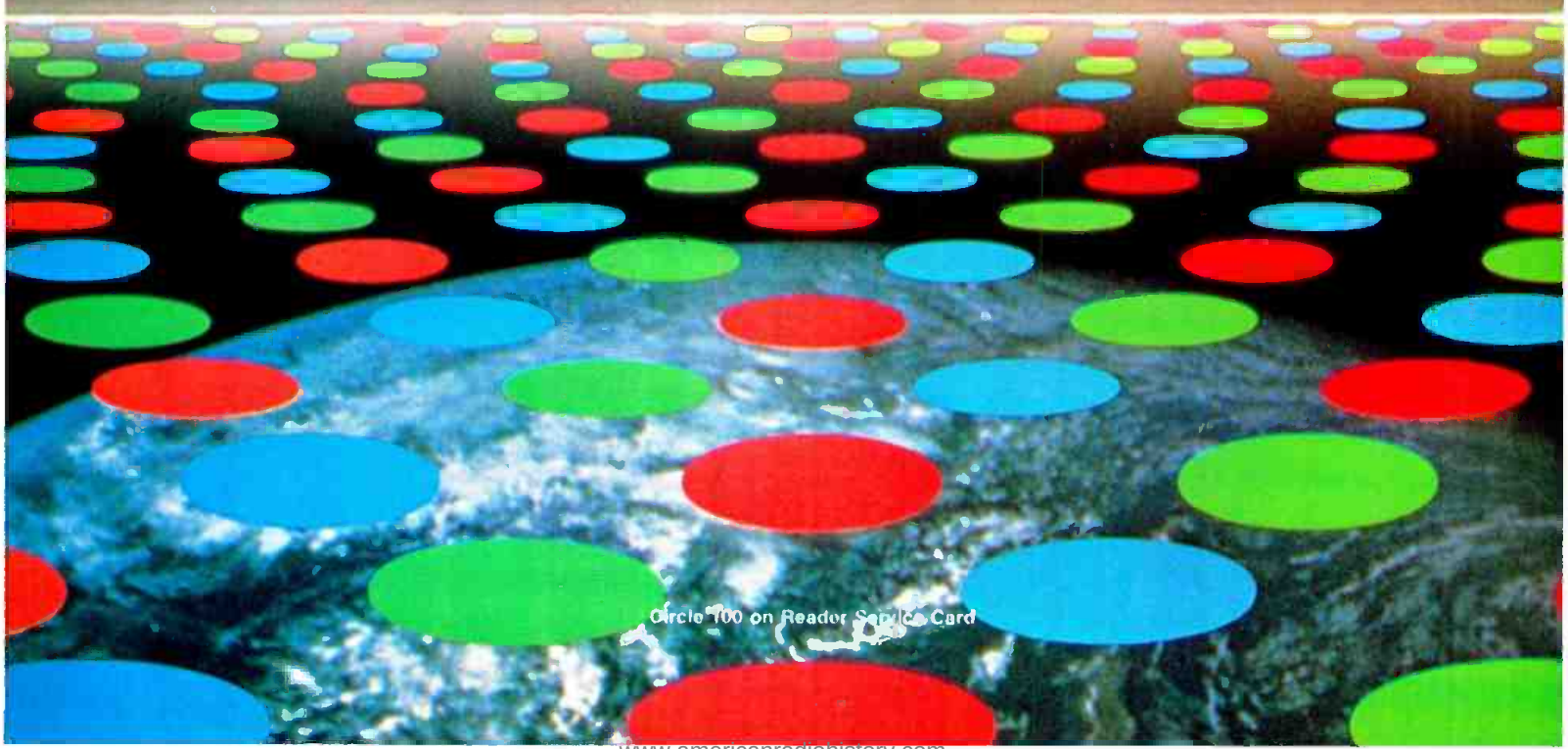
We make sure the continuing CMX evolution of hardware and software not only paces the future of new videotape editing systems but guarantees non-obsolescence to our present 340X family.

For instance, we've just added a new controller to the 340X that will provide it with substantially greater potential. Of course, it's for existing 340X systems, too.

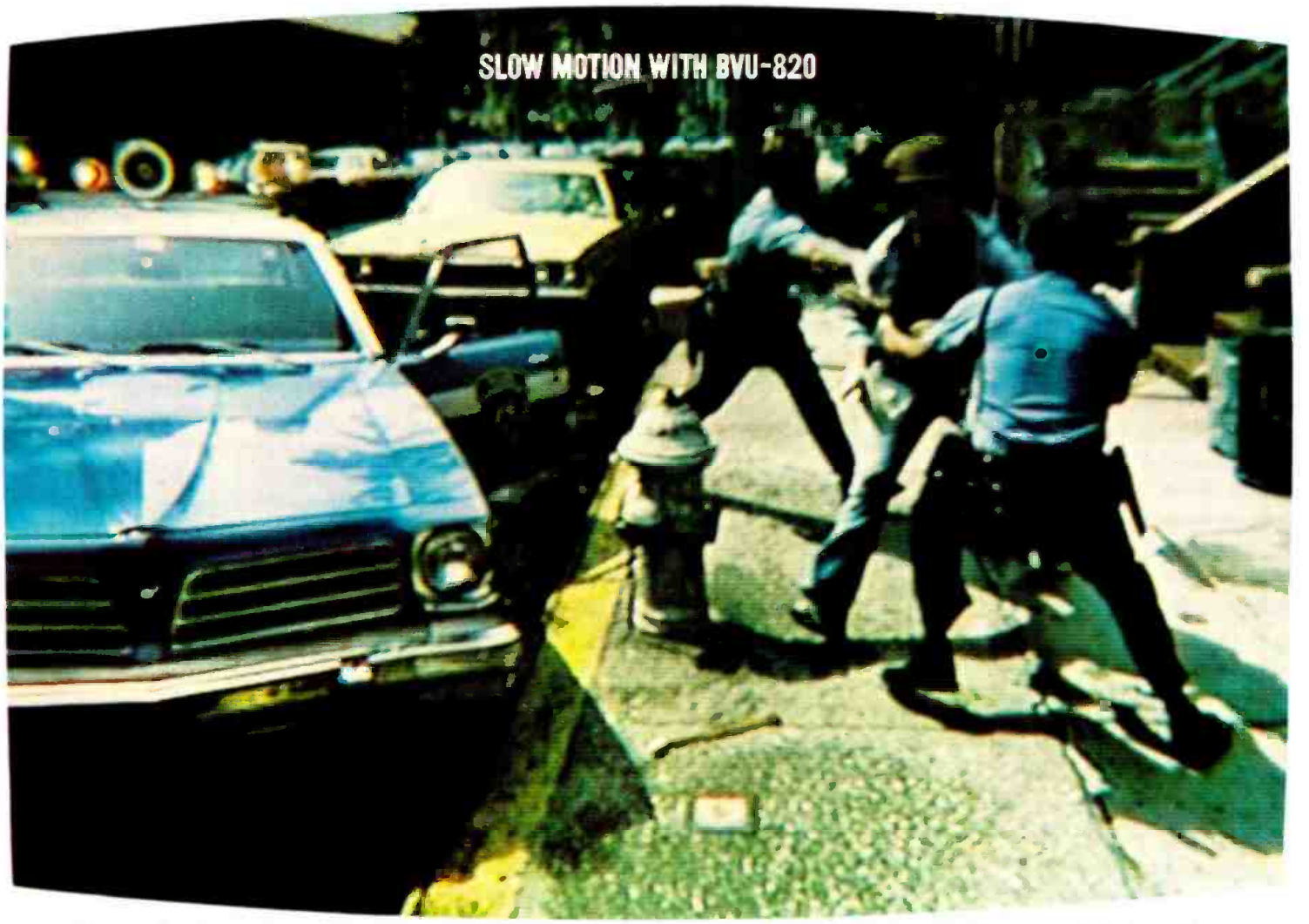
We created an evolution that is the world standard for editing. That's why our customers start with us and stay with us.

Orrox Corporation, 3303 Scott Blvd., Santa Clara, CA 95050 (408) 988-2000, TWX 910-338-0554

CMX ORROX



INTRODUCING U-MATIC SPECIAL EFFECTS WITHOUT SIDE EFFECTS.



Sony, the inventor of the U-matic® format, as well as every link in the chain, has evolutionized U-matic again.

Now, for the first time ever, you can make instant broadcast-quality edits of those dramatic events which call for freeze frame, slow motion, fast forward or reverse, without transferring to 1".

And the implications of this in terms of saving time and money are enormous.

TWO NEW WORDS IN ¾" VTR'S: DYNAMIC TRACKING.®

At the heart of the new, fully integrated, plug-compatible Sony editing system is the BVU-820 videocassette recorder.

It retains all the outstanding qualities of the BVU-800 series. Including up to 40x play speed in shuttle, which is more than twice as fast as ever before—to stop, instantly, without slewing or breaking up.

But there's one brilliant addition—Dynamic Tracking. Which means U-matic users now have the ability to broadcast special effects—something which, until now, has only been associated with more expensive reel-to-reel broadcast VTR's.

TOTAL FLEXIBILITY AT YOUR FINGERTIPS.

If the BVU-820 is the heart of the system, then the BVE-800 is most assuredly the brain. Not merely because of its 128 multi-event edit memory, but because of the way it gives you total motion control of three VTR's.

The BVE-800 is expandable and upgradeable and includes full A/B sync roll capability; time code or CTL editing; built-in BVS-500 Audio/Video switcher control logic and something else only Sony can offer:

A price that's at least $5,000 less than its nearest competitor.

A CHAIN WITH NO WEAK LINKS.

The Sony U-matic editing system features another marvel of Sony technology, the BVT-800 Digital Timebase Corrector.

Without it, the BVU-820 is capable of up to 10x play speed—fully viewable.

With it, it's capable of up to 40x play speed fully viewable, and full play speed in reverse to 3x forward with broadcast quality.

For all the facts on the state of the art, from the people who invented it, call Sony Broadcast 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.

SONY
Broadcast

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295 Madison Ave., New York, N.Y. 10017
212-685-5320, Telex: 64-4001
Publishers of:
BM/E—Broadcast Management/Engineering
BM/E's World Broadcast News

ABP mcc BPA

BM/E BROADCAST MANAGEMENT ENGINEERING (ISSN 0005-3201) is published monthly by Broadband Information Services Inc. All notices pertaining to undeliverable mail or subscriptions should be addressed to 295 Madison Ave., New York, NY 10017. BM/E is circulated without charge to those responsible for station operation and for specifying and authorizing the purchase of equipment used in broadcast facilities in the U.S. and Canada. These facilities include AM, FM and TV broadcast stations, CATV systems, ETV stations, networks and studios, audio and video recording studios, telecine facilities, consultants, etc. Subscription prices to others $24.00 one year, $36.00 two years. Foreign $36.00 one year, $60.00 two years. Air Mail rates on request.

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Our monitors are worth looking into

Ikegami 8-Series Standard and High Resolution Color Monitors

Once you look into an Ikegami monitor, chances are you may never look into buying a monitor from anyone else. And it's no wonder, since every Ikegami monitor is designed by the same demanding engineers who have succeeded in making Ikegami cameras synonymous with performance and reliability.

Look around. If you think you're seeing more Ikegami monitors at NAB, network and independent stations, professional studios, remote vans and corporate facilities in general, it's because you are.

Fact is, when you look into the Ikegami 8-Series standard and high resolution color monitors, you'll see more than 13V and 19V monitors (23V standard resolution monitor available). You'll see a host of standard features, from American Standard Matched Phosphors (not available on 23V) to a Shadow Mask Dot Matrix CRT to an Active Convergence Circuit to Delta Gun tubes and more. And you'll see a product name that says exceptional quality—every time.

That's something worth looking into.

TM14-8R TM14-2RHA

TM20-8R TM20-8RH

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Delta Gun Standard and High Resolution Monitors

Ikegami is the supplier of Color Monitors to ABC for its coverage of the 1984 Winter and Summer Games.

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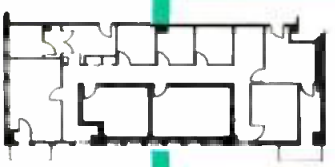
BM/E
BROADCAST MANAGEMENT/ENGINEERING
NOVEMBER 1982 VOLUME 18/NUMBER 11

SPECIAL REPORT: POST-PRODUCTION IN THE FIELD

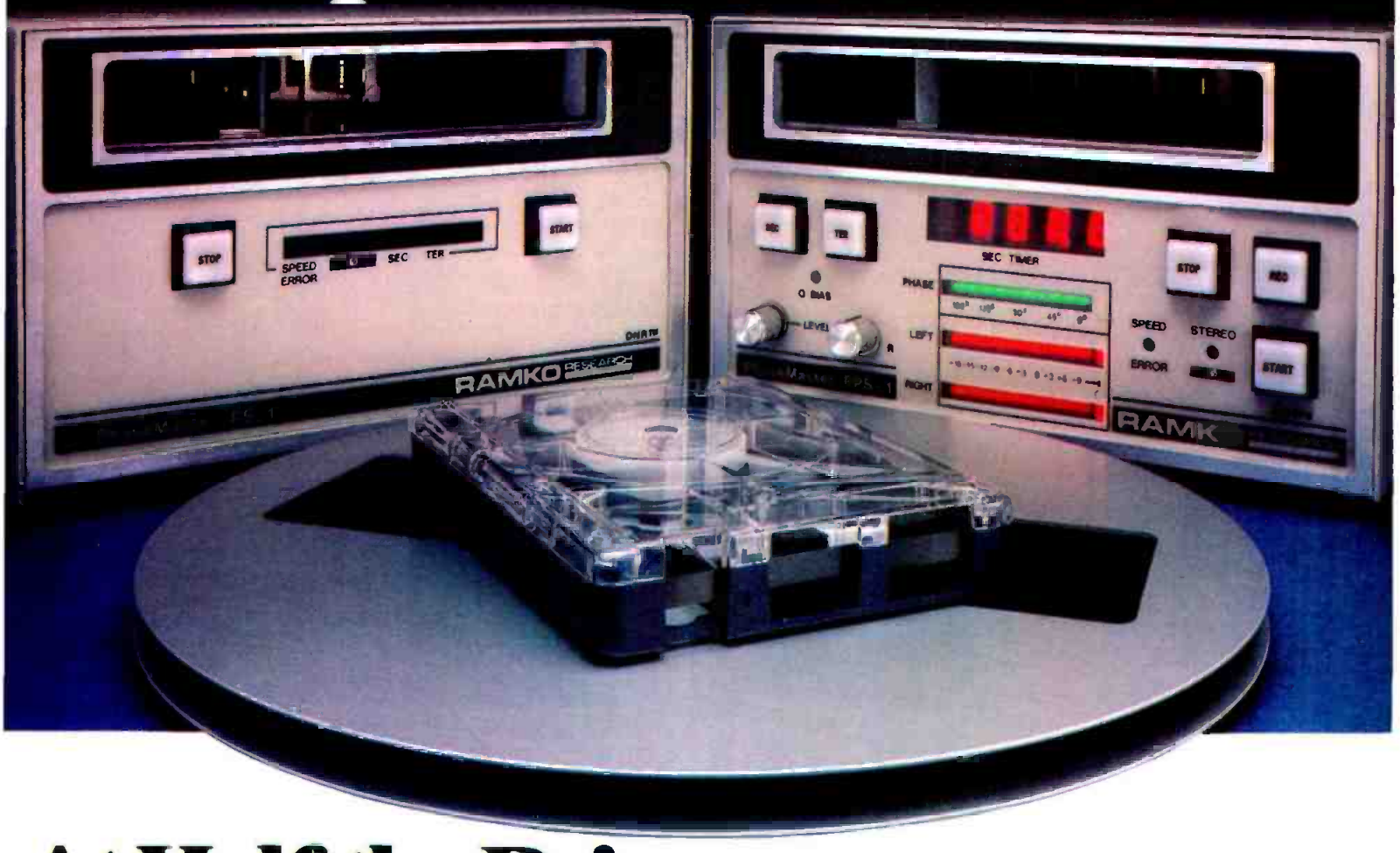
BM/E's exclusive report on the latest trend in post-production . . . radio and TV stations on the road with sophisticated editing systems.



RTNDA REPORT

COMING IN DECEMBER
Best Station Contest

The Performance of an Open-Reel Recorder.



At Half the Price of Its Nearest Competitor.

Let's face it, the secret to better cart machine performance isn't in the cartridge, it's in the machine.

The new generation of improved cartridges and tapes alone can't solve the serious phase stability and noise problems. The plastic cart and its guiding system are highly imprecise, at best. The new "hot" tapes bring a slight decrease in audible noise, which is not terribly significant considering the noise base. The maintenance of precise machine-to-machine head phase alignment has been practically impossible in even the best installations.

The solution to the problem?

PhaseMaster. The industry's most advanced broadcast reproduction system. In the stereo units, our exclusive electronic solution utilizes variable delays in each of the output channels. A sample of the left program channel is encoded on the cue track (without interfering with the cue information), and upon decoding in the playback cycle is compared to its upper track (left program) mate. Thus, an apples-to-apples comparison which is used to correct for the time (phasing) differences due to head misalignment, tape skewing and jitter. It works flawlessly with any cartridge. It eliminates the compromise of unreliable and inconsistent electromechanical schemes; the tradeoffs imposed by noise-inducing and non-compatible matrixing approaches; the complex and inexact cross-correlation methods.

PhaseMaster gives you compatability with all your present, previously recorded carts too. An easy transition can be made at your own pace without having to immediately rerecord your station's entire library. Interestingly, even these carts will sound better due to our new noise-reduction circuitry.

Add to this the performance specifications that rival open-reel recorders and the best mechanical design you've ever seen in a cart machine.

Here's the best news yet: PhaseMaster can be performing in your studios for as little as $1,091.* At $2,600, our Stereo R/P is about half the price of the ITC/3M Series 99B. And the margin's even wider with Tomcat.** If you've given thought to adding the Phasechaser, you're now up to, or over the price of a new PhaseMaster with all of its inherent advantages.

Feature for feature, spec' to spec', dollar for dollar—the Phasemaster comes out on top.

The only way to fully appreciate a PhaseMaster is to get your hands (and ears) on one. To prove to yourself that PhaseMaster really has the performance of an open-reel recorder, that once and for all phase stability, noise and fidelity problems are a thing of the past, that there's a cart machine truly ready for FM & AM Mono or Stereo—write or call us now. We'll loan you a PhaseMaster at no obligation. Free, for two weeks.

Like we said, try it with anybody's cart.

You'll discover performance of an open-reel recorder, at half the price of its nearest competitor.

*Model PM-1 mono playback.
All prices are introductory and subject to change without notice.
**Based upon manufacturer's suggested professional prices 7/82.

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PhaseMaster's Numbers

Wow & Flutter:	0.095% max. DIN weighted (0.04 to 0.07% typical)
Signal-To-Noise Ratio: (Playback)	−68dB. @ 160 nWb/m (A weighted) −72dB. @ 250 nWb/m (A weighted)
Frequency Response:	Amplifier: +0.25 dB (NAB Curve) System: 50 Hz to 16kHz ± 1.5 dB
Phase Correction: (Stereo)	±738° correction range @ 16kHz
Separation (Stereo):	50 dB
Output Level:	+25 dBm
Distortion:	0.3% max. (amplifier)
Price:	$1,091 Model PM-1 Mono Playback $2,600 Model RPS-1 Stereo—Record/Play $2,000 Model RPM-1 Mono Record/Play $1,399 Model PS-1 Stereo Playback

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RAMKO

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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 broad-band 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.

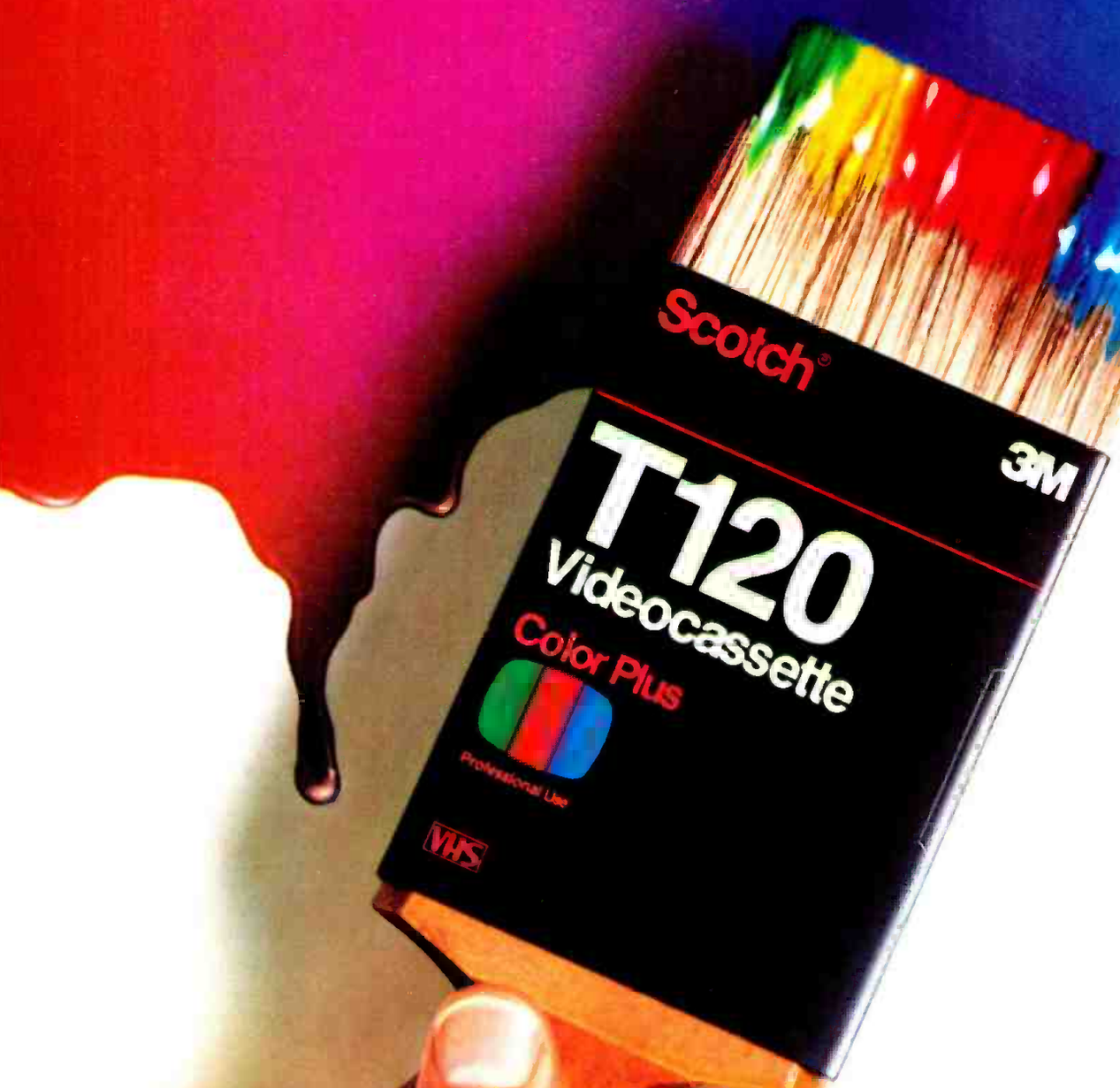
New packaging plus a convenient labelling and hanger/storage system make our half-inch tape professional right down to the last detail.

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

EDITORIAL

Multichannel TV Trouble

FOR THE PAST THREE YEARS, the Multichannel Sound Subcommittee of the EIA's Broadcast Television Systems Committee has been studying the feasibility of multichannel, specifically stereophonic, sound for television. Side-by-side tests of three systems selected as the best contenders—one from EIA-J (the Japanese manufacturers' association), one from Zenith Radio, and one from Telesonics Systems—were run in actual over-the-air broadcasts from WTTV, Chicago.

The object of the study, whose findings already fill two volumes, is to recommend one as "the best" to the FCC, which would presumably adopt it as an industry-wide technical standard. The result, of course, would be a major improvement in the audio portion of the TV signal, long the weak sister of the video component. As early as 1983, U.S. viewers could be enjoying stereo TV audio with the fidelity of FM radio, in addition to several auxilliary audio services.

All three systems examined have similar functions, based on their adherence to EIA guidelines calling for a system compatible with present mono receivers, FM-type modulation with FM-like signal quality, automatic receiver switchover to stereo operation when a stereo signal is present, and other features. The systems also call for an increase in aural carrier deviation to around 70 kHz and increasing the baseband frequency to 107 kHz.

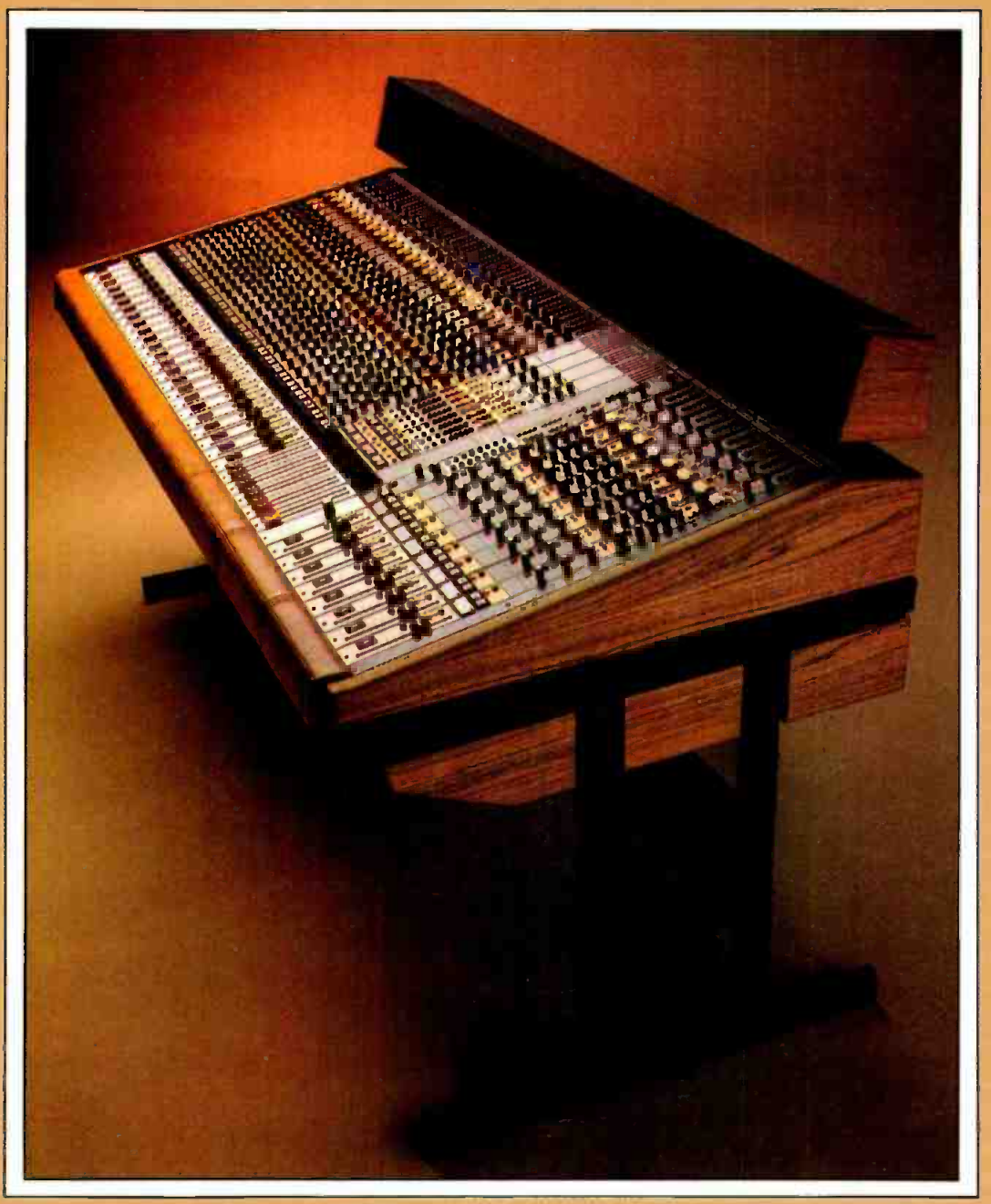
But the difference among the systems are just as profound, principally in how they treat auxilliary program channels, SAP (separate audio program) service for bilingual telecasts, frequency of the pilot signal, spacing between L + R and L − R signal components, and so forth.

Also at issue is the question of audio signal processing—companding—for the TV audio signal, with three systems from dbx, Dolby, and CBS being evaluated separately.

But hold the phone. The subcommittee, on the verge of making a recommendation, has run into a serious snag. Claiming that it had the best test results (signal modulation capability, freedom from ICPM, signal-to-noise ratio, dynamic range, and so forth), Telesonics Systems informed the subcommittee that a decision might lead to antitrust action. Essentially TSI has requested further tests.

This delay could cause the EIA to dump the matter on the FCC, whose staff had prepared rulemaking calling for "marketplace" choice of multichannel TV sound. Considering the dissatisfaction on all sides created by the commission's marketplace decision regarding AM stereo, a replay for stereo television could create another fiasco.

The FCC must not jeopardize the future of a promising technological improvement to video sound by insisting on marketplace theory in what is after all a standards issue. The EIA was in a position to prevent this possibility, but blew it. As of this writing, it appears that the best hope is for a delay by the commission while the subcommittee regroups. Otherwise, we fear another drawn-out period of frustration and confusion. And this time the cause of the confusion is a nondecision by the industry, not government.



Harrison TV-3

STEREO TELEVISION CONSOLE

TV-3 is the only television audio console that provides production facilities and signal-performance specifications which match your high standards of video production. It incorporates virtually every function and feature requested by a wide range of surveyed teleproduction clients.

Eight stereo groups, a versatile separate multitrack-interface section, VCA input grouping, and automation make TV-3 the perfect console for all audio production, post-production, and master control applications.

If your sound goes with pictures, we have what you need.

HARRISON SYSTEMS, INC./P.O. Box 22964, Nashville, Tennessee 37202/(615) 834-1184, Telex 555133

Circle 104 on Reader Service Card

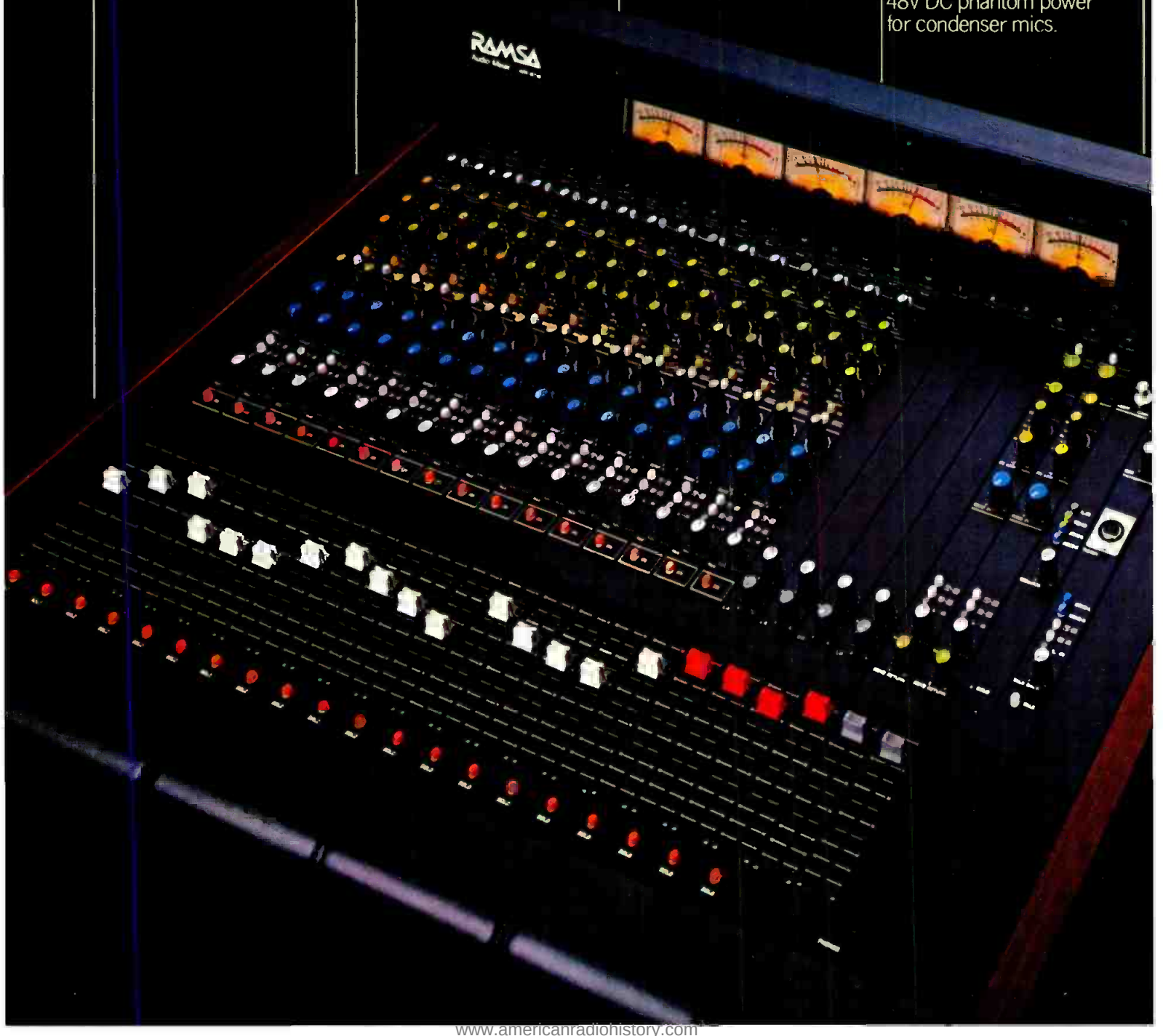
If you're ready to move up to a specialized mixer, you're ready for Ramsa.

The Sound Reinforcement Specialist: Ramsa WR-8716

When your sound says you're professional but your mixer doesn't. When you're wasting your subtlety and style on "make-do" boards. When you're creating compromises instead of clear-cut distinctions. Then you're ready for Ramsa—the mixers that are specialized so you won't have to compromise.

The WR-8716 is a fully modular sound reinforcement console with 16 input modules, 4 group modules, and 2 masters. It features 16 input pre-fader solo buttons, 4 group modules with pre-fader insertion patch points, and lockable post-fader solo buttons. There are 6 illuminated VU meters with peak LED's for easy outdoor reading and a separate stereo variable frequency EQ for monitor sends. Pan pot controls allow panning to the left or right masters while level controls permit 16 x 6 board operation. The left and right direct channel assign function lets you bypass the group modules for individual sources. Portable operation is a snap with easy access connectors.

And the WR-8716 features plastic conductive faders for greater reliability and smooth, low-noise operation; external power supply for light weight, and switchable 48V DC phantom power for condenser mics.



RAMSA

The Recording Specialist: Ramsa WR-8816

The WR-8816 recording console includes the same modular construction, input modules, power supplies, and faders as the WR-8716 plus many important recording advantages. Like direct outputs for 4, 8, or 16 track recording and peak-reading LED meters that let you monitor any 4 out of 24 signals with clear, quick response.

You'll command a variable frequency EQ section with 3 frequency settings for the high and low frequencies plus continuously variable midrange. Stereo echo send replaces the separate mono controls you'll find on competitive boards. And you get two independent stereo monitor controls—one for musician's headphones, one for control room monitors—a special feature for any mixer in this class. And there are other important features like low noise electronically balanced mic inputs with high-speed IC's, 16 switchable post-fader solo controls and XLR-type mic connectors.

Ramsa offers a full line of specialty mixers including the more compact WR-8210 recording mixer and WR-130 sound reinforcement mixer. So don't hold down your professional sound, call (201) 348-7470, because you're ready for Ramsa.

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Panasonic®
PROFESSIONAL AUDIO DIVISION

U.S. Readies RARC Stance as FCC Grants STC's CP

Amid challenges to the U.S. position for the upcoming Regional Administrative Radio Conference (RARC) and general consternation in the broadcast industry, the FCC in late September granted Satellite Television Corp. a construction permit for its proposed DBS system.

The CP was given with the caveats that the Comsat subsidiary must find its funding from non-Comsat sources, and that any future grants of funds from Comsat to STC must be approved by the FCC. The conditions reflected concern among the commissioners that the financial drain of a less than successful DBS service could impair Comsat's ability to provide international satellite communications services.

Commissioner Anne Jones, the lone dissenter in the action, pointed to the "great financial risks" involved in the enterprise. Commissioner James Quello, who voted for the proposal, admitted to "a continuing concern about the potential adverse impact direct broadcast satellite programming may have on local broadcast service."

The broadcast industry has been especially concerned about the effect of DBS on local and national broadcasting, and NAB plans to appeal the FCC's action.

The FCC, which was expected to act on the eight remaining DBS proposals within the next few weeks, noted that assignment of frequencies and orbital slots for the STC system, as well as launch and operation authority, would have to wait until results are in from RARC.

Complicating the U.S. bargaining position at the conference will be Canada's request for space for its own DBS system. Canada's proposals in several respects conflict with those of the U.S.

Former FCC Commissioner Abbott Washburn will chair the U.S. delegation to RARC, which will take place June 13 to July 15, 1983, in Geneva, Switzerland.

Broadcasting, Cable Meet in New Mass Media Bureau

The FCC's Broadcast Bureau will combine with its Cable Television Bureau to form the new Mass Media Bureau, under a plan recently voted in by the Commission. The long-expected move, which will involve no loss of staff, must be approved by both houses of Congress.

Broadcast Bureau chief Larry Harris will head the new bureau, assisted by two deputy chiefs—Henry Bauman (now deputy chief of the Broadcast Bureau) and William Johnson (now Cable Bureau chief). The recombined bureau will be structured into four divisions: video services, audio services, enforcement, and policy and rules. Heading each division, respectively, will be Roy Steward, Larry Eads, Charles Kelley, and Roderick Porter. Marilyn McDermett will head the administration and management staff under the new organization.

ABC Inaugurates Live Closed Captioning

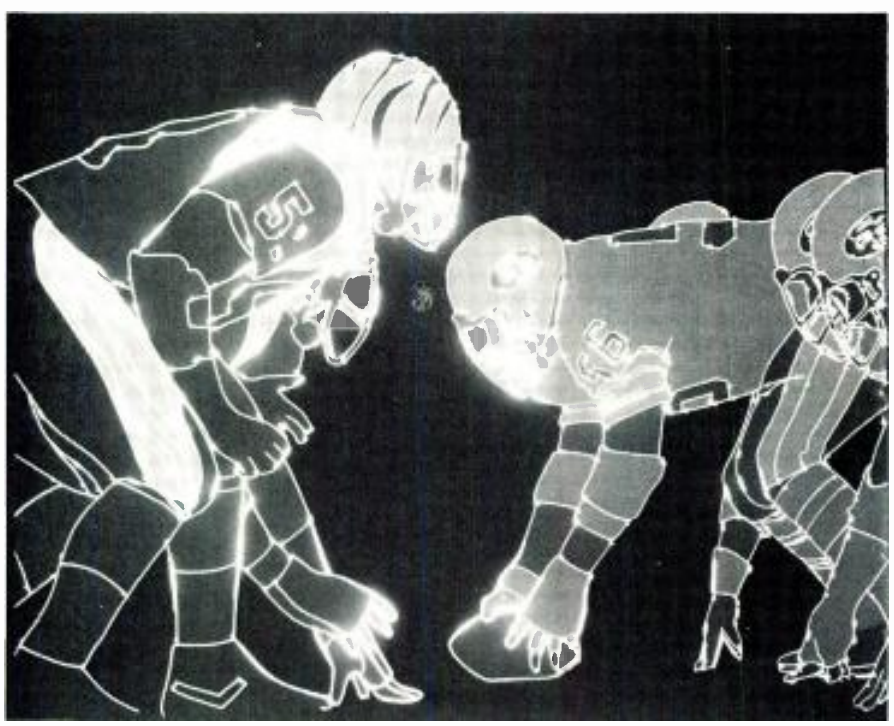
In a move anticipated for several years, the ABC television network has inaugurated live closed captioning service on a regular, daily basis. Beginning October 12, *World News Tonight* has been carrying line 21 encoded messages entered as the newscast is in progress.

The new live system makes use of courtroom-style stenography fed into a Translation Systems, Inc. (TSI), processor that converts the shorthand into full words and positions the captions as a four-line rollup message at the bottom of the screen. The system was developed jointly by ABC and the National Captioning Institute.

Explaining ABC's commitment to the project, Broadcast O&E president Julius Barnathan pointed to growing numbers of viewers who can receive closed captioned material with line 21 decoders. There are currently some 60,000 decoders in the U.S. (with an average of over four viewers per set). This number, Barnathan remarked, is larger than 35 broadcast markets in the U.S. and an increasing source of viewer interest.

ABC currently airs some 14 hours per week of closed captioned programming, including NFL football games, when they are played. Over 100 advertisers also participate in the project and have their spots translated by NCI. The *World News Tonight* project is funded for two years by the Department of Education.

In the live closed captioning project, a courtroom stenographer sits at the NCI headquarters in Washington, DC,



With real football players scarce this season, electronically generated ones may become the new rage. This 60-second opener for HBO Sports' Inside the NFL *incorporates rotoscope animation and motion graphics special effects created by designer/director Kathy Landman of Harold Friedman Consortium.*

MASTERFUL PERFORMANCE

You are assured of one masterful performance after another because the DA16B/CH20B provides audio distribution of unquestioned reliability. It offers a unique combination of features for exceptional versatility.

- Each amplifier is a one-input, six-output plug-in card.
- The input, and each output is individually transformer coupled.
- Input levels up to +27 dBv; output levels up to +27 dBm before clipping.
- Output amplifiers have individual, front accessed gain adjustment, and a test point.
- Each CH20B will house up to six DA16B cards, and has a complete set of redundant power supplies with automatic changeover.

But probably the most important feature of all is ADM's unexcelled built-in quality—quality backed by a five-year unconditional warranty.

Contact us today for the complete story about the unique DA16B/CH20B system.

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listening to the telecast and entering the captioning; top speed is more than 225 words per minute, more than enough to keep pace with the fastest speaker, at around 175 wpm.

The output of the TCI computer is then sent back to ABC's master control over telco lines and inserted into the feed.

Barnathan also revealed that in an even farther-reaching experiment, the network is working with Beston Electronics (BEI) to develop a system for closed caption encoding of locally originated programming. The BEI Dataprompter, a microprocessor-based teleprompter/character generator, would automatically relay the newscaster's reading script to the caption encoder, eliminating the need for a stenographer.

Half-Inch Video Advances Sans Format Agent

The failure of a working group of the SMPTE Committee on Video Recording and Reproduction Technology (VRRT) to reach agreement on a single standard for half-inch video recording has not stopped Opryland Productions of Nashville, TN, from investing in the Matsushita format.

According to Opryland chief engineer Hugh Hickerson, the teleproduction facility recently purchased three Panasonic Recam camera/recorder combos and 12 RCA Hawkeye HR-2 half-inch studio recorders for the Nashville Network, a cable programming service it produces. Nine of the HR-2s, which operate on RCA's Chroma Trak recording format, will be used to originate commercials for the Nashville Network; the remaining three will be used to edit material produced on the three Recams.

The SMPTE group, which met late in September, reported that it had reviewed favorably the Betacam format submitted by Sony Corp., finding both it and the Matsushita format, backed by RCA and other manufacturers, to meet all user requirements. The members were unable to agree on a single standard, however, and the VRRT therefore voted to disband the working group and organize one to develop an interface standard for analog component TV signals. The new group's organizational meeting will take place November 10 during the SMPTE conference in New York.

New Ampex VTRs Wow IBC Show

Proving that the biennial IBC show in Brighton, England, is not just a rerun of the NAB, Ampex Corp. came to this year's gathering, September 18 to 21, with some important new VTR equipment, including the first showing of its recorder/camera unit.

The Ampex introductions—one-inch Type C machines and half-inch Matsushita-format units—will "put a lot of pressure on the ¾-inch format," one company spokesperson observed. The positioning of the new products bears out this remark.

The Ampex Nagra C VPR-5, the result of a joint development project with Kudelski S.A. in Switzerland, is a portable one-inch helical scan VTR that weighs less than 15 pounds with tape and battery installed. Playing time is 20 minutes, but for studio and tabletop use the unit will accommodate 60-minute reels. The VPR-5 owes much of its portability and ruggedness, as well as its audio characteristics, to the Kudelski partnership, according to Ampex. Priced at $45,000, it will be available in December.

The latest Ampex entry for high-quality production work is the VPR-3 one-inch Type C VTR. The company

RESPONSIVE SOLUTIONS CREATED BY POPULAR COMPLAINT

You've heard the complaints a thousand times. The sound is muddy, distorted, unintelligible! The system just isn't doing the job! The darn thing is in trouble again! Yet these inadequate communications systems are continually patched, reworked and rebuilt, running up costs and ruining schedules.

The field-proven RTS Systems' TW INTERCOM effectively solves these problems to deliver outstanding sound quality in any teleproduction, broadcast or industrial application. It's a high-performance conference-line system that offers remarkable reliability, coupled with extensive capabilities.

A selection of 30 components make up virtually any custom configuration. It's everything you need and want in a system, but never thought you could get.

All of this performance translates into lower costs, smoother operations, and production schedules that are met, time and time again. The TW INTERCOM SYSTEM, engineered by the company dedicated to providing responsive solutions to communication problems – RTS Systems. So stop complaining! Call or write Marie Hart today for more information.

RTS Systems INC

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RTS SYSTEMS, INC. · PROFESSIONAL INTERCOMMUNICATIONS · PROFESSIONAL AUDIO PRODUCTS
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claims the sophisticated, fast VPR-3 is the first VTR on the market with vacuum capstan transport, a design feature of computer tape drives that combines speedy transport and precise handling. In addition, gas-film guides reduce the friction that builds up in Type C recorders.

The VPR-3 features a menu-based display with six "soft keys" that permit the operator to call up multifunction menus, which then appear on a flat-panel fluorescent display. The basic unit is about $68,000, with delivery promised for the second quarter of next year.

However, Ampex put icing on the cake by announcing that ABC Television Network had signed a contract for 100 VPR-3 systems valued at approximately $10 million. Deliveries will begin in April 1983.

The first showing of the ARC-10 integrated recorder/camera revealed no essential differences from the configuration that supplier Matsushita Electric Industrial Co. of Japan uses for the Panasonic Recam. Weight is just under 22 pounds and recording time is 20 minutes. The camera portion has three tubes with a choice of ⅔-inch Saticons or Plumbicons. The ARC-10 goes for $35,900 for the basic system, less lens. Also included in the family are the ARC-40 studio VTR and the ARC-30 electronic edit controller.

NRBA Convention Wins Big In Reno

Signs were optimistic at the recent 1982 National Radio Broadcasters Association convention. The theme was "Radio: Win Big in the '80s," and NRBA itself scored a big win this year. The association rebounded from last year's near-disastrous Miami convention with attendance of 4500, including exhibitors.

In his address, FCC Chairman Mark Fowler praised NRBA for its guts in supporting spectrum fees, however modest. More deregulation is coming, Fowler promised, citing the end of the three-year trafficking rule as a particular goal consistent with marketplace regulation.

Despite the program's broad appeal, management sessions offered few fresh insights. The technical sessions were better in this regard (see following story). Management sessions typically featured a panel of broadcasters describing their successes in programming, sales, promotion, satellites, or computers. Attendees learned, for example, that the computer is now nearly indispensible and quite affordable.

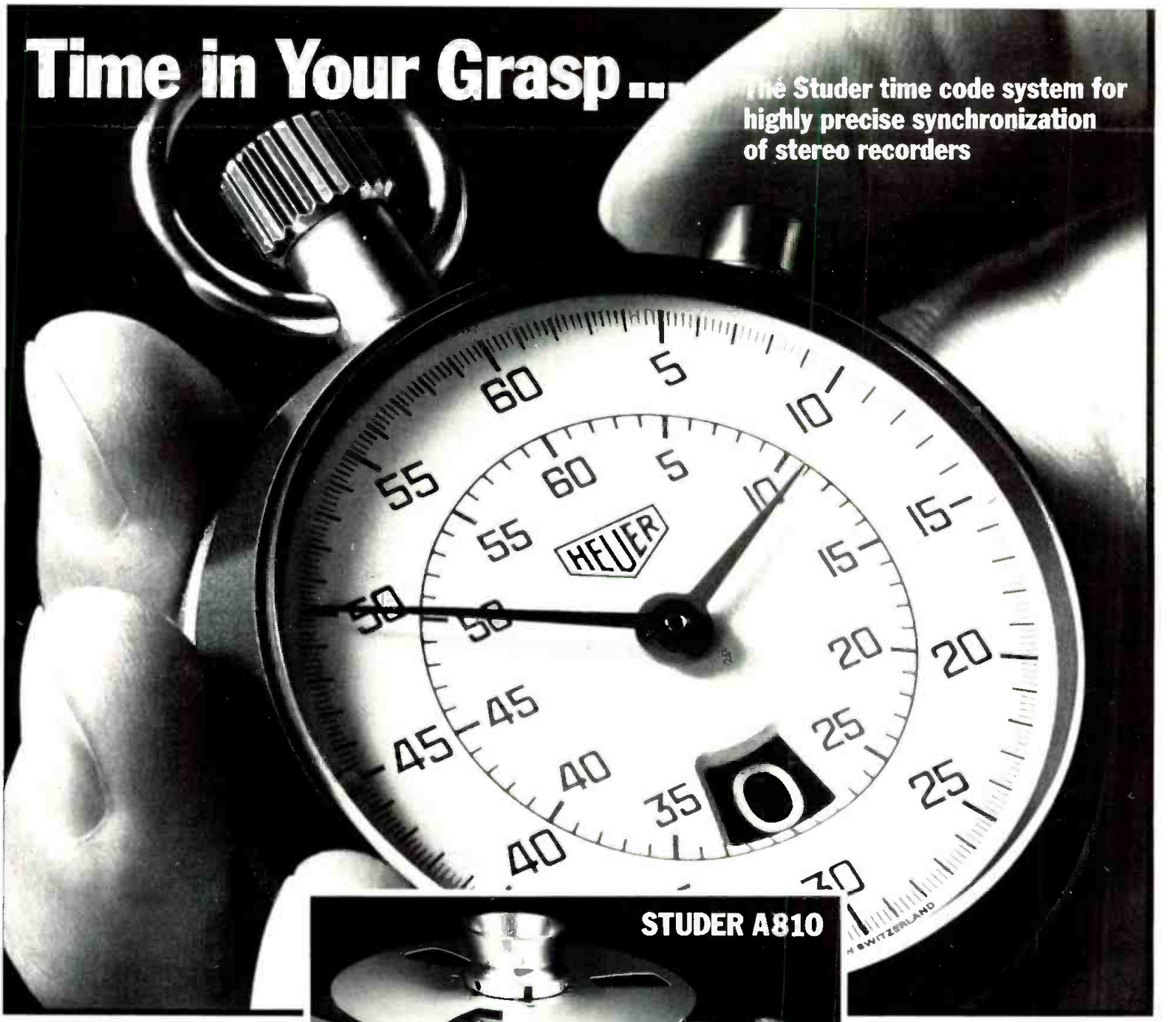
Another bit of wisdom was that a consultant may pay for himself if a station improves its ratings by several points—if the market can supply the needed points. The real benefit of an outside expert, according to one panel, is his ability to generate creativity and innovation in the staff.

The exhibit area revealed little not already seen at NAB last April. One product getting its premier showing was a radar system for radio weathercasting from Radac Marketing, Inc., of Memononie, WI—reasonably priced at $13,000.

The single biggest group of exhibitors were those featuring business computer systems. On hand were Computer Concepts, Custom Business Systems, Dexel Systems, Nidus Broadcast Systems, Radio Computing Services, Register Data Systems, Spectrum, Station Business Systems, and Station Research Systems. Cetec brought no equipment, but featured a videotape promoting its system. Satellite distribution from regional networks was the big theme at Satellite Systems Corp., Wold, and AT&T (in the M/A-Com

Time in Your Grasp...

The Studer time code system for highly precise synchronization of stereo recorders



The new Studer A810 points the way to the future; now even two-channel ¼" stereo recorders may be perfectly synchronized. Precise SMPTE time code synchronization and maximum crosstalk rejection are attained by separating time code heads from audio heads, and by using a microprocessor-controlled delay. Studer has finally solved the problem of synchronizing stereo machines!

Until now SMPTE-code synchronizing of video-audio, film-audio, or audio-audio has been restricted to multi-channel machines. But such linkups pose no problem for Studer's A810 time code recorders. Designed for maximum system flexibility, the A810 has a fully digital control system for both the tape transport functions and audio electronic alignment. And, for the first time in the history of audio recording equipment, the A810 offers complete data exchange to peripheral equipment via serial interface. The bus-compatible A810 is ideally suited to complex automation tasks, and the A810's flexible modular concept allows simple, cost-effective changeover to specialized configurations.

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DCC booth). Low power uplinks with less than 15 kHz bandwidth can reduce costs greatly, making state networks feasible. Satellite Systems announced regional services for Louisiana and Mississippi. The project will include two uplinks and 89 receive terminals.

New Rules for Peak Deviation Suggested

A review of FCC rules regarding peak deviation and occupied bandwidth shows them to be substantially in conflict with each other, according to Eric Small of Modulation Sciences. The result, he said, is "awful FM broadcast quality, on the whole." Small made these charges at the recent NRBA convention during a session on FM modulation.

One rule, for example, says that limiting or compression should not substantially alter the dynamic characteristics of programs (73.1570(c)). Nonetheless, tightly compressed stations often have an output varying no more than 3 dB. If a typical record were played legally without compression, it would modulate a transmitter at only 18 percent, said Small. S/N would be poor and coverage nil.

Although some rules say that 99.5 percent of the transmitter energy should be within the allowed bandwidth, the standard measurement looks only at modulation. It is assumed bandwidth is related—75 kHz deviation is defined as 100 percent modulation. The FCC says modulation excesses must be held to less than 10 occurrences per minute (73.342 (b)), ostensibly to prevent energy spillover into adjacent bands. But Small claims there is only a casual relationship between peak deviation and occupied bandwidth, and he provided figures to show that stereo modulation, for example, occupies less bandwidth than mono—166 kHz versus the allowable 240 kHz (double sideband) for a 15 kHz modulation signal. Audio processing widens it, however.

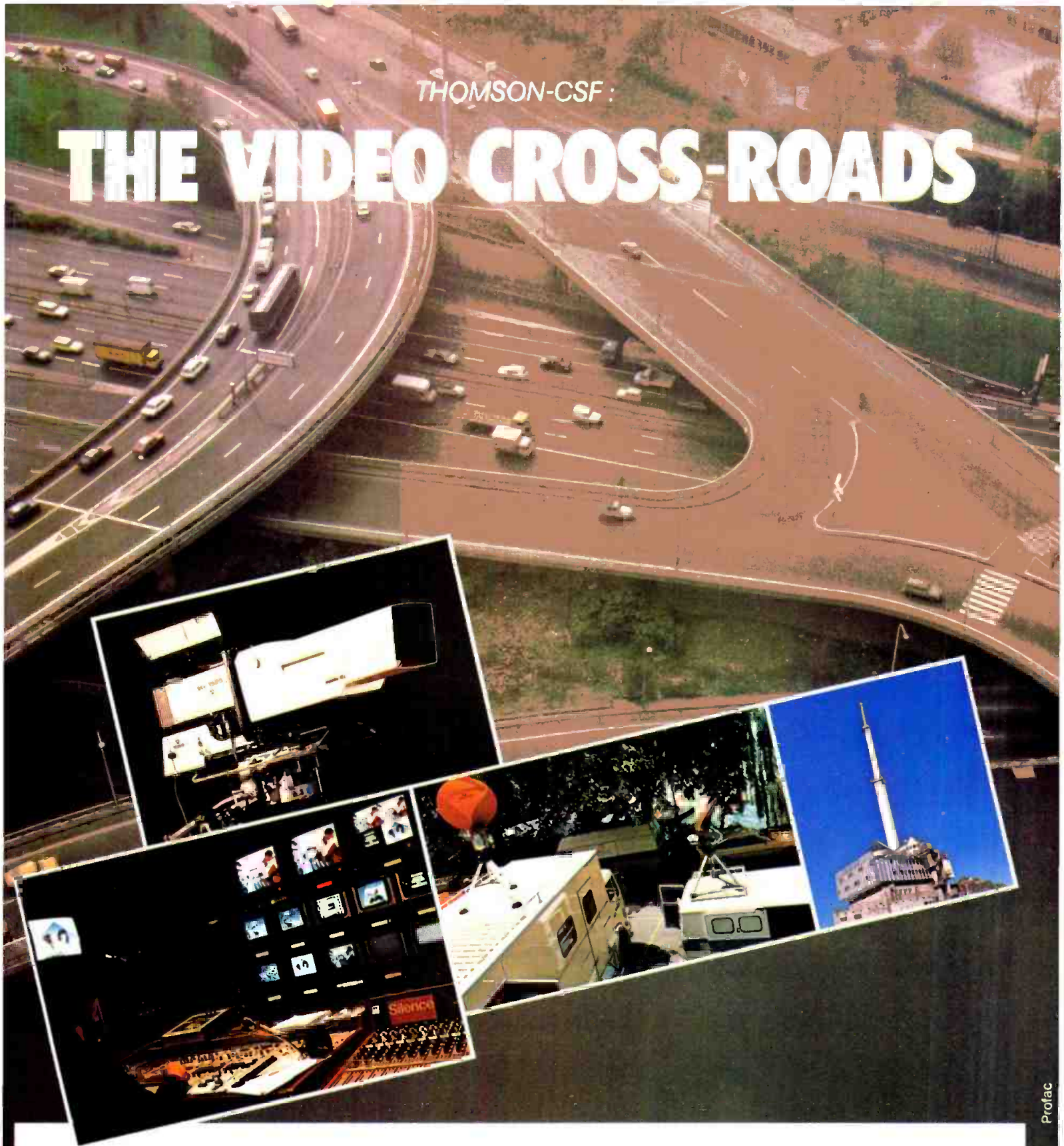
The situation presses for a rule change, Small argues, since peak deviation and occupied bandwidth are not the same thing. In fact, says Small, the new proposed SCA rules allow 110 percent modulation if the second SCA carrier is at 90 kHz. Measuring occupied bandwidth inexpensively is a problem, but Small believes some indirect methods might be possible.

To avoid penalizing the broadcaster who would like to reproduce a musical record faithfully, Small proposes allowing as many as 200 peak occurrences at 250 percent. These figures are arbitrary, he notes, since research on the effect of such peaks on bandwidth has not been conducted.

In the discussion that followed, 75 μs preemphasis curves were judged to have outlived their usefulness—most agreed 25 μs would be better.

Reacting to Small, Dane Ericksen of the FCC's Western Division said the biggest problem with measuring occupied bandwidth would be the need for a spectrum analyzer with storage capability—an expensive unit. He showed some slides where occupied bandwidth is exceeded by some stations but probably due to improper setup. Charlie Haubrick of QEI commented that current receivers would limit or clip wideband, creating distortion.

Similar considerations came up at the technical session devoted to the newly proposed rules for FM SCA. Both Lou Dorren of Quadracast and John Kean of NPR provided evidence that several SCAs could run at over 100 percent modulation without adding to spectrum pollution. The biggest pollution offenders, said Dorren, are improperly adjusted exciters, which can be cleaned up.



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NEWS BRIEFS

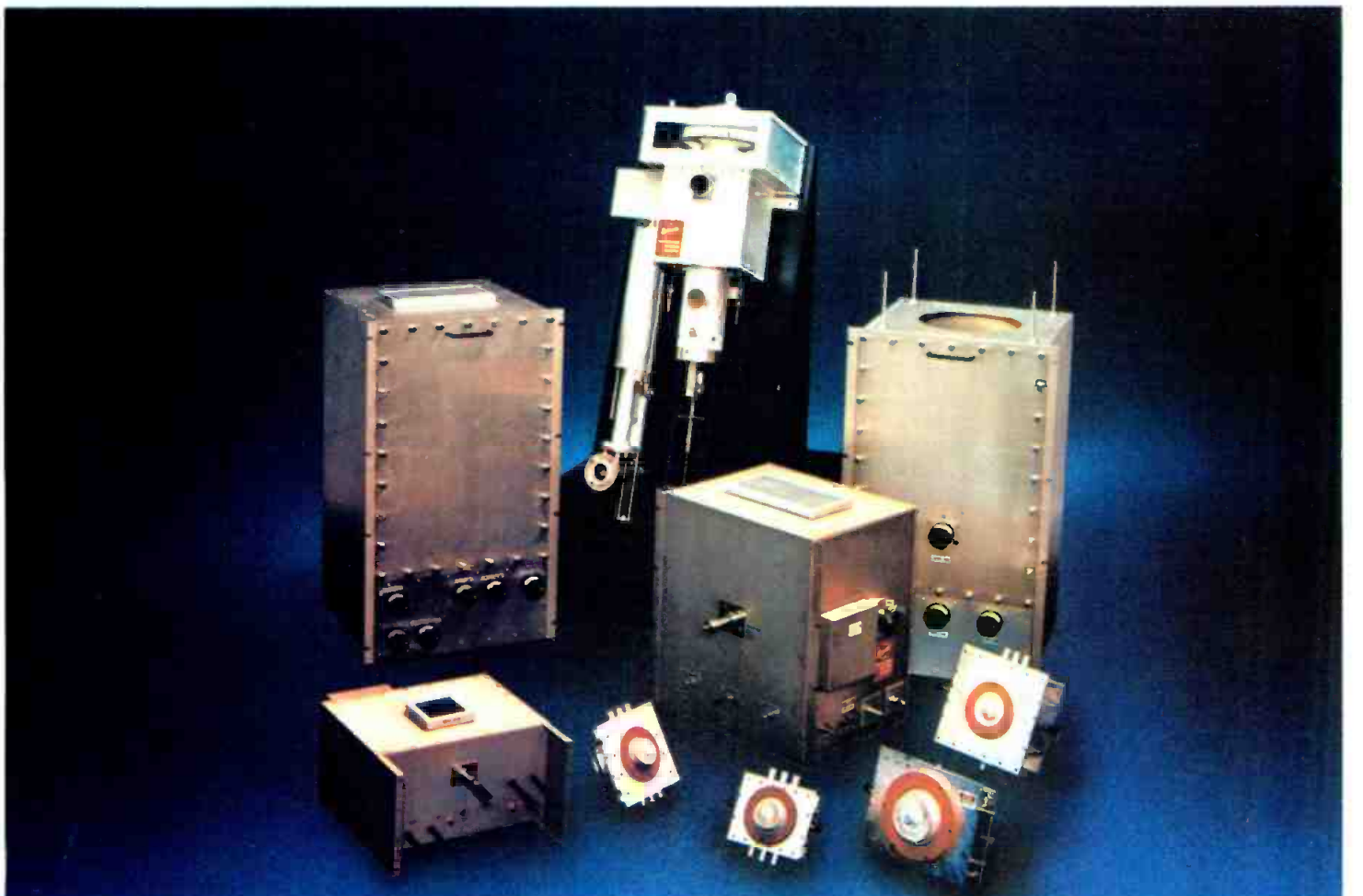
Stephen A. Sharp has assumed his seat on the FCC, replacing former commissioner Abbott Washburn . . . . Working to keep the **Cuban interference problem** alive in the minds of regulators and policy makers, NAB's All Industry Task Force on Cuban Interference recently met with representatives of the FCC and the State Department to explore possible courses of action for the U.S. . . . . Meanwhile, the FCC has closed down two **unlicensed radio stations** in the Miami area, broadcasting in Spanish as "The Voice of Independent and Democratic Cuba." The broadcasts were aired on 5106 kHz and 7355 kHz.

The House Energy and Commerce Committee has approved a bill that would strengthen the **syndicated exclusivity requirements** for cable operators and continue the must-carry rules for noncommercial and conventional channels. The compromise bill, supported by both NAB and NCTA, makes cable operators who violate syndicated exclusivity rules liable for copyright infringement . . . . **Few vacancies exist** for commercial VHF and UHF stations in the U.S., according to a recently released report from the FCC. No VHF commercial channels are vacant or not applied for in the top 200 markets; just 99 UHF commercial channels in those markets are not spoken for . . . . Demographic changes over the next decade will have a strong impact on **radio station formats,** according to an NAB-commissioned study entitled "Tomorrow's Radio." The study forecasts a one million decline in the 16 to 24 age group, the primary listeners to rock stations. Greatest growth is seen for the 35 to 54 group, boding well for C&W.

Ted Turner reportedly is going ahead with plans to form a **fourth television network** to compete with CBS, ABC, and NBC. Following the success of his Cable News Network and CNN Headline Network, now cleared by almost 110 broadcast stations, Turner is looking towards increasing his broadcast syndication operations . . . . Gen. William C. Westmoreland wants **$120 million in damages** from CBS for "false, unfair, inaccurate, and defamatory" charges allegedly contained in a documentary on the Vietnam War. CBS will "mount a vigorous defense," said CBS News president Van Gordon Sauter.

With **NFL football off the air** due to the players' strike, a federal district judge in Oklahoma City has voided the National Collegiate Athletic Association's authority to control sale of TV rights to college football games. This ruling, which is expected to be appealed by the NCAA, would give individual colleges the exclusive rights to their own teams' games . . . . Arbitron will phase out its **printed monthly reports** in about a year and replace them with computer-accessed three-month rolling averages. . . . September was a bad month for birds as **three communications satellites** bit the dust. Two European satellites—one for Inmarsat and another for Italy—crashed into the Atlantic shortly after launch on Ariane. The third, an Indian DBS bird, fell out of orbit and could not be recontacted.

The Gannett Co. has purchased Chronicle Broadcasting's **KRON-TV,** San Francisco, for $100 million plus Gannett's **KOCO-TV,** Oklahoma City. Gannett is also selling its **KARK-TV,** Little Rock, AR, after buying Metromedia's **WTCN-TV,** Minneapolis . . . . Metromedia had previously purchased Chicago UHF indie **WFLD-TV** for $136 million . . . . **WVAH-TV,** described as West Virginia's first full-service independent TV station, has signed on air in the Charleston/Huntington market.



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CV-2240	3CX10,000U7	54–88	10 kW†
CV-2250	3CX10,000U7	170–227	10 kW†
CV-2400	8874	420–450	300/1250 W*
CV-2800	3CX400U7	850–970	225 W
CV-2810	3CX400U7	910–970	190 W

*pulsed power
†peak sync, or 2.5 kW combined in translator service

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BUSINESS BRIEFS

Gotham Audio Corp. has acquired 100 percent of the stock of **Quantum Audio Labs.** This is the first time in its 25-year history that Gotham has entered the manufacturing field . . . . **Chyron** has signed a letter of intent to acquire privately owned **Sterling Television Presentations, Inc.** and its operating division, Video Data Systems of New York, who designs and manufactures graphics display systems . . . . **Dilor Industries Ltd.** of Canada has announced the purchase of the name and assets of **Skirpan Lighting Control Corp.** from **Compact Video, Inc.** of California.

A new UHF TV station serving Springfield, MO is scheduled to go on the air by the end of 1982 using **RCA** transmitting systems valued at approximately $1 million . . . . **Dielectric Communications** has received contract awards worth more than $1 million to provide a ten-port modular multiplexer designed for a 35 kW FM station for total power handling capability of 350 kW average power . . . . **Microtime** has announced the first worldwide deliveries of the S-130 framestore synchronizer.

Modulation Associates has received an order from **Transtar** and its affiliates to provide receive-only satellite terminals for the full 15 kHz audio stereo programming, simultaneously receiving 12 automation control functions . . . . **Phasecom** has signed a licensing agreement with **Hughes Aircraft Company's** microwave communications products for Phasecom to manufacture and market Hughes' satellite video receiving equipment . . . . the formation of a **Satellite Systems Business** section with worldwide responsibility for the design, manufacture, and marketing of all satellite-related products was announced by **General Instrument Corp.**

Sony sold its third BVP-330 camera to **Catalyst Productions** because of what they claim is its film-like image . . . . **KRON-TV** in San Francisco has purchased 16 Sony DXC-6000 video cameras . . . . **KBTV** in Denver has expanded its ENG coverage with the purchase of five BVP-330 cameras, nine BVU-200A editing VCRs, three BVE-500A editing consoles, and five BVU-50 portable VCRs.

Editel has ordered three **CMX** FLM-1 computer-assisted film editor controller systems for use in its Los Angeles-based production facility . . . . **Telemation** has been awarded a $500,000 contract by **Metrosports, Inc.** to provide mobile production facilities and crew for a schedule of upcoming NCAA football and basketball games.

Ampex has signed a contract with **Capital Cities Communications** in New York valued at $1.4 million to supply VPR-2B VTRs . . . . **Devlin Productions** recently went on line with its new Ampex ESS-2 digital video production system, a computer-type disc recording technique for use of still pictures . . . . **VCA/Teletronics** has developed the Palette III, an exclusive film-to-tape transfer process.

RCA announced two personnel changes with Richard Sonnenfeldt appointed to staff VP, business resource planning, and James Griffin, chief engineer for broadcast video systems. . . . . **Panasonic** named Larry Ingenito as sales manager for the company's audio-video systems division . . . . Charles Nangle was promoted to the position of exec. VP, finance and administration for the **American Satellite Co.** . . . . Campbell Morrow was appointed managing director of **Rohde & Schwarz** UK Ltd. . . . . **Data Communications** announced that Greg Calhoun was named assistant sales manager for **BIAS.**

Studio Standards

Canon 18X Series, Canon 12X Series

Canon broadcast television lenses represent the state-of-the-art, providing an exceptional combination of advanced electronic technology, mechanical durability and optical superiority.

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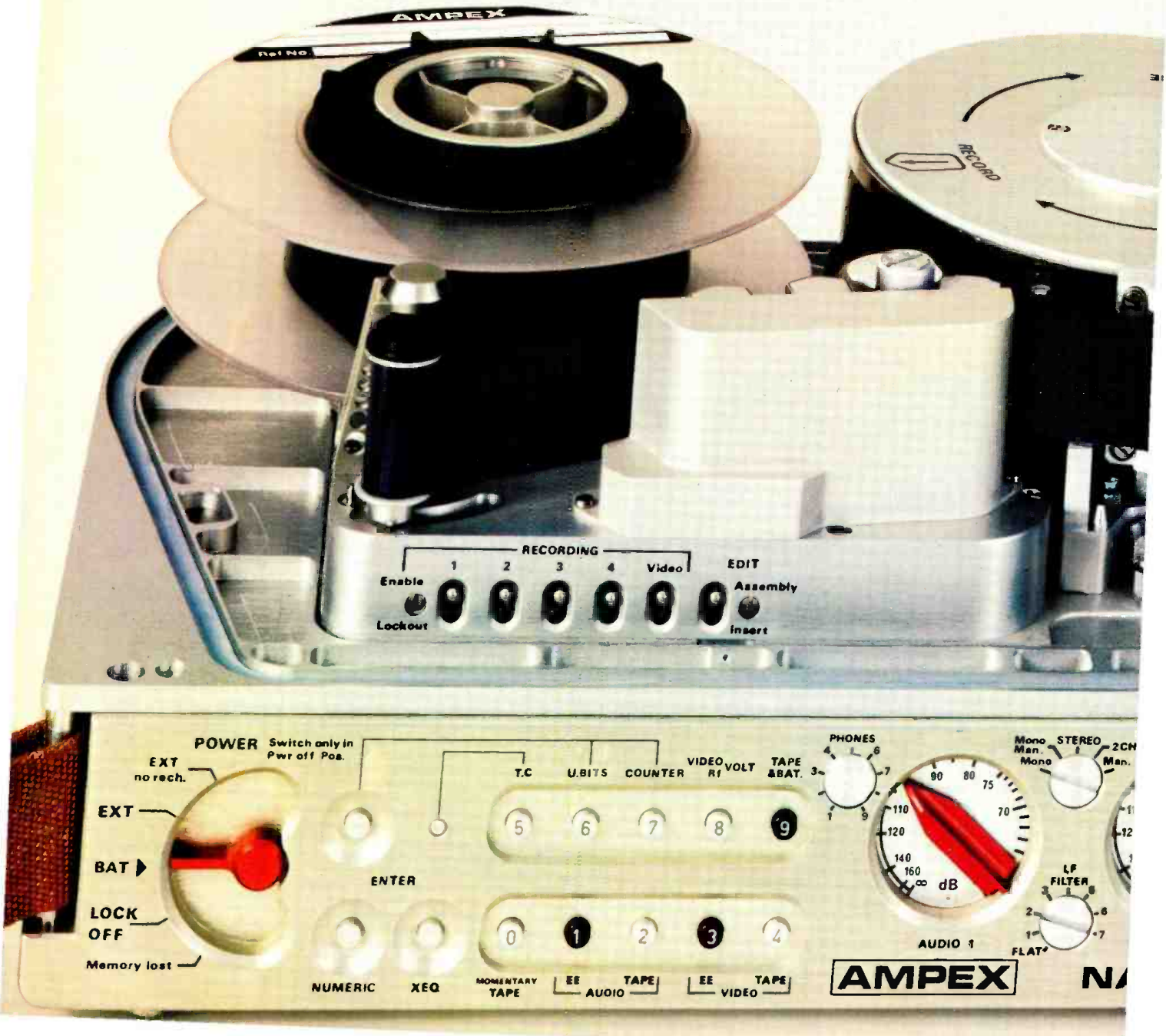

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We've started a VTR revolution by combining our talents with those of Kudelski SA, an innovator in audio technology, to create the Ampex Nagra VPR-5. At 15 pounds (including 20-min. reels, battery and cover), the VPR-5 is the world's lightest most portable one-inch Type "C" VTR.

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KGW-AM: Holding Off an FM Invasion

"WE TALK TO at least some people every single day to find out what they like and don't like about our music, our air personalities, our news coverage, etc.," Bill Minckler, program director of KGW-AM in Portland, OR says. "We also have a very strong program of audience research, frequently using telephone sampling, focus groups, mail questionnaires, and a weekly call-in program that opens to us a lot of the thinking of our audience, their concerns, and what their priorities are."

This is at least part of the reason KGW, one of the oldest in the industry, has kept up to date, despite several new FM stations pushing hard in the city. KGW was founded in 1922, one of the first years of commercial broadcasting in the U.S. Currently the station is putting its 5 kW signal on the air 24 hours a day.

The programs are built on "Adult Contemporary" music put together in the station, along with a large volume of local news, community affairs programs, public service activities, and other operations aimed to keep the station in close touch with the city's people. "We rub elbows with the people of Portland in every way we can," says Minckler.

As to the music, Minckler admits that the name "Adult Contemporary" has become so elastic as to be almost meaningless. KGW's music is nonrock, targeted for the 24-44 demographic, with a basically conservative tone. The targeting is by no means haphazard. The audience research is used to refine the choice of music, and the programs can thus be attuned closely to the tastes of the desired audience. The result is a very strong response to the music, giving the station a solid hold on the target group.

Younger listeners in the city, Minckler says, have to a considerable extent gone off to rock music on one or another of the FM stations. He is not unhappy about this, since it sharpens the demographic position of his own station.

But the music is just one part of KGW-AM's hold on the top ratings. The very comprehensive news operation is another vital part; and a third is the strong community leadership stance that KGW-AM has built.

For the news, KGW has a staff of eight people, working with outside pickup vans, a helicopter, and completely equipped news editing and preparation rooms. From five a.m. to eight p.m., the local news goes on regularly for eight minutes at the top of each hour. During the morning and afternoon drive times there are expanded newscasts.

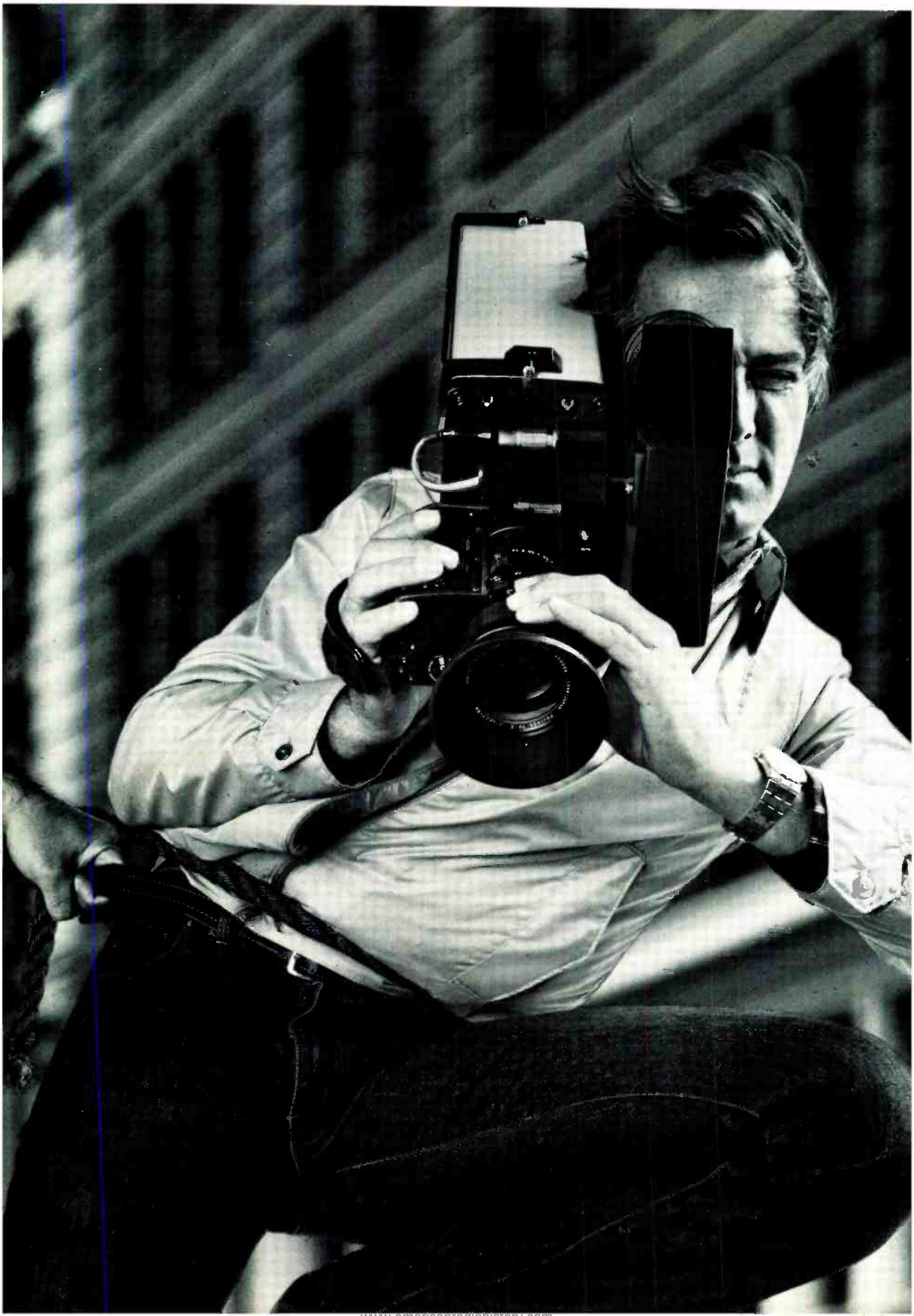
From nine p.m. to four a.m., KGW takes top-of-the-hour news from the RKO Satellite Net, with a feed from the AP sat terminal in the city (a California Microwave system).

A number of other RKO programs, Minckler says, fit beautifully into the KGW style. Some of the news commentary programs, such as the Sunday morning *Newsline*, are taken regularly. The RKO weekend music specials are also strong with the KGW audience when they are not too definitely in a rock style. And Minckler likes the high technical quality of the RKO transmissions.

KGW-AM reports on important community affairs, often helping the operation with communications or public address services. But the biggest community affair of all is one created, organized, and run by KGW-AM itself. Called the "Neighborfair," it is a yearly exposition and entertainment gala set up on the Portland waterfront. The last few years the Neighborfair has pulled more than 500,000 people each time for the single-day event.

There are three outdoor stages set up for music, on which a number of local groups give the crowd big-band, jazz, and rock concerts. There are two beer

A part of the 500,000 people who came to the Portland "Neighborfair" annual community event created by KGW.



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A *super-light* camera you can float on your shoulder hour after hour without fatigue. An ENG camera with *balance* for sure-footed shooting from impossible angles. With *low power consumption* that lets you keep rolling after others quit.

It's the new Harris TC-90.

The lightest, best balanced, least power-hungry, most rugged, low-profile three-tube prism ENG/EFP camera you can buy.

Only 7.9 pounds.

The basic TC-90 body weighs only 7.9 pounds, less lens, viewfinder, and battery. To realize just how light that is, the Ikegami HL-79 body weighs 13 pounds; the Philips LDK-14S is 11.9; and the Hitachi FP-22 weighs in at 11.7.

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The TC-90 is one of the smallest. But we deliberately made it a bit bigger than it had to be, to add balance and stability. A little longer, to let the cameraman grasp the lens in a natural, comfortable, controlled way. And we carefully shifted extra weight to the tail, so that the weight of the lens is counterbalanced for easy, smooth handling.

No blind-siding to the right.

The height of conventional ENG cameras blocks the sightline to your right. But the TC-90 has a low profile for peripheral viewing no other camera can equal. So you won't miss the action no matter where it happens.

That low-profile TC-90 body is built of graphite Nylon plastic, the same kind of material used for high-stress components in jet aircraft. Its strength-to-weight ratio is ideal for resisting damage from bouncing in the back of the van, from heavy weather, hostile newsmakers, inevitable accidents. The TC-90 housing should never need repair, which saves a lot of shots and a lot of money.

Inside that awesomely strong housing are, among other components, 14 LSI chips. They not only substantially reduce weight, but greatly reduce power consumption. You can keep on shooting with the TC-90 long after a conventional camera's batteries would run down. More than two hours on a fully charged 4-ampere/hour battery.

Built-ins, not add-ons.

Features that make the TC-90 a high-performance ENG/EFP camera are tucked inside, not plugged in or dangling from the outside. TC-90 on-board components include genlock, microphone and amplifier, intercom amp, and CCU interface. And they're built into the price, too.

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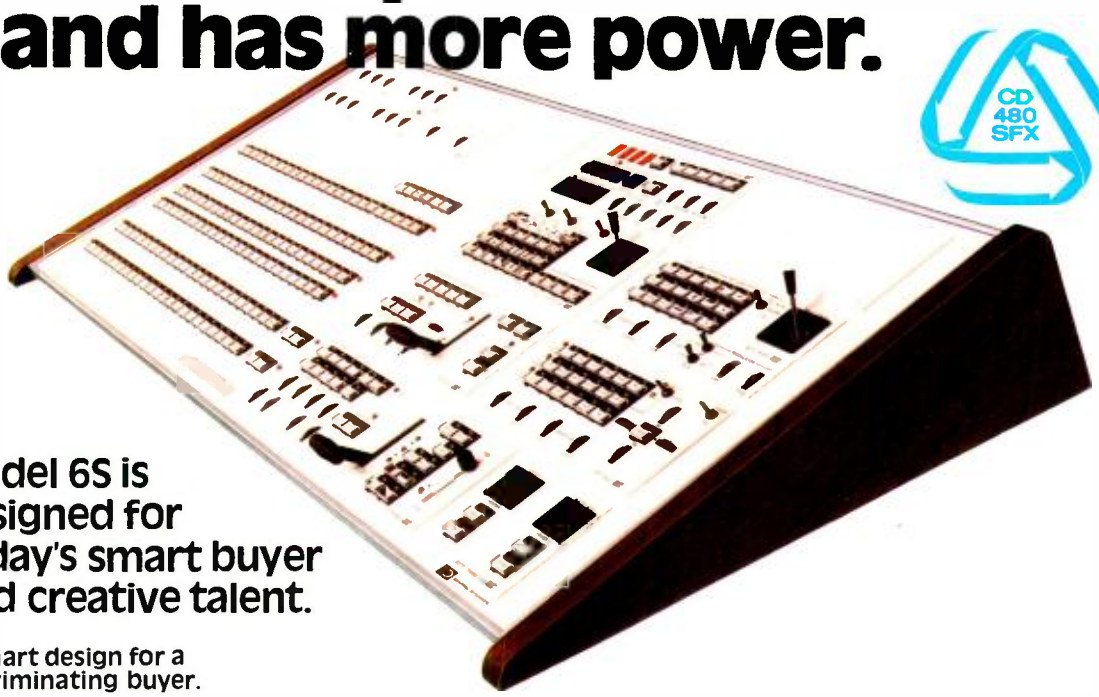

Model 6S is designed for today's smart buyer and creative talent.

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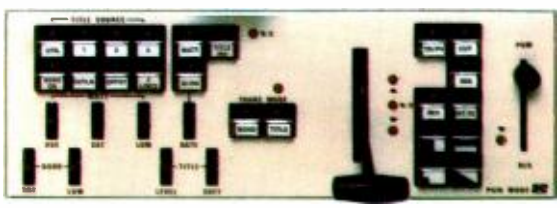

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Film for Video Finds the 30 fps Advantage

THE COMMERCIAL PRODUCTION industry has always put a premium on quality, so it's no wonder 35 mm film has been its dominant production medium. The recent trend toward transferring film to video for post-production, however, has led to some interesting changes that may make 16 mm a viable alternative—even if it will never actually challenge 35 mm. (See *BM/E*, October 1981, p. 43 for a look at the inroads of video into film production.)

One response to the presence of video in film work has been increasing interest in shooting film at the video frame rate of 30 fps, rather than at 24 fps, the film rate. The improvement in resolution is such that 16 mm film almost equals 35 mm in image quality—although costs for film stock, processing, and camera rental are roughly half those for 35 mm.

16 for 35

"We've done side-by-side comparisons of the same piece of film—shot at 24 fps and transferred at 24, shot at 24 and transferred at 30, and shot at 30 and transferred at 30," relates Mike Grasso, president of Grasso Productions in Sacramento, CA. "There's a dramatic difference with film shot at 24 and transferred at 30. When it's shot at 30 and transferred at 30, it's even more noticeable."

Grasso produces commercials in the 16 mm format with an Arriflex 16 SRII 16 mm camera outfitted with Zeiss Distagon prime high-speed lenses. To keep the sound in sync when shooting at 30 fps he hooks a Digi-Tach sync control unit with 30 fps sync crystal to the camera. The Digi-Tach, made by Cinetronics of Burbank, CA, is a digitally controlled unit that allows the user to dial in a range of five to 75 fps with crystal sync. Film stock is Kodak 7247 negative.

Engineers agree

For posting, the film is transferred to tape at Editel in Los Angeles or Ruxton in Burbank. Telecine engineer Dick Cain at Editel shares Grasso's enthusiasm for the quality improvements possible by shooting at 30 fps.

"Film shot and transferred at 30 fps has a whole different look to it," Cain says. "The resolution is about 20 percent better." For one thing, the strobing effect often encountered during fast camera pans is significantly lessened, according to Cain. (This observation is not new, Cain notes: *Around the World in Eighty Days* was shot in 30 fps for this very reason back in 1956.) But the biggest difference, says Cain, "is that all of a sudden a 16 mm negative starts looking like 35. The difference is amazing." Not all the users of 30 fps are shooting 16 mm, Cain points out; maybe 10 percent of Editel's 35 mm clients are shooting at least some of their material at 30 fps, using either Panavision cameras, which allow variable frame rates, or modified Arriflex cameras.

"Once you start shooting at 30 fps, it solves an awful lot of problems," Cain continues. "You really notice it when you're trying to sync mattes. When you run into the 24 to 30 conversion problem, things don't look like they're in sync even though they really are. But if you shoot it at 30 frames, then matte it and edit in at 30 frames and do all your finishing in tape, it becomes very simple."

The new generation of telecines make transferring at 30 fps easy, explains Cain. He says that Editel's newest Rank Cintel telecine (the company owns three) can be set for 30 fps operation, and the older ones were easily modified to allow this. (Visitors to last April's NAB show in Dallas will recall that variable speed is the latest feature in telecines and was seen in Marconi's B3410 and Bosch's FDL-60 CCD telecines, as well as in the Rank Cintel Mark IIIC.)

Mike Grasso shoots a spot for the California Chamber of Commerce with a Panavision camera. Grasso is heavily involved in shooting 16 mm at 30 fps.

Editel transfers Grasso's film and records it on a Sony one-inch VTR, although the company also has Bosch Type B and Ampex quad machines for different client needs. Time code is laid on with a Gray time code generator. (Arriflex has recently proposed building a SMPTE time code generator into a 16 mm film camera.)

Effect on effects

After transfer, Grasso takes the one-inch tape and a ¾-inch workprint to Positive Video in Orinda, CA, for post-production. Jim Lautz, one of the partners in Positive Video, notes in particular the benefits of 30 fps for post-production effects, especially expansion and compression modes.

"Sometimes when you put a tape through the special effects generator the focus gets a little soft because of the manipulation," Lautz explains. "The increased resolution from shooting and transferring at 30 fps makes the effects come out a little better. Obviously, the cleaner the picture when you start out, the better signal you'll have after manipulation." Effects at Positive Video are produced by the company's Grass Valley Group MkII DVE unit. Tapes are edited with a CMX 340X editor with expanded keyboard; one-inch tape machines are all Sony BVH1100As. The facility also has a Chyron IV graphics unit with font compose, Thomson 5500A color corrector with auto sensor, GVG 16007K switcher, and an all-MCI audio system built around the JH-600 console.

Rank Cintel's NAB exhibit featured the Mark IIC's new Varispeed capability, useful for slow motion and fast speeds as well as 30 fps transfer. Other telecine makers also promoted variable speed features.

Another advocate of 30 fps is independent commercial producer Don McCuaig of Los Angeles, who has produced prime-time programming as

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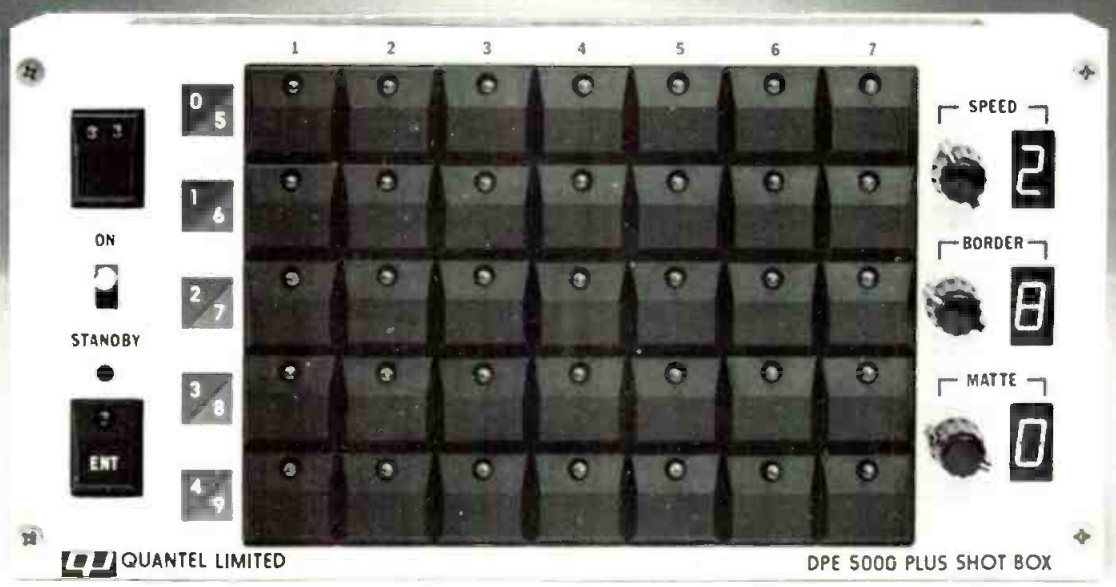

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TV PROGRAMMING

well as commercials in 16 mm.

"The more I shoot, the more pleased I become," McCuaig says of 30 fps. For 16 mm work, he used either a Cinema Products CP-16 or an Arriflex SR; he also shoots 35 mm at 30 fps with an Arriflex BL3. His film stocks are Kodak 7247, 5247, or 5293, or the new Fuji 250.

Besides excellent quality, cost-effectiveness is one of the greatest boons of 30 fps, according to McCuaig. He likes to increase the savings by recording sound single-system with mag stripe film; altogether, he says, this can reduce the cost of a typical spot from $20,000 to $12,000. McCuaig points out that a fully-equipped 16 mm camera outfit rents for about $250 a day at the most, while a comparable video camera with one-inch recorder would run four times that.

Careful film processing is an especially important factor, McCuaig insists. For this reason, he has his film processed at Image Transform (a division of Compact Video), where he has found the work uniformly excellent. "We used to die a thousand deaths when our film came back dirty from other labs," says McCuaig. From there, the film goes to Ruxton in Burbank, where it is transferred on a Rank flying spot telecine and recorded on Ampex Type C VTRs.

"It's quite pretty when it's finished," McCuaig says of his 16 mm/30 fps work. At 35 mm, the results are even more impressive: "Not very many pictures are better than that."

Spreading the word

So if 30 fps is so good, why isn't everybody using it?

"It's a big education problem," opines Cain. "Many film editors prefer to cut their workprints, but don't realize that it's possible to do it at 30 fps. But it's very easy to modify film editors to run at 30 frames."

McCuaig agrees that producers are not as aware of 30 fps as they could be, or of the advantages of post-producing in videotape.

"People are still afraid of videotape," he suggests, "It's my impression that video technology scares people. The film community is still big-screen oriented, 24-frame oriented."

Still, the advantages of shooting and transferring at 30 fps are too big to miss, and more and more film producers are becoming aware of them. The dramatic increase in picture quality, coupled with the economies of being able to work in 16 mm, are bound to make 30 fps more attractive. Film producers making the switch to video for post-production will find the 30 fps advantage hard to ignore. **BM/E**

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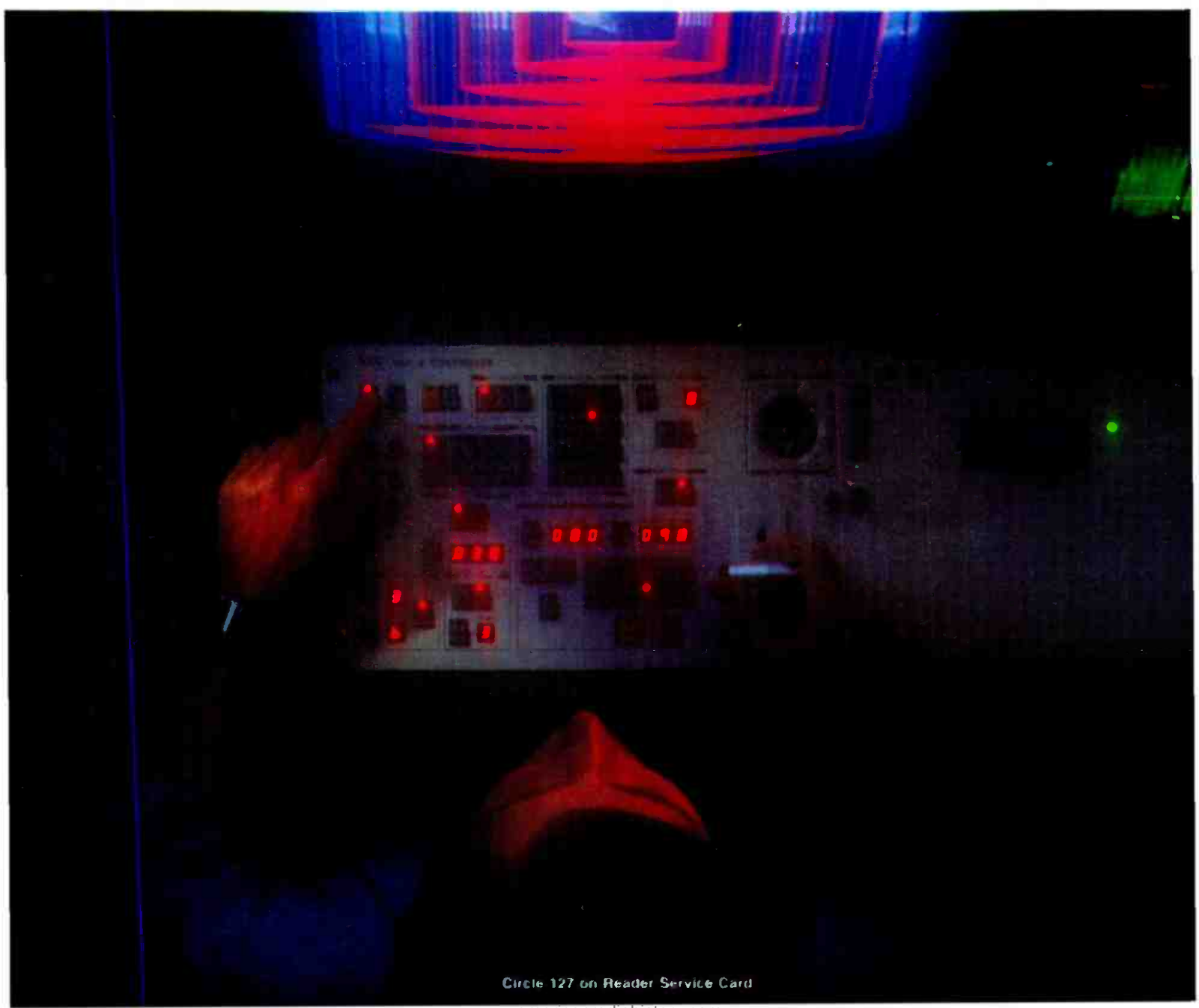

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SPECIAL REPORT: Post-Production In the Field

PART I: Audio Facilities Develop Wheels

POST-PRODUCTION OF AUDIO MATERIAL in a mobile truck is not yet a very widespead practice, but indications are that it is growing as stations and recording companies realize the convenience and economy that can be achieved in a well-planned and well-executed mobile post-production facility.

One of mobile audio post-production's most enthusiastic proponents is audio engineer Steve Colby, who supervises operations in the ambitious mobile audio facility he designed and built for WGBH-TV, Boston's renowned PBS station. According to Colby, the $350,000 truck was the site of all post-production for WGBH's *Evening at Pops* music series.

The truck was completed in May, Colby relates, "only 24 hours before we were supposed to pull into Symphony Hall for the first time." Meeting that deadline is a point of pride for Colby, who notes that the entire project took just six months "from pencil and paper to rolling it out on the driveway."

Post-producing audio in the truck makes sense for a project like *Evening at Pops* because the truck is, in effect, parked outside Symphony Hall for two months at a time.

"We just try to do everything there that we can," Colby explains. "We'll go in on, say, a Tuesday morning and rehearse. Tuesday afternoon will be meetings and technical checks, and Tuesday night will be the shoot. Then, perhaps, we'll have another shoot and a rehearsal Wednesday or Thursday." On that kind of schedule, posting right in the truck streamlines the job considerably.

Because of this, the truck was designed with post-production in mind, although its main work is recording live music events. The two Otari MTR-90 24-track audio recorders are hooked up to an associated autolocator, which allows editors to indicate up to 10 cue points for later recall. A Sony PVM-1900 ¾-inch VCR helps the editor mix a show to picture.

"We thought specifically about post-production when we built the truck," Colby says, "so we left lots of holes to plug in additional equipment." The vehicle's 2000-point patch system lets engineers bring in anything that's needed, drawing on the station's supply of Datatronix time code generators, BTX readers and regenerators, and Adams-Smith synchronizing gear.

Other audio equipment on board gives the staff plenty of leeway in production and mixdown. The mixing system is a custom job by API, a wedding of two consoles

The control room of WGBH's Unit 4 audio control facility features a custom 40x24 API mixing system that provides simultaneous 24-track, stereo, and mono mixes. Outboard equipment includes eight dbx 903 compressor/limiters, dbx 162 stereo program compressor, Lexicon 224 digital reverb system, and two Lexicon PCM 41 DDL effects units. Otari MTR-90 24-track recorder is seen in foreground.

Birch-panelled production lounge in the WGBH truck seats six and can double as an announce booth.

that allows 40 inputs to be mixed down to 24 out for recording. The truck carries plenty of special effects gear, such as a Lexicon 224 digital reverb system and two Lexicon PCM-41 PCM effects units that perform automatic doubletracking and other effects. The special effects gear is used most heavily for the large amount of rock and roll work WGBH does for area radio stations.

"We've sort of joined the Effect-of-the-Month Club," Colby laughs, explaining that the station has been adding new effects gear regularly as the budget allows. Other effects units include eight dbx 903 compressor/limiters, a dbx 162 stereo limiter that Colby is particularly pleased with, and 24 channels of Dolby noise reduction.

Several different monitoring options are selectable with a speaker switcher. The main speakers are UREI 811As, but editors can also check sound on Auratone 5Cs or the speaker in the Sony video monitor, which Colby says effectively mimics the sound of a home TV receiver.

Colby and the other WGBH engineers who worked on the project paid special attention to acoustics in the close mobile truck environment. To avoid standing waves that can play tricks with dynamics, they made sure the walls were not parallel. The walls themselves were constructed of alternating layers of fiberglass and soundboard and floated on rubber pads to prevent unwanted resonances. The main speakers were connected to UREI third-octave equalizers to deal with bass buildup, often a problem in mobile vehicles.

An unusual feature of the truck is the coach itself, which was built by Rockets International of Turner's Falls, MA, a subsidiary of a religious commune. The company's main work is building lavish touring buses that it rents to rock groups and their crews. Colby had seen their work and been impressed by it, so he engaged them to do the interior work, which he describes as "lovely."

The final result is a truck that works. Colby says, "The mixes that have been done out of the truck so far seem to have a universal appeal." Acoustics are still being fine-tuned as the result of suggestions from users, but overall, the station is well pleased.

Smooth sailing

Another proponent of on-site mixdown is John Phelps, president and owner of Full Sail Recorders in Altamonte Springs, near Orlando, FL. Full Sail's two subsidiaries—Full Sail Recording Workshop, which trains recording engineers, and Heartland Records, a small independent label—both benefit from the Full Sail Dream Machine, a 27-foot GMC coach outfitted for mobile audio production and post-production.

Most of the post-production work is done for Heartland Records, which specializes in Christian rock music ("Not at all what anybody would imagine as gospel music," Phelps is quick to note). Other clients have also taken advantage of the truck's post-production capabilities.

The Full Sail Dream Machine features a 32-input Sphere audio console. Fostex speakers are floated to avoid bass buildup; fabric walls help absorb sound reflections.

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Phelps cites two basic reasons for mixing and sweetening albums right in the truck. First, the economics make good sense: "We own the truck. If we go into a studio, we pay $150 an hour." The second reason, equally compelling: "It has an incredible sound." The sound is the result of careful planning by designer and builder Gary Hedden of Chicago.

Recording and mixing gear is all top-of-the-line, starting with the custom-built Sphere console, a 32x24 cross between the company's A and C models. Each channel has graphic equalization; eight have Sphere's Supergraphic equalizers. The ATR is an Otari M-90 24-track model, and Phelps occasionally brings in a second M-90 for live dates. The two-track recorder, for mixdown, is an Otari M-10.

A special feature that will become permanent in January is a JVC DAS-90 two-track digital ATR, which Phelps says Heartland is using both for mixdown from the 24-track machines and for direct-to-digital recording from a live mix. "Phenomenal," Phelps calls the latter application. "It's like going straight to disc."

The larger of Record Plant's two trucks has a custom API console and Westlake speakers. dbx 160 compressor/limiters are on the left; Ampex MM-1200 ATR is in foreground.

Most post-production effects gear is not permanently installed, but rented as the need arises, according to Phelps. Exceptions include an Eventide flanger and Micmix spring reverb unit. For mixdown, Heartland has brought in a Lexicon 224, using it simultaneously with the Micmix unit for extra flexibility. The truck also has a Lexicon PM-41 mini prime time unit and "a whole bunch" of dbx 900 Series effects, including graphic and parametric equalizers, limiter/compressors, and de-essers.

Monitors are by Fostex, and the Fostex engineers worked closely with designer Hedden to come up with the best possible installation. As Phelps describes it, the monitors are suspended on rubber mounts, which eliminates the problems with bass response that often plague mobile audio trucks. The clever monitor mounting has made third-octave equalizers unnecessary for the speakers, Phelps says.

Phelps not only claims superior results from mixdown in his truck, but feels that trucks may have certain built-in advantages over traditional studio facilities.

"In any mobile," Phelps explains, "you're sitting so close to the monitor that the room plays far less of a role in what you hear than it would in a large control room." Problematic control room acoustics, in fact, prompt many editors to mimic a mobile truck environment by placing speakers right on top of the console so they hear sound direct from the speakers, not reflected off the walls.

"We designed the space acoustically so that nothing comes back and hits you on a close monitoring situation," says Phelps. "When you sit down to mix, you're right in front of the console and monitors, so what you hear is very believable." He sees more audio engineers, especially in recording, becoming aware of the flexibility provided by recording and mixing down right in the truck.

"I think there's a big trend right now by recording artists to record album projects in other than a studio environment, which is acoustically dead," Phelps says. "I think that's yesterday's way of recording." People are now tending to find an environment they find acoustically pleasing and musically inspiring—whether a house on a mountainside or a giant auditorium—and bring the recording equipment there. Once the music is on tape "it makes more sense for me to mix it at my leisure in my unit than to fly somewhere, pay for a motel, and watch the clock while I rush through somebody's project."

Mixed responses

Not all recording companies have had such positive experiences with field mixing operations, and some regard it as occasionally expedient but usually inconvenient. Paul Christianson, president of Omega Audio in Dallas, started out by doing audio posting in his truck, but switched to studio operation as soon as his studio was built.

"We used the truck to make our expensive mistakes and test the waters," Christianson says. "Our studio, however, can post circles around it. I don't really see the reason for posting in a truck unless the client feels the need

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for immediacy." Christianson saw his mobile post-production facility as an interim step from the outset.

The truck carried some excellent gear, such as an Otari MTR-90 24-track ATR and a BTX 4600 controller/synchronizer to interlock the ATR with a Panasonic NV-9600 ¾-inch VTR. That way, clients could edit the audio tracks for video programs using a ¾-inch work print. ("Why pay on-line video rates to work with audio?" asks Christianson.)

Posting in a truck may actually be more expensive than working in a studio, Christianson claims. He points out that trucks must be rented by the day, while studios rent by the hour. "If you rent a 24-track studio facility you'll pay $100 a hour, on the average," he states. "My truck rents for $180 to $220 an hour on an audio-only basis, so the customer is paying a premium."

In New York City, the Record Plant recording company prefers to do post-production in its four studios, but will operate out of its two mobile trucks if the client so requests.

Randi Greenstein, Record Plant traffic manager, says that customers who request post-production in the truck usually do so in order to meet tight deadlines, but those with more time prefer to work in the studios. "Most people are more comfortable in the studio," explains Greenstein. "Our truck is as comfortable as it can possibly be and still be allowed on the road, but when you're spending endless hours you want more room around you." Both trucks carry all Ampex ATRs—two 24-track MM-1200s, plus two-track or four-track machines as needed. The four-tracks are used when clients want to leave the truck with a stereo mix for video; stereo audio goes on two of the tracks, sync on the third, and SMPTE time code on the fourth. For mono mixes a two-track recorder takes one track of the mono mix and one of sync.

The larger truck carries a custom-designed API console with 44 inputs and 24 outputs, and a Westlake two-way monitor system. The audio board in the smaller vehicle is a 48x24 Trident Series 80. Both can be set up with any kind of audio processing gear the engineer or producer requests, drawn from Record Plant's well-equipped studios.

The advantages or disadvantages of posting audio in a truck seem to depend, therefore, on the user's specific needs and desires as well as the capabilities of the vehicle. For a small-scale recording company like Heartland Records or a station with long-term field projects like those of WGBH-TV, mobile audio post-production may provide an efficient and economical solution. Large-scale audio facilities, on the other hand, are more likely to view the in-truck working environment as cramped and limited. The key factor for success in mobile posting seems to be *planning* for post-production right from the start. Neither Colby nor Phelps, who knew they'd be posting audio right in their trucks, has any complaint about comfort or quality. The movement toward field audio post-production is not a stampede, and there's no indication at this point that it will become one; signs are, however, that interest is picking up slowly as stations and producers look to get the most out of their mobile facilities.

PART II: Video Set to Roll

VIDEO EDITING SYSTEMS are moving out of the large studios and into mobile vehicles to achieve faster and more efficient editing turnarounds, allowing producers, directors, and clients more direct and immediate control of the post-production effort. The uses of editing equipment, from simple two-machine editing to complex multiple deck controllers with effects, are expanding beyond news and sports coverage into more diverse areas. And the end of their potential is still not in sight. Though some editing in remote settings has been done in the past, the number of stations and production companies now considering setting up a mobile editing system is multiplying. The on-location editing trend is clearly developing into a major influence on the way video programming is shaping up in this country.

In part, the reason for the mobile alternative to studio editing is the increased demands on time for much of the current ENG coverage around the world. People want their news and they want it fast. Sending a tape back to the station for an all-night edit session just won't do. Now, the tape must be edited on the spot and sent back to the station as a complete package. Complete, ready, now. Meeting this demand are companies like Television Matrix in Miami, FL, which has worked with CBS News on many fast-breaking news stories of international importance. One of the most recent events was the assassination of Anwar Sadat in Egypt. CBS called Television Matrix because the network wanted to use the Sony BVU-800, ¾-inch editing system available at the Florida firm. It works on any type of power and can be quickly packed in road-ready cases. The night after they received the call from CBS, they were working in Egypt.

According to Frank Beacham of TV Matrix, "a benefit of the system is 40-time speed so you can cut right by lots of tape and get quickly to the place you want on the tape. This is important in a fast turnaround situation." The equipment can be set up in an hour, though Beacham and crew have done it in half an hour. "It takes about two hours to edit a typical news piece," he claims. When it's done they hand it over to the satellite pool on location; it is then sent to the networks. Such a procedure is not unique since this company alone has done it often, including the Sadat-Begin peace talks in 1977, and again for the President Reagan tour of five countries in two days. Paris, the Vatican, Rome, and London were all in one day and the tape had to be edited for that evenings' news. Complete, ready, now.

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source deck locked up with a Cezar controller, and a Microtime 120 time base corrector. Creative director Dan Leahy notes that "there were two crews on the floor and in the city. Given the on-the-fly situation, there was no other way of doing the editing. It had to be right on location. It gave us the ability to deliver what people wanted at an opportune time."

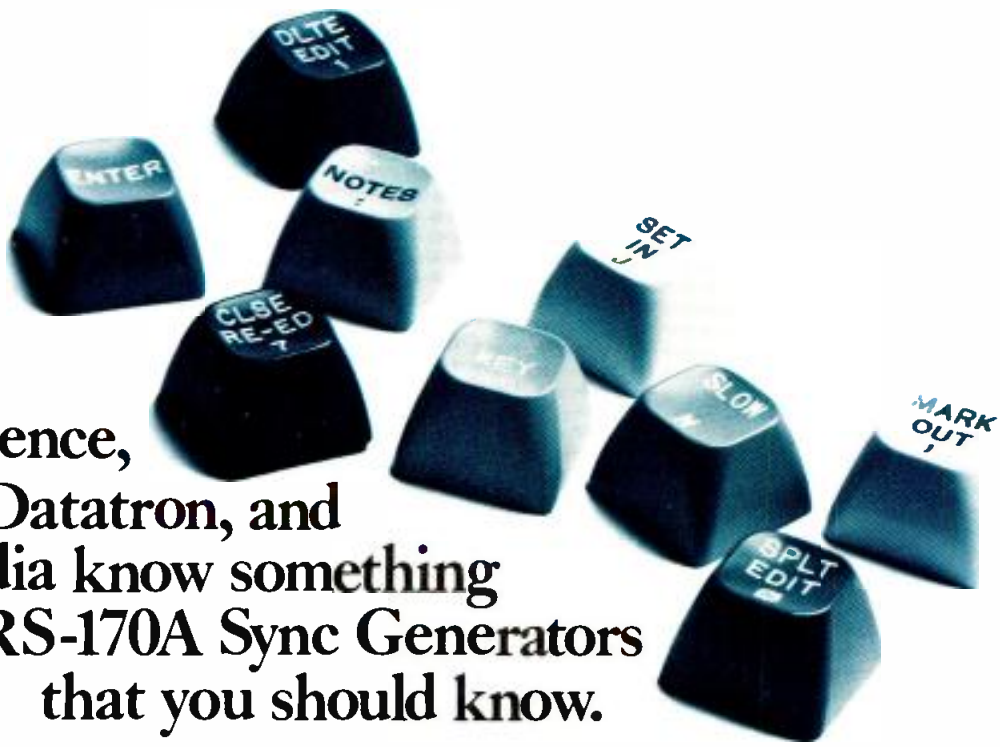
One particular situation, in which Rollins Cable and a local Baltimore broadcast station collaborated on the coverage, absolutely required that the editing system be on hand. At that time, there had been difficulty in getting through security and the crowds with enough of a crew to interview Senator Kennedy. The two location crews got together, made the tape and ran it back to the location edit room. The tape was edited and dubbed, enabling Baltimore's local broadcast audience and the various broadcast and cable viewers in the New England area to see the taped interview. It would not have been possible without location editing.

As with most mobile post-production teams, Galady Productions has used their action editing system for a sports event. They find, however, that the possibilities are more far-reaching than that. One of the productions they often handle for local TV and for cable is the taping of situation comedies and game shows. With the combination of their Ampex tape machines and their Sony editing equipment, they were able to edit out large sections of unnecessary tape for the dailies, reducing the long hours normally spent during the formal edit sessions.

Another ability of the mobile editing system has won them many clients they would normally have lost. Galady Productions is located about 90 miles from Chicago—a pretty fair commute. Because of this distance many clients might have preferred to opt for editing facilities located closely within the Chicago area. When Galady lands a client who requires a long edit session or a series of sessions and who wishes to be involved in the approval process at each stage of the editing, they simply drive the truck to the client's parking lot and proceed with the editing. This offers the client a mobile editing facility as well as the convenience of having it right at the door for easy access in case of any unforeseen problems. Additional equipment can be put on tables with wheels to roll around the truck for added flexibility. That's the name of the game.

As audio and video interests come closer together, equipment mobility and flexibility become more of a mutual concern. As those involved with location production are beginning to realize, the advantages of location post-production permit a higher quality finished product as well as greater versatility, providing increased operator and client convenience. This flexibility, allowing more control over the finished product, also often results in a substantial return on the investment in equipment and personnel required for the move to mobile post-production systems. If the current trend continues, more people will be jumping on the bandwagon—with their editing equipment. **BM/E**

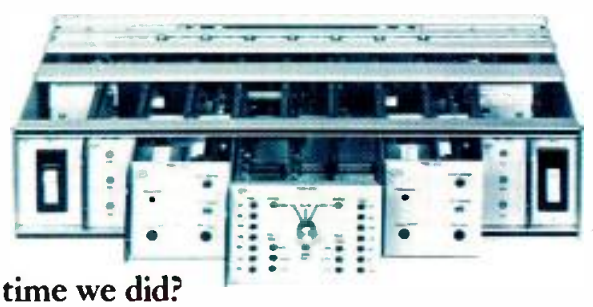
Who's Pulsing the Editors?



Convergence, CMX, Datatron, and Videomedia know something about RS-170A Sync Generators that you should know.

These and other leading manufacturers are committed to producing the ultimate in quality videotape editing equipment. How? By using the PMG-312 Master Sync Generator system to test and pulse their editing systems.

The complete dual sync system consists of a dual power supply frame, two RS-170A Generators, and an Automatic Changeover. The Automatic Changeover meters each generator pulse and DC voltage for fault indication. The PMG-312 offers chrominance subcarrier with an accuracy of .35Hz stability over a one year period. Subcarrier to horizontal phase relationship is maintained in reference to line 10, RS-170A. Black burst is optional. Professional broadcast quality at very attractive prices. Two year parts and labor warranty.



These manufacturers of editing systems know who's pulsing the system and now so do you. Is Lenco pulsing your editing equipment? Don't you think it is time we did?

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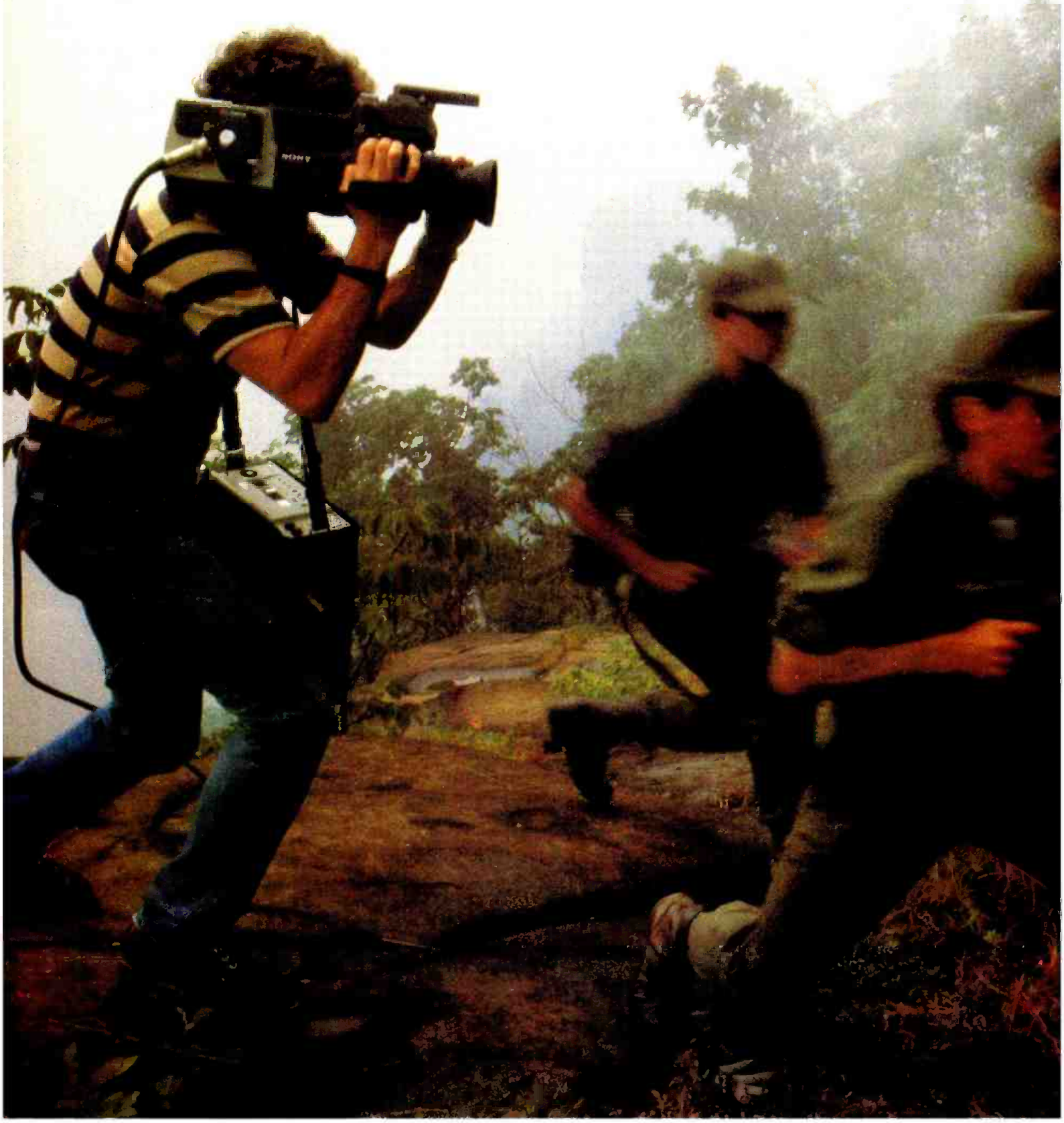


If your cameramen don't mind packing 30 pounds on their shoulder, you can stop reading right now.

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.

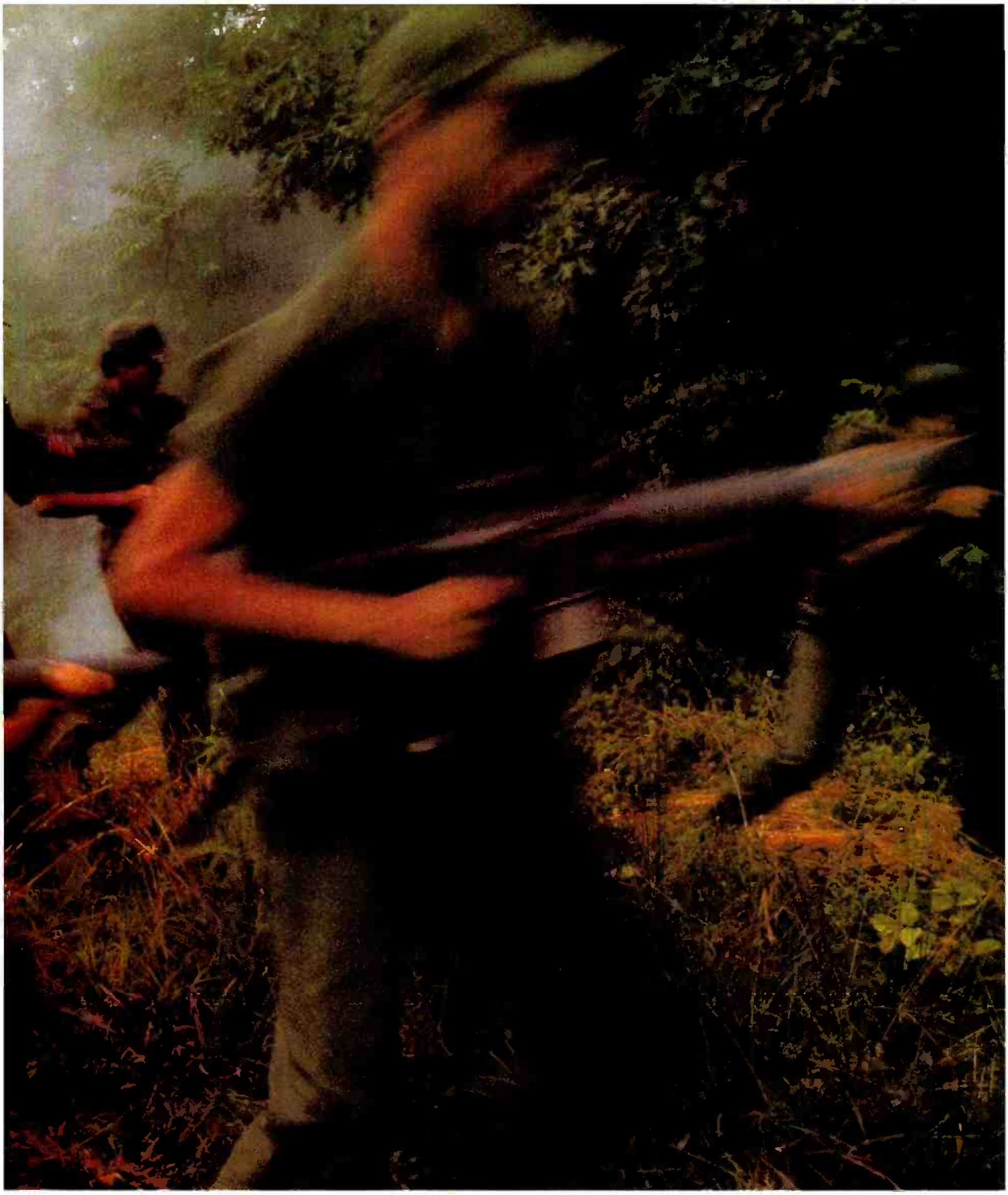
Which is precisely why Sony engineered the BVP-110.

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.

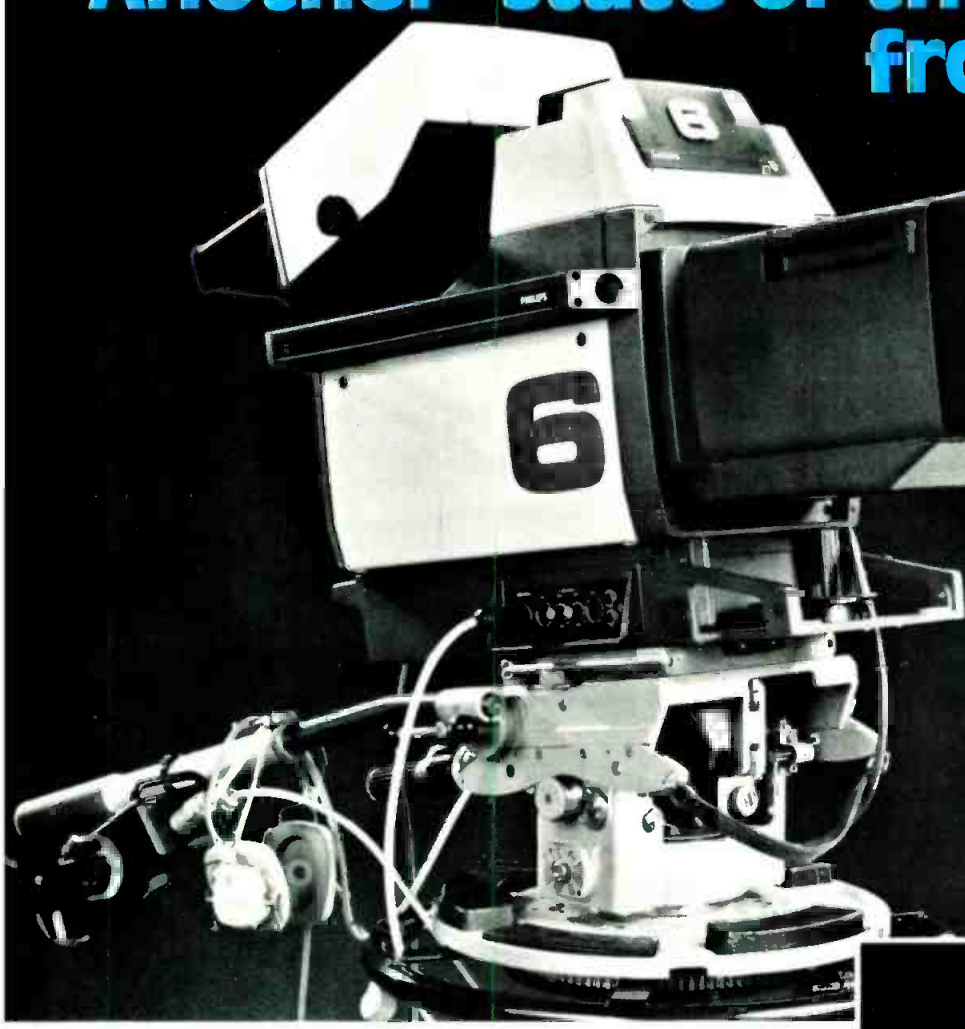
So if you're looking to stay out in front of the news, instead of behind it, and you can't get bigger cameramen, get the next best thing. The Sony BVP-110.

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.

SONY
Broadcast

Another "state of the art" camera from Philips...



The computer controlled LDK6 joins the family of other Philips cameras.. "state of the art" cameras for tough and specialized assignments.

A new era has been launched with the all new LDK6 field and studio triax camera with "distributed intelligence" to control, report and diagnose. These features now mean the operator can concentrate on creative camerawork.

For the first time, individual microcomputer and data communication facilities in each of the main system units provide an unequalled degree of intelligence within the system.

Other unique features include:
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LDK5B and 25B are rugged and reliable high quality cameras. The all triax LDK5B has become a standard for tough remote requirements, and continues to be the first choice for quality field productions. The multi-core LDK25B is a first line studio camera...and surprisingly affordable.

LDK14S and SL EFP/Studio cameras are ready for any shoot out and comparison of automatic features...and require only a simple adapter for triax conversion. The LDK145L with Low Output Capacitance diode gun Plumbicons® offers an unusually high S/N Ratio (57dB) and higher resolution.

LDK44 is a new modular 3-in-1 versatile and economical broadcast quality ENG/EFP/Studio camera. No other camera offers the features and flexibility at such a low price.

Philips high technology "workhorse" cameras continue to be the choice of demanding broadcasters for quality pictures, reliability, flexibility and low cost of ownership.

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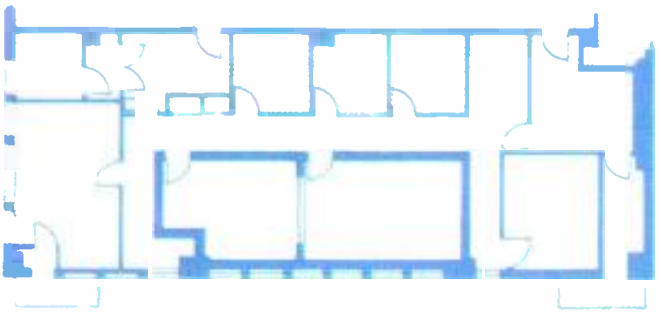
PART 5



MAKING A VIDEO POST-PRODUCTION PLANT

BY ALAN J. ZAUZMER

The construction of a video post-production facility requires a plan that will establish in the beginning the final operational characteristics. Like any facility design, the plan must take into account the budget, the necessary engineering, and the requirements of the users.

A rough budget, or "first facility draft," will be based on the facility's functions. It must specify not only the videotape machines but all the major support equipment, such as special effects units, editors, character generators, switchers, and so forth.

The choice of tape machines will depend on the facility's intended use. For example, for work on TV variety shows, state-of-the-art one-inch tape machines are needed. For ENG work, ¾-inch machines are appropriate. The number of machines needed will depend on the expected volume of work.

Unfortunately, there is no generally accepted rule of thumb as to the ratio between the cost of support equip-

New facility of National Video Center, New York, has edit board in front of operator, switching and other controls close at left.

Alan J. Zauzmer is president of Ztronic Enterprises, Ltd., designers of broadcast facilities and telecommunications systems for business. His earlier affiliations were with CBS Television Network engineering and development department, N.Y., and ABC broadcast operations and engineering department, Hollywood.

ment and the cost of the whole facility. A careful needs analysis must be made for each facility to determine how much support equipment should be included. Remember that one editor can do only one show at a time.

The cost of housing for the facility—a main factor in the original budget—can be as little as refurbishing a seldom-used room in the plant, or as much as 25 percent or more of the cost of the electronic equipment. Creature comforts are essential for efficient operators in the demanding process of editing videotape. There is one pretty good rule of thumb: for the price of each inch of thickness in solid oak paneling, you can buy a major piece of electronic equipment.

Tax considerations can affect your design choices as well. The ITC (Investment Tax Credit) is in a state of change, so you must consult your accountant to keep you up to date on this. In any case, the tax laws may favor one equipment configuration over another.

"ORANGE CRATE" EDITING

This phrase means the use of the facility while it is being built. Obviously, it is better to make your promised on-line date. The revenues lost because of a late start cannot be recovered. But a partial phase-in can reduce the damage if the on-line date gets out of reach.

To the neophyte it might seem easy: use a dual shift with production taking up one shift, construction the other. In practice each operation group must find the combination of production and construction that works best.

In any event, going on-line while building probably benefits everyone. The room is making money, and the construction process can go ahead without a long wait.

This also gives the design team a chance to watch the system perform before everything has been committed to final shape. If something in the original plan is not working well, a change can be made far more easily during

NEW ABC VIDEO POST-PRODUCTION FACILITY

As part of a completely new engineering complex in New York, ABC put together two new post-production systems and a new audio sweetening system, all in one central area. The placement of the main items of equipment in the three systems is shown in the floor plan. The principal designers were Abdelnour Tadros, manager of post-production facilities, and Martin Jasper, A/V systems engineer, both of ABC's broadcast operations and engineering department.

Each video post-production system is built on a CMX-340X editing system backed up by four Ampex VPR-2 one-inch VTRs. An additional VPR-2 feeds programs to the audio system; all nine VTRs are in a centralized row, as shown at the lower left of the drawing. Having four tape machines for each editor allows assembly editing of elaborate special effects material with images from many sources.

The facility is the site of post-production for standard ABC network material—sports, *20/20*, net promos, and soap operas. It has also been used for on-air integration of live program segments. To allow live on-air playback, the facility is linked to ABC's main distribution area through a Grass Valley 200-in/200-out switcher and an extensive A/V trunk system.

The two post-production systems are set up as mirror images of each other. The switching and routing allow either system to use any equipment in the other, resulting in great flexibility in handling assignments. Used for this internal switching is a Grass Valley 32X16 routing unit, which also controls the audio routing.

In addition, the switching system allows post-production to use additional VTRs or other equipment in ABC's central operations area, if needed.

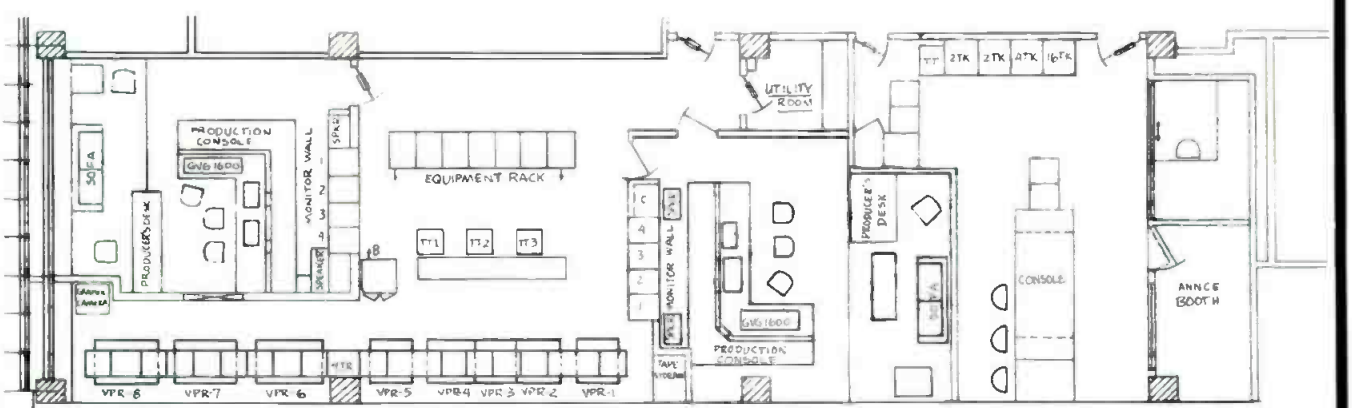
The ABC engineering department made important refinements to the interfacing of the units. For example, the powerful E-MEM system and the CMX-340 ordinarily require parallel lines to "talk" to each other. ABC and CMX jointly created a new serial interface so that the two systems could be connected by three wires for easy, efficient communications.

Another example is the use of the computer architecture in the SSL audio console to control the audio and video tape machines synchronously. The console computer was interfaced with EECO synchronizers, which in turn control the VPR-2 and audio recorders. Thus, all the machines are controllable at the consoles.

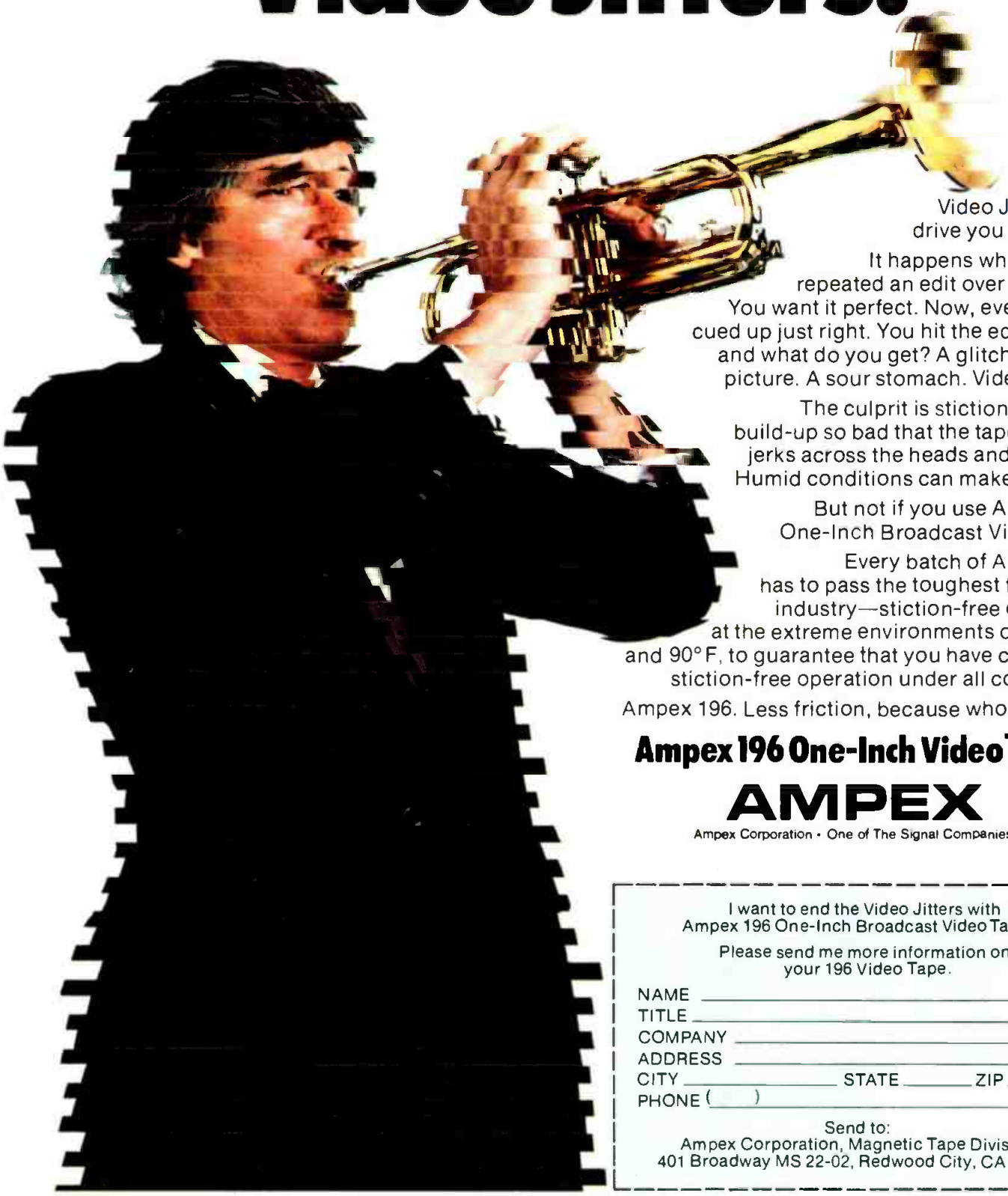
The complex facility went together in stages, with the first stage completed in 1979, the second in 1980, and the final one in the first quarter of 1982. Each early stage went into operation while later ones were under construction; operating experience with the early stages helped fine tune the design of later ones.

Partial list of equipment:

Nine Ampex VPR-2 one-inch VTRs
Two Grass Valley 1600 switchers
Quantel DPE-5000 special effects unit
Quantel 5000-Plus five-channel special effects
Two CMX-340X editors with GIZMO
Four Conrac 6122 color monitors
Thirty-Two Conrac SNA-9 black and white monitors
Two Ampex ATR-104 audio tape machines
Two Ampex AG-440 audio tape machines
One Solid State Logic 4040E audio console
Three ITC cart machines
Lexicon time compressor



Ampex Announces the Practical End of Video Jitters.



Video Jitters can drive you up a wall.

It happens when you've repeated an edit over and over. You want it perfect. Now, everything's cued up just right. You hit the edit button, and what do you get? A glitch. A shaky picture. A sour stomach. Video Jitters.

The culprit is stiction—friction build-up so bad that the tape actually jerks across the heads and scanner. Humid conditions can make it worse.

But not if you use Ampex 196 One-Inch Broadcast Video Tape.

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Ampex 196. Less friction, because who needs it?

Ampex 196 One-Inch Video Tape.

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In ABC's new post-production room monitors are in wall above edit position, switching directly under operator's left hand.

construction than later on—and at a lower cost.

The planners must ask themselves if room for future expansion is necessary. One way to help with the expansion problem is to use modularity: by keeping things standard (room size, rack size, consoles), it becomes relatively simple to change operating configurations rapidly. If extra space and equipment are put into the facility today, they are likely to provide handsome operating and economic dividends in the future.

The modularity idea is further applied by using the "hub and spoke" configuration. Each operating system is on a separate spoke, tied to the central hub by electronic umbilicals. With this system additional equipment can be added easily, in a separate spoke, not as a "hang-on" but as an integral part of the facility.

TAPE MACHINE AND EDITOR CHOICES

The kind of tape machine chosen will guide the choice of editing system, because the two work intimately together. Study the manufacturers' information on this point closely to be sure your tape machine and editor can be happily married.

It is understood that the tape machines are the primary players, but the editor and its associated control software will determine the limit at which the tape machine can perform. Even if the editor is perfect for the tape machine, it may not play well with the special effects switcher, for example. In that case it might pay to develop specialized software or hardware, or both, to make all systems work together.

Do not try to interface the tape machine with your personal home computer. Developing your version of the CMX-340, for example, is an awesome undertaking. It's been tried, and a few have struck upon a faint resemblance to the CMX-340; but it's a chancy enterprise, with very long odds against success.

With tape machine and editor choices made, the planners must move to laying out signal distribution, which brings into play the staff's video and audio engineering talents. The distribution system can be either closed-end (confined to the equipment in the facility itself) or open-end (connected operationally to other parts of the video plant). The choice will depend in the main on whether or not the post-production facility will hold enough equipment to stand on its own feet. If the facility can stand alone, you can make it closed-end, with no signal leaving for other parts of the plant, or coming in from outside.

If the post-production operation will need to use equipment in other parts of a plant, then clearly signal distribution must be open-end. This is more complicated and needs careful engineering strategy to work out. In today's video facilities, signal distribution is given shape with routing switchers. The designers must apply the switchers to carry out the functions wanted.

INTEGRATION INTO AN EXISTING PLANT

What if you must construct a post-production facility using some equipment in an existing plant? Don't push the panic button. List the audio and video requirements of the new facility and determine what is usable in the existing plant. Measure all against the best audio/video engineering standards, to make sure the signal coming into the post-production facility is top grade. Don't rely on signal processors to clean up poor signal quality, because if it is poor the processors will only make it worse. Get a good signal, and then processing can give you sparkling video.

NBC's Edit Room 7, Burbank, CA, has similar disposition of controls, machine racks visible through glass doors at left rear.

Winding up the design process are the human factors considerations. Production facility designers have a tendency to go overboard here. They try for something directly out of *Star Wars*, or else bring over ideas from a fancy "fun" basement at home. Something between these two extremes should work, depending on the budget.

The creative use of relatively inexpensive materials (celotex wall coverings, fabrics, oak insets) can turn a

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plain design into a spectacular working space. Unless the design engineer has a flair for architecture, it is prudent to call in an interior designer at this point. Work with the interior designer to develop a standard room design that can be reproduced in variations for future rooms. This, of course, fits in with the use of modularity in the engineering design.

While it is often a good idea to call in an interior designer, don't let the decorator call the engineering shots. Remember that the purpose of the room is to edit video programming.

EQUIPMENT PLACEMENT

The placement of the tape machines can be either centralized, that is, all in a row at one side of the room; or localized, with each tape machine clustered with an editor, special effects units, etc. The centralized arrangement is used in production facilities with very heavy loads, such as major TV network operations or production houses with many large customers. Operators can be dedicated to tape machine functions exclusively and carry them out with high efficiency if the machines are all together.

Localized placement works well with smaller loads, with one operator assigned to do several different things on a video program—operate the tape machine, the editor, and so on.

It is important to have a machine-room environment for tape machines pounded as heavily as those in a large production facility. Humidity, temperature, and the cleanliness of the air must all be at optimum levels. Dirt, of course, is a prime enemy of tape machine reliability. Cleaning the air will extend the head life substantially. So do not tuck the tape machines behind part of the decor in an ordinary room, in order to keep them out of sight.

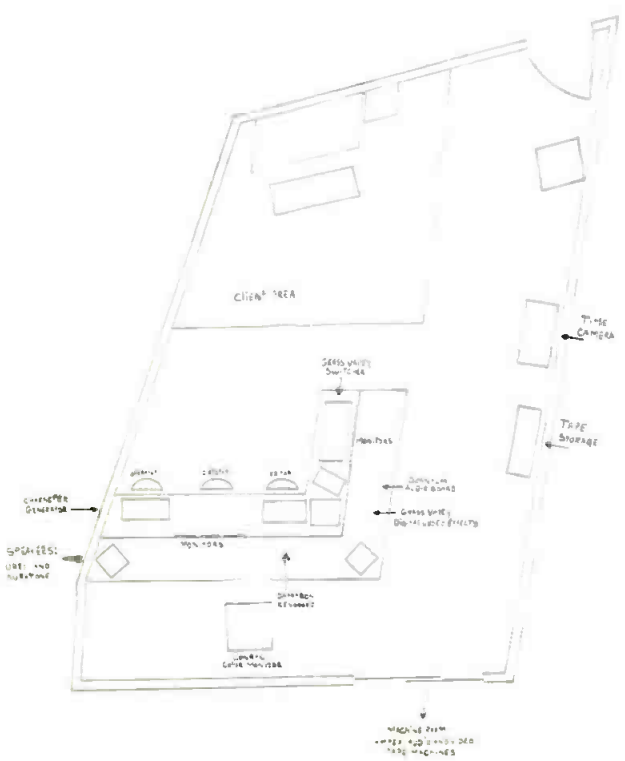
The consoles also have to be placed according to published ergometric standards, to insure operator comfort and efficiency. In the placement of monitoring equipment, you have great flexibility from recent advances in

EQUIPMENT AND DESIGN OF EDIT ROOM A, NATIONAL VIDEO CENTER, NEW YORK

National Video Center, a video and audio post-production facility in New York City, recently put on line a totally new plant, including Edit Room A, shown in main outline in the floor plan. Herb Ohlandt, VP and director of engineering, was the principal designer.

The edit room is used for production and post-production of full-length programs, cable program integration and formatting, national and local commercials, political spots, and similar material. It is built around a Datatron Vanguard editing system, interfaced with four Ampex VPR-2B tape machines.

The edit room functions as one spoke in the hub-and-spoke structure on which the plant is laid out. Routing switchers and dedicated A/V trunk lines connect the room to the central hub and effect interconnection to other elements of the plant. The edit room can thus make use of other equipment in the plant if needed—including framestores, studios, telecines, and animation cameras.



The four Ampex VTRs and four others serving another post-production room are in an area immediately adjacent to the edit room itself. This was done to minimize security problems that sometimes occur with commercial programs if the tape machines are in a distant machine room, far from management and client supervision. Many buyers of video commercials want the material kept strictly from the public and from their competitors until it goes on the air.

The switching is set up so that either edit room can, in an emergency, make use of one or more of the tape machines assigned to the other edit room.

Since the edit room was built to give ad agency clients and producers a relaxed, creative working environment, it had to be laid out for comfort, attractive decor, and good acoustics, as well as excellent monitoring facilities. Wood paneling covers three sides of the room to give a finished look and aid good acoustic qualities. National has eliminated the standard video monitor wall in favor of a pedestal in front of the client seating area.

The system incorporates some original development by National in the interfacing of the Datatron editor with the Grass Valley Series 1600 Switcher, E-MEM, and the BEI character generator. A time code comparator checks the window of the character generator for coincidence. When this occurs, relays activate the switcher and digital effects unit. Datatron also added software that allows the editor to control crosspoint closures in the switcher.

The nightmarish difficulty of bringing in a complex editing facility at the same time that a whole plant was being constructed was greatly reduced with complete documentation of all equipment placement, wiring, etc.

Partial list of equipment:
Four Ampex VPR-2B tape recorders
Datatron Vanguard editing system
Grass Valley 1600 switcher with E-MEM and audio E-MEM
Two-channel Grass Valley Group Mark II digital effects unit
BEI CG-3000 character generator
Quantum eight-input/four-output audio mixer
Two UREI Model 811 speakers
Conrac 6142 color monitors
Eight Hitachi VM 906 B/W monitors
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computer display technology. Different colored phosphors can be used in the screens for the edit system edit list and operating control read-out to reduce operator eye strain.

A console designed around basic equipment rack frames (standard 19-inch racks whenever possible) will greatly enhance your freedom to add additional equipment or change location when you need to. Good console designs will use flexible frames that can be easily covered with materials that you choose—formica, leather, etc.

ADAPTING TO PARTICULAR NEEDS

Customization bridges the gap between the standard equipment items and the particular needs of each facility. It is usually based on external remote connectors on the machines, which allow most functions to be controlled by external switching devices, ranging from a simple SPST throw switch to shaft-encoded joy sticks. Interfacing also varies from one facility to another to meet the particular needs. You must work on the interfacing problems with operators and design engineers, using the manufacturers' service manual as your bible.

After the design work is finished, getting the plant built will bring a new set of problems. Experience and instinct are essential, but each plant is unique and requires fresh thought. You need methods for coordinating the various construction trades, and for timing each element of the job. Scheduling guides such as GANT and PERT charts help in identifying and guiding the critical paths of the project toward completion targets.

But avoid the pitfalls of the weekly meeting. Although such meetings can be useful for updating everyone on the progress of the project, they take time that is badly needed on the actual work. A more efficient scheme is a "triage" approach. As critical problems arise, take them on a priority basis. Put off until a less critical time the small details that will bog down the movement of the project. During the construction phase never overlook the overriding objective of getting the project to a revenue-producing capacity.

As an example: project engineers have the tendency to want every last terminal strip detailed for construction be-

EDIT ROOM 7, NBC, BURBANK, CA

At NBC's West Coast network headquarters in Burbank, CA, a new production and post-production room, Edit Room 7, went on line in August, 1982. The main designer was Max Grossbard, project engineer, audio/video projects department in Burbank.

A CMX-340 editor works with four RCA TH-200 one-inch tape machines and a Grass Valley series 300 16-input switcher that includes two-channel digital video effects capability to post-produce NBC network shows, game shows, and promos.

Edit 7 is completely self-sufficient for most of its work, but is also linked by dedicated A/V lines to the central signal distribution area through an NEC routing switcher. This gives Edit 7 access to many additional equipment units throughout the plant.

A main design objective, straightforward and efficient operation, required careful human engineering, with more and more units of complex equipment incorporated into post-production systems. Fresh ideas in Edit 7 included:

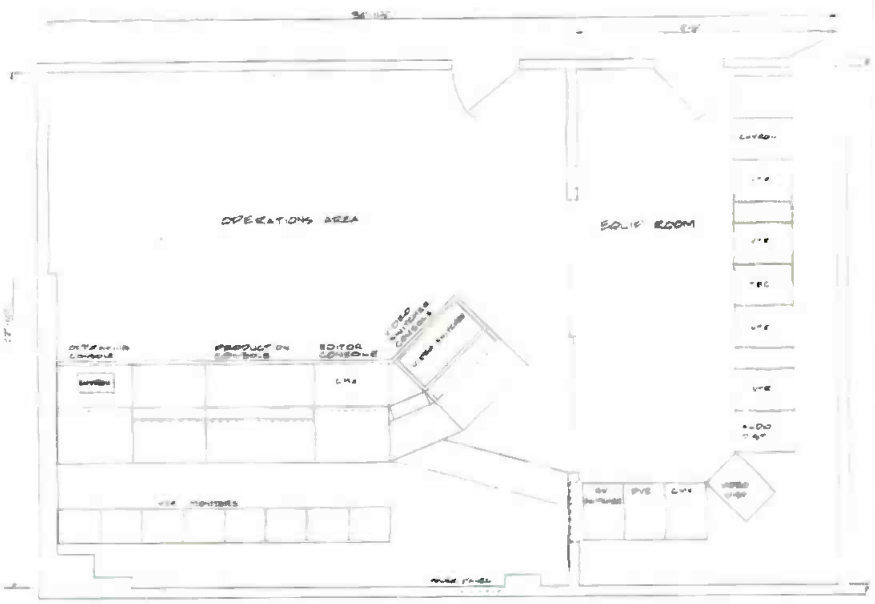
- A central rack that holds four RCA TBC-200 time base correctors, along with a vectorscope and high-resolution monitor. With this part of the operation in one spot, rather than attached by separate systems to each tape machine, an experienced operator can carry out the function rapidly for the whole plant. Centralization eliminates the need for multiple vectorscopes. TBC operators can switch the control to any of the tape machines for rapid setup.
- Single-channel multiple audio monitoring, with a system that takes all 12 console fader inputs into the machine room for separate connection to individual audio channels on the VTRs. Operators may add audio channels from any machine one over the other, or select either the left or the right channel.
- An edit menu display using a new green phosphor in the Conrac DBZ monitor for low operator eye fatigue.
- A microphone adjacent to the producer's position at the console, allowing the producer to give voice cues easily during production.
- The "lazy L" configuration of the operating console, giving the editor full access to all major equipment panels, with production personnel close at hand for easy interaction during a session.

For a good ambience for clients, the room has a wet bar, microwave oven, and refrigerator. Comfortable couches and a table with chairs help make long editing sessions pleasant for viewers.

The large amount of equipment in the room necessitated extensive humidity and temperature control, so exhaust fans on equipment racks supplement the air conditioning system. Machines are visible from the editing room through double glass doors.

Partial list of equipment:

Four RCA TH-200 one-inch VTRs
CMX-340X edit system
Grass Valley 300 16-input switcher with two-channel DVE
Chyron IV character generator
Quantum Audio 12-channel console
Two Conrac 6142 color monitors
14 Conrac 5722 color monitors
Two JBL 4111 speakers
ESE timing clocks
Ampex 700 audio recorder



RCA FM power tubes. 15 to 55kW outputs at high efficiency.

RCA is now in the FM power tube business with a series of four tubes and cavities designed specifically for high-gain, high-efficiency broadcast service:

Tube Type	Output	Gain	Efficiency	Cavity Model
8986	15kW	20db	80%	Y1393D-V1
8985	25kW	20db	80%	Y1393D-V2
9011	30kW	21db	80%	Y1393D-V3
8984	55kW	16db	78%	Y1369

There's a very persuasive reason for using a tube with high efficiency: lower operating costs. Over the lifetime of a transmitter this can mean considerable savings.

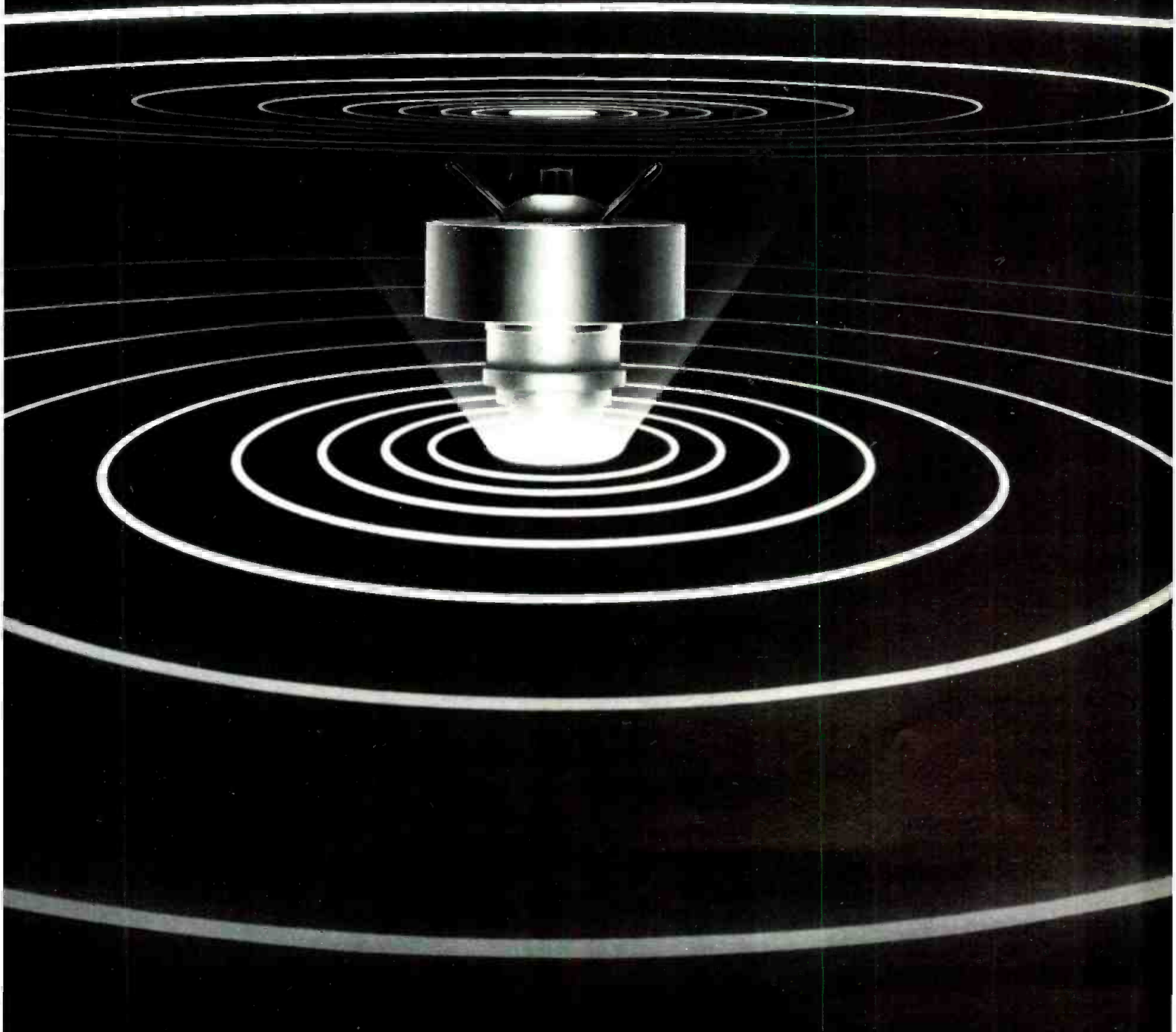
And RCA tubes are designed for long life.

Our cavities complement our tubes. They provide high-gain, grid-driven circuits which take full advantage of the tubes' high Gm electron optics, high efficiency, ease of neutralization and ease of cooling.

Along with our power tubes, and the cavities that bring out their best performance, we also supply service and application engineering. Find out more today. Contact RCA Power Tube Marketing, New Holland Avenue, Lancaster, PA 17604. Call (717) 397-7661. Or get in touch with RCA, Brussels, Belgium. Sao Paulo, Brazil. Sunbury-on-Thames, Middlesex, England. Paris, France. Munich, West Germany. Mexico 16 D.F., Mexico. Hong Kong.

We supply both the power tube and the cavity. In our pictured Y1393 cavity, the 9011 tube delivers a measured gain of 20 db with an efficiency of 80%.

RCA



fore they start work on a part of the project. By using a parallel design process, the designer works side by side with the construction people to give them a constant flow of construction detail, as the detail is called for. This parallel plan will keep construction moving.

While construction is going ahead, the main machines—tape recorders, editors and so forth—should be checked out in a factory acceptance test. This step will save debugging time later.

The factory tests should be done in two phases. The first is a performance check at each major equipment vendor; the second part is an assembly check at the vendor supplying the editors. The units should be assembled into a system and overall performance monitored. A minimum of a week's time should be spent to make sure the units interface properly and work together. If more time is available, use it for a burn-in of the system. If the system is proved out in the factory, the permanent installation will go much faster. The edit system will be qualified for editing on its arrival.

When integrating the system into an existing plant, one firm rule is, do not accidentally take down an existing system. Another rule of any large electronic construction project: there is never enough documentation. Set up a documentation plan in the beginning, and never deviate from it.

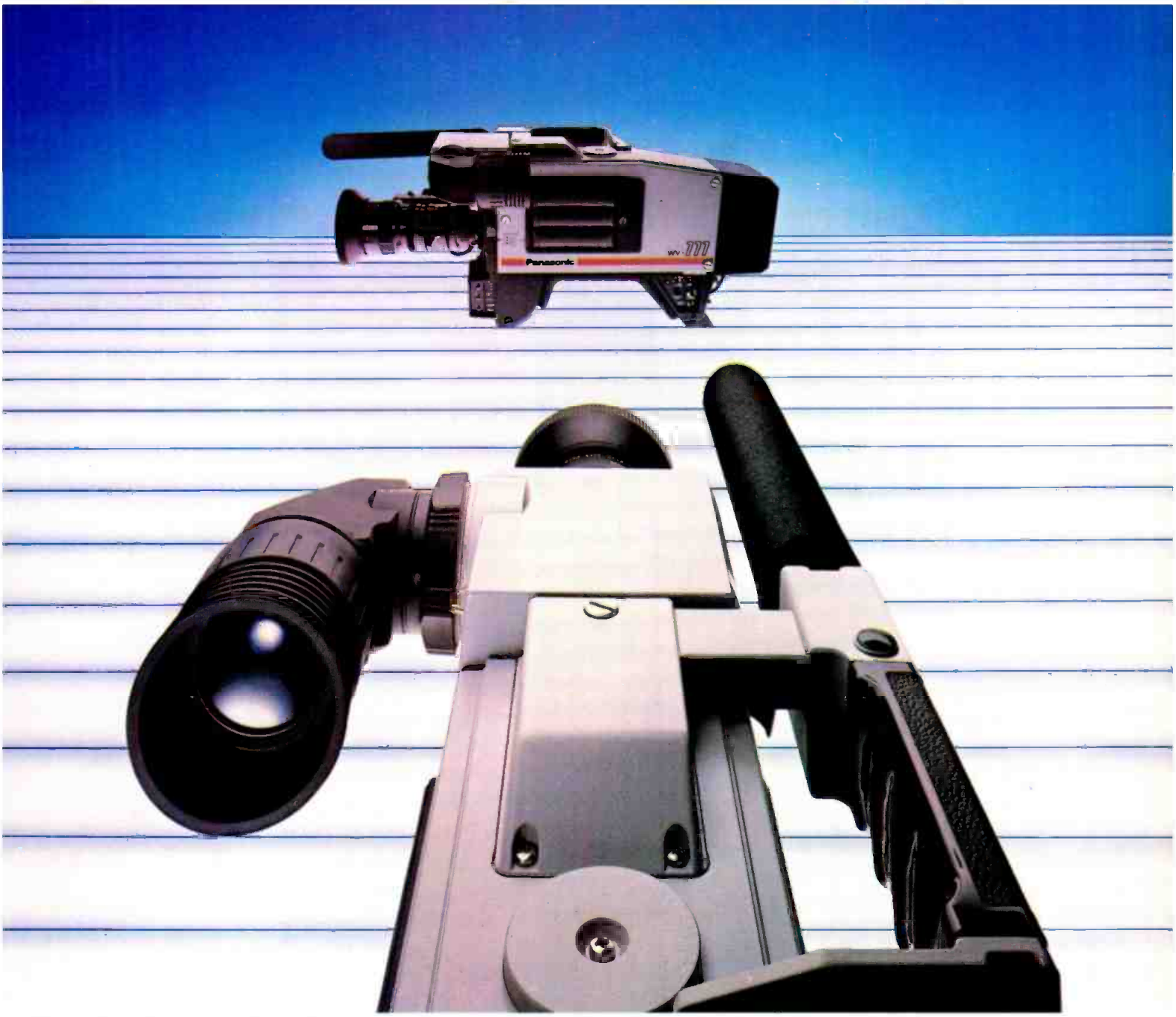
GETTING ON LINE

While the last coat of paint is drying is the time to get the system on line. The first step is debugging. If the factory acceptance tests have been carried out, this should, hopefully, involve only the interface to the existing plant. The standard way to debug is to start at the input of the system and work through.

However, if the modular hub-and-spoke plan was followed, debugging is simplified: each self-contained spoke can be handled separately. During the debugging operation you should get the performance specs up to the optimum levels, in conditions as close to real operation as possible.

Once the system is up to performance standards, the second step toward full operation can be taken: the operator training, or "baby sitting" phase. The operators should practice every part of running the system, under close observation. It is important during this period for the builders and designers to develop a thick skin. The operators and the engineers may well disagree from time to time on whether faults in performance spring from poor engineering or poor operating practice. Ego defenses have to come down and errors in performance studied objectively to determine the actual causes. Then corrections can be made early in the game when the cost will be much lower than at a later date.

This shake-out time should be no less than two weeks with a large production facility, with as many operation trials and training classes as possible. When that period is judged to be over, however, it is time for the builders and designers to say goodbye, no matter how strong their attachment to the project has become. Before going, they should complete all documentation and leave a telephone number. **BM/E**



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The 1.5" di-optic electronic viewfinder is not only fully adjustable, it also includes indicators for battery warning, VTR tally and other key operating conditions.

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The WV-777 has a −72dB mic input, a −20dB line input, 2 audio output levels, a snap-on AC adapter and battery case. And for studio use, there's also an optional 5" (meas diag) studio viewfinder, studio lens package and remote control unit.

But perhaps the Panasonic WV-777's most surprising element is its price, $7,650.* So broaden your perspective and get the prism optics camera designed with the cameraman in mind. The Panasonic WV-777.

Saticon is a registered trademark of NHK (Japan Broadcasting Corp.)
*Manufacturer's suggested price

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VIDEO SYSTEMS DIVISION

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Video Systems Division
One Panasonic Way
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Digital Audio Distribution— A Practical Approach

Large radio networks have opted for digital transmission from a single uplink. But for independent producers and program distributors, a multiple uplink capability may be more practical, with benefits such as power savings and time sharing.

By Steven B. Salamoff

RECENT DEVELOPMENTS in satellite distribution of program audio using digital transmission have been acknowledged by the industry as a major improvement over analog systems. However, the widely publicized proposal of the three major commercial networks for joint transmission of radio programming from a single location has all but neglected a rapidly expanding and highly diverse segment of the radio industry, the independent networks and programmers. In particular, recognizing that most individual network requirements are initially for a smaller number of audio channels, and that extensive backhauling can be eliminated in favor of convenient multiple uplinks, it is evident that the major networks' approach falls short of meeting the multifaceted needs of the mainstream of radio broadcasters.

To provide the radio distribution industry the means to meet the multiple requirements of large and small users alike, without penalizing one segment to the advantage of another, a solution has been developed by M/A-COM DCC, based on three-meter digital audio receive-only earth stations and T1 (1.544 Mbps) satellite signals. M/A-COM DCC has already been selected by AT&T as the equipment supplier for its Digital Audio Satellite Service, and is manufacturing a complete line of MAESTRO earth station equipment which can be configured for other audio, data, and audio/data multiplex applications.

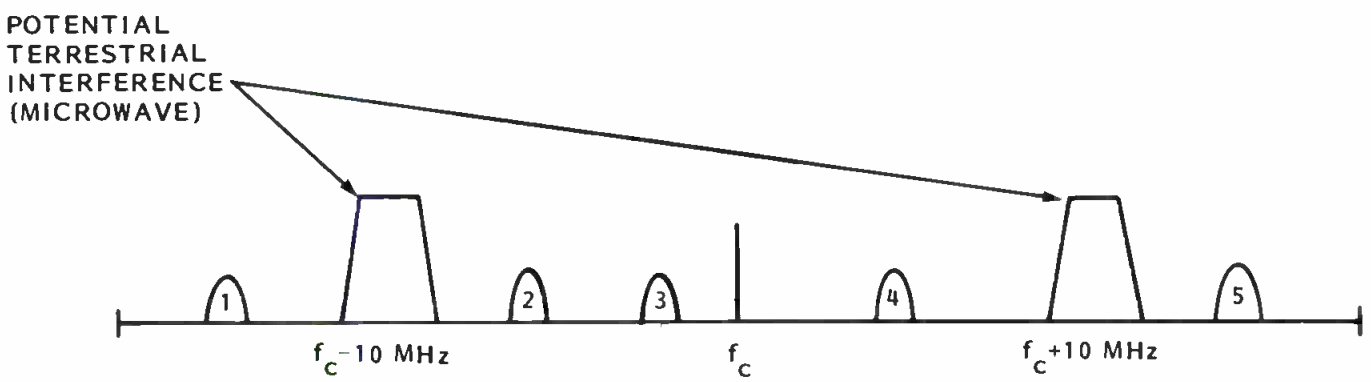
Steven Salamoff, EE, is director of Satellite Communications Equipment Marketing for M/A-COM DCC.

Network description

The system is organized around a 1.544 Mbps (T1) transmission format. Unlike the single-carrier-per-transponder TDM approach selected by the major networks, up to five parallel T1 carriers can be placed in a single transponder.

There are several important advantages to this frequency-division/multiple-access (FDMA) approach. First, several uplink (transmitting) sites can access the same transponder. This allows, for example, a network to transmit directly from New York and/or Los Angeles without having to backhaul across the country. The affiliates can select from either carrier signal by simple thumbwheel control, or carriers can alternately occupy the same frequency at different times.

Second, since each T1 carrier requires only 20 percent of the satellite transponder power, network implementation and subsequent growth is handled incrementally in



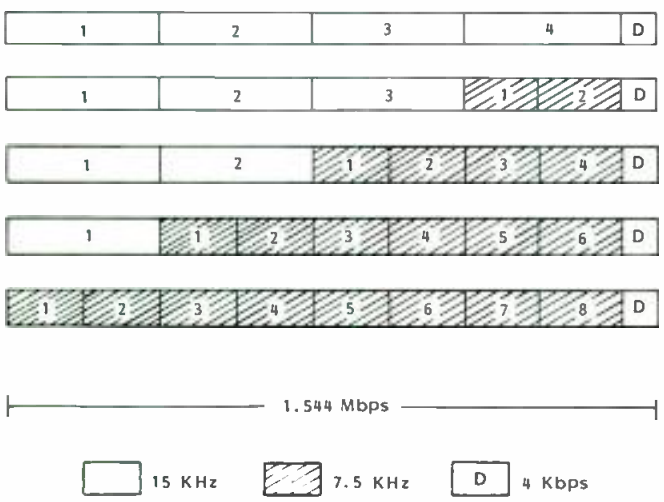
Typical transponder utilization (36 MHz).

T1 steps. The advantages are very clear: a full transponder need not be utilized to handle a minimal number of initial program channels; only 20 percent would be required for four 15 kHz audio channels. Network growth is accommodated through the use of additional T1 signals, and the transponder usage (and its related cost) increases only as needed.

The single-carrier time division multiplex approach requires a full satellite transponder from the initial service offering, even for requirements as low as a single channel. A common carrier providing combined uplink facilities and satellite space must have assurance from a network or networks that the full capacity of the single carrier will be utilized, or at least paid for. Otherwise, unassigned audio channels would result in significant additional cost. Similarly, potential users assigned to a partially utilized satellite signal may have to wait for the service until all the unused channels are committed.

Third, the interface between the satellite receiver and the audio demultiplexer is a digital T1 data stream. Thus, the earth station may be located separately from the studio facilities without any loss of audio performance, since the connection is done with standard T1 interfaces. The connection may be a simple twisted pair cable run over several thousand feet, or longer distance T1 facilities available from the local telephone company. Several studio locations or alternate network users can also share the same earth station and still benefit from the inherent quality of digital audio.

The single-carrier TDM approach does not lend itself to T1 connection, since the digital stream is a higher nonstandard rate. Therefore, the digital signal must first be reconverted to an analog audio signal for subsequent distribution over coaxial cable or other analog transmission equipment. This subjects the receive audio to additional degradation due to signal attenuation, noise pickup, and other anomalies that are not a factor in a digital signal distribution system.



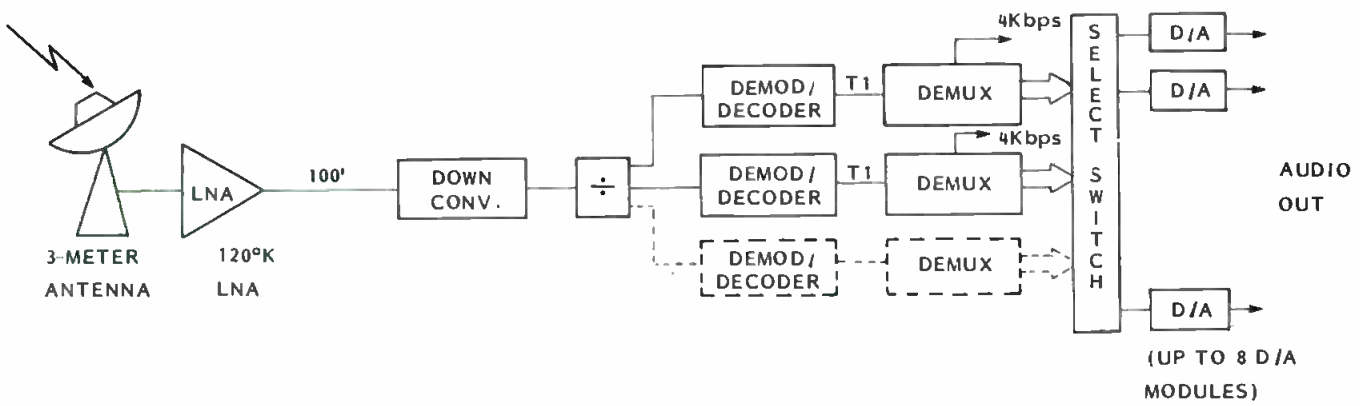
Audio channel capacity per T1 carrier.

MAESTRO Audio Performance

Sampling Frequency	32 kHz (for 15 kHz channels) 16 kHz (for 7.5 kHz channels)
Encoding and Decoding	15 bits per sample
Compression/ Expansion	15-11-15 bits per sample
Full Load Level (FLL)	adjustable from +21 dBm to +24 dBm
Impedance	600 ohms
Interface Level	+8 dBm nominal
Gain vs. Frequency Response	50-7500 Hz Channels ±.3 dB 50-1500 Hz Channels ±.3 dB
Idle Channel Noise	−81 dB
Harmonic Distortion (THD, over 40 dB dynamic range)	Less than 0.3%
Intermodulation Distortion	
a) SMPTE Standard 60 Hz and 7 kHz at 4:1 ratio (+18 dBm)	Less than 0.3%
b) 500 Hz and 2 kHz (+12 dBm)	Less than 0.3%
Phase Difference between channels	Less than or equal to 5 degrees over the response bandwidth
Crosstalk between channels (40 Hz to 15 kHz)	Greater than 75 dB

Audio channel capacities

Each T1 signal used in the MAESTRO system can provide 15 kHz and 7.5 kHz audio channels in several combinations. In addition, each T1 signal contains a 4 kbps data channel which can be used for data cue, control, teletype, or alternate data services. With up to five T1 signals in a single transponder, 20 15 kHz channels can be derived. Since the T1 format provides all framing and synchronization, separate timing information need not be carried on additional channels. The single-carrier TDM network, on



Receive-only earth station block diagram.

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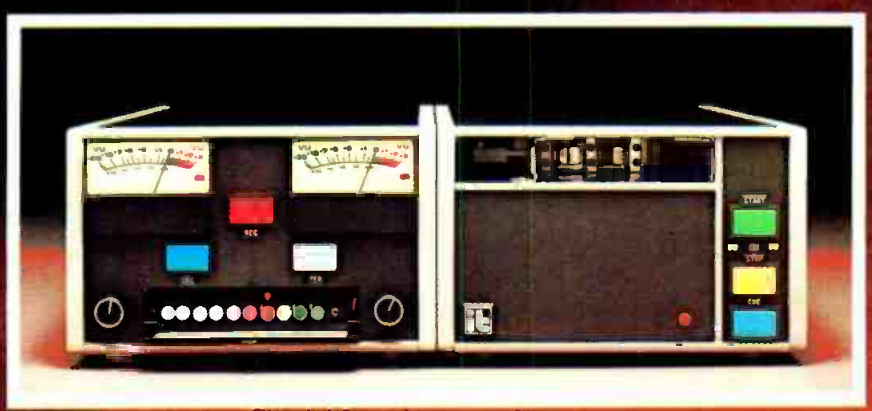

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the other hand, requires a 32 kbps synchronization channel; therefore only 19 15 kHz digital channels can be transmitted in a single transponder.

System receivers can select from any of up to five carriers per transponder, and from any of four 15 kHz channels per T1, allowing affiliates to select any of the 20 channels available. However, for privacy, selective digital scrambling can be implemented on each of the different carriers to preclude unauthorized reception.

The T1 signal distribution concept is almost directly applicable to data transmission and audio/data multiplex. Examples of this feature are: direct distribution of 1.544 Mbps data (for data retrieval, medical data archives, news services, etc.); and audio and data on a single T1, such as two 15 kHz radio program channels and other standard data signals for services requiring 56 kbps circuits, 2.4, 4.8, and 9.6 kpbs channels.

Upgrade from analog SCPC

Several radio networks already use analog single-channel-per-carrier transmission that has occasionally performed poorly. The MAESTRO equipment is compatible with most three-meter receive dishes, and is offered as an upgrade to these systems to improve general performance and add capacity. In the same 22 dBw of satellite effective radiated power needed to support two analog FM SCPC signals for stereo, a digital T1 carrier will provide four 15 kHz circuits. Moreover, the audio performance of the four 15 kHz circuits is not degraded by

M/A-Com's Maestro power supply for five-channel digital satellite system.

transmission impairments such as multipath and crosstalk, and is generally superior to the equivalent analog transmission.

Another obvious advantage is that the T1 carrier can coexist in the same message traffic transponder with the analog FM signals. This means that space segment need not be repurchased from a new satellite vendor and the existing space can continue to be used.

In conclusion, the MAESTRO digital earth station provides an efficient, low-cost, and flexible solution to audio distribution for independent radio networks. In addition, data distribution can be accommodated for a variety of services. Advanced error coding techniques and digital audio processing provide highly reliable operation and superior audio quality while network growth is incremental with minimal initial system costs—significant factors in the telecommunications revolution of the 1980s. **BM/E**

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While electronic news journalists will appreciate the SM82's extended reach and exceptional balance in hand-held situations, you'll love its low mechanical handling noise, rugged construction and reliable operation over a variety of temperature, humidity and wind conditions.

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The SM82 utilizes an internal battery or it can be externally powered by an optional PS1 power supply or equivalent. For added security, it automatically switches to battery power if its simplex source should ever fail.

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Wayne Vriesman, VP of WGN Continental Broadcasting and station manager of WGN Chicago, was its news director.

Neil Derrough, president of the CBS TV Stations Division, is a former GM of all-news radio stations.

Ron Handberg, GM of WCCO-TV, Minneapolis, moved up after 11 years as the station's news director.

RTNDA REPORT:

MAKE THE NEWS DIRECTOR A GM?

Wendell Harris, VP and GM of KTBC-TV, Austin, TX, moved to that position after several years as a news director.

Henry Stone, general manager of WFKN, Franklin, KY, was promoted from news director and still does a daily newscast.

Results of a recent survey show attitudes of news directors and station management are shifting. With news as a major station revenue source, GMs are eyeing news managers for promotion.

By Vernon A. Stone

WHEN WAYNE VRIESMAN left Northwestern University with a master's degree in journalism in 1959 and took a job as a news writer at WGN, Chicago, he had given no thought to working in any department but news. However, after becoming news director, first at KWGN-TV, Denver, and then back at WGN Radio and TV, he increasingly saw opportunities beyond the newsroom. And, since 1978, Vriesman has been VP of WGN Continental Broadcasting Co. and station manager of WGN, standing as an exception to the longtime rule that station and general managers most often come from sales or program departments, seldom news.

That's still the case, according to a national survey of managers of commercial TV and radio stations conducted recently as a project for the Radio-Television News Directors Association. The 167 TV (including joint TV-radio) and 96 radio-only general managers included few—7 percent of the TV and 4 percent of the radio respondents—whose primary background was news. The majority—58 percent of TV and 64 percent of radio GMs—had moved

Dr. Vernon A. Stone is director of the School of Journalism at Southern Illinois University at Carbondale and chairman of the Research Committee of the Radio-TV News Directors Association.

Make the News Director a GM?

up from sales. Former program directors were managing 24 percent of the TV and 20 percent of the radio stations surveyed. Other backgrounds, most often operations or business management, accounted for the remaining 11 percent.

But change is underway. With news becoming the primary department at most TV and many radio stations, often the station's biggest money maker, news directors are increasingly moving up to GM positions. The trend was confirmed in the RTNDA survey of general managers' evaluations of their news directors.

The survey was conducted by mailing questionnaires to all 690 nonsatellite TV stations and a sample of 810 commercial radio stations. Response rates were 24 percent for television and 12 percent for radio. Despite the low return rates, the findings are considered viable for describing overall trends, which was the purpose of the research.

A substantial 45 percent of the station heads in television and a third in radio responded that they saw their news directors as potential station managers. As Table 1 shows, this was particularly the case in larger TV markets. Half of the news directors in the 100 largest markets are seen as future station managers, compared to about a third in smaller markets. The size of the TV news department accounts for an even greater difference. Directors of news staffs of 21 and more are twice as likely as others to be seen by their GMs as future GMs. (Radio results by market categories are not reported because the small ample makes the reliability of such sub-breaks tenuous.)

TABLE 1: GM Responses to: "Do you see your news director as a potential station manager, here or elsewhere?"

	Yes
TV	45%
ADI 1–25	52%
ADI 26–50	52%
ADI 51–100	48%
ADI 101–212	36%
News staff of 1–20	31%
News staff, 21 & up	60%
News staff of 0–2	37%
News staff, 3 & up	32%

Sales managers are still the most likely to succeed the present GM, except in the top 25 TV markets, where the news director is now rated the better prospect. Nearly a third of the ADI I-25 general managers see their news directors as number one, compared to about a quarter who name their sales managers. Table 2 shows that in other TV market categories and in radio, the sales manager remains the most likely heir apparent. Again, news directors with staffs of 21 and more are twice as likely as those with smaller staffs to be seen as leading candidates for GM positions.

TABLE 2: GM Responses to: "Which department head appears the best prospect as a future GM?"

	Sales	News	Program	Other
TV	42%	19	13	26
ADI 1–25	23%	32	18	27
ADI 25–50	48%	18	15	19
ADI 51–100	48%	14	10	28
ADI 101–212	41%	18	13	28
News staff of 1–20	48%	13	13	26
News staff, 21 & up	36%	28	12	24
RADIO	44%	21	18	17
News staff of 0–2	40%	24	19	17
News staff, 3 & up	50%	20	13	17

Shifting role for engineers

Neil E. Derrough, president of the CBS Television Stations Division, has observed changes in the backgrounds of general managers in larger markets. In the early days, when keeping the station on the air was a major concern, they tended to be engineers. As broadcasting revenues grew, GMs increasingly came from sales. Now, with news setting the station's "personality" and producing much of its revenue, Derrough says there is a trend toward moving news directors into top management positions. Looking ahead, he sees a possible "dark horse in the GM race, the young MBA with management education and background."

What do general managers want in their news directors? As detailed in Table 3, the survey found personal maturity, experience in journalism and broadcasting, and personality/style topping the list as generally highly important. College education is next, rated somewhat more important for television than radio. Management experience and training were checked as important, though not highly so, by most TV GMs for their news directors, but only moderately so (at the scale's midpoint) in radio. The GMs attached little importance to news directors' track

TABLE 3: Mean Responses (on 1–5 scale) to: "How important is each to a news director at your station?"

	TV	Radio
Personal maturity	4.8	4.7
Journalism experience	4.7	4.3
Broadcast experience	4.5	4.4
Personality/style	4.4	4.3
College education	3.9	3.4
Management experience	3.9	2.9
Management training	3.7	3.0
Track record as ND	3.6	3.3

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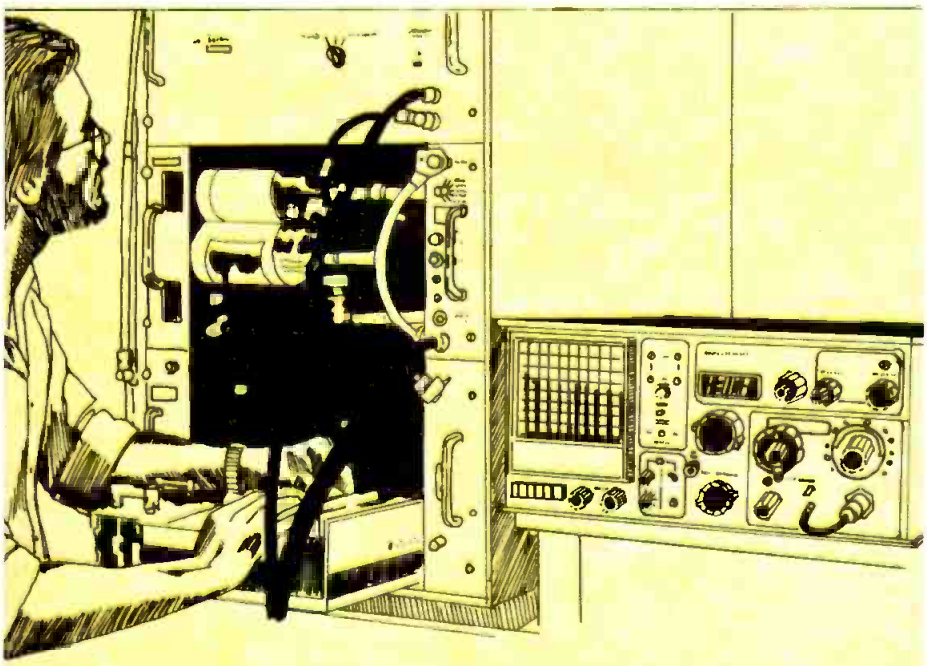

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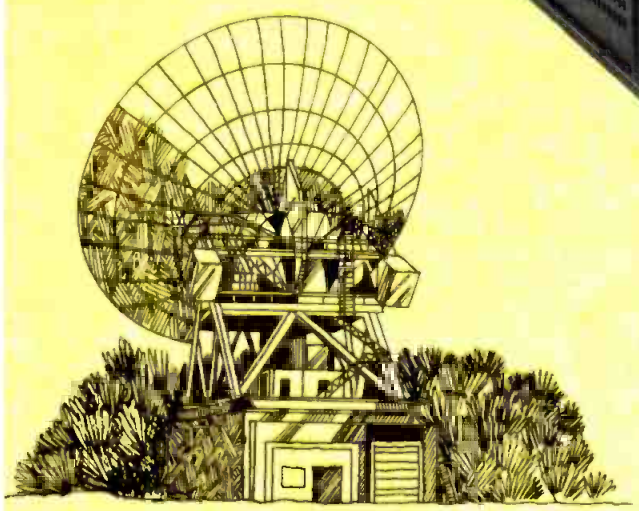

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records in their fields. Perhaps broadcast news demands are changing so fast that past achievements are poor barometers. Indeed, a few news directors were faulted for being "too set in their ways," not keeping up with their professions. None of these drew ratings as potential GMs.

John L. Greene, who moved up from news director to VP and GM of WRAL-TV, Raleigh, NC, says a news director needs management skills, organizational ability, and an overview of station operations. Indeed, most news directors who are seen by their GMs as material for higher management recognize and work toward the goals of the station as well as the newsroom. News "myopia," "tunnel vision," and "self-contained elitism" were terms used by GMs to describe news directors not likely to be their successors. A medium market TV GM who came up through news himself wrote that "most news directors, by the nature of the job, develop the analytical ability to become good managers, good decision makers; but many lack the breadth of perception to see the bigger picture and their role in it." A manager in Indianapolis noted on his questionnaire: "Unless news directors choose to get out of their own world and get themselves exposed to other aspects of the station, they are not going to be candidates for general managers. Cross-training should be accepted as a growth process on their part."

Douglas A. Smith, 14-year general manager of WFBC-TV, Greenville, SC, said, "Those news directors who aspire to top management positions should make every effort to learn and appreciate the contributions of the sales, programming, production, and engineering departments, and the overall legal and financial commitments of the station as an operating entity directed by the station manager. Green eyeshade news directors who cannot see beyond the newsroom have little hope of progressing beyond the newsroom."

Small radio station needs

Managers of small radio stations especially need to know the basics of all aspects of broadcasting, and many of them remain active in their former specialties. Henry Stone, who was news director of WFKN, Franklin, KY, for several years before becoming GM of the station, still does a daily newscast. GMs who came up through sales often keep on selling. Those who are former chief engineers tend to continue spending quite a bit of time with equipment. Stone says the manager of a small station "should be able to handle most jobs in the total operation."

Neither are small-staff TV stations suitable for the overspecialized. David G. Riveness handles news as well as GM duties at KYUS-TV, Miles City, MT, where the staff totals six. "KYUS-TV just doesn't fit into the mold," he said. "I get to work at 6:30 a.m. each day, so by 10:00 p.m., on our news, weather, and sports, I'm tired—and hungry."

Strengths and weaknesses

The survey asked GMs to write in the main strengths and weaknesses of their news directors. Journalistic strengths were cited most often. Of the 223 GMs who wrote in responses, 43 percent used such descriptions as "first-rate newsperson," "good at getting news," or "strong journalist." One-fifth listed such general attributes as dependability, willingness to work hard, and integrity. Eighteen percent cited news directors' leadership and skill in working with personnel. Eight percent said competitiveness or aggressiveness was the best thing their news directors had going for them, and an equal number said organization. Six percent of the GMs said the news directors' main strength was in working toward overall station goals.

Working with people was the weakest area for the news directors. Personnel management was cited as the main weakness by 21 percent of the 211 GMs who responded to the question; general interpersonal or people problems were noted by 5 percent; lack of cooperation with superiors or other department heads by 8 percent; and bad temper or disagreeable manner by 5 percent. The top weakness of 15 percent of the news directors was in unspecified management or organizational areas. For 8 percent it was fiscal management. Six percent of the GMs said their news directors' main weakness was failing to see or work toward overall station goals.

How satisfied are general managers with their news directors? As Table 4 shows, they average four on a five-point scale—"B" in an A-B-C-D-F grading system: good but not excellent. In specific performance areas, they were rated somewhat better as journalists than as managers. Their top score was on professional relationships with news sources. News directors tended to get B or B− on understanding overall station goals and professional relationships with supervisors and other department heads. Radio news directors scored higher than those in TV on operating with a budget. Personnel management emerged as the most deficient area for news directors, the average grade from their GMs being roughly a C+.

Compared to other department managers at their stations, news directors seldom were rated worse. As Table 5 details, news directors' performances were seen by their general managers as about the same or often better than for other second-line administrators at their stations. News directors drew their highest ratings on overall performance. They did well on potential for promotion, facilitating station goals, working with supervisors, and handling fiscal matters. Again, their main weakness was in personnel administration. A quarter of the news direc-

TABLE 4: Mean Responses (on 1–5 scale) to: "How satisfied are you with your news director?"

	TV	Radio
Overall performance	4.0	4.0
Professional relationships with news sources	4.2	4.3
Understanding overall station goals	4.1	3.9
Professional relationships with supervisors	4.0	3.9
with other department heads	3.9	3.7
Operating within a budget	3.8	4.3
Professional relationships with subordinates	3.7	3.7
Personnel management	3.5	3.5

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tors were rated below other department heads on staff supervision.

What areas of management training would be most helpful for news directors? Personnel management—supervising, motivating, and leading people—was most mentioned in responses to that open-ended question. Fiscal matters—budgets, profits, and resource management—was a close second. Other management areas—time use, objectives, stress control, for instance—were next. Personnel and fiscal management were suggested predominantly by TV GMs. Those in radio most often suggested training in time management and journalism.

WFBC-TV's Doug Smith, who came up through sales, believes that "as news departments and budgets grow, news directors must become good managers and administrators first and journalists second," with matters of journalism handled primarily by secondary newsroom management. CBS's Neil Derrough adds, "Formalize your business education as soon as possible."

Many GMs responded essentially as did William H. Dilday Jr., WLBT-TV, Jackson, MS, who wrote, "Anything that can be done to improve the managerial skills of those journalists coming up through the ranks is greatly needed."

Performance records

How do news departments fare when news directors become general managers? Derrough, who ran two all-news radio stations and two TV stations before becoming president of the CBS TV stations, believes that GMs who are former news directors are easier for the news department to work with because they understand news problems and, at the same time, tend to "lean over backward to stay out of the news director's way."

Ron Handberg, general manager, WCCO-TV, Minneapolis, after 11 years as news director there, says he is extra careful not to show favoritism to the news department: "I try to view the budget request and other requests from news with the same objectivity that I hope I'm showing to other departments.

"I tried to make it very clear to the news staff that I was not intending to become a super news director as general manager. Yet one of the reasons I was selected for the job was because of that experience and because of the importance of news at our station."

Becoming general manager is a big move up, but is it the right one? Handberg says he did not actively seek the job as GM, but he took it because he realized that he had been in the same newsroom for a long time—20 years—and needed to look at all the possibilities. He advises other news directors to be aware that a "fatigue factor" may enter after many years in the same position. "If you don't have the zest to come out charging every day," he goes on, "it's time to do some really careful self-examination."

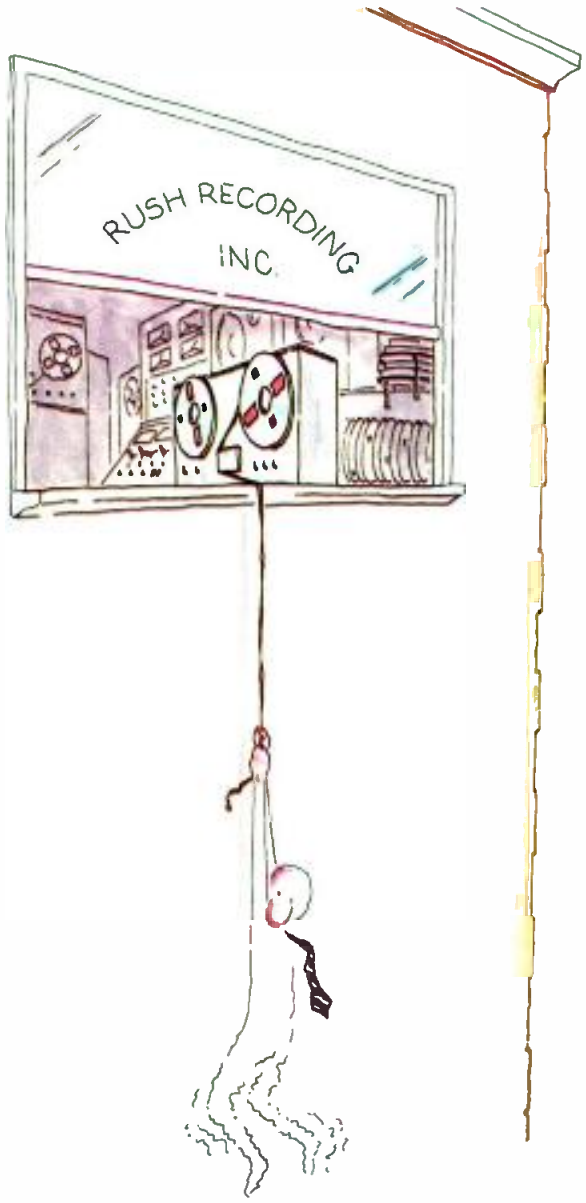
Before taking a GM position, Handberg suggests, ask yourself: Am I really equipped for it—by training, by experience, by temperament? Have I availed myself as news director of the opportunities to learn the things I am going to need to know as general manager? Budgets, labor negotiations, personal service contracts, research, promotion, to say nothing of the business and sales sides.

TABLE 5: Responses to: "Compared to other department managers at your station, how does your news director rate on . . .?"

	Better	Worse	About Same
Overall performance			
TV	46%	8	46
Radio	37%	2	61
Potential for promotion			
TV	36%	18	46
Radio	27%	17	56
Facilitating station goals			
TV	35%	7	58
Radio	29%	16	55
Working with supervisors			
TV	32%	6	62
Radio	31%	7	61
Handling fiscal budget			
TV	28%	11	61
Radio	28%	7	65
Working with other departments			
TV	24%	12	64
Radio	18%	17	65
Personnel administration			
TV	30%	25	45
Radio	22%	27	52

Joseph Dembo, who has moved back and forth between news and station management, a former VP and GM of WCBS Radio, New York, and currently news director and executive editor for CBS News radio operations, advises: "Become the best director of news in your area. Never stop studying and trying new ways. Sooner or later quality will tell, somebody will notice, and the breaks will come. And when they come, don't let the rest of us down. Since I left the news director ranks, there have been others who have gone up similar ladders. One or two fell off because of unethical, unprincipled behavior. So don't become dizzy or disoriented when you're suddenly thrown into a lofty position."

Peter Lund, VP and GM of WBBM-TV, Chicago, who came up through sales, says "news directors are the wave of the future" in station management, in large part because news is now "where the dollars are." But he adds, "Do you really want to be a general manager?" It means more power and money, he says, but "journalistic skills and managerial skills are sometimes not transferable to the general manager's slot, and if you don't like the job, you won't do well at it." **BM/E**



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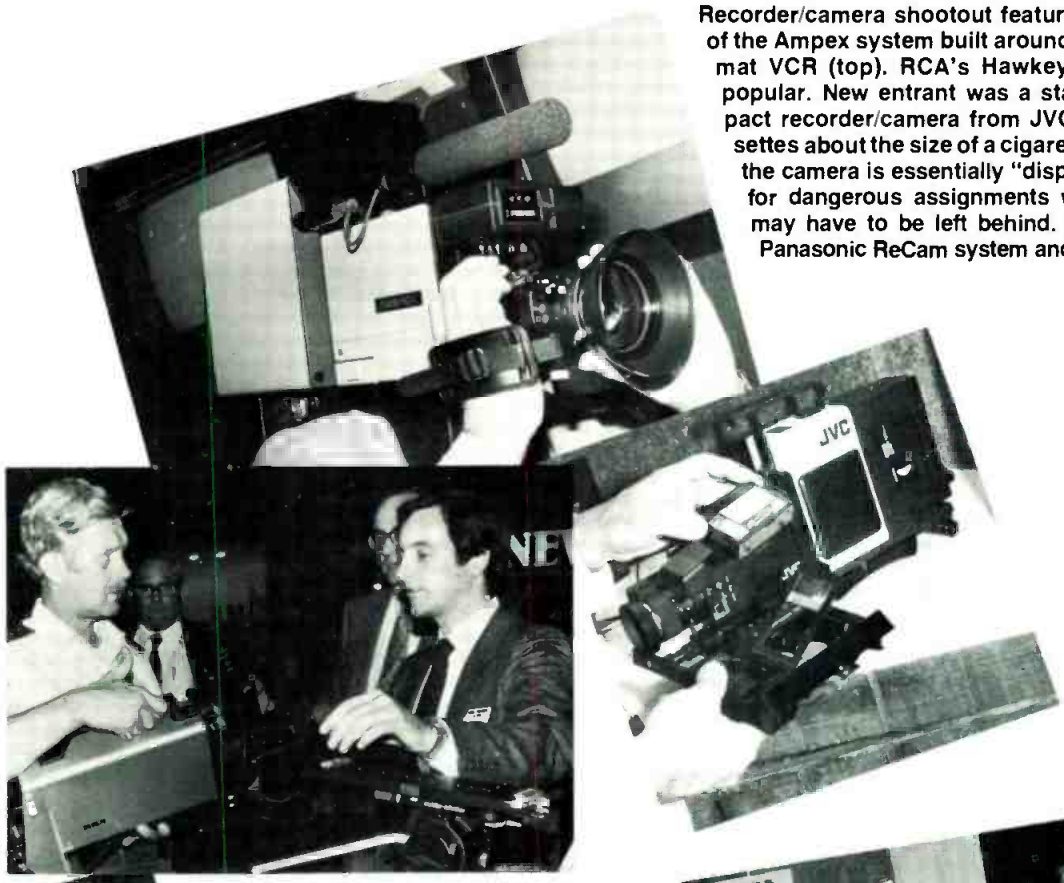


Recorder/camera shootout featured the U.S. debut of the Ampex system built around a Matsushita format VCR (top). RCA's Hawkeye (left) was also popular. New entrant was a standard VHS compact recorder/camera from JVC (right) with cassettes about the size of a cigarette pack; at $2500, the camera is essentially "disposable," and ideal for dangerous assignments where the camera may have to be left behind. (Not pictured, the Panasonic ReCam system and Sony's Betacam.)

◄SBN showed some new developments in its weather system, including a new move towards satellite bandwidth compression. (Also present, but not pictured, was Arvin/Diamond's Satweather unit.)

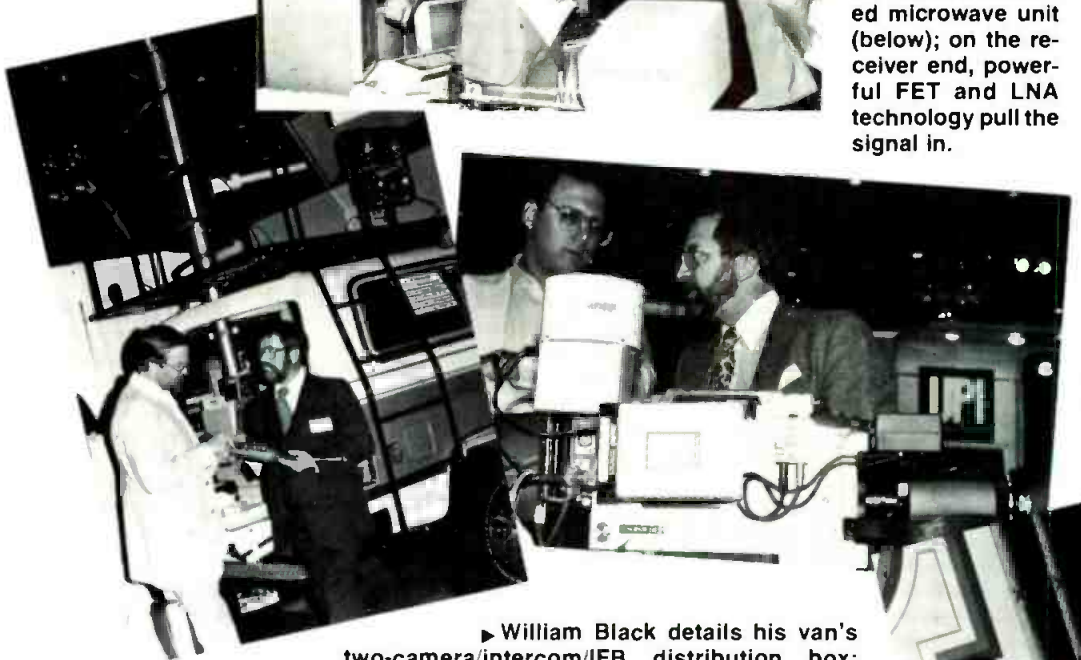
▲This unusual, square antenna from Broadcast Microwave Services is a low-cost substitution for a motorized tracker.

Still stores are rapidly becoming a major component of news presentation. ADDA's ESP (left) drew interest in a configuration coupled with a small Grass Valley production switcher; complex, multi-generation graphics are created digitally without image degradation; at Harris, the new Iris II was on display with its cartridge-based, removable disk pack (right); the 80 megabyte cartridges (two can fit side-by-side in a 19-inch rack) each hold 250 stills. (Not pictured was the MCI/Quantel DLS-6030, now featuring its own internal computer.)

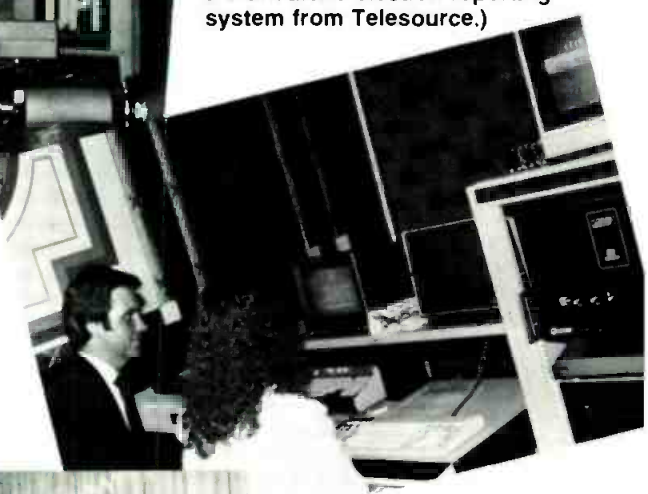
NEWS FROM LAS VEGAS!

TEA featured new headsets and sportscaster mics in addition to a one-inch videotape evaluator (not pictured).

Colorgraphics was one of only a few companies which brought elaborate weather display systems, despite earlier interest in these systems. (Not pictured is the Thomson-CSF Graphics V.)



RF Technology still leads the field with its camera-mounted microwave unit (below); on the receiver end, powerful FET and LNA technology pull the signal in.



Among new developments in newsroom computers was the QuantaNews system from Quanta (below). Users define their own formats for filing, wire service acquisition, teleprompter formatting, etc., with each terminal accessing the entire data bank. (Not pictured were Jefferson Data's ENP and a standalone election reporting system from Telesource.)

▶ William Black details his van's two-camera/intercom/IFB distribution box; Black's truck, built for KCST, San Diego, is completely self-contained with 2 GHz microwave, Lang SID system, and 350 W of lights. Other vehicles (not pictured) included E-N-G Corp., Midwest Corp., and Video Communications.

PEP proudly displayed the new Frezzolini dual channel/dual regulated charger and power supply which can simultaneously charge batteries and power cameras or VCRs.

Ted Turner delivered the opening address, urging broadcasters to look seriously into reporting the lighter side of the news.

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Fiberoptics Offer High-Quality Links

It is now possible to get studio-quality performance over fiberoptic lines 8 km long or longer without repeaters. TV signals may be transmitted in either analog or digital form.

By J. B. Wise and T. W. Leonard

OPTICAL FIBER CABLES and systems have made an impressive entry into conventional transmission technology in applications such as military, computer, and telecommunication systems. Boasting wide bandwidth, low attenuation, immunity to RFI, elimination of ground loops, small size, and low weight, fiberoptics stands ready to solve interconnect problems in the television broadcast industry as well. While some fiberoptic equipment has been developed for high-quality video transmission, fiberoptics has until now made its mark in cable television video trunking applications, which can tolerate significantly lower performance than that permissible in broadcasting. In addition, such fiberoptic systems generally do not offer repeaterless performance much beyond 3–5 km.

But new systems are at hand that can offer studio-quality performance over links of 8 km or more without repeaters. In many applications, such as outside broadcast or studio-transmitter links, the expense of the fiberoptic terminal equipment will be more than covered by elimination of line amplifiers and equalizers and by the ease of handling of the fiberoptic cable.

J. B. Wise and **T. W. Leonard** are engineers for the ITT Electro-Optical Products division, Roanoke, VA.

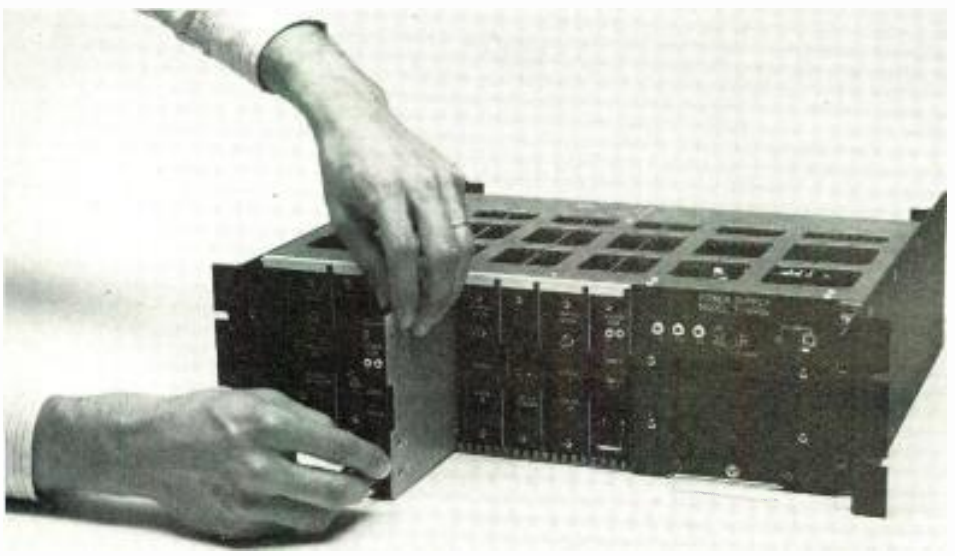
System performance targets

According to the EIA's standard RS-250B, a short-haul video link should have the following major performance characteristics: weighted S/N of ≥ 67 dB, differential gain of $\leq 2\%$, and differential phase of $\leq 0.5\%$. Thus, any fiberoptic system that purports to be studio-quality should at least come close to meeting these goals under all likely operating environments.

Another advantage of fiberoptics is that television signals may be transmitted in either analog or digital form. Analog techniques include vestigial side band (VSB) intensity modulation, baseband intensity modulation, and frequency modulation (FM). The digital techniques commonly used are pulse code modulation (PCM) and differential pulse code modulation (DPCM).

Analog modulation techniques

The simplest technique, from the point of view of the fiberoptic equipment supplier, is VSB since the user must provide a complete VSB video signal with associated audio subcarrier. The incoming signal intensity modulates a light emitting diode (LED) or laser driver (ILD), and at the far end of the link is reproduced by a low-noise pin photodiode and amplifier, as shown in



Linear, high-quality video transmission up to 10 km without repeaters is possible with the new Video Laser Transmission system developed by ITT.

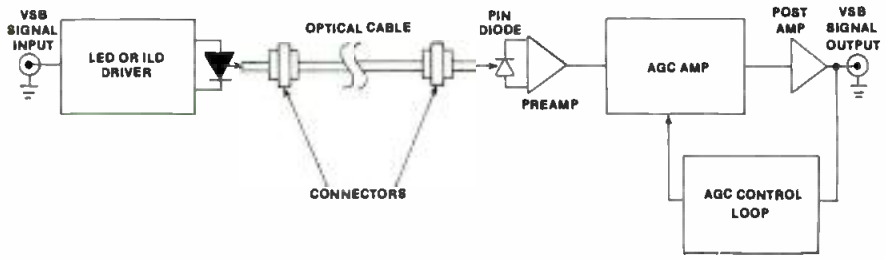


Fig. 1. The basic fiber optic transmission system is driven by a light emitting diode or a laser and has a S/N of 40 to 50 dB.

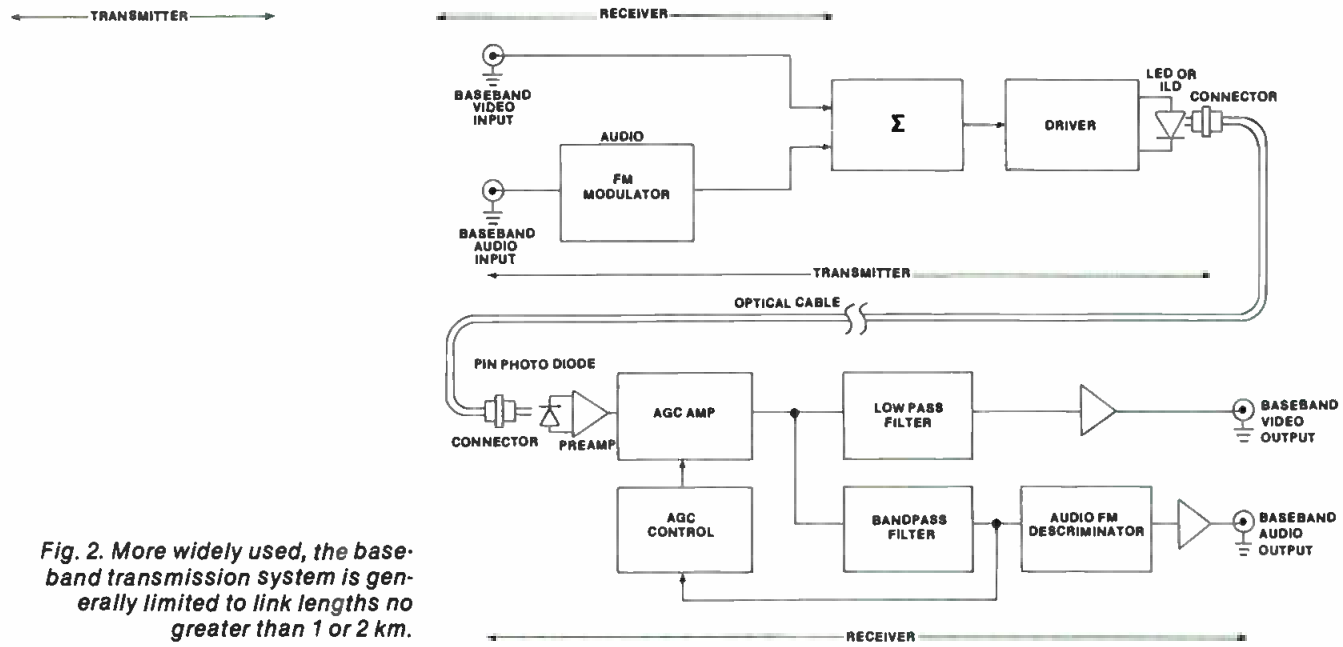


Fig. 2. More widely used, the baseband transmission system is generally limited to link lengths no greater than 1 or 2 km.

Figure 1. Where transmission of a composite video RF signal for reception by standard TV receivers is necessary, this basic transmission system can provide acceptable performance (S/N of 40–50 dB).

Baseband transmission is a more generally applicable approach because most users need to transmit their video and audio at baseband. A typical equipment setup is shown in Figure 2.

Both techniques rely on the linearity of the sources used. Even with source linearization techniques,[1] however, such systems can rarely meet studio-quality specifications, especially if link lengths of greater than 1 or 2 km are contemplated.

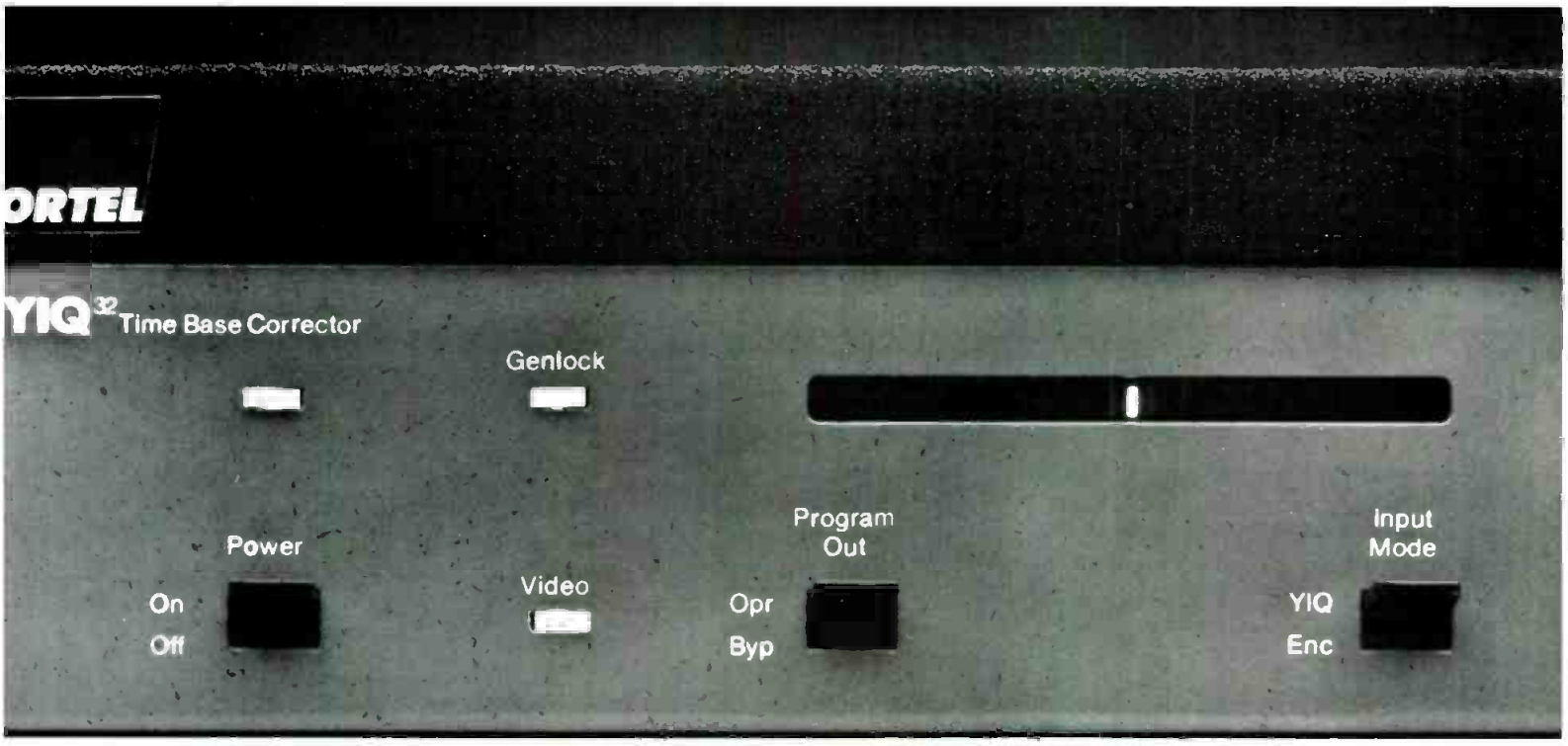
The use of lasers, which have 10 to 30 times the coupled power of LEDs, increases the potential link length but does not significantly improve link noise and distortion characteristics because lasers are often subject to modal noise and distortion. These effects, which depend on the particular devices used and their interaction with the connectors and cables employed in the system, usually limit the available S/N to less than 50 dB.[2] Both noise and distortion problems inherent in these direct intensity modulation techniques can be greatly reduced by intensity modulation of the optical signal by one or more frequency modulated subcarriers as shown in Figure 3. Typically these systems are not as demanding as studio feeds so that weighted S/Ns are normally in the range of 50–60 dB and link lengths rarely exceed 4–5 km between repeaters. However, new FM systems that offer performance more in line with broadcast requirements are available.

A system developed by ITT mainly for 10 MHz bandwidth radar and high resolution video operates over 10 km links with an S/N in excess of 55 dB. It uses wideband FM (10 MHz deviation on an RF carrier of 45 MHz) and high performance laser transmitters with avalanche photodiode (APD) receivers. With its baseband restricted to 5 MHz, this system provides an S/N of 65 dB or more over distances of up to 8 km using 4 dB/km cable. Its excellent gain and phase distortion characteristics can be tweaked to $<2\%$ differential gain and $<1\%$ differential phase.

Digital modulation technique

The major advantage of digital transmission of video signals is the almost complete absence of signal degradation due to the transmission channel and repeaters (if used). Pulse code modulation transmission offers very good performance, but at the expense of transmission channel bandwidth. Thus, where long-haul digital systems based on the T3 rate are necessary, DPCM is used to reduce the PCM bit rate ranging from 90 to 107 Mb/s down to the T3 rate of 44.736 Mb/s. Generally, such systems are very expensive and offer only CATV quality at best. Thus, in broadcast applications PCM employing 8- or 9-bit coding is the logical choice. The performance of such systems, as typified by the ITT system shown in Figure 4, is as follows: weighted >62 dB, differential gain $<2\%$, differential phase $<1°$, operating length >8 km with 4 dB/km cable, and data rate 107.4 Mb/s.

[1] Strauss, J., and O. I. Szentesi. "Linearized Transmitters for Optical Communcations," *Proc International Symposium on Circuits and Systems*, Phoenix, AZ (April, 1977).
[2] Couch, P., W. Muska, and R. Martinet. "Laser Modal Noise Experiments and Evaluations," *Proc Second International Fiber Optics and Communications Exposition*, Chicago (September, 1979).



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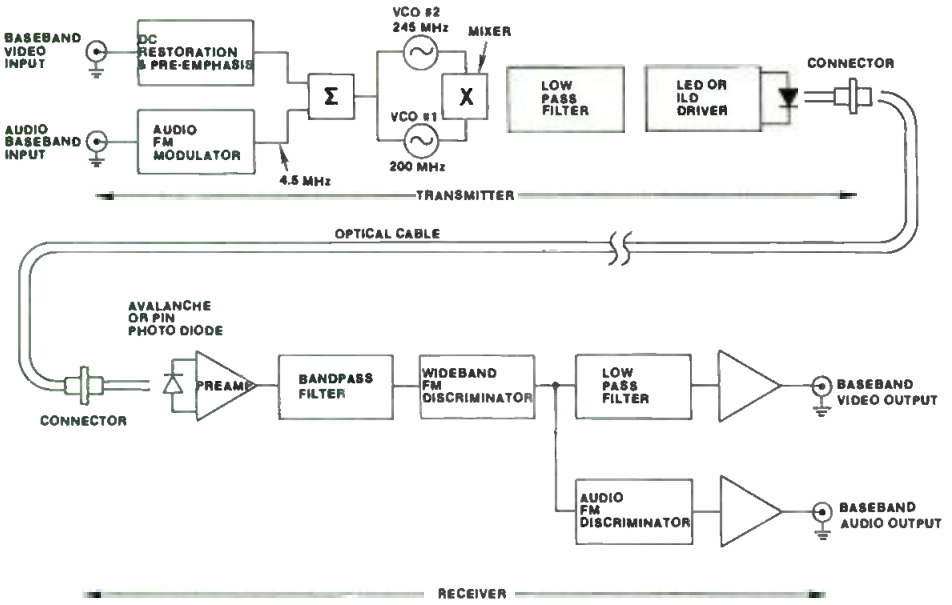


Fig. 3. In order to reduce the noise and distortion problems inherent in baseband transmission, a frequency-modulated system may be built.

An added advantage of PCM systems is the ease with which non-video information can be carried. As an example, the ITT system can transmit three high-quality audio channels, eight telemetry, and 16 digital data channels and still has significant unused capacity. The video performance depends largely on the analog/digital converter (ADC) and digital/analog converter (DAC) used. With the recent advent of suitable nine-bit analog/digital converters, the S/N performance can be expected to increase to > dB.

Cable construction

Optical cables of the tightly bound fiber design have been proven over the past several years to be extremely rugged and light in weight, characteristics that make them very suitable for applications ranging from tactical battlefield communication links to outside broadcast setups.

A typical cable has the following main characteristics: seven fibers, attenuation <4 dB/km at 0.85 m, bandwidth >500 MHz•km, tensile strength >150 kg, outside diameter 7 mm, weight/km 39 kgm, and temperature range $-30°C$ to $+70°C$. Where remote powering of equipment is necessary, up to five of these fibers can be replaced by copper strands with no effect on the performance of the remaining fibers.

Using optimized fibers, this cable design can also operate at the wavelength of 1.27 m with an attenuation of less than 1.5 dB/km, substantially extending the reach of the video links without repeaters from about 8 km to at least 15 km. **BM/E**

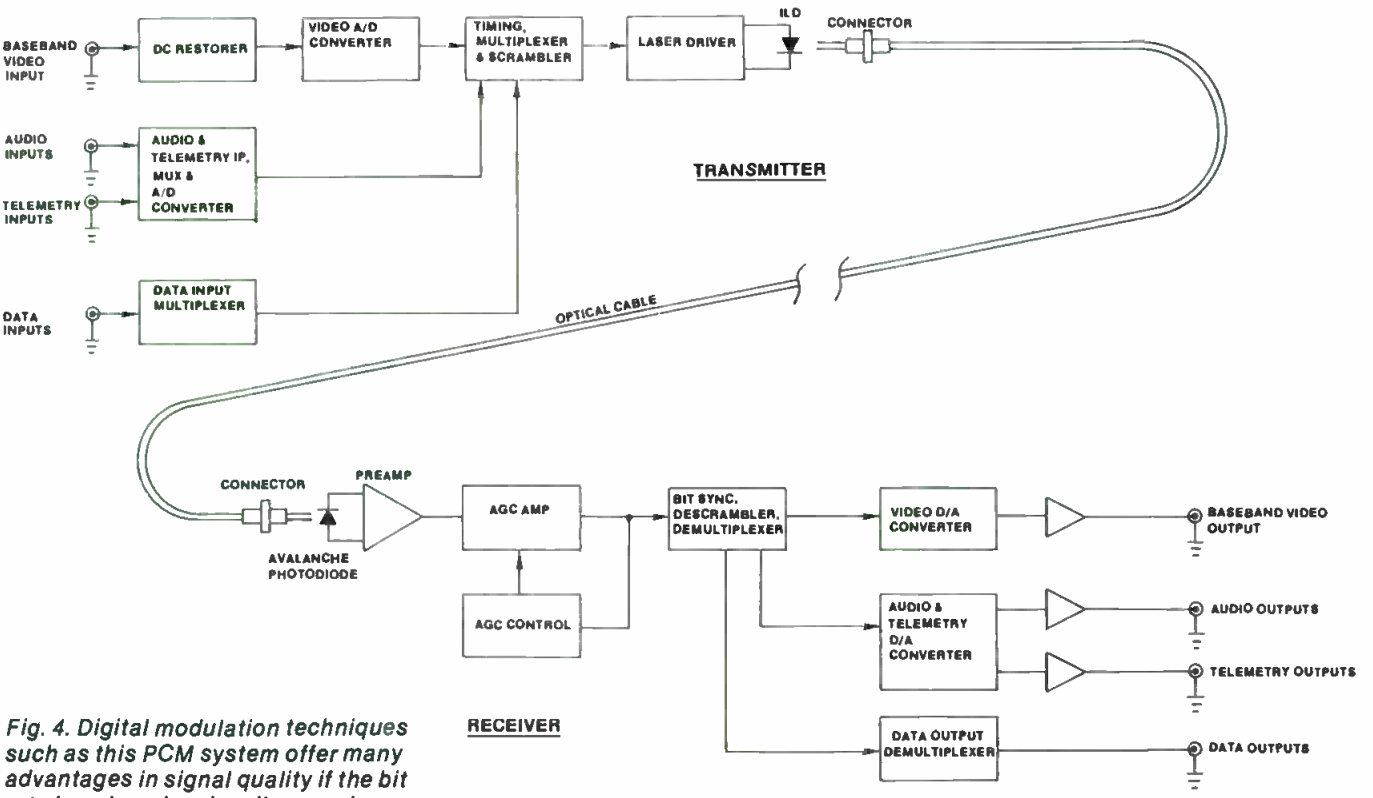
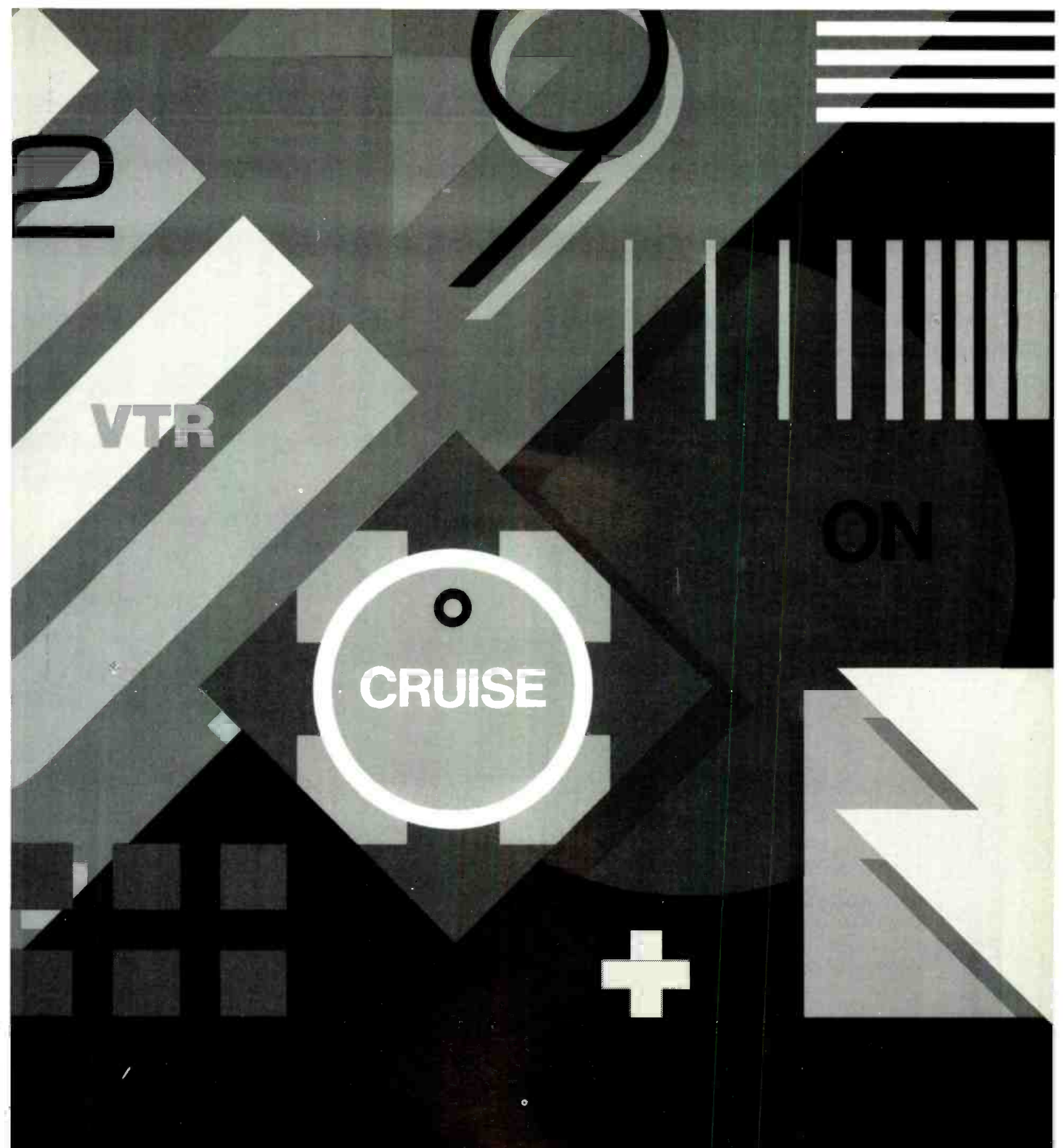


Fig. 4. Digital modulation techniques such as this PCM system offer many advantages in signal quality if the bit rate is reduced and coding used.



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Local Lighting Solutions for World Games Coverage

Having to provide lighting setups for 40 events during a 10-day period at World Games I forced some imaginative solutions in sports coverage of use to any station televising local events.

By C. Robert Paulson

WHEN A NETWORK COVERS the Olympics, it has as long as a year to set up, and can bring almost infinite resources to bear (both capital and human) in solving the various production problems. For coverage of World Games 1, however (an event organized by a federation of 18 world-popular sports which are not included in Olympics competitions), a San Francisco-based teleproduction facility had to make do with local resources and a syndicated TV production budget. Versatile Video nonetheless managed to provide coverage of 40 of the 72 events scheduled morning, noon and night during the week-long competition.

Versatile Video, Inc. (VVI) first became involved in the negotiations for coverage when the original syndication company appointed by the World Games committee dropped out of the picture. VVI management moved quickly to define and check out the financial risk and return options open to them. Although the risk was high, they decided to cooperate with WGI television executive

Special assignments editor **Bob Paulson** is president of AVP Communications, Boston.

Mobile unit 5 and its companion tape truck covered competitions at 12 different venues in 10 days, with several calls running from sunup until after midnight. Stability, reliability, and quick setup of the Philips LKD-5 triax cameras aided the demanding undertaking.

producer Hall Uplinger, self-fund the production, and create a joint venture to syndicate the resulting footage in whatever program formats appeared salable.

Coordinating multi-site coverage

VVI's Larry Bentley was promoted to operations supervisor for World Games I field production. His forces included 40 people, about 75 percent of them local freelancers, a fleet of 10 production and support vehicles and cars, 13 cameras, eight VTRs, two character generators, and a truckload of lighting equipment supplied by San Rafael's Producers Service. A father-and-son team of Bill and Mike Malley and two gaffers took over responsibility for lighting each competition venue.

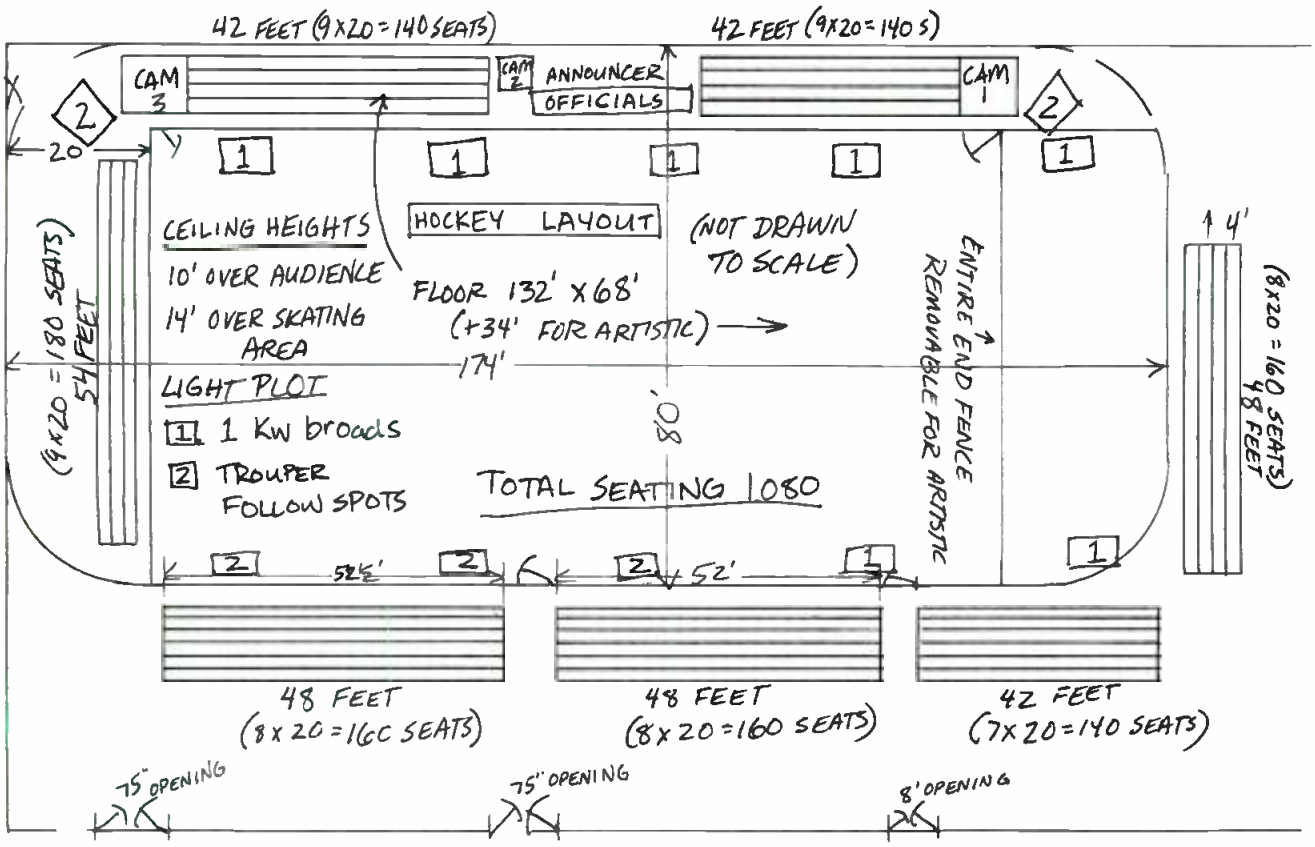
Simultaneous and back-to-back competitions on nine days required rolling two multi-camera mobile units while covering other events with single camera/VTR EFP crews shooting "film-style." To keep firm management and technical control of these multi-site activities, VVI remote operations manager Raoul Proctor concentrated on each day's operations, with Drew Kelsey and Ron Bailey as site managers. EFP crew operations were the responsibility of each of the freelancers hired to run the cameras. Larry Bentley kept his focus on future operations; however, he also visited or was in constant radio contact with each active site, ready to attack sudden problems with immediate solutions.

As WGI's opening ceremonies neared, VVI still had only sketchy information about which events would most likely be picked up live and which sold into syndication. The battle plan for each of the 10 days, therefore, became "Shoot everything in sight!" at as many of the 72 morning, afternoon, and evening events as possible. The 40 events selected included preliminaries in those sports having a chance of worldwide syndication sale, and *all* final competitions.

Bentley's master production plan called for constant juggling of four production units from site to site. Site surveys completed the week before the Games had determined which unit was best suited for pickup of competition slated for each site on each day. MU (Mobile Unit) 5 ("The Fifth Wheel") rolled with four Philips LDK-5 triax cameras and a triax LDK-14, plus a tape truck, and was the choice for large-field-of-play pickups, especially those with lighting problems. MU 2 ("The Goose"), then equipped with three multi-core CEI-280s, plus another tape truck, covered medium-scale events where lighting was adequate. "Jimmy," MU 1, an RV with a single Ikegami HL-79A and Ampex VPR-20, drew assignments for background color pickups and the speed skating marathon. Single camera/VTR EFP crews (HL-79A and VPR-20) roamed from event to event.

Sites which needed lighting and power installations were scheduled for special attention one or two days ahead of competition. As the opening ceremony neared, pre-production planning ended. Trucks were loaded; crews were tightly scheduled, but provided with coffee and meal breaks during reasonable length days. The specifics of this comfortable master plan held up until *almost* the middle of the *second* day of competition.

A frantic call from Ernie St. Germain, owner of the Milpitas Cal Skate Arena which was the site of the artistic and roller hockey competitions, blew up the master plan. Roller hockey teams practicing there for the first time couldn't see the hard black ball and refused to compete. The problem was not too *little* light but too *much*, specifically too much bounce off a floor that had been changed from a dull matte finish to a glossy one after the site survey



Original Cal Skate Arena light plot called for the installation of 10 1 kW broads and two Trouper follow spots at 32° K to swamp out existing fluorescents.

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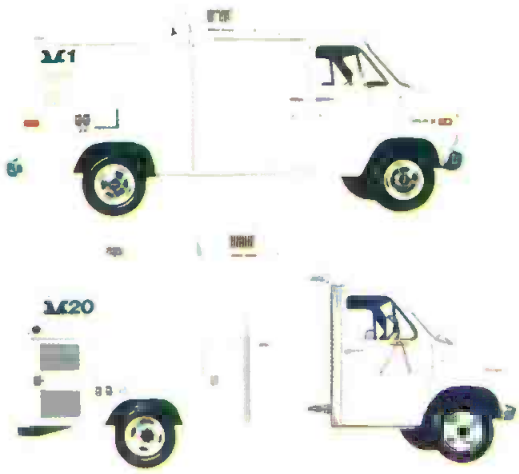

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was completed, deemed necessary by Roller Hockey Federation officials to slow it down.

Oddly enough, the solution to this first lighting problem had a chain reaction which forced changes in many other master plan elements. These changes, plus competition schedule changes made by WGI officials, created subsequent problems on a routine daily basis. Specifically, re-doing (reducing) the boost lighting at Cal Skate meant that the CEI-280 camera mobile unit couldn't be used. Further, it couldn't just be traded with the LDK-5 mobile unit, because the latter was scheduled for other indoor events with light level problems. The solution: cover the artistic and roller hockey skating events with three HL-79As on high gain with three isolated VPR-20s.

Lighting the unlightable

Most locales for sports and cultural events share a long list of physical features inimical to good video (and audio) pickups: low ceilings; inadequate, badly located, incompatible color temperature lighting; little (no) ac power reserve; noisy, insufficient air conditioning; poor camera sight lines when the crowd comes in/sits down/stands up/walks by; unending physical and human obstacles to pulling camera and mic cables to desirable locations.

Further, these facilities are generally only temporarily loaned for the event. Setup has to occur *after* the previous day's moneymaking business closes. Strike must be completed *before* the next day's moneymaking begins. And that means midnight to 6 a.m. calls for the setup and strike crews.

Sites designated for lighting system rework began with Cal Skate, followed by the San Jose Civic Auditorium (badminton and trampoline/tumbling), Homestead Lanes (bowling), and Decathalon Club (racquetball). Two other indoor sites, the San Jose Center for the Performing Arts and University of Santa Clara's TOSO Sports Pavilion, required no boost lighting. The latter arena's basketball lighting was adequate and uniform enough to provide excellent LDK-5 pickups of the karate and taekwondo competitions—about 100 footcandles overall.

The Center for Performing Arts stage was scheduled to be lit at 40 to 50 footcandles to provide satisfactory illumination for the live audience. Cooperation was readily forthcoming from the lighting director to raise the base light to 100+ fc, with an overall background wash added to reduce the contrast range. The men's and women's bodybuilding events were covered by three CEI-280s in front and a rear-of-the-hall triax-connected HL-79.

Cal Skate lighting plots

Cal Skate's rink was normally lit by fluorescent tubes 14 feet overhead, which gave a maximum of 40 fc (direct, at floor level) of typical flat greenish light. Since the surveyed skating surface was a dull matte finish with no bounce, VVI decided to overpower the facility lighting with four or five 1K broads on either side, hung at ceiling height. The ceiling height over the three camera positions was only 10 feet, so the opposite side broads were specifically located to avoid flare and bounce reflections. An overhead sprinkler system set for 165 degrees F turn-on also influenced light locations.

Since the hockey players issued their ultimatum about the lighting/shiny floor problem before the cameras arrived, the potential camera problem was never defined. The compromise light plot fortunately turned out not to be a problem for the HL-79s.

The compromise was to re-lamp the entire facility with 100 watt daylight tubes with nominal 6400 K color temperatures. Extra fixtures were added over one goal located in what was the middle of the normal roller rink surface. Artistic skating events were covered with two additional Trouper follow spots at opposite ends of the competition surface. The cameras gave no problems with ghosting, inasmuch as the spill from the fluorescents into the spectator area eliminated most dark backgrounds.

At the Monday evening drop of the ball for the first hockey action, the lighting and EFP systems designed just two days earlier were up and running. They produced crisp, clean, colorful pictures for the next five competition days, some of which began with 7 a.m. crew calls and ended sometime after the next midnight.

Additional problems and solutions

MU 2's first substitute assignment was to provide switched-live coverage of fin swimming and women's water polo at Santa Clara's world-famous, U.S. swim-champion-producing Olympic sized pool. Originally, HL-79 EFP crews were to cover these events by shooting highlights. Lowel-Light kits were on hand to boost closeup shot light levels as needed around the goal areas, starting blocks, finish lines, and leading swimmers' lanes.

Although the three CEI-280s were located in the stands shooting action with slower field production zoom lenses, it was hoped that the existing lighting at this well-televised pool would forestall need for boost lighting. Wrong! The handful of pole-mounted mercury-vapor lamps delivered about 10 footcandles of dancing reflections at water level.

Dick Reisner, of the Bay Area's Reisner & Reisner Film & Video, who was running the shoot as a VVI freelancer, solved this problem as it began to define itself in the late afternoon sun. All the Lowel kits in his truck, plus lights and cable and stands scrounged from everywhere, were marshalled around the goal areas to enable the CEI-280s to deliver clean, non-smearing pictures.

For bowling events, four days of preliminary competitions at the Homestead Lanes facility proceeded without the glare of television lights. Saturday's finals beginning at 9 a.m. were scheduled for switched-live pickup by the Fifth Wheel's four LDK-5s and a roving HL-79A. Setup for Saturday could not start until Friday after midnight, however.

Mike Malley's lighting plot was conventional. Boost lights were aimed down the two center alleys designated for the finals competition. The pin machines were floodlit from overhead. Key lights on floor stands provided good shooting coverage of the bowlers from all angles. Broads covered the small audience area for crowd shots. Lighting setup started as soon as the last bowler left the lanes Friday night. It was completed by the time the cameras were powered up for checkout about 7 a.m. Saturday.

The Decathalon Club participant sports facility had one racquetball court with a glass rear wall for limited spectator viewing of a match. That provided two camera positions for from-the-rear coverage, one poking between spectators' shoulders, the other mounted on a fork lift.

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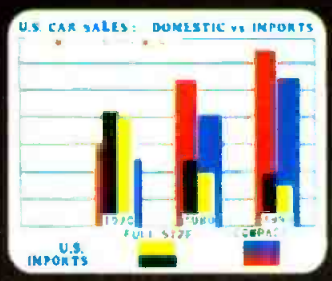

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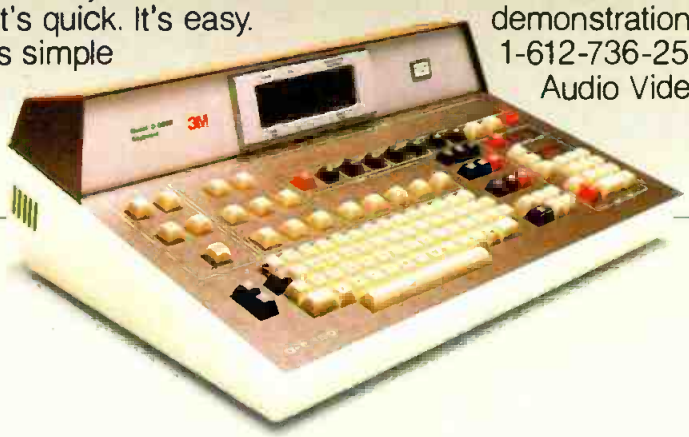

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The light, dull-gloss finish court walls made boost lighting planning a simple job—two 2Ks hung at the rear sides. Installation required extensive reliance on gaffer's kit hardware and tricks, both for the lights and cameras. And, of course, the air conditioning system didn't cope well with the combination of hot lights and spectators, putting undesirable strains on the abilities of both the athletes and cameras to perform well.

Lighting the barn-sized, 1930s built, civic auditorium facility for the multi-court badminton and trampoline/tumbling competitions was anticipated to be the toughest problem to solve. Badminton courts cannot be lighted overhead or from the ends, because of these athletes' far-roving eyes as they follow birds at speeds and in flight arcs never seen on suburban front lawns. VVI knew that other tournaments they had covered required two to three days of setup time of special lighting rigs flooding a curved ceiling.

Before boost lighting was added, illumination from overhead permanent fixtures which could be used provided 80 fc at floor level. VVI added four 2K flooded spots hung from the side balconies to raise overall shadowless light level to 100 fc, adequate for the LDK-5s.

The moment of anxiety arrived when the president of the International Federation toured the auditorium just hours before the competition was to begin. He eyeballed the court lighting from various angles, then headed for the truck to check the pictures. His verdict—the lighting was beautiful—the finest he'd ever seen!

In retrospect . . .

"If Versatile had gone into this World Games I venture knowing it was going to be responsible for undefined worldwide sales of whatever we produced, we would have done lots of our coverage planning much differently," VVI general manager Larry A. Johnson emphasizes. "We would certainly have concentrated more on the coverage of preliminaries as well as finals of popular U.S. participant sports like bowling, badminton, softball, bodybuilding, and racquetball.

"That would have given us lots of highlights footage for cable special interest audiences and 'how-to' videocassettes and videodiscs. And those sales would have lessened the upfront financial drain we incurred to carry off the production coverage essentially as it was originally planned *for* us, not *by* us."

"When we undertake the next 'multi-everything' field production venture," concludes Bentley, "we'll know before we plan the first pickup where the edited footage has been sold—for broadcast, cable, videodisc, private networking, or whatever. For instance, we're now involved with satellite networking as the northern California/Nevada affiliate of Intervideo Network, Inc. for origination, uplink transmission, and downlink reception and distribution of pre-sold productions.

"Further, we've begun exploring co-production possibilities with other local television organizations to extend both our production capabilities and marketing power." *Versatile* Video. It's living up to its name! **BM/E**

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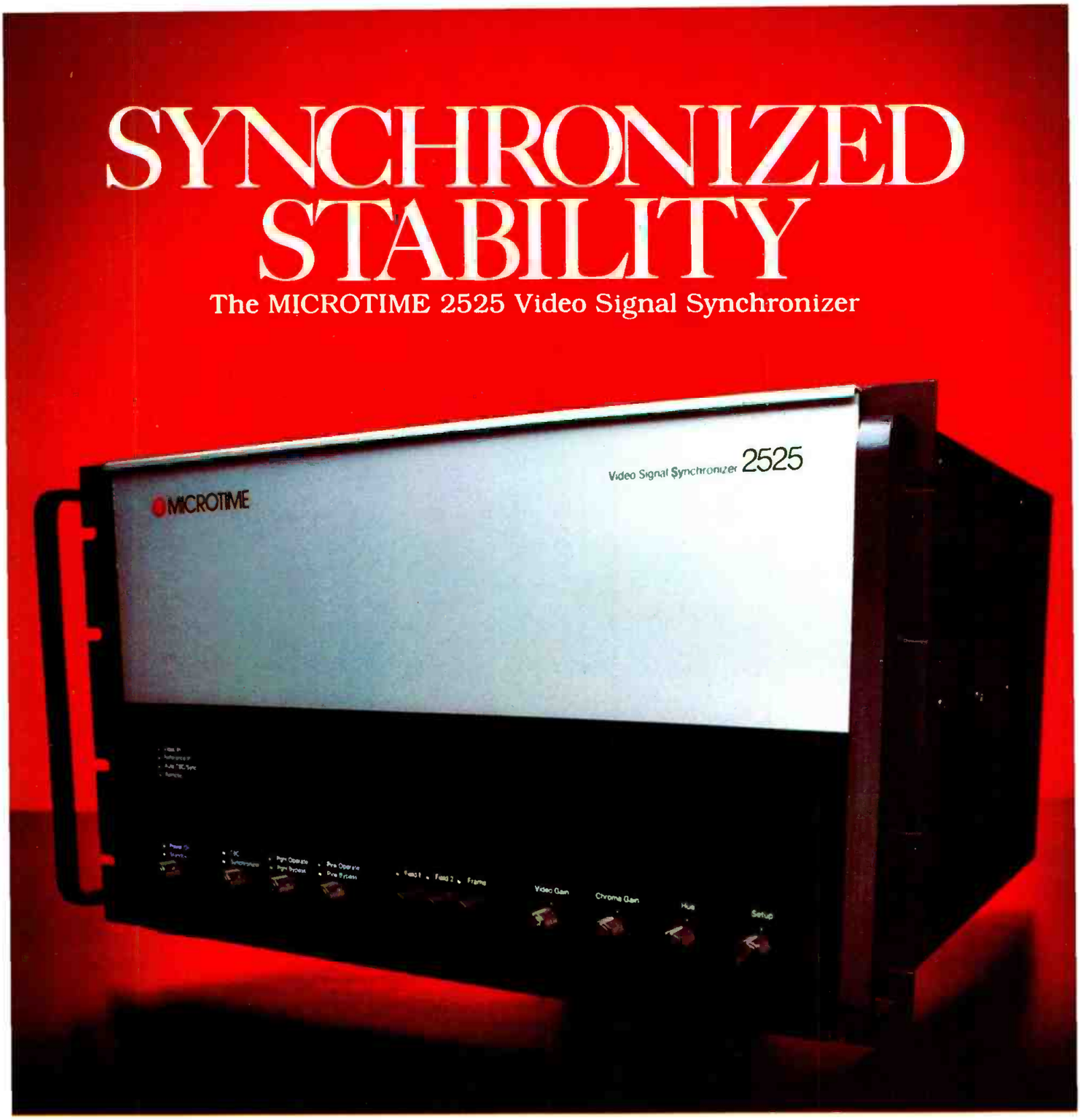

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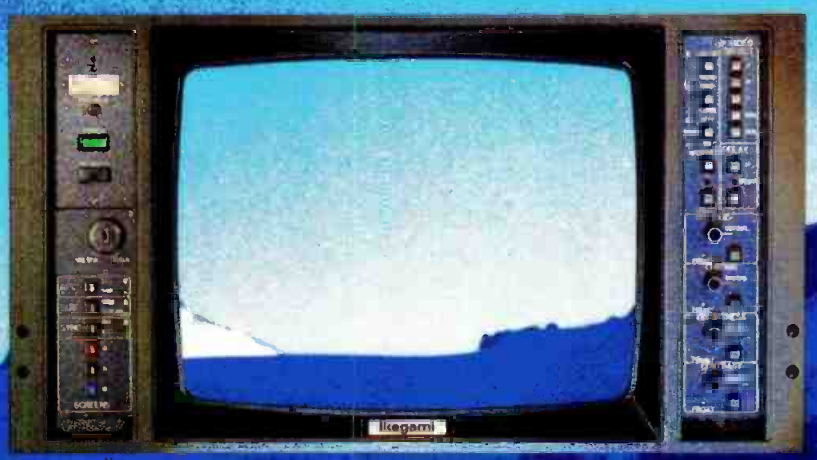

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NRBA: Kahn Declines Participation in AM Stereo Tests

MAVERICK AM STEREO system developer Leonard Kahn, claiming broadcasters in major markets prefer his system over others, told NRBA attendees in September that he has great difficulty in accepting Delco's offer to test his AM stereo approach along with others. Tests of Motorola's and Magnavox's systems were completed in August; Harris tests began in late September following the NRBA convention.

Kahn said his lawyers are against such participation based on anti-trust implications, and that four out of five of his "broadcaster friends" support his stand. Kahn implied that Delco may not be fair or totally informed on how to run tests and, further, that directional antennas should be involved.

Fellow panelist Chris Payne, formerly of NAB engineering but now with Motorola, said such a charge of unfairness was totally unfounded and that the Delco tests (see *BM/E*, June, p. 137) were thorough and competent with all transmitter functions for over-the-air tests, under the control of WIRE, Indianapolis. (Alex Kidde, chief engineer of WIRE, reports his station is directional at night, operating on a two-tower array.) Magnavox panelist William Streeter said he was completely satisfied with the tests.

Speaking on an earlier panel, Delco's director of engineering R.J. McMillin reported that the Delco tests were to be completed by October unless Kahn or F.T. Fisher and Son (which has expressed interest) decides to supply equipment. Delco's conclusions will be turned over to the separate General Motors Sales Division for a final decision, but it is generally assumed that the various GM auto divisions will adapt AM stereo radio for at least some 1984 models. McMillin says, AM stereo, based on tests so far, "is a very attractive service." Kidde confirmed to *BM/E* that he was surprised at how good AM stereo quality receivers could sound.

The debate over whether broadcasters or receiver manufacturers should decide on which system is to be selected continued at NRBA. Obviously Delco wants to make up its own mind, since it feels there is sufficient information available to make a true evaluation of AM stereo performance in an automobile. Motorola and Magnavox told NRBA attendees they would go with Delco. Arno Meyer of Belar came down on the side of receiver manufacturers as the logical decision makers. But both Kahn and Harris believe broadcasters should and will make the decision based on their own preferences, and that receiver manufacturers should follow such leads.

Most large receiver manufacturers are not anxious to make a decision, since economics dictate that a single decoder be used; a wrong choice might cost a company well over $20 million. At NRBA, Panasonic, Pioneer, and Sansui spokesmen participated in a panel discussion. Almon Clegg of Panasonic reported what he said at NAB in April: consumers are not likely to pay more than $10 or $15 more for AM stereo (hence the need for a single system), and that all five proposals are acceptable.

David Hershberger, speaking for Harris, quite confidently believes Harris will win the current marketplace test (including the Delco competition). He reports that receiver manufacturers have told Harris that when about 100 broadcasters clearly approve of any one system, they will begin producing sets. Harris already has about 120 domestic broadcasters signed up to test its system but only a few had received exciters at NRBA time—WQXI, Atlanta; WNOE, New Orleans; CKLW Windsor/Detroit; and KROW, Reno.

Kahn quite adamantly believes his system will prevail because the others won't perform well in fringe areas or when multipath is present. Kahn boasts that his is the chosen system in the the major markets with NBC, ABC and RKO stations in the lineup. Kahn's system, being the first to get FCC type approval (see *BM/E*, September, p. 14), has been on the air in 10 major markets.

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Structure of the FCC: How It Affects Broadcasters

By Harry Cole
FCC Counsel

MOST BROADCASTERS are by now aware of some of the major changes in form the Commission has recently undergone. First, they heard about the reduction of the Commission from seven members to five. Second came the news of the Mass Media Bureau, which was designed to serve as a centralizing replacement for the Broadcast and Cable Television Bureaus, and elements of the Common Carrier Bureau. The question now remains to be answered: to what extent do these changes affect the evolution of Commission policies?

As predicted (*BM/E*, May 1982, p. 94), the Commission in September voted unanimously to centralize its structure. Specifically, the Mass Media Bureau is a consolidation of the Broadcast and Cable Television Bureaus designed to "provide a single, integrated organizational structure for administering FCC policies regarding traditional broadcasting, cable TV, and the emerging television systems." This means that the Mass Media Bureau will assume the regulatory functions for broadcast, cable, and such emerging systems as DBS, while MDS will apparently remain in the control of the Common Carrier Bureau.

Internally, the new bureau's organization seems based on a holistic approach to broadcasting. Gone are the separate branches for construction permit applications, assignment or transfer applications, renewal applications, and the like. Replacing them will be two divisions: the Audio Services Division for radio licensing, and the Video Services Division for TV-related matters. The divisions will in turn be comprised of branches. The difference is that the branches will be defined more by the broadcast service in which they specialize (i.e., AM or FM, TV, or cable), rather than by any type of specific permit, such as construction and license renewal.

The new bureau also includes an Enforcement Division, consisting of the following branches: Complaints, Equal Employment Opportunity, Fairness/Political Broadcasting, Hearing, and Investigation. The Enforcement Division will function much as its predecessor, the Complaints and Compliance Division, functioned, though it will include within its jurisdiction cable and DBS matters as well as broadcasting items. About the only subdivision of the old Broadcast Bureau which appears to have escaped more or less unscathed is the Policy and Rules Division, which continues to bear primary responsibility for the Bureau's rulemaking activities.

What effect will the changes have on the individual broadcaster? Though the answer involves some speculation, it is clear that the new organization is designed to permit streamlined processing of applications. For more than a year the FCC has been reducing the paperwork involved in applications. The result is that now there is very little difference among the various applications. So, instead of retaining an internal office structure based on type of application, the Commission has decided to allocate its staff on a service-by-service basis. It is reasonable to conclude that the net effect of this change will be to make the overall processing of applications more streamlined and efficient, particularly since it will probably allow the Bureau to deal more directly with major backlogs of applications in any particular service.

Dramatic reorienting

Conceptually, such reorganization indicates that the FCC, by creating a single bureau, considers the development of the different media to be subject to a common regulatory approach. The Commission is also indicating

that the regulatory policies and practical development of any one service should take into account the policies and development of other services. This is a dramatic change from the days when, for example, television service was authorized with little regard for the availability of cable service and without any regard for such services as DBS and MDS. It is safe to assume from the design of the Mass Media Bureau that it will be in a position to consider the overall availability of media, rather than the isolated availability of any single type of service.

This breaking down of traditional barriers separating the various services is also likely to lead to changes in the Commission's policies on adequacy of available services, multiple ownership, and localism. With respect to the FCC's notion of available service, it seems clear that, by throwing cable, DBS, and LPTV into the hopper of factors considered in the allocation process, the FCC may very likely determine that many areas of the country are already receiving adequate service. This could lead to a reduction in the traditional emphasis placed by the Commission on assuring additional service to "unserved" or "underserved" communities.

Similarly, the FCC's multiple ownership rules could be affected as well. Those rules are designed to assure that the public has access to a broad diversity of points of view. By limiting the number of media interests any one person or group can own, the Commission has attempted to maximize the points of view available by increasing the number of different media owners. However, this tends to be an artificial approach, since it considers only the number of interests held, and not the number of points of view actually available. Thus, the restructuring of the Bureau, and the resulting increased facility to consider all available services in each particular area, could lead the Bureau, and the Commission, to a reevaluation of the significance of multiple ownership. Chairman Fowler has already made known his belief that the multiple ownership rules are due for substantial relaxation. The new Bureau alignment may be a step toward the realization of that goal.

Finally, the merging of cable, DBS, and traditional broadcast services strikes a further blow against the FCC's historical tendency to favor localism. The consideration of cable, DBS, and broadcasting as equivalent services would substantially undermine the concept of localism, since both cable and DBS are based almost wholly on the provision of distant signals.

The alteration of the Bureau's form does not necessarily mean that the substance of its policies will change. However, in view of the alterations involved as well as recent Commission decisions, and considering that major technological advances have raised serious questions about the adequacy of many of the Commission's present policies, it is not far-fetched to conclude that the structural changes are but a precursor to more substantive changes.

The other important change at the FCC, that of reducing the number of Commissioners from seven to five members, underscores an often overlooked aspect of communications regulation. With a total of five Commis-

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sioners, the establishment of regulatory policy will in the future require the votes of only three Commissioners—and so will the reversal of regulatory policy. Thus far, most of the deregulatory advances have occurred at the Commission level. As a result, when the FCC is reduced to five members, those advances could be undermined, or even withdrawn, if only three Commissioners think that would be wise. By contrast, if the policies, be they related to DBS, deregulation, or multiple ownership, had been adopted by Congress as part of the Communications Act, it would require a majority vote of the House and Senate to change them. In other words, the stability of the Commission-adopted policies has always been weaker than the stability of Congressionally adopted policies, and the reduction in the number of Commissioners will merely reinforce the disparity between the two.

New books

On an unrelated, but no less important, note, two books on broadcast law published earlier this year should be mentioned. *Broadcast Law and Regulation* by John R. Bittner (Prentice-Hall, Inc.) is a scholarly and detailed review of virtually all of the practical areas where broadcast and the law interface. Unfortunately, doubtless as a result of publication deadlines, the book does not include discussion of a number of current regulatory developments resulting from the Fowler Commission's efforts to stamp out certain "regulatory underbrush." This criticism aside, Professor Bittner provides an excellent overview of the role which legal and regulatory policies play in all aspects of the day-to-day business of broadcasting. Because of this, his book is a valuable text for anyone wishing to gain insight into that frequently misunderstood area. Warning: as a textbook with more than 400 pages and over 450 footnotes, this is not an easy read. Yet it is well indexed, and can serve as a useful introductory or reference work. Since it is not necessarily current, though, it should not be taken as a substitute for competent legal counsel.

Acknowledging the difficulty of aiming at a "moving target," Erwin Krasnow, Lawrence D. Longley, and Herbert A. Terry have focused more on the "how" of communications policy in the third edition of their book, *The Politics of Broadcast Regulation* (St. Martin's Press, Inc.). Rather than fall prey to the difficulties of analyzing specific regulatory developments, the authors choose instead to review how any such developments come about, who makes the decisions, and who influences the decision makers. It includes five illustrative case studies, although, again, the specifics of the policies discussed are not as central as the way in which those policies developed. *The Politics of Broadcasting* is a perfect complement to *Broadcast Law and Regulation*, providing, as it does, fundamental insights into how and why the broadcast industry tends to be regulated as it is. While *The Politics of Broadcasting* is less useful as a reference work, it is extremely valuable for the background it offers on the process of communications regulation. **BM/E**

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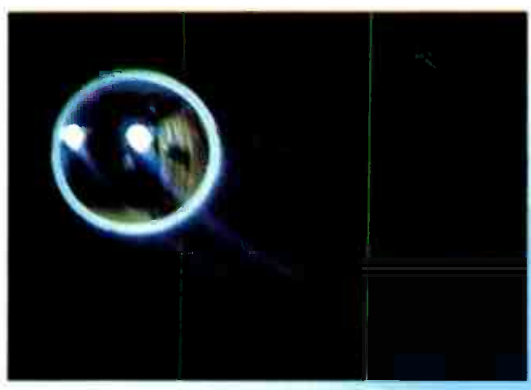
Good. Plumbicon XQ1427.

Photograph of direct reflection of flood lamps, produced by camera with CTS circuitry. Note highlight memory with red trail.



Better. Saticon II BC4390.

Same subject and conditions as in photograph at left. Note reduced highlight memory without red trail.

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TAX TIPS for stations

Tighter Tax Rules on Tap

By Mark E. Battersby, Financial Consultant

THE RECENT PASSAGE of the Tax Equity and Fiscal Responsibility Act of 1982 heralds a general tightening of both our personal and business tax rules. It also means increased complexity in the rules. The increased excise taxes on telephone bills and the increased tax levy on cigarettes and gasoline have been well publicized; also well-known are the withholding provisions that require taxes to be withheld from most interest and dividend payments. But what impact will this voluminous law have on your broadcasting business?

First, the new law repeals the more rapid accelerated cost recovery system rates that had been scheduled to take effect in 1985 and 1986 under last summer's tax law changes. Under the cost recovery system, station owners can use the declining balance method of depreciation with a switch to the straight-line method for the years 1981 through 1984. The rates were scheduled to increase to 175 percent declining balance depreciation in 1985 and to 200 percent in 1986—but no longer.

For property acquired and placed in service in 1983 and later, the basis or book value used for computing depreciation must be reduced by one half of the amount claimed as investment tax credits, energy credits, or the credit for rehabilitation of certified historic structures. Using only an eight percent investment tax credit instead of the present 10 percent will allow a station to avoid this basis reduction, but is certain to mean more advance planning.

Those controversial safe harbor leases will be phased out by September 30, 1983 under the newly passed tax law. The safe harbor leasing provisions of last summer were intended to permit the owners of property to transfer the tax benefits of ownership (depreciation and the investment tax credit) to other persons. The safe harbor provisions work by guaranteeing that qualifying transactions will be treated as leases and that the nominal lessor will be treated as the owner of property, even though the lessee is in reality the owner of the property.

Between July 1, 1982 and the scheduled September 30, 1983 repeal of the safe harbor leasing rules, leasing is extended to certain closely held businesses that were formerly denied these benefits, in effect excluding them from the onerous "at risk" rules. The rules have also been modified substantially to include limits on the amounts of property that may be leased and the amount of depreciation and tax credits available to lessors.

Under the new rules, the lessee may apply the safe harbor rules for no more than 45 percent of all property placed in service during the tax year. Any investment tax credit earned on leased property is allowable over only five years—at 20 percent of the tax credit each year. With

TAX TIPS

these reduced tax benefits, most of the advantages of safe harbor leases have also disappeared.

When it comes to ordinary leases, the new act liberalizes the criteria currently used by the Internal Revenue Service to determine what leases qualify to pass tax benefits on to lessors. Under the current rules, a "lease" is considered a financial arrangement if the lessee has a purchase option that is less than fair market value at the date of exercise or if the property can only be used by the lessee. The new law will permit a lease to qualify if the option price is at least 10 percent of the original cost. There will be no exception for property that can be used only by the lessee.

The so-called "Tax Equity" law supplements the existing corporate minimum tax with a new set of rules that require a 15 percent cutback of certain tax preference items available to those broadcasters doing business as corporations. Corporate tax preference items include accelerated depreciation on real property, percentage depletion in excess of the adjusted basis of the property, and 18/46 of the broadcasting corporation's net capital gains.

The amount of estimated tax that a corporation is required to pay through quarterly estimated tax installments to avoid underpayment penalties will be increased from 80 percent to 90 percent of current year's liability. This increase will apply to taxable years beginning after December 31, 1982.

Under our existing tax laws, individuals, personal holding companies, and Subchapter "S" corporations are required to capitalize interest and real property taxes attributable to the construction period of real property that is to be used in a trade or business or held for investment purposes. The capitalized interest and taxes are amortized (i.e., deducted in equal portions), generally over a 10-year period. The interest that must be capitalized is that which is attributable to the construction period on any debt incurred or contracted for the purpose of acquiring, constructing, or carrying that real property.

Construction period interest and taxes must also be capitalized by corporations if incurred after December 31, 1982. For everyone, the amortization of capitalized interest and taxes now begins in the year that the interest or taxes were paid or accrued. However, the amortization of capitalized interest and taxes is then suspended until the year that the station's building or improvement is ready to be placed in service or to be sold, when the amortization resumes.

On another front, the targeted jobs tax credit is presently available on an elective basis for hiring individuals from one of nine so-called "target groups." The credit is equal to 50 percent of the first $6000 of wages paid for the first year of employment and 25 percent of the first $6000 of wages paid for the second year of employment to a target group individual.

This tax bill extends the life of the targeted jobs tax credit to any member of a targeted group who begins work on or before December 31, 1984. It also adds a new targeted group consisting of economically disadvantaged youths who are 16 or 17 years of age on the hiring date and who have not worked for the employer previously. The credit for this summer youth category is 85 percent of up to $3000 in wages paid for any 90-day period between May 1 and September 15, effective for individuals begin-

ning work after April 1, 1983.

Federal unemployment taxes for employers are also scheduled to rise. In fact, effective January 1, 1983, the federal unemployment tax wage base rises from $6000 to $7000. The gross federal unemployment tax rate will be increased from 3.4 to 3.5 percent. This means that employers in states with approved state unemployment programs will continue to receive the 2.7 offset credit, so the standard net federal tax would be 0.8 percent.

Effective January 1, 1985, the new tax law will increase the gross federal tax rate to 6.2 percent. This includes a permanent tax of 6.0 percent plus a temporary 0.2 percent that would remain in effect until all outstanding general revenue loans to the Federal Extended Unemployment Compensation Account (EUCA) have been repaid. The offset credit will increase to 5.4 percent, so the net federal tax rate will remain at 0.8 percent until the EUCA account has paid off all general revenue loans. After that time it would drop to 0.6 percent. The wage base remains at $7000, however.

The big news under this summer's tax law changes is the increased paperwork burden on all stations. We all have heard that banks and financial institutions paying interest or dividends must withhold taxes from those payments beginning July 1, 1983. But did you know that this rule also applies to your own incorporated business should it pay more than $150 in dividends, or to any business that pays interest to shareholders or family members?

Present law requires every station owner or manager to provide an information statement for any nonemployee who is paid more than $600 in any tax year. Few broadcasters have bothered to comply with this rule, but after December 31, 1982, failure to report payments in excess of $600 to independent plumbers, electricians, accountants, decorators, and the like will result in a $50 penalty—for each omission.

Similarly, present law imposes a penalty on any person who fails to file timely information returns relating to various types of compensation, interest, and dividends. The old penalty is $10 for each such failure, and $10 for each failure to provide the recipient with a copy of those required information returns. After December 31, 1982, however, the penalty for each failure jumps to $50.

Penalties for fraud and outright cheating have also been substantially increased, and the Internal Revenue Service given broader powers to enforce our tax laws. Fortunately, the poor taxpayer has also been given more help in his or her fight against unreasonable actions by the government.

Under our present law, a taxpayer who prevails in civil tax litigation in any federal court—except the U.S. Tax Court—may be awarded reasonable attorneys' fees and other litigation costs unless the court finds that the position of the government was substantially justified. Of course, if a Tax Court proceeding has been instituted by the taxpayer merely for delay, the court can award damages to the U.S. in an amount not to exceed $500.

The Tax Equity law extends the awarding of attorneys' fees to all civil tax litigation, including the U.S. Tax Court, or cases begun on or after March 1, 1983. Using the Tax Court to delay the payment of taxes can now cost a scheming taxpayer as much as $5000 in cases begun after July 1, 1983. **BM/E**

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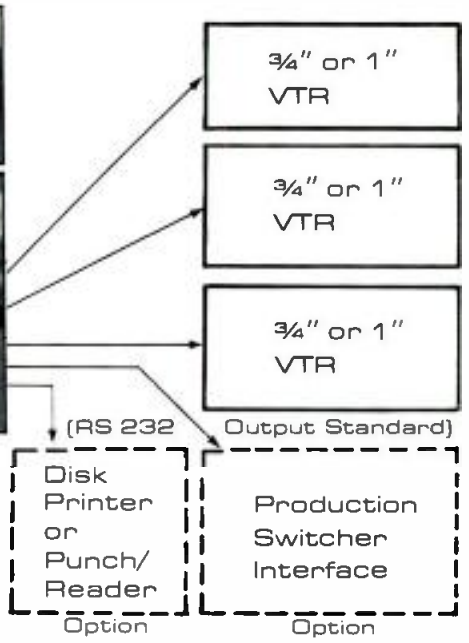

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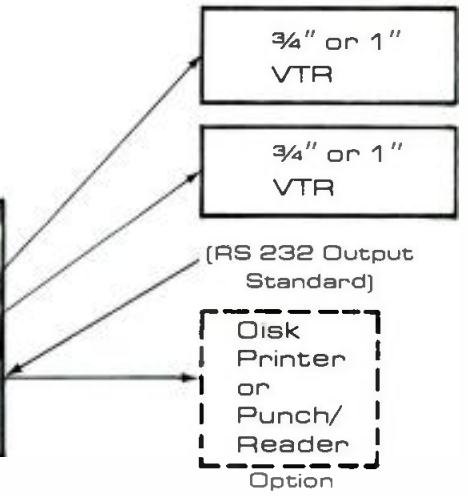

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Each month, *BM/E* presents two engineering problems and invites you to submit solutions complete with diagrams. *BM/E*'s editors will read the entries and select the best for publication—giving readers an opportunity to vote for the idea they consider best by using the ballot area on the Reader Service Card.

We will pay $10 for each entry printed. In addition, the solution in each month's competition receiving the most votes on our Reader Service Card will win $50.00. So put on your thinking cap and submit an answer to either of the problems outlined below . . . and be sure to watch this section for the solutions.

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Problem 13: 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 13 must be received by November 16, 1982, and will be printed in the January, 1983 issue

Problem 14: ATR Remote Operation

In a small market station, the production room can often be brought up in the control room for on-air operation, and two reel-to-reel tape machines, one in production and one in control, can be remoted from either room for greater economy. Design a simple switching system to give signal distribution, cueing, and remote start and stop control in either position.

Solutions to Problem 14 must be received by January 14, 1982, and will be printed in the March, 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.

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295 Madison Avenue, New York, NY 10017

Solution to Problem # _____

Your Name: _____

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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.

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GREAT IDEAS

SOLUTIONS to problem 11: Cart Automation

The station has three cart machines, bought at various times, so they are not equipped with automatic sequencing circuitry. Design an inexpensive relay and pushbutton system to: (1) Start the second cart when the first finishes; (2) Stop the first and start the second at the push of a button; and (3) Proceed similarly from second to third, and from third back to first, if a switch is set for that. Use the simplest cue tone or other end-of-tape system that will do the job.

SOLUTION A

Stephen C. Ellis, Director of Engineering
Galesburg Broadcasting,
Galesburg, IL

My solution uses both the run (start) and stop (ready) lamp voltages to operate. Most cart machines use 24 V lamp circuits (28 V lamps). Not all cart machines use the full 24 volts in normal operation. I have in mind those machines that are equipped to indicate secondary cues by brightening the run lamp. Run lamp voltage is reduced, then increases when tone is detected. This is a problem if 24 V relays are used, since this voltage may be below the release voltage of the relays. The problem may be eliminated with lower voltage relays and dropping resistors when needed. Resistors should not be needed for relays K-1 through K-6 as these relays only operate for short durations. I used dropping resistors for K-7 through K-9 since they remain energized for extended periods.

Relays K-1 through K-3 and switches S-1 through S-3 should be wired to either the normal open or normal closed contacts, depending on how the machines involved are stopped. Machines may be mixed as I have done. My machine #2 uses an open circuit for stop, while 1 and 3 use a closed circuit. Each machine is treated separately and the circuit wired accordingly.

My original circuit in fig. 1 will only work satisfactorily if one wishes to sequence three carts and does not intend to sequence a fourth. A problem exists, however, if one wishes to insert a cart into an emptied machine. Once a cart is

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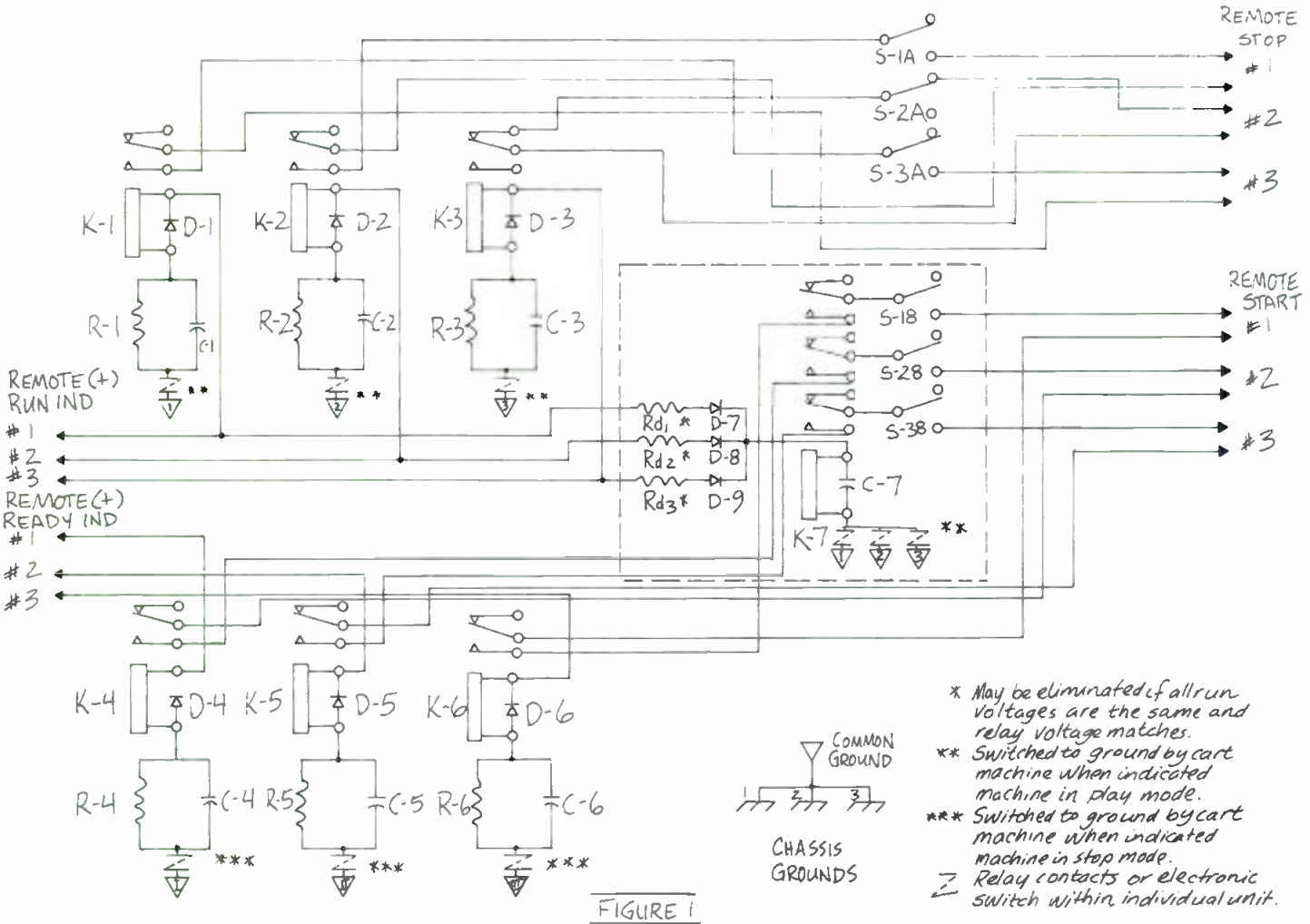


FIGURE 1

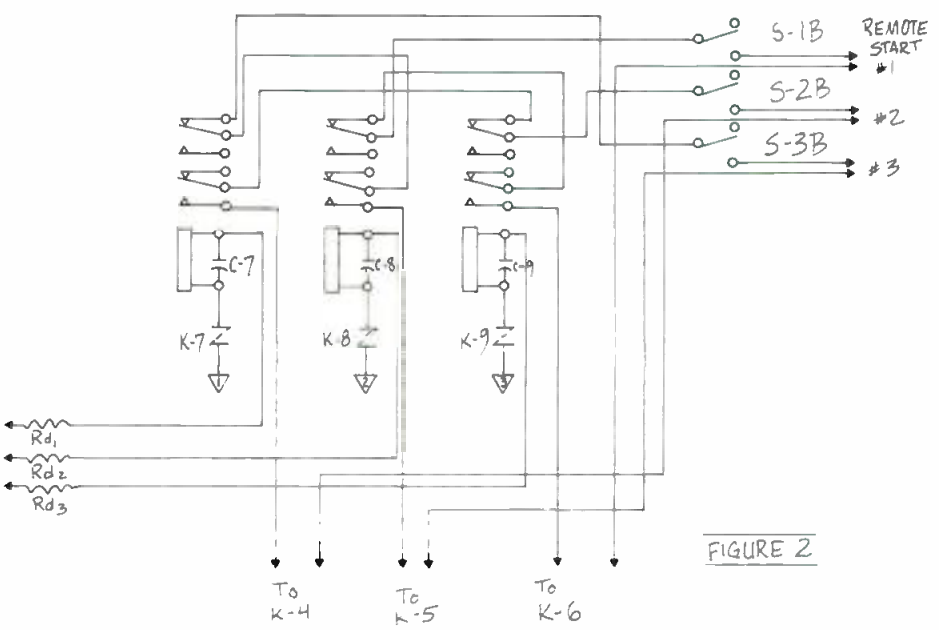


FIGURE 2

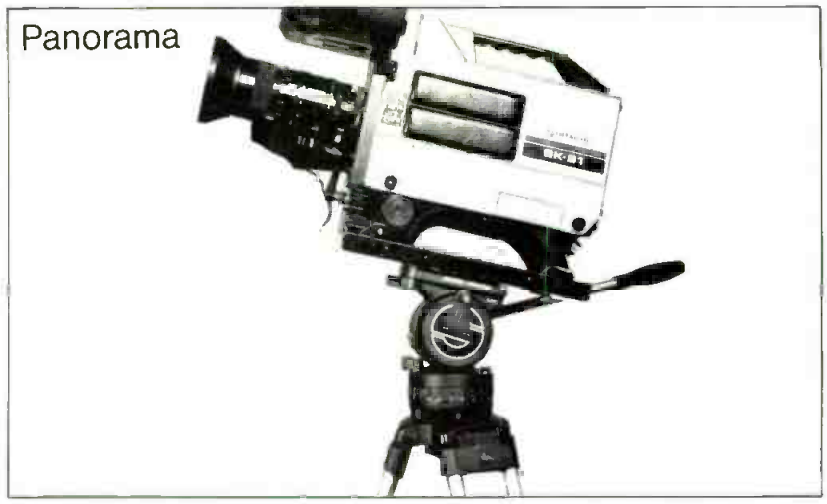
removed and a new one inserted, fig. 1 will give an unwanted start when the ready lamp is energized. Such a problem could be eliminated by activating the switch involved to disable, until the newly inserted cart has been started. This solution could be used if one seldom desires to use a fourth cart in sequence. A better solution is to add fig. 2 by inserting fig.2 in place of the boxed area on fig. 1.

Fig. 1 assumes that the run indicator is turned on by completing the ground return. This may not always be the case. If the supply side is completed to turn on this indicator for one machine while another machine completes the ground return, we could have a closed circuit through K-7 at all times. The use of fig. 2 will eliminate this problem along with the problem of false starts.

I purposely did not list any components, as this circuit can be constructed with a number of different type relays with somewhat different operating characteristics. All resistors and capacitors should be selected for proper relay operation.

The R-1/C-1 through R-6/C-6 combinations are selected so that the relays will operate momentarily and then release as the capacitor charges. The resistor should allow the capacitor to discharge rather rapidly when the operating voltage is removed. C-7 through C-9 are selected to delay the release of the relay involved long enough to allow the next machine in sequence to be started. Rd-1 through Rd-3 are selected to drop the applied relay voltage to a value near the normal operating voltage. If all the machines use a 24 V run lamp voltage and 24 V relays are used, these resistors may be eliminated. S-1 through S-3 are DPDT switches wired as required for the machines used. One could use six switches instead of three if separate control is desired of the auto start and stop functions. Remote start/stop push buttons,

sachtler



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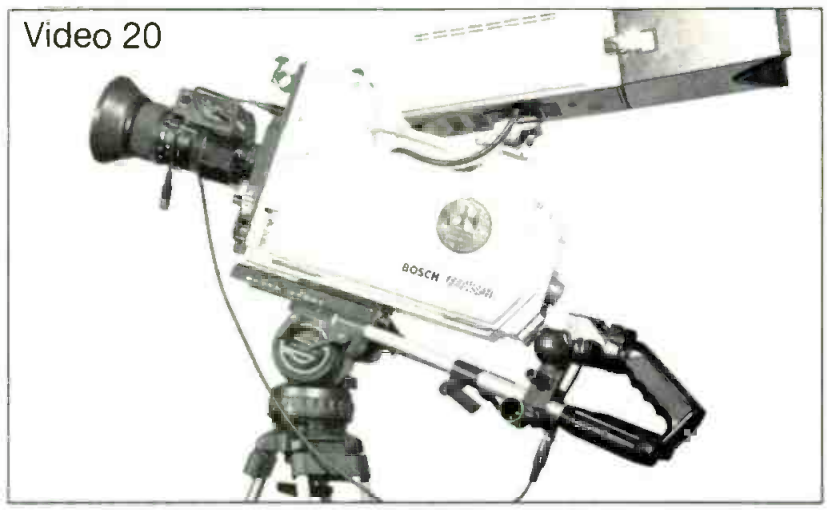
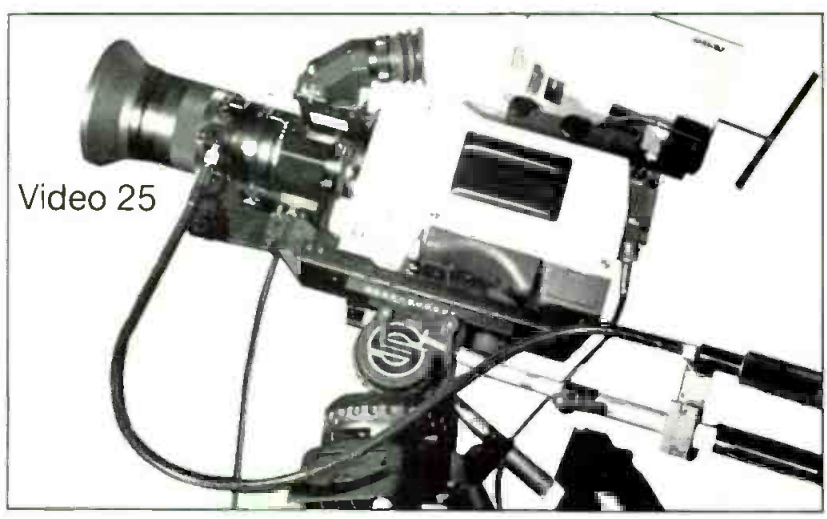
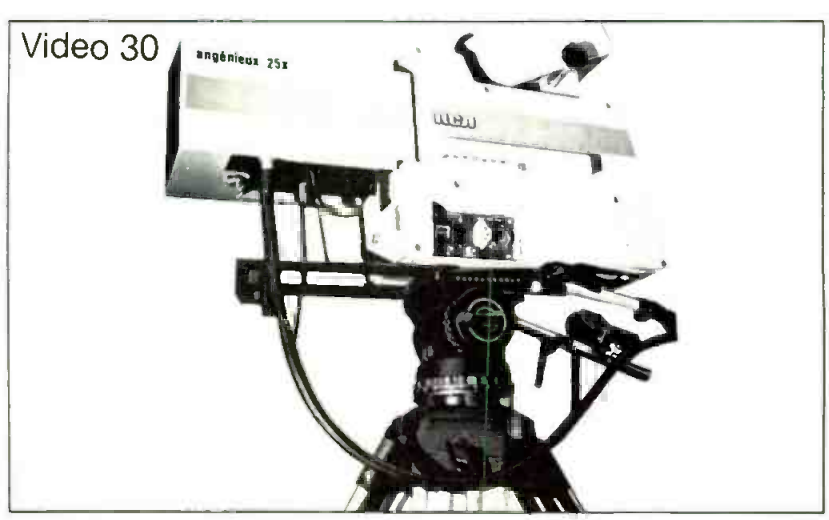






not shown on diagram, would be connected in the normal way with this circuit preceding these switches.

This circuit should work satisfactorily to sequence three cart machines and to stop the previously running machine, and could be expanded to sequence four or even five machines.

SOLUTION B

Carr Stalnaker, Chief Engineer
KRMD Radio, Shreveport, LA

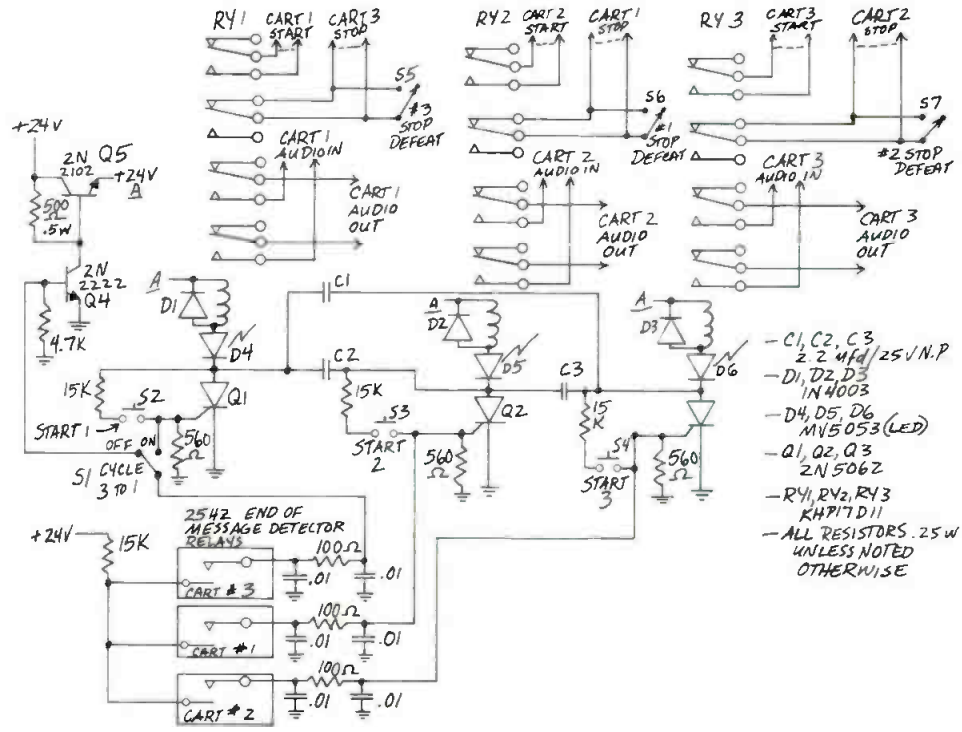
This solution is based on the assumption that the cart machines are equipped with end of message cue detectors. The E-O-M relay contact closures are utilized to operate the sequencer. SCR's Q1, Q2 and Q3 are connected as a ring counter; therefore only one of the SCRs can be conducting at any given time.

Assume that SCR Q1 is triggered, either by the momentary start switch, S2, or the end of message relay closure. Q1 anode voltage drops to less than one volt, causing D4 to illuminate, RY 1 to energize, and Q2 and Q3 to turn off.

RY 1 energizing sends a remote start to machine 1 and a remote stop to machine 3. To provide for recuing of the last cartridge played, the remote stop to machine 3 can be defeated by S5. By using one pair of relay contacts to switch the audio line, the machine with the cartridge recuing can be muted.

When the end of message occurs in cart 1 and its E-O-M relay energizes, SCR Q2 is triggered, turning off Q1 and starting machine 2. The E-O-M from machine 2 will trigger Q3, turning off Q2 and starting machine 3. This sequence is repeated continually if switch S1 is left in the cycle position.

With S1 in the off position, the 24



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SOLUTION A	SOLUTION B	SOLUTION C

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volt E-O-M signal from machine 3 turns on Q4, which causes Q5 to turn off. Q5 is in series with the 24 V line to all the relays; therefore turning off Q5 will extinguish any SCR that is on.

The LEDs D4, D5 and D6 are in series with their respective relays, RY 1, RY 2, and RY 3; therefore they provide a visual indication of which machine is selected.

The low pass filter located between the SCR gate and E-O-M relays protects against false triggering due to RF or other noise pickup. If desired, additional protection can be provided by a snubber network, consisting of a 100 ohm resistor in series with a 0.1 UFD capacitor, connected from the anode of each SCR to ground.

It is imperative that capacitors C1, C2 and C3 be *nonpolarized* electrolytics.

The utilization of four pole, double throw relays provides a circuit that is very flexible.

SOLUTION C

William Howe, Chief Engineer
WEIV, Ithaca, NY

Switches S1 through S3 set up each cart machine to be sequenced by the preceding machine; cart 2 is sequenced by cart 1, cart 3 by cart 4, and cart 1 by cart 3. The switches are SPDT push on/push off and are shown in position, which allows a cart machine to be started by the previous machine. When each cart is produced, a secondary (150 Hz) cue tone is placed on the cue track where the next cart should start. Switch S4 is also push on/push off and is used to disable the whole sequence operation without disturbing the individual cart settings. When S2 is in the position shown, pin 1 of IC1 is low and the LED is on to indicate cart 2 will be started by a secondary cue tone on the cart being played in machine 1. UMC type 10 Beaucart machines are used, having internal relays which activate on the cue tones and have relay contacts available at the remote plug. The N.O. contacts for the second cue are on pins 10 and 11. When the contacts on cart 1 are closed by a secondary cue tone, pin 2 of IC1 goes low, driving pin 3 low and turning on K2. The N.O. contacts of this relay are connected to the remote start on cart 1 so that when the relay is activated, it starts the machine. The relay is a Magnecraft W171DIP-2, which can be driven directly from the logic and does not require a driving transistor.

When S2 is not in the position shown, pin 1 of IC1 is held high and prevents the relay from being activated by IC1A. At the same time, pin 5 is low

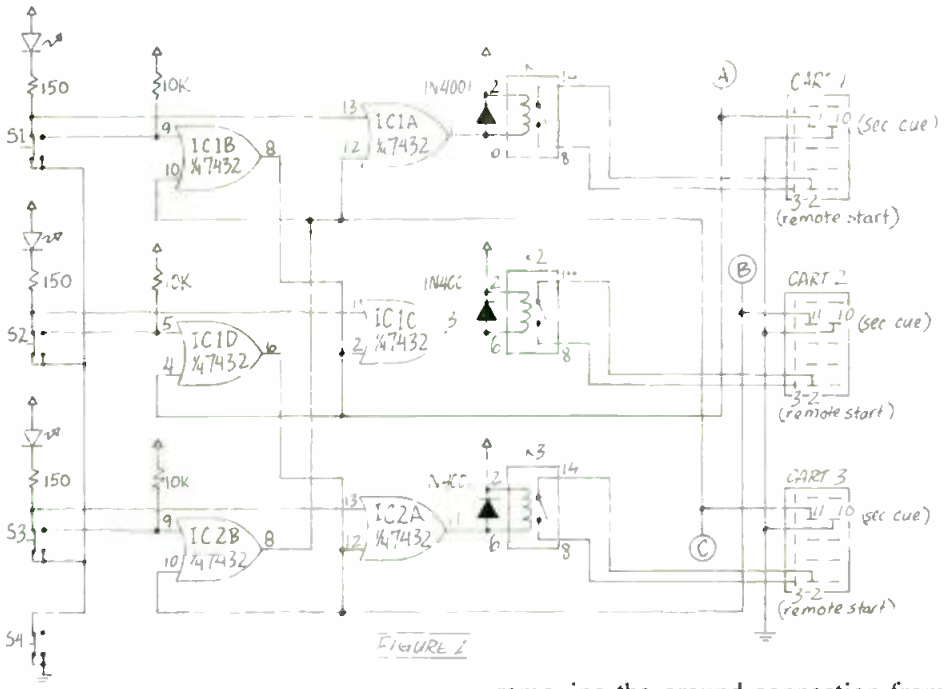


FIGURE 1

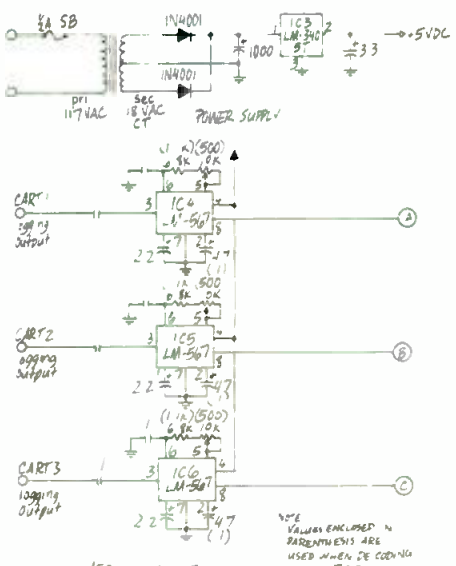


FIGURE 2

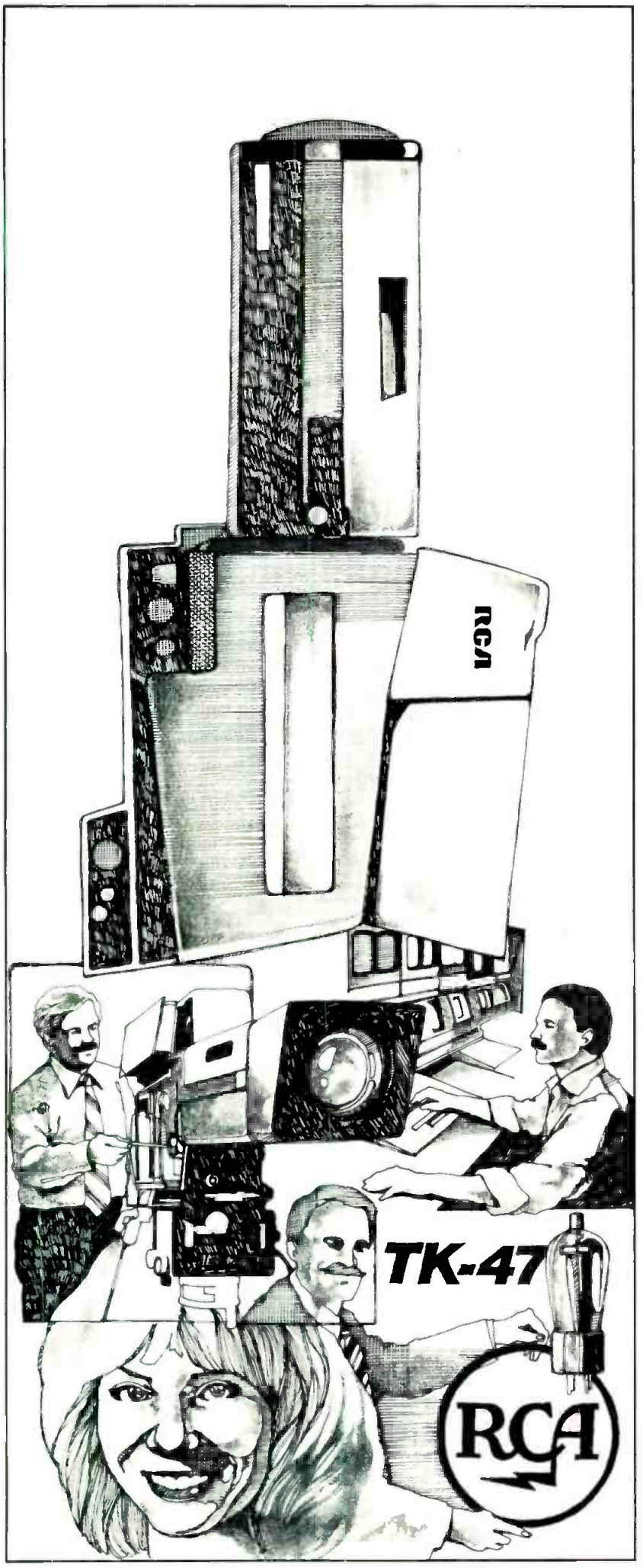
and pin 6 is driven low when pin 4 goes low from the activation of secondary cue relay of cart 1. Pin 6 of IC1 is connected to pin 12 of IC2, which is in the circuit for cart 3 and performs the same function as pin 2 of IC1 does for starting cart 2. The circuit for cart 3 and cart 1 is the same as the one described for cart 2. If the LED is on, that particular machine will be started automatically from the preceding machine. If it is off, that machine will be skipped and the next one started. This permits the sequencing operation to continue if a machine has been removed or if it's necessary to bypass a particular machine. Placing S4 in the other position will disable the entire operation by removing the ground connection from S1 through S3. This holds all pins of the logic gates high and turns off all LEDs to indicate the system is off. This system is easily expanded to more than three machines.

If the cart machines do not have internal relays, a simple cue detector can be built. Points A, B, and C of the detector connect to corresponding points of the automation circuit, and the connections to pins 10 and 11 are omitted. The input to the decoder is connected to the logging output or other cue tone output of the machines. IC4 through IC6 are tone decoder PLL which react to a tone of the frequency to which it is set. Frequency is determined by total resistance between pins 5 and 6, and the capacitance between pin 6 and ground. The trimpot adjusts the center frequency of the decoder bandpass. The circuit is shown for decoding the second cue tone (150 Hz), if it is more desirable to use the tertiary cue tone (8 kHz) substitute values in parentheses where two are given. When the proper tone is present on decoder input pin 3, pin 8 will be driven low, causing the same effect as the closing of relay contacts in the preceding description.

CONTEST WINNER

problem 4: blackout protector

Congratulations to
John Yurek
Assistant Chief Engineer
Eastern Tekcom, Monroeville, PA
for his winning solution B: see p. 104 of the May 1982 issue. The solution has won Yurek an engineering slide rule calculator.



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Richmond Sound Offers Portable Console 250

Richmond Sound Design's Model M82B broadcast audio control console features production and on-air capabilities with transformerless inputs, equalization, and complete monitoring facilities. A calibrated attenuation switch is offered, selecting mic input on 0, 10, and 20; line inputs are on A and B positions respectively. Three-band equalization is included with a wide adjustment range, continuously variable boost/cut, and active filter design.

The echo send signal is derived post-EQ and fader and may be used as an auxiliary monitor or foldback channel. A toggle selector provides exclusive or combination output assignment capabilities. Other input features include environmentally sealed faders, cue button for both post-EQ/pre-fader listen and monitor/meter solo function.

Output facilities offered by the M82B are dual concentric master monitor level control, master echo send level control, and master foldback level control. Mechanical light-reflecting cue bottoms for operator monitoring and meter of foldback mix, air signal, or echo send mix are also standard equipment.

Any M82B may have up to four S42Bs added at any time for a maximum channel complement of 24. The S42Bs attach to the master chassis in the field without extra tools, requiring no subsequent system calibration. Input transformers are also available, as are a communications module providing talkback, two extra VU meters, tone oscillator, and output transformers.

Fiberoptics from Grass Valley 251

Wavelink, the product name of the Grass Valley Group's fiberoptic transmission equipment, includes the Model 3290. This unit is a broadband transmission system consisting of an LED-based transmitter, a receiver employing an APD detector, and a compact frame built to simultaneously accommodate both transmit and receive modules plus power supplies.

The transmitter features an optional plug-in submodule for variable equalization of the incoming coaxial cable, an adjustable gain stage, and a separate monitor output amplifier. The receiver module features AGC and squelch functions, a delay trim allowing for precise timing of multiple signals, an adjustable gain stage, and a fanout of five outputs. Both units are housed in either one rack unit or two rack trays.

■ FOR MORE INFORMATION ■

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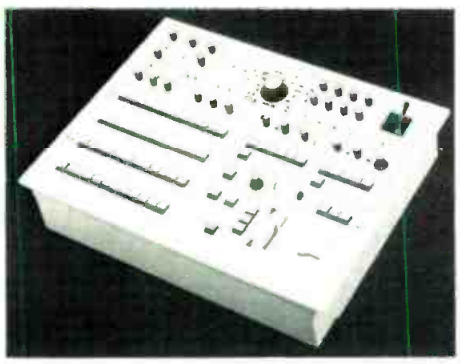
Ross Video Has New Switcher 252

The new Model RVS 524 is a compact production switcher designed for small studios, editing suites, and mobile vans. It is available with 12 or 20 inputs, and offers the Ross multilevel ef-



fects system, permitting manipulation of up to four video signals at one time without locking up the switcher.

The unit offers a preview function, and interfaces with all major computer editors and digital effects systems, analog key borders, and the company's scene store memory system.

Stereo for Video by Solid State 253

The new SL 6000E consoles combine an in-line format with centralized master facilities, enabling a single operator to control signal processing and routing functions. This console series provides 24 group outputs for multitrack recording and a six-group post-production mixing matrix. The matrix offers three discrete stereo mixing groups for music, effects, and dialogue tracks, which may be subsequently reduced to mono and stereo mixes for transmission.

The standard mainframes accept up to 24 or 32 input/output modules, providing as many as 32 mic and 64 line inputs, plus four stereo echo and effects returns. Each I/O module contains complete input, output, and monitoring controls as well as high and low pass filters, four-band parametric equalization, an expander/gate, and a compressor/limiter. An auxiliary stereo send with pan pot is also provided, along with four mono cue, echo, and effects sends.

Standard operating modes are selected by five console status pushbuttons directing the consoles' master logic to reconfigure the main signal paths throughout the system. A single pushbutton can switch the console between live, multitrack and post-production modes. Combinations of buttons provide variations. The system is compatible with the company's other audio systems, including its primary studio computer, allowing storage of information concerning mixes onto floppy disks.

For a Shot in the Dark 254

The SECO scope permits shooting by ENG crews at night, using only available light. The design uses black and white phosphors for contrast resolution. It combines the features of a 25 mm format and high-gain, second generation image intensification into a compact unit. It is compatible with most major cameras by selecting the appropriate adaptor.

The scope is made of aluminum alloy and weighs 5.5 pounds. The monochromatic image is spectrally peaked at 55 nm while resolution exceeds 250 lines. The relay lens has a full range of the focal plane and back focus adjustment. Scope power is furnished by two AA batteries.

Tapecaster Develops Cart Loader 255

Tapecaster Model X-100 cartridge loader was designed for the broadcast cart or the eight-track hub. It features tape loading from a 7.5-inch supply reel or a 10.5-inch pancake of lube

tape, and automatically meters the tape to the time programmed in minutes and seconds. The manufacturer claims it loads all size hubs and has an adaptor available for the 3M cartridge.

It has two direct drive motors and has a loading speed of approximately 50 IPS. Other features include a solenoid-operated brake, which stops the supply disc at the end of wind. It also offers an adjustable tension control for the supply disc brake. Ramp design tape guides and a heavy steel top plate mounted on a Formica-trimmed wood base are standard features of this unit.

■ FOR MORE INFORMATION ■
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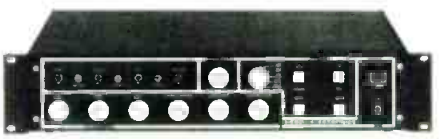
Image Corrector from Siegel 256

The Series 1100 video image corrector from Siegel Electronics incorporates a genlocked RS-170A sync generator for timing pulse reinsertion on the output video. It includes a comb filter separation of chroma from luminance, resulting in removal of cross-modulation patterns in fine detail pictures. Chroma coring is also included, as are horizontal and two lines of vertical enhancement. Picture coring for luminance noise reduction and RGB decoding and re-encoding for correction of optical color errors are also standard, as is a built-in switcher fader for adding camera titling. The unit is priced under $4000.



MXR Introduces Digital Time Delay 257

Studio-quality flanging, doubling, chorusing, reverb, and echo are offered in the new Model 175 digital time delay. It is one rack space high and has stereo output capability and a red/green LED signal present/overload indicator. Other features include delay settings of 0.63 to 320 ms and a 4:1 sweep.

Leader Expands Output Power Supplies 258

Leader Instruments has introduced the LPS-151 and 152, triple output dc power supplies with metered output voltage adjustable from 0 to 6 Vdc, 0 to +25

EQUIPMENT

Vdc, an 0 to −25 Vdc. All three outputs have independent adjustable current limiting with an automatic recovery feature, allowing the output voltage to return to normal when the short or overload condition is removed.

Both units feature a tracking output mode which permits an adjustable ratio of positive versus negative voltage between the 25 V outputs. These power supplies can be rack-mounted or operated on a test bench. List price for the LPS-151 is $395, and the 152 is $495.

■ FOR MORE INFORMATION ■
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Hitachi Introduces Delayed-Sweep Scope 259

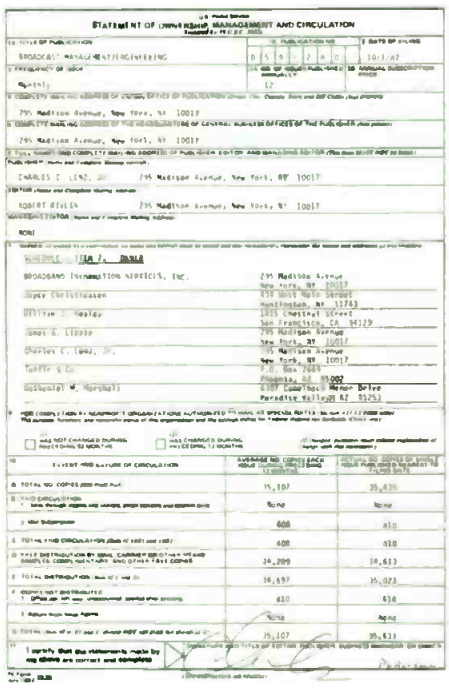
Featuring six ranges of time base delay from one micron to 100 μ, the new Model V-353F offers delayed sweep capability allowing for the selection and expansion of a portion of the displayed waveform. The scope has a 5.5-inch CRT with a 5.2 kV acceleration potential, offering an internal graticule and an illuminated scale.

Other features are 1 mV sensitivity to 7 MHz, voltage and time base axis accuracy of ±3%, a built-in signal delay line, a dynamic range of eight divisions at 35 MHz, and a CH 1 vertical signal output for DMM. The vertical sensitivity on the V-353F is 5 mV/div to 5

V/div in 10 calibrated steps in a 1-2-5 sequence. Display modes are CH 1, CH 2, dual, add and diff. Calibrated sweep speeds extend from .2 μ to .2 s in 19 calibrated steps, while X10 magnification extends the fastest sweep rate to 20 ns/div. The unit is priced at $949.

3M Designs Telephone Interface 260

The new FB-1 from ITC/3M interfaces telephone line with cartridge machine, providing answer-only access to any taped information. It answers by connecting callers to the cartridge machine and starting the tape. When the prerecorded message is over and the cartridge recues, the FB-1 hangs up and awaits another call. The unit is FCC-approved and offers a two-year warranty.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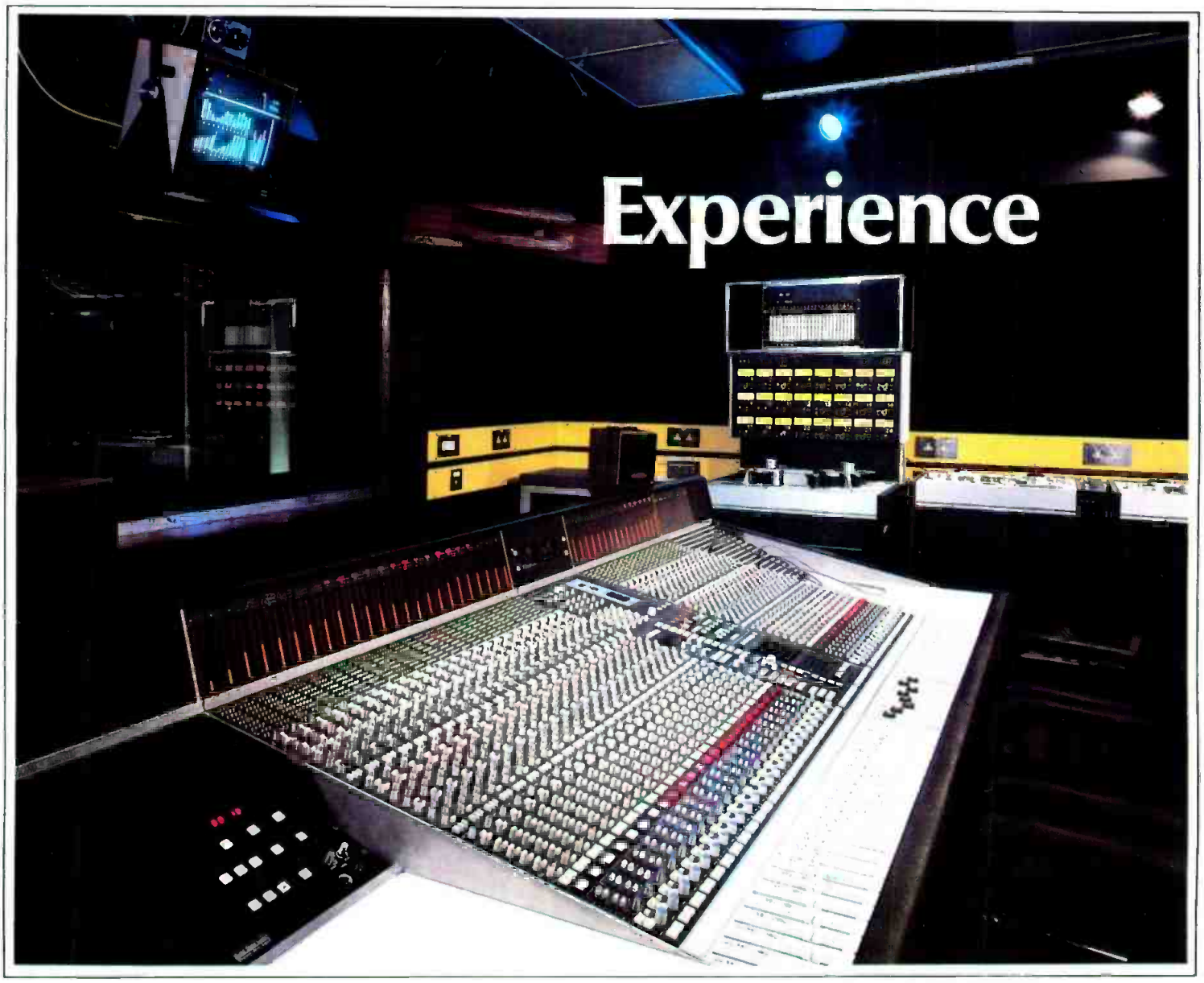

Solid State Logic at BBC Maida Vale 4, London

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