NOVEMBER 1985 $3.00

BM/E

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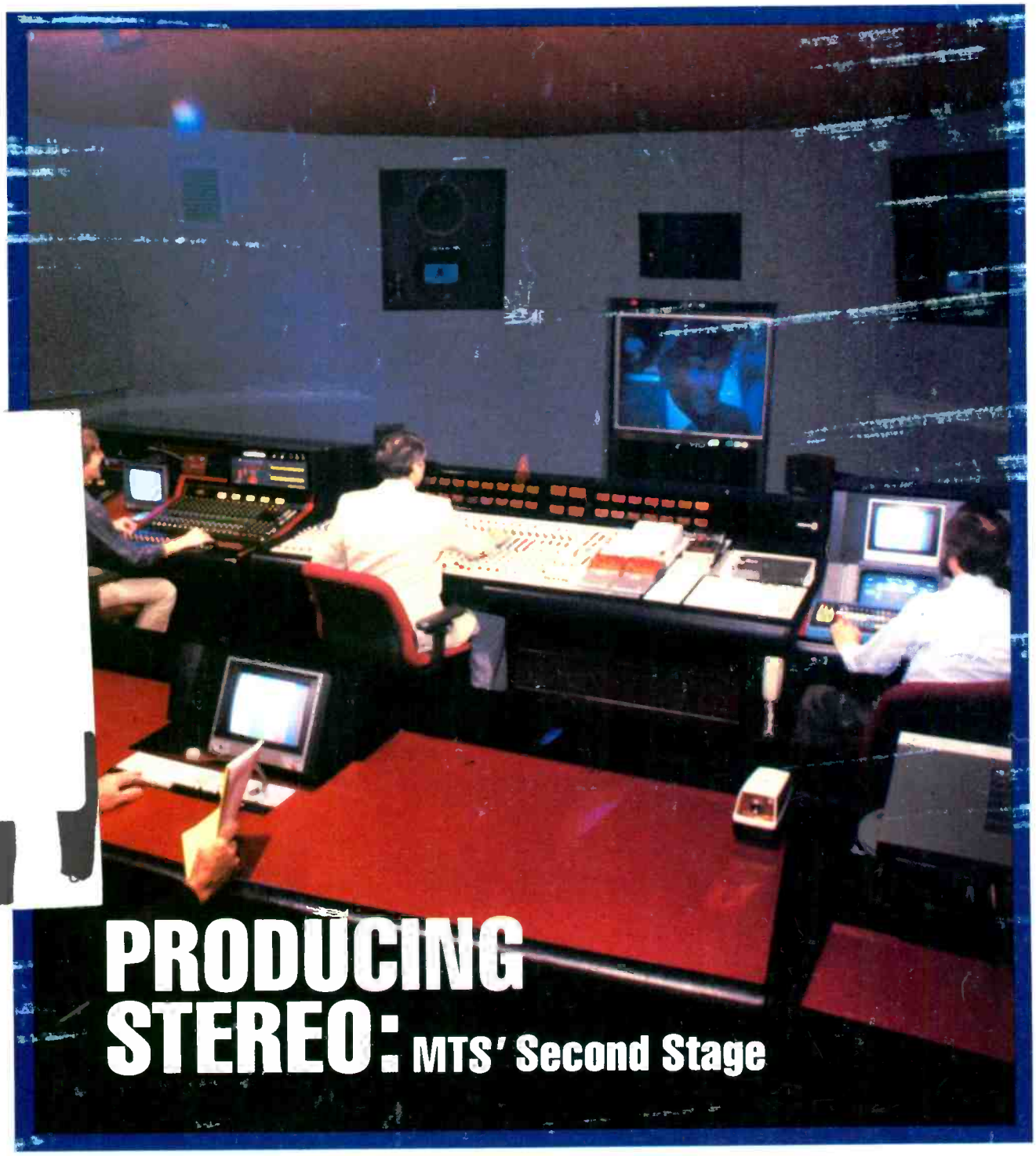
Grand Ole Opry



PRODUCING STEREO: MTS' Second Stage

Also in this issue:
Image Processing ▪ Post-Production
Audio TBCs ▪ Film-to-Tape

Studer 961/962: Small Wonder

It's a wonder how a console so small can do so much ... and sound so good!

The Swiss have a special talent for making great things small. A case in point: the new 961/962 Series mixers from Studer. In video editing suites, EFP vans, remote recording, and radio production, these compact Studers are setting higher standards for quality audio.

Sonic performance is impeccable throughout, with noise and distortion figures well under what you'd need for state-of-the-art digital recording. By refining and miniaturizing circuits developed for our 900 Series production consoles, Studer engineers have squeezed world-class performance into suitcase size.

The 961/962 Series is fully modular, so you can mix-and-match modules to meet your requirements. The 961/962 features stereo line level input modules with or without 3-band EQ, plus mono mic/line inputs and master module with compressor/limiter. Other choices include a variety of monitor, talkback, auxiliary, and communication functions. The 961 frame holds up to 14 modules, the 962 accepts up to 20.

Other new features in the 961/962 Series include improved extruded guide faders, balanced insert points, FET switching, electronic muting, Littlite® socket, and multi-frequency oscillator.

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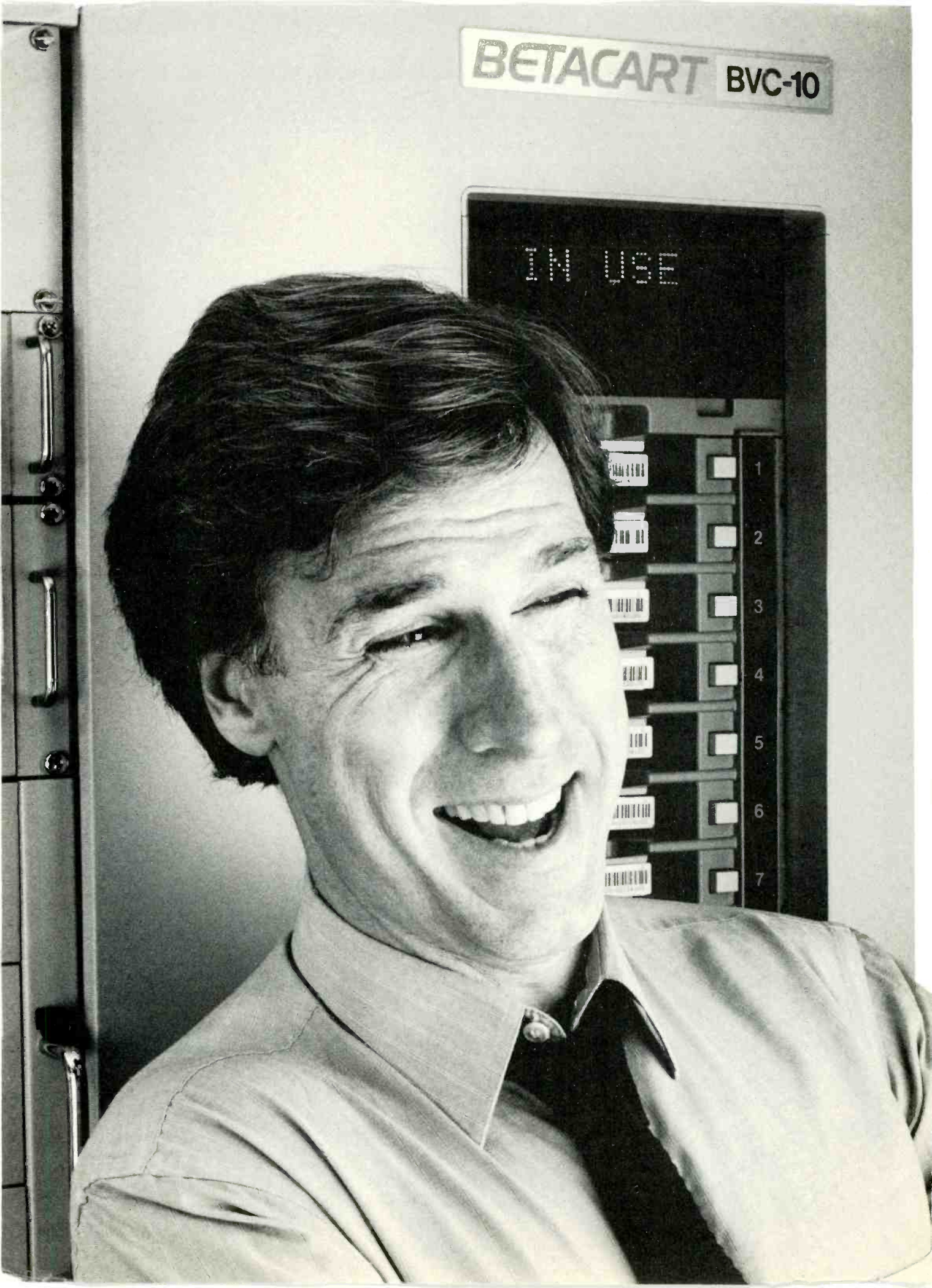
BETACART BVC-10
IN USE
1
2
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"Makegood? What's a makegood?"

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All those people from Anchorage to New York who already use Sony Betacart™ Systems.

They forget about downtime. They forget about on-air backup systems. And they forget about ad agencies demanding damngood makegoods.

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Operating simplicity anyone will appreciate. The front panel controls of the 1710B are logically grouped and labeled for fast, easy handling. And the high quality Tektronix CRT offers a sharp, bright trace so it's easy to see.

You get outstanding versatility and Tek quality in a convenient, compact package that fits in half a rack. DC power operation can be installed and used with a battery pack for fully portable operation in the field.

If you see a place for a cost-effective waveform monitor in your operation, you owe it to yourself to see the 1710B. Available in both NTSC and PAL versions, the 1710B is our most economical answer yet to improving picture quality through video waveform monitoring.

For a look, contact a Tektronix Professional Video Dealer, or your local Tektronix Sales Engineer, listed in major-city directories.

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Create a room

with a view.

We'd like to open your eyes to the incredible REV-1 digital reverb. Because it gives you unheard-of control over virtually all reverb parameters. And something that has never been seen in any type of reverb: the capability to "look" at the sound as well as hear it.

The remote unit that controls the nineteen-inch rack-mountable unit has a lighted high-resolution LCD display that graphically depicts the results of the adjustments you make.

So getting just the right reverb sound is no longer a question of trial and error.

"EARLY REFLECTION" display mode showing room size and relative level and time of discrete reflections.

"REVERB DENSITY" display mode showing level and relative time of subsequent reverberation.

"REVERB TIME" display mode showing difference in reverb time in each of four frequency bands.

"MEMORY TITLE" display showing the titles of internal ROM memories.

The logical grouping of the parameter controls on the remote also makes it easy to create any effect you like. Then store it in any of 60 memories for instant recall.

The remote also contains 9 additional RAMs so you can store programs and carry them with you to use anywhere there's an REV-1.

And there are 30 additional ROMs with factory preset sounds. Many of which can be completely edited (as can the user-programmed sounds) by using the LEDs to tell you the set value or indicate in which direction to move the control so you can easily and precisely match the value of the originally programmed sound.

And the sound itself is far superior to any other digital reverb. The REV-1 uses specially developed Yamaha LSIs to create up to 40 early reflections and up to 99.9 seconds of subsequent reverberation. So the effect can be as natural (or unnatural) as you want it to be.

We could go on about the REV-1. Tell you about its 44.1 kHz sampling rate that provides a full 18 kHz bandwidth to prevent the natural frequency content of the input signal from being degraded.

How it has a dynamic range of more than 90 dB for the delay circuitry and more than 85 dB for the reverb circuitry.

But why not take a closer look at the REV-1 at your authorized Yamaha Professional Audio Products dealer. Or for a complete brochure, write: Yamaha International Corporation, Professional Products Division, P.O. Box 6600, Buena Park, CA 90622. In Canada, Yamaha Canada Music Ltd., 135 Milner Ave., Scarborough, Ont. M1S 3R1.

YAMAHA

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BROADCAST MANAGEMENT/ENGINEERING
NOVEMBER 1985 VOLUME 21/NUMBER 11

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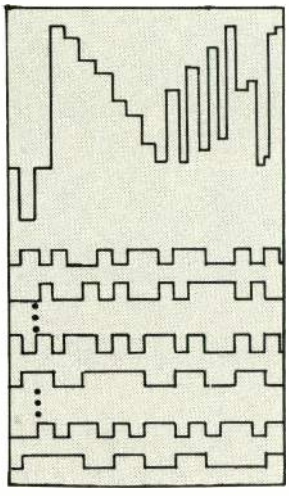

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DEPARTMENTS

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TEN REASONS TO CHOOSE THE NEW WESTAR CONSOLES FOR VIDEO/TV/FILM:

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EDITORIAL

FCC Take Heed

Back in May we offered some food for thought on the current role of the FCC in serving the broadcast industry. At issue was a radical rate restructuring which would, in effect, tax broadcasters to finance the Commission. We questioned, at the time, whether the FCC was in fact responding to the needs of broadcasters, and what radio and TV stations could expect to get for the extra dollars they were being asked to contribute.

Now, six months later, the FCC has restructured licensing fees amid NAB protests, but still intends to raise more than half of its income by dipping into broadcasters' pockets. The questions we raised then are still valid now, perhaps more so, in light of the failure to come through with a satisfactory "must-carry" policy.

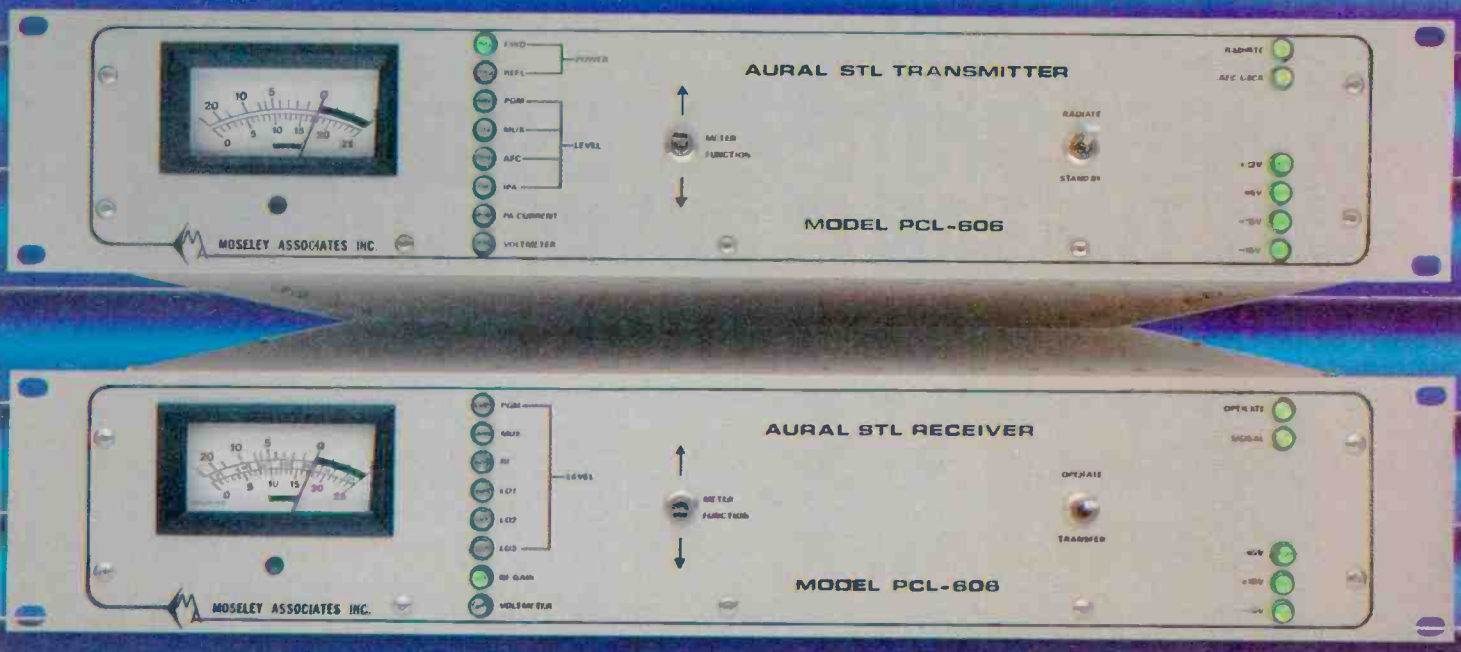
We asked our readers to participate in a straw poll, an "FCC vote of confidence," voting either "yes," the FCC is doing an adequate job of serving the industry and should be allowed to levy its proposed tax, or "no," it does not adequately represent those needs and should not be allowed to support its activities with the tax. The response was definitive, and the FCC would do well to take it to heart.

Of the 101 responses we received, 94, or a clear majority, voted that the FCC was not doing an adequate job. Only seven responses said that they were. Most of the votes, it should be noted, came from chief engineers or major members of the engineering staffs, and presidents and general managers of stations, in that order. In light of the recent weakening of the Commission's technical section, the responses from engineers should inform the FCC that a restructuring of priorities may be more necessary than a restructuring of rates.

While this may be bitter medicine to swallow, the FCC would do well to get more in touch with those who are directly affected by its policies—or lack of them. Our straw poll was only a thin slice of the whole pie, and we can only wonder how many more dissatisfied broadcasters there might be, industrywide.

As for those who took the time to respond, we urge you to go beyond this poll and make your feelings known to the commissioners, and to your federal legislators.

Yes, the FCC is doing an adequate job for the industry, and should be allowed to levy its proposed new tax on CPs.....7
No, the current FCC does not adequately represent the needs of the industry and should not be allowed to support its activities with a tax on CPs..... 94



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You're running compact discs mastered on digital equipment. You've bought the best console you can afford. Your processing equipment is state-of-the-art. Your RF plant is clean as a whistle.

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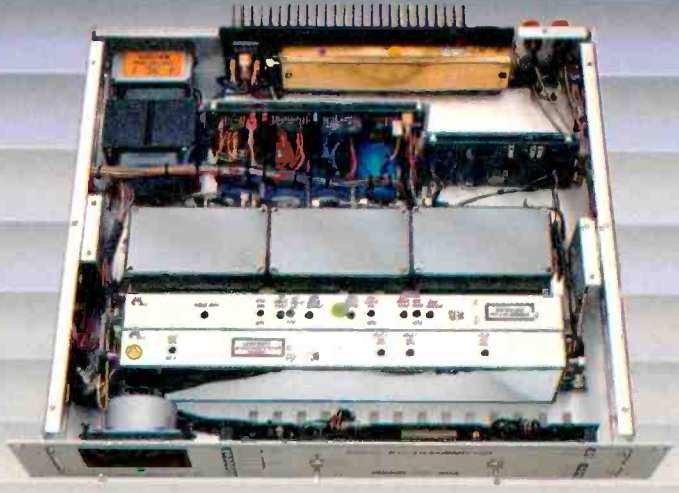

PCL-606/C Transmitter.

Cover removed. Note easy access to all critical adjustments and modular construction.

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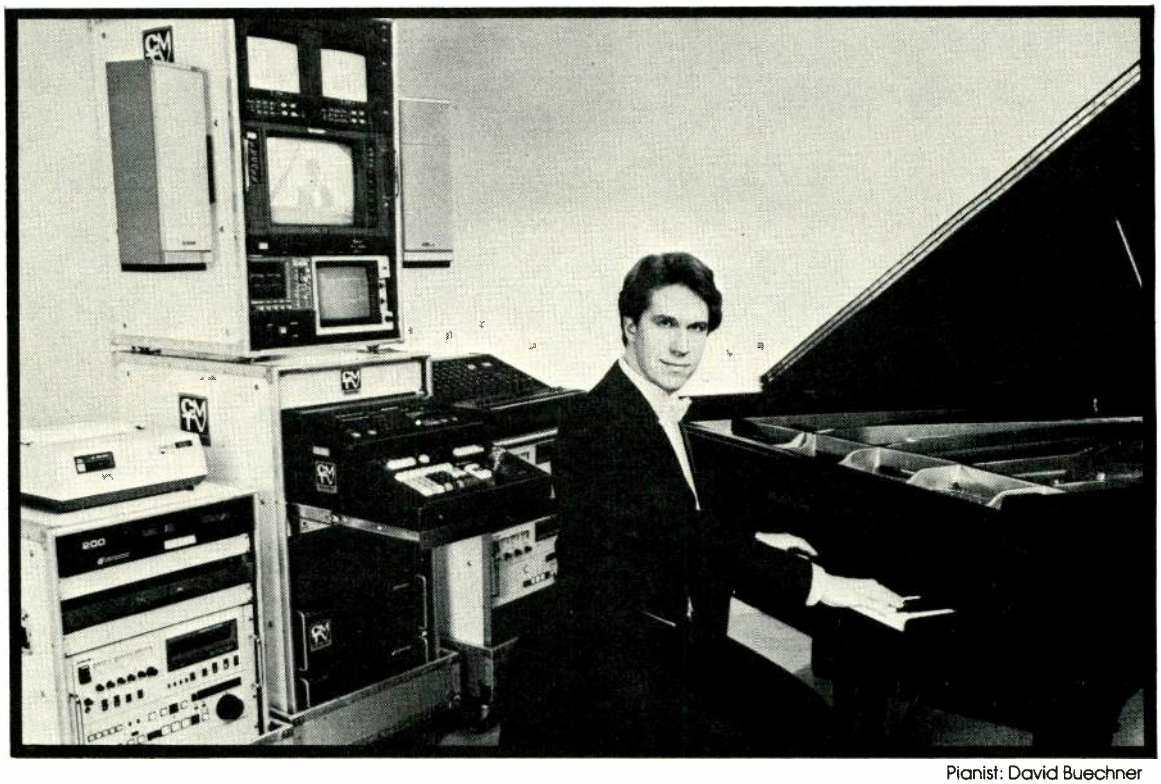
CAMERA MART VIDEO SYSTEMS PERFORMS AT THE VAN CLIBURN PIANO COMPETITION.



Pianist: David Buechner

Of all the videotape production systems that could have been chosen to produce the Van Cliburn Piano Competition, the production team picked Camera Mart's Super System II for editing and the Betacam camera system using the innovative Ikegami HL-95 camera.

Why select a New York supplier for a job in Fort Worth, Texas? With only 48 hours between announcement of winners and airdate, the producers had to have a fully portable, self-contained professional system on location. And they knew they could count on Camera Mart to deliver it—anywhere in the world.

Where are you shooting next?

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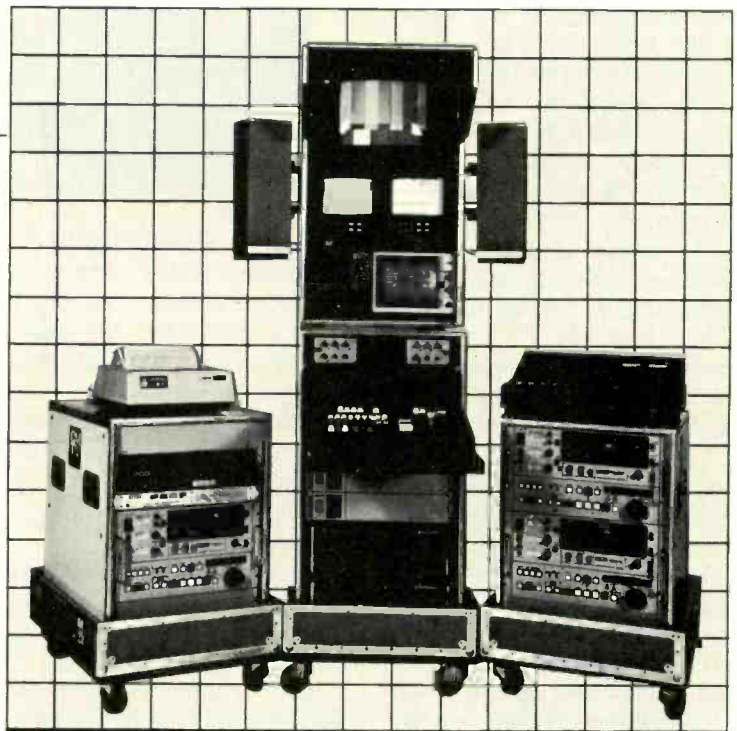

Camera Mart Transportable "Super System"

"Super System" is a fully portable ¾-inch A–B Edit System based on the Convergence Edit Controller. It is completely self-contained, can be rolled from room to room and shipped anywhere in the world.

Open the cases, plug in and you're ready to power up in a matter of minutes.

It has one BVU-800 and one BVU-820 as source machines feeding one BVU-800. Other configurations are available employing combinations from half-inch through one-inch.

The Editor is supported by two TBC's, time code, dual floppy disk drives, high-speed printer, switcher, and audio mixer. Monitoring includes dual 8-inch color monitors, one 12-inch color monitor, wave-form monitor/vectorscope, data display monitor, and 2-channel audio system. All permanently mounted and pre-wired.

"Super System" was built for Camera Mart rentals by the Systems Division of Camera Mart. You can rent it from us or have one built to your specifications.

It's new, and, as you'd expect, it's available right now from Camera Mart.

The more you know about video, the more you can rely on Camera Mart.

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McKinney Theorizes Major AM Changes

The FCC has started work on a full report on the engineering, legal, and economic options for potentially dramatic changes in the AM industry.

Speaking at a recent IEEE broadcast symposium in Washington, DC, FCC Mass Media Bureau chief James McKinney prefaced his remarks by saying that they were "more philosophical" than a statement of new policy, but in his conclusion he revealed that he has already asked the Commission's Policy and Rules Division "to turn their attention to the present state of the AM band," and that a forthcoming report will "include options for future rulemaking."

The FCC bureau chief detailed the following changes he said the Commission would make if "we had the ability to start fresh with AM":

- Get co-owned AM/FM stations to duplicate programming (though McKinney believes not all would do so).
- Strike the duopoly rule for AM. "Why would we prohibit the overlap of groundwave signals by the same owner if we wanted to fully utilize the primary advantage of AM—extended range of signal coverage?"
- Permit the use of synchronous transmitters or satellite AM stations on different frequencies covering a whole region. "It is entirely feasible today to build multiple AM transmitters along a narrow corridor (say, I-95 from Washington to the North Carolina border)."
- Concerning clear channels, create a limited number of "super-power" AMers covering large sections of the country day and night; limit or abolish clears for more regional service; allow clears to operate during the day in more areas.

McKinney also discussed AM's current difficulties, noting that AM stations have slipped in the ratings competition with FM stations in almost all markets and suggesting that, due to spectrum limitations, AM will never be able to win in the head-to-head combat for music listeners "broadcasters seem to want."

Another growing threat—one to the AM bandwidth itself—is noise from computers, telephones, and light bulbs, said McKinney. The Commission has already proposed revisions to rules covering many of those devices, but the NAB's Science and Technology Department has recently reported that RF light bulbs have no radiated emission limit of any kind for frequencies below 30 MHz. An NAB survey on that subject was due out shortly after press time.

The Mass Media Bureau chief issued a warning on another technical problem he suggested may be contributing to AM's loss of audience. "Many of the directional antennas arrays installed in the 1950s and many of the ground systems buried in the 1940s are so severely deteriorated . . . that complete rebuilds are probably required."

New Automated Audio For Video Studio

National Video Center/Recording Studios in New York City has built its second audio for video sweetening room, fully automated with 24-track capability. The room is equipped with Crown-driven, track-mounted Urei 813 B Time Aligned speakers and provides natural stereo acoustics so no monitor equalization is needed. The video monitor is also moveable. Audio Kinetics' Q. Lock is usually used for overall control; other features are ¼-inch center track time code, Sony Pro Audio's automated 500 console, and Ampex ATR-100 recorders.

RCA Broadcast Div. Closes its Doors

Bowing to stiff foreign competition and continuing losses, RCA Corporation has announced that it will phase out its Broadcast Systems Division, a major supplier of television cameras, transmitters, and other products. The division reportedly lost $74 million in 1983 and $15 million last year. Ironically, the announcement came less than a month after RCA garnered an Emmy Award for its CCD-1 solid-state ENG camera, a recent introduction, which it had promoted as a new era in video imaging.

According to Andrew M. Hilliard, manager, advertising and promotion for Broadcast Systems, the decision by the corporation's board of directors took employees by surprise when it was announced Thursday, October 3.

"Up until that point," he said, "we were optimistic that things were turning around." RCA recently had rehired a number of key sales and marketing employees and appeared poised to boost its flagging broadcast business until the sudden announcement.

RCA had supplied broadcasters since the industry's inception, although broadcast equipment was a small part of its overall business, which includes consumer products, satellite construction and communications, and the NBC broadcasting network. RCA products

Midwest and Ikegami give you super performance on the road

To cover those on-the-road events that mean big ratings, you need a mobile unit that delivers a top-quality performance everytime. So, at Midwest we equip our M-1, M-20 and M-24 Mobile Units with tough, dependable Ikegami ITC-730A and ITC-730AP Color Cameras.

Every feature of the ITC-730 Series meets Ikegami's high standards of quality and reliability. These professional 3-tube cameras have excellent ENG and EFP capability and the performance of these economical, easy to handle cameras surpasses that of many studio cameras that cost a lot more.

The ITC-730A and ITC-730AP Color Cameras use the same lens mount as the ITC-350, SC-500, HL-83, HL-95, and HL-79, making lens interchangability possible. Your choice of pickup tubes – Plumbicons® in the ITC-730AP or Saticon IIs® in the ITC-730A – make these rugged yet lightweight color cameras the perfect choice for the budget-minded professional.

And 1985 marks Midwest's 25th year in integrating superior equipment like Ikegami Cameras into comprehensive systems like the M-1, M-20, and M-24 Mobile Units. So, we have the expertise to custom design a unit that fits your needs perfectly. In addition, as one of the largest distributors in the nation, we can deliver a fully equipped mobile teleproduction unit on time and on budget.

If you want to improve your ratings by covering on location events, contact the company that specializes in giving super performances on the road. Call 800-543-1584 and order a Midwest Mobile Unit with Ikegami Cameras.

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are in use at hundreds of stations and broadcast-related facilities.

Hilliard said that RCA "will honor and fulfill all its contracts and will provide warranty service and technical support" for products already in the field. All Broadcast Systems manufacturing functions ceased immediately, but existing inventory will continue to be sold.

In addition, RCA will attempt to find a buyer for certain portions of the broadcast business, including the transmitter and antenna operations. About 500 employees of the Broadcast Systems Division, based in Gibbsboro, NJ, will be displaced by the division's closing. RCA plans to try to place "as many as possible" in other divisions, according to Hilliard.

60 Hz HDTV Clears Another Hurdle . . .

A worldwide HDTV standard is substantially closer since an International Radio Consultative Committee (CCIR) group adopted the 60 Hz NHK standard for recommendation to the crucial Plenary Assembly next year. The major obstacle remaining appears to be European concern over transmission.

An Interim Working Party of the CCIR was responsible for the advancement, which occurred despite the failure of a European Broadcasting Union meeting to reach a consensus on the standard. At the EBU meeting, British representatives insisted that not enough was known about transmission of the NHK standard. Fortunately, at a subsequent meeting the CCIR group was able to note this exception while still approving a "draft recommendation" for the next level of talks.

Those were scheduled, as of press time, for late October in Geneva between the U.S. State Department and other governments, who were supposed to directly address the political and economic issues of HDTV. Robert Hopkins, executive director of the Advanced Television Systems Committee, which represented the U.S. at the successful Working Party, said he had "very high hopes" for the NHK standard being approved at this last meeting and also for its going on to adoption at the CCIR Plenary meeting next spring.

Hopkins noted that the reservation about transmitting the 60 Hz standard is designed to buy time for brief studies, and that all parties involved have said they want a world standard. The CCIR recently released a message from a senior Soviet Union broadcasting official, stating that that country "strongly supports" a world HDTV standard and will be flexible about the standard it had already proposed.

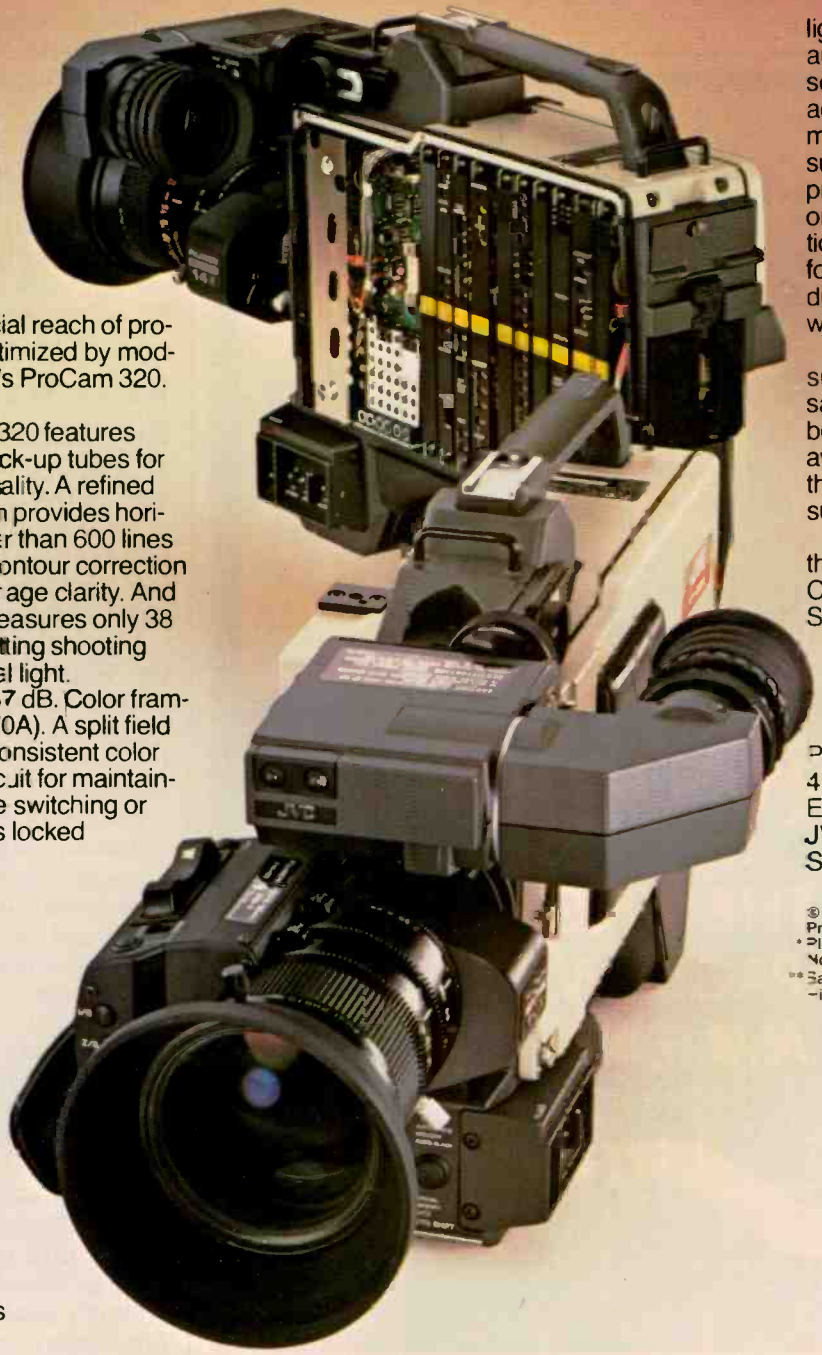
. . . And Motivates 30 FPS Film Study

With HDTV aimed at a 60 Hz standard and video becoming the fate or salvation of more and more movies, SMPTE has organized a study group to see whether changing film's 24 frame rate to 30 is possible.

The main factor tending to hinder such a decision is economics, according to Edmund DiGiulio, the study group chairman and president of Cinema Products Corp. "Nobody will be keen about spending 25 percent more for stock," he observes, and adds that someone would have to pay to convert film equipment. "The real question is,

320.

The ProCam™ Video Camera with Plumbicon* tubes at Saticon** price.



JVC's experience—and success—in designing the highest quality and reliability into compact video production cameras is unmatched. Now, continuing this tradition of high performance at an affordable price, JVC has brought a "high-end" teleproduction camera within the financial reach of production people often victimized by modest budgets. This time, it's ProCam 320.

What a package!

SENSITIVITY. ProCam 320 features three, 2/3" Plumbicon pick-up tubes for incomparable picture quality. A refined f/1.4 prism optics system provides horizontal resolution of better than 600 lines at center. A 2H vertical contour correction circuit further assures image clarity. And minimum illumination measures only 38 lux (3.6 fc) at f/1.7, permitting shooting even in limited or artificial light.

A video S/N ratio of 57 dB. Color framing output signal (RS-170A). A split field color bar generator for consistent color reference. A genlock circuit for maintaining a stable picture while switching or mixing with other signals locked on the same source.

EASY OPERATION. Several 8-bit data memory chips offer operator conveniences for quick set-up and consistent performance. These include: Auto centering, auto-black balance and auto-white balance, auto black level stabilization and auto beam control circuits. Matrix masking for true color reproduction and automatic protection for the pick-up tubes are a few of the many features standard on this new camera.

VERSATILITY. Easy portability. Outstanding performance in low-level lighting. High degree of automation. An extensive selection of options and accessories combine to make the ProCam 320 suitable for both studio production, EFP or ENG; or, indeed, to any application, anywhere, that calls for top quality video production while staying within a tight budget.

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Circle 111 on Reader Service Card

do the economics of the situation make it viable?"

Although "nothing is technically unfeasible" about the increased rate, DiGiulio stresses that any thinking at this point is tentative and merely based on several suggestions which have been made at the "knock-down, drag-out" discussions over HDTV standards.

Chief among incentives for adopting a 30 frame rate, DiGiulio feels, is HDTV, with its 60 Hz rate and aspect ratio matching film's. The film industry is increasingly reliant on video distribution markets, and a widespread HDTV system would make flicker and picture quality problems more obvious. A 30 frame rate, DiGiulio notes, offers the "enhanced use of film for HDTV."

Film is already shot at 30 fps for a lot of material intended for television, especially commercials.

The study group is expected to hold its first meeting some time before or during this month's SMPTE convention in Los Angeles.

Engineering License Deadlines Approach

Engineers who have not yet acted to preserve their FCC licenses might want to note two upcoming deadlines. First Class or General Class Radiotelephone Operators license holders have until December 31 of this year to trade their tickets in for a Lifetime General Class Certificate. Holders should contact the FCC field office that issued their last license.

The National Association of Radio and Telecommunication Engineers (NARTE) in Salem, OR, also has an end-of-year deadline on its grandfathering of FCC licenses (see *BM/E*, July 1985, News section.) People with certain kinds of work experience are also eligible. NARTE has a full licensing program covering first through fourth class licenses and most RF radiation categories.

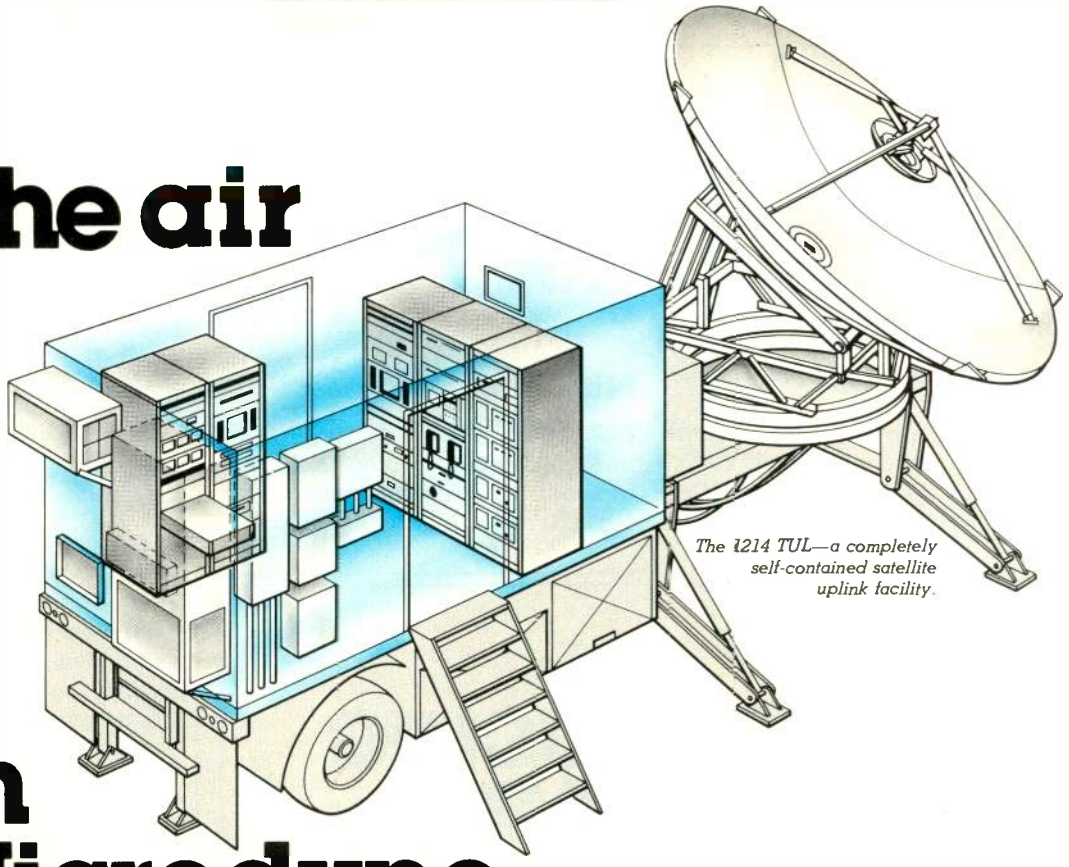
Radio Watson Used for Regional News

A self-employed radio newsman in Michigan has combined a new computer voice-mail technology with traditional radio newsgathering to provide broadcast news stories to subscriber stations 24 hours a day.

Known as Watson, the computer device is an IBM or compatible phone modem unveiled by Natural Microsystems last year. Watson was originally designed to act as a computerized phone manager, taking incoming calls and recording them in voice mailboxes, and allowing the user to leave messages for incoming callers. Callers can access various messages by dialing the correct codes, and the messages can be edited or changed remotely, making it ideal for adding news stories as they develop.

The newsman, James Doherty, decided to set the system up for news feeds, and now has six member stations that would find it difficult to cover individually the community stories Doherty provides. When he's ready to record a story, Doherty calls into Watson from a phone booth, and the system records his voice. With Watson's features, Doherty can easily edit a story even after he has recorded it. He can also provide each station with custom opens and closes, which Watson automatically switches into the story.

Get on the air fast



The 1214 TUL—a completely self-contained satellite uplink facility.

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For teleconferencing, training seminars, special event broadcasting or electronic news gathering, there's nothing faster, more reliable or more flexible.

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Since you link directly to a C- or Ku-band satellite, you rely less on expensive, troublesome backhauls. You go from site, to satellite, to studio. With no interference. No loss of signal quality. No delays.

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Not just for ENG

Electronic news gathering is only one of the many uses of a Microdyne transportable uplink. As a completely self-contained uplink facility, it is ideal for covering a multitude of events.

Sports, Teleconferences, Training Seminars

You can, for example, follow the action on the NASCAR racing circuit, cover fights at the Las Vegas Sports Arena, broadcast the 1988 Winter Olympics, provide full coverage of national political conventions.

Or you could let the Chairman of the Board speak directly to every branch operation across the country, all at the same time, on the same day.

You can even televise a complicated operating room procedure at Boston General to other major hospitals across the country. For instruction, and for consultation.

Ku- or C-band, large system or small

We can provide you with a system to fit your needs and your budget. Our economical SCPC radio system has proven ideal for local sports and other audio-only broadcasts. And you have your choice of equipment for C-band or the newer Ku-band satellites such as Anik, GTE Spacenet or SBS. With either full or half transponder configurations.

Custom uplinks and downlinks

Our engineering staff is skilled at custom-tailoring our equipment to suit your needs. We offer a full range of components and services for both uplinks and downlinks, and all our products are backed by one of the most responsive service policies in the industry.

Our 12-foot audio uplink is ideal for sports, news and data transmission—and is surprisingly affordable.

Call us today

Call our Sales Department at (904) 687-4633, and tell us what you need. We'll show you just how simple it can be to get on the air, fast. And at a cost that's easy to take.

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When a station wants to access a story, it simply enters a code Doherty has provided by pushing numbers on a telephone. Watson reads off a list of available stories, each with a corresponding number, and the radio station chooses from them, again by punching the correct number on the phone keypad.

Watson is priced at $698 and Doherty runs it from his Tandy 1200. He can add actualities to his stories as well, and says the finished product is relatively high-quality audio at 4000 bps. A station could improve audio quality even further by installing a Watson modem at the receiving end as well, but so far, Doherty's Dial-It local news service hasn't gone that far.

NBC Wins Olympics for $300 Million

In second-round bidding, NBC has captured the television rights to the 1988 Summer Olympics in Seoul, Korea. NBC will pay a mere $300 million plus a share of ad revenues. The bargain price—advance predictions had been on the other side of half a billion dollars, and ABC paid $309 million for the Winter Olympics—was largely attributed to the 13-hour time difference, a damper on live prime-time broadcasts.

"Monday Night Football" has become the first sports series to be closed-captioned in real time. A three-person team from the National Captioning Institute, including a spotter to keep track of overall action, transcribes ABC's play-by-play commentary.

The International Olympic Committee and South Korea had rejected the three U.S. networks' original bids because all fell far short of the $500 million or more anticipated by Seoul and the committee. NBC then reportedly lowered its $320 million bid and won the second round, while CBS and ABC stood pat at $300 million and $225 million respectively. Sharing ad revenues is a new angle probably needed to placate the sponsors, but analysts expect that it will not add much to the amount NBC will pay.

The most important reason for the low price is the 13-hour time difference between Korea and the United States; but Seoul's lack of appeal to most of the U.S. audience is probably a factor also. The Los Angeles Olympics, for example, earned tremendous ratings despite the Eastern bloc boycott, and ABC obviously expects big audiences for the 1988 Winter Olympics in Calgary, Canada.

Tactics Vary Over Must-Carry Battle

Faced with being dropped from cable systems across the nation, broadcasters

Picture this for under $25,000!

An affordable hi-resolution color graphics system outperforming others costing 3 times as much!

The Whirlwind™ AT Graphics System

AVAILABLE WITH UE ANIMATION

Photographs taken are of actual monitor display.

***User friendly:** Icon-driven menu is designed for artists, not programmers. There is no easier-to-learn system available.*

Whether you select the IBM-PC add-on package, or the complete turn-key workstation, you'll have at your fingertips the graphics power & features of systems costing far more. Your production/broadcast image will never again be the same!

Compare the performance:

- Simple to install & service; IBM PC-based hardware ensures serviceability *anywhere*.
- Programmable, completely unattended weather data reception & image generation. At air time, the images are waiting and ready.
- Receives the major weather data bases (Accu-Weather, ESD, Weather Central, WSI, & Zephyr)
- Art-in-motion (AIM) 3-D animator automatically creates smooth motion from selected scene to selected scene.

Hand drawn graphics courtesy of Saul Bernstein.

- NTSC color frame grabber digitizes images from any video source, acts as a Still-Store for up to 500 frames.
- 512 simultaneously displayed on-screen colors from a palette of 16.8 million (the largest in the industry).
- Entire system fits on a desk-top. No bulky equipment racks needed; travels anywhere.
- Newest technology; IBM-PC/AT with LSI-based graphics cards and internal RS-170A encoder/gen-lock circuitry saves space & cost.

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are taking two approaches in dealing with an Appeals Court elimination of the FCC's cable must-carry rules. The NAB wants the FCC to rewrite the rules so that fewer stations would have to be carried, while the Association of Independent Television Stations (INTV) would like to revive mandatory carriage of all local stations in return for continuing the practice of not charging cable operators for broadcasters' programming.

NAB's strategy is based on the court's finding that the old rules unfairly required cable systems to clog up their channels with all possible local stations without regard for the systems' capacity, the quality of local coverage, and duplication of programming on network affiliates. NAB is said to be considering a plan in which operators with 12 or fewer channels would not be required to carry any stations, while others could limit local (within 50 miles) stations to one-third of their total channel capacity.

INTV, on the other hand, has recommended to the FCC that cable systems be required to carry all local stations as long as copyright licensing allows them to carry broadcast signals without paying copyright fees.

Both INTV and NAB have given the FCC a list of stations that have been dropped by cable systems, told they will be dropped, or told they will be charged for carriage, including some "staggering" fees.

The NAB is also pursuing a U.S. Supreme Court review of the Appeals Court decision. INTV has put out a series of 30-second spots urging viewers to, "Call your cable company now and tell them you want this station, and all other local stations, to stay on the cable."

First Solid-State 50 kW Unit on Air

This country's first totally solid-state 50 kW radio transmitter went on the air recently with the installation of a Nautel Amfet 50 at KBMR-AM in Bismarck, ND.

The new transmitter uses RR power MOSFET transistors, which were developed five or six years ago to handle power requirements bipolar transmitters could not. The new transistors eliminate secondary breakdown, the focusing effect of bipolar transistors which makes them impossible to use at higher wattages. The new transmitter gives AM 50 kW stations the option of replacing vacuum tube transmitters and eliminates worries about replacing tubes or tube decay.

Nautel believes it is the only company producing solid-state transmitters as high as 50 kW; other companies are making them in the 10 kW range. Several of the higher power transmitters were on the air in Canada, but KBMR is the first station to use a solid-state 50 kW in this country.

NAB and Exhibitors Grapple with Dallas

The 1986 Dallas NAB convention—and the question of where to hold future shows—has become a news event even before it happens.

The Dallas convention center has added room since the NAB met there in 1981, but the show had space trouble then and has grown enormously since. Ed Gayou, NAB's exhibit director, es-

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Promise Delivered

AGFA VIDEO

The New Breed

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AGFA-GEVAERT MAGNETIC TAPE DIVISION, 275 NORTH STREET, TETERBORO, NJ 07608 (201) 288-4100

timates that Dallas offers 300,000 square feet net, compared to Las Vegas' 315,000. The difference is "huge," he says. "There won't be as many aisles, they'll be narrower, there will be more back-to-back booths, and practically no island exhibits," Gayou claims, predicting a five to 10 percent cut in booth sizes.

Exhibitors' trucks, vans, helicopters, and satellite dishes will probably be limited to sheltered outside parking lots.

The closing of RCA Broadcast Systems (see story above), should also ease the space problem since it had reserved 11,000 square feet at Dallas. Americom and Solid State divisions, exhibiting on their own for the first time, plan to have substantial booths.

Gayou also expects a waiting list for booths. When *BM/E* spoke with him, 75 companies had already asked for first-time entry to the show, though many of those are expected to drop out when asked for a deposit.

Dallas presents other difficulties, too. The exhibit area is on two floors, and big exhibitors must use the upper floor since the lower has a ceiling height of only 12 feet. An extra exhibit day discussed last spring has been dropped to allow seven days for setup; larger exhibitors often need 10 days at Las Vegas. An NAB exhibitors' advisory committee, formed this year, has asked that the hall be kept open all day Wednesday instead.

A possibly permanent change is that over the next few shows, the radio/television exhibit division will be dropped in favor of separate areas for equipment categories such as transmission, radio, and lighting. Distributors might also be clumped separately, and possibly "nonessential" products.

Another issue this fall is where to take the NAB after Dallas in 1987. Las Vegas is generally viewed as ideal, but the NAB is worried about attendee "burnout," and the association wants different geographic regions to have the show nearby. Chicago's enormous McCormick Center is an obvious answer, but Al Fisher, the exhibitor committee's chairman and manager of marketing communications at Ampex Corp., says that many companies are "quite emotional" about not going to Chicago, where booths have been known to destroy themselves overnight if not wired by the right union personnel.

Plus, McCormick Center is booked through this decade, as are Houston and New York. Atlanta is about the only other contender for 1988 and 1989. For the immediate future, as Fisher says, "Dallas presents a lot of difficulties, but it's a fact of life."

Indies Keep Hold on Top Spot Dollars

Figures released by the Television Bureau of Advertising show that independent television stations have maintained their share of ad dollars spent by the top 25 national spot television advertisers in the first half of 1985, compared to 1984, at the same time as spending increased 22 percent.

Broken out by product category, indies gained two points over the same period, receiving 44 percent of spot dollars of the top 20 classifications. The leading category was sporting goods and toys at 91 percent of spot dollars.

Go For The Gold!

4-position stereo preselector

PGM-AUD routing switches

Input punch block

the MEDALIST *Au*

The competition is tough, but you'll be tougher with the all new Harris GOLD (Au) MEDALIST Audio Console. With an excellent track record of more than 300 units in operation in less than two years, the MEDALIST family has achieved a leadership position in the stock on-air console market. The new GOLD MEDALIST is the premier member of this family.

Everything about this board is competitive. Take for instance its 24-carat program performance with superb quality sound that will set you well above the rest in your marketplace, regardless of price. The GOLD MEDALIST provides features previously found only in much higher priced modular boards. Features like:

- **Start/Stop of up to 36 sources**
- **Remote control of all 12 input channels**
- **Illuminated input channel On/Off switches**
- **Expandability to 72 sources with preselector switch**
- **Comfortable padded arm rest—and more . . .**

More features, better sound, exceptional price... from start to finish, you'll be more competitive with the GOLD MEDALIST on your team! For more information, contact Harris Corporation, Studio Division, P.O. Box 4290, Quincy, Illinois 62305. 217/222-8200.

HARRIS

For your information, our name is Harris.

Circle 120 on Reader Service Card

NEWS BRIEFS

FCC chairman Mark Fowler has begun talking about **deregulating cross-ownerships.** He suggested that certain newspapers that have folded would have been kept going if the owners could also have owned broadcast stations.

Several people are reportedly in the running to fill ex-commissioner Henry **Rivera's seat.** Most are minority members, as is traditional since the early 1970s, and Democratic. In other FCC politics, commissioners Mimi Dawson and Dennis Patrick are said to be contenders for the agency's chair if Fowler retires; he may, however, be considering another term . . . . The possibility for **television coverage of the U.S. Senate** is said to be gaining ground after hearings on that issue. Main opponent, however, is said to be Senate majority leader Robert Dole (R-KS).

It's Worth Your While Department: The FCC's Mass Media Bureau has authorized the **Field Operations Bureau** to issue "monetary forfeitures" of up to $10,000, up from the $2000 limit, for multiple technical rule violations.

The NAB and Electronic Industries Association's National Radio Systems Committee plans to study **AM preemphasis and deemphasis** standardization proposals and hopes to set up a voluntary industry standard. The thinking is that if receiver manufacturers adopt uniform deemphasis characteristics, broadcasters will be encouraged to follow suit.

The **Mexican/U.S. AM allocation agreement** may be delayed due to Mexico's earthquake. The Mexican computer database used for determining the allocations may have been destroyed.

Satellite radio broadcasting got a small boost at this fall's Space WARC, where delegates agreed to look for spectrum outside the 0.5 to 2 GHz band, which was originally set aside for satellite sound but proved unsuitable.

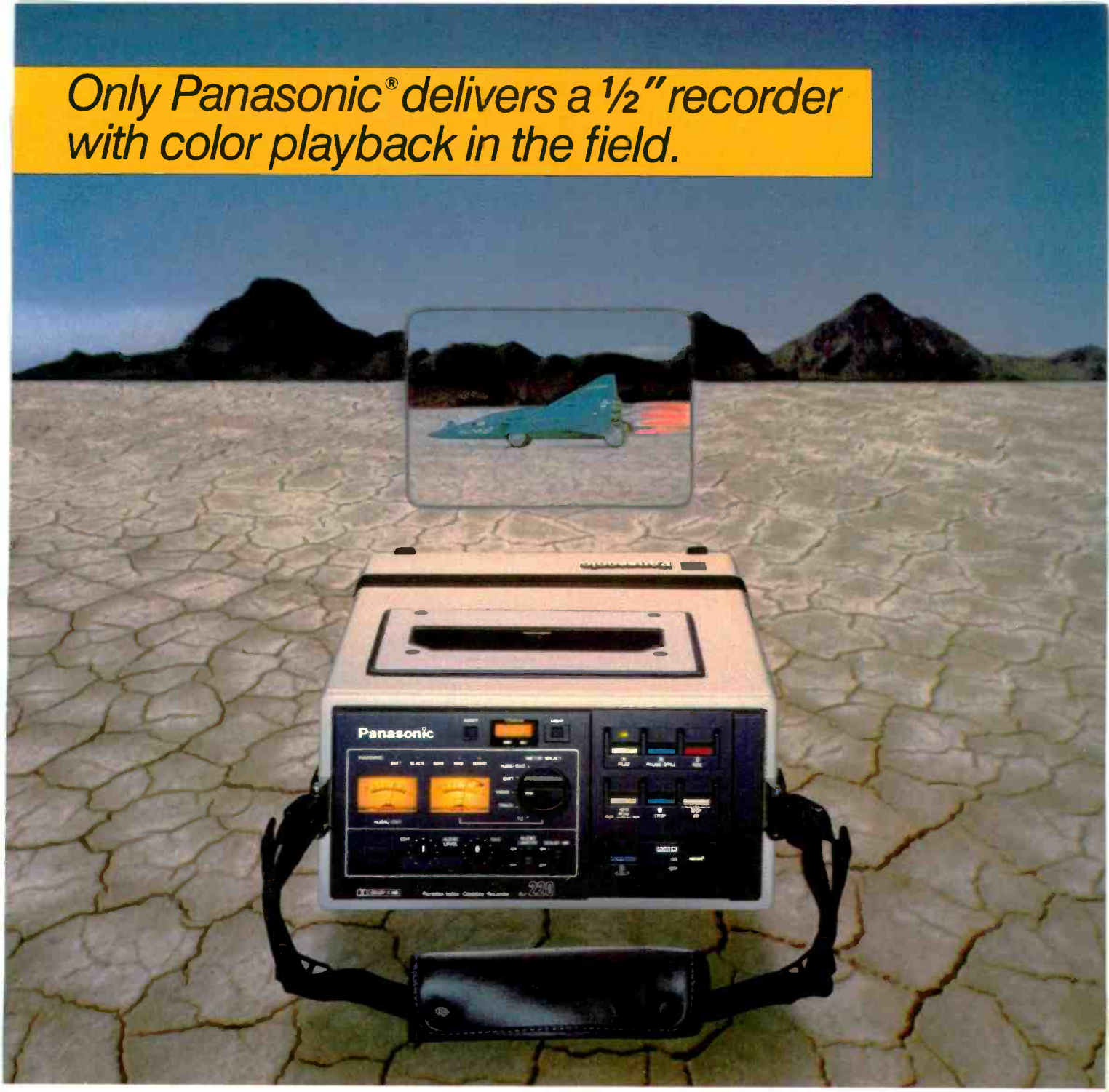
A study by Telepicture's N.I.W.S. news service of **satellite facilities at television stations** finds that 98 percent of television stations have downlink capacity, 74 percent have more than one satellite dish, and 17 percent can uplink. Among those with more than one downlink, 51 percent have C-band only, and 45 percent have C and Ku bands; 48 percent of uplinks use C-band only, 30 percent have just Ku, and 22 percent employ both.

WTIC-TV of Hartford, CT says it is the first east coast station to add **Spanish separate audio program** (SAP) capability. A local retailer reportedly sold 500 SAP sets at $270 each, while area Radio Shacks ran out of decoders.

Arbitron has added four **new ADIs** going into the 1985-1986 broadcast year. Three are in Montana: Missoula, ranked 176, Butte, 189, and Helena, 210. Charlottesville, VA is the one hundred and ninety seventh market. The top 10 markets haven't changed . . . . The Television Bureau of Advertising and the National Auto Dealers Association are taking entries through November 29 for "original" **auto ads** in smaller markets. Call (212) 486-1111 for entry blanks . . . . Forty weeks into 1985, **VCR sales** topped the total 1984 record of 7.5 million.

The **L.A. Pro Videoshow and Video Production Conference** will be held in Long Beach on May 13 to 16 next year.

Only Panasonic® delivers a ½" recorder with color playback in the field.



Is it a "wrap" or isn't it? Now you can tell right on the spot. Because the Panasonic Recam™ AU-220 is the only ½" VCR that gives you the quality of 1" color playback in the field. So you can instantly see what you've shot. Either through the viewfinder or a monitor.

Consider the facts: The Panasonic AU-220 records, utilizing the M-Format, on standard ½" VHS cassettes. Yet it delivers the kind of picture quality that's long been the broadcast standard. Luminance is 4.0mHz (typical). Chrominance is 1.0mHz. While the video S/N is every bit as good as 1" with chrominance better than 50dB.

For total flexibility, the AU-220 includes a built-in switchable SMPTE time code generator. And it's compatible, not only with component analog video equipment, but also with YC and NTSC.

The Panasonic AU-220. 1" color quality from ½" tape makes it one of a kind.

For more information, call your nearest Panasonic regional office. Northeast: (201) 348-7336. Southeast: (404) 925-6772. Central: (317) 852-5973. West: (619) 941-3387. Canada: (416) 624-5010.

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"We're putting out 50 kw of AM Stereo and we've never sounded better."

Morris Blum
President and General Manager,
WANN Radio, Annapolis, Maryland

"As anyone who's been in this business a long time knows—if you don't move ahead, you're left behind.

"We've just upgraded WANN to a 50,000 watt, four-tower directional array. We now reach a potential market of six million people.

"That—along with a new urban contemporary sound—means that WANN is moving ahead, planning for the future . . . and sounding better than ever.

"And Of Course, We're In Stereo"

"AM Stereo is the most phenomenal sound I've heard in 40 years of owning this station.

"We sound absolutely great in stereo—a purer, cleaner high-quality signal. We even sound better in Mono.

"And you can be sure AM stereo receivers are coming. By next year, over 30% of all new cars will have AM Stereo. And we're ready to capture those listeners *right now.*

"Naturally, I Chose Delta Electronics"

"When I decided to upgrade to AM Stereo, I chose Delta Electronics. Why? Because Delta's been around a long time, providing precision equipment to the broadcast industry long before they came into AM Stereo. They know my business and they know what they're doing. They installed my C-QUAM® stereo system without a hitch.

"And Delta's C-QUAM system is rugged and reliable, built to work the way it should. Literally trouble-free. Plus, it's got the numbers to back it up: over 65 systems operating in the U.S. and worldwide.

"Even better, Delta stands behind it with full technical and service support. Any problems or questions—I just pick up the phone. They're always ready to help.

Delta's C-QUAM Stereo System: ASE-1 Exciter (top) and ASM-1 Modulation Monitor. FCC laboratory tested and type-accepted.

"Next Time You're In Annapolis . . ."

"Stop by and I'll personally give you the deluxe station tour.

"Better yet, turn your dial to 1190 and hear for yourself the new sound of AM Stereo—and hear where your listeners are going to be."

Delta Electronics, Inc.
5730 General Washington Drive
P.O. Box 11268
Alexandria, Virginia 22312
(703) 354-3350
Telex: 90-1963

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DELTA ELECTRONICS

Circle 123 on Reader Service Card

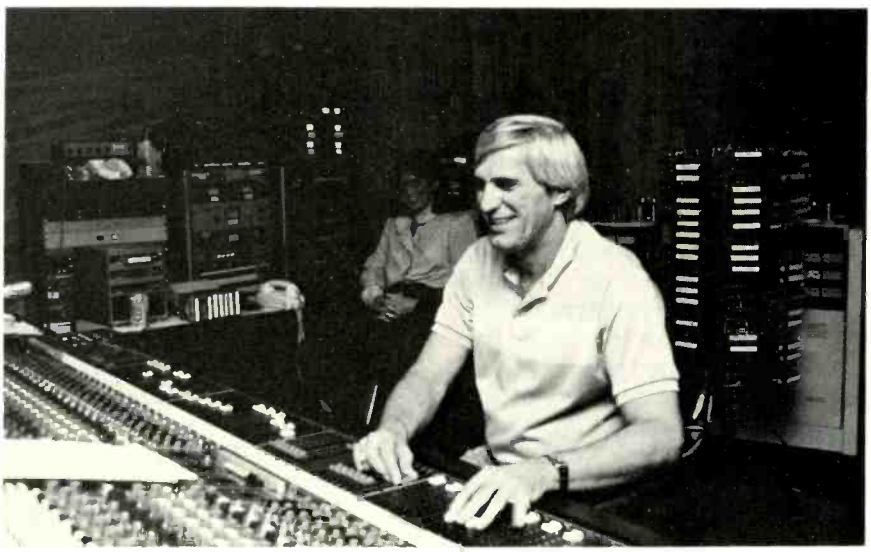
WSM Presents a Night at the Opry

By Eva J. Blinder
Senior Editor

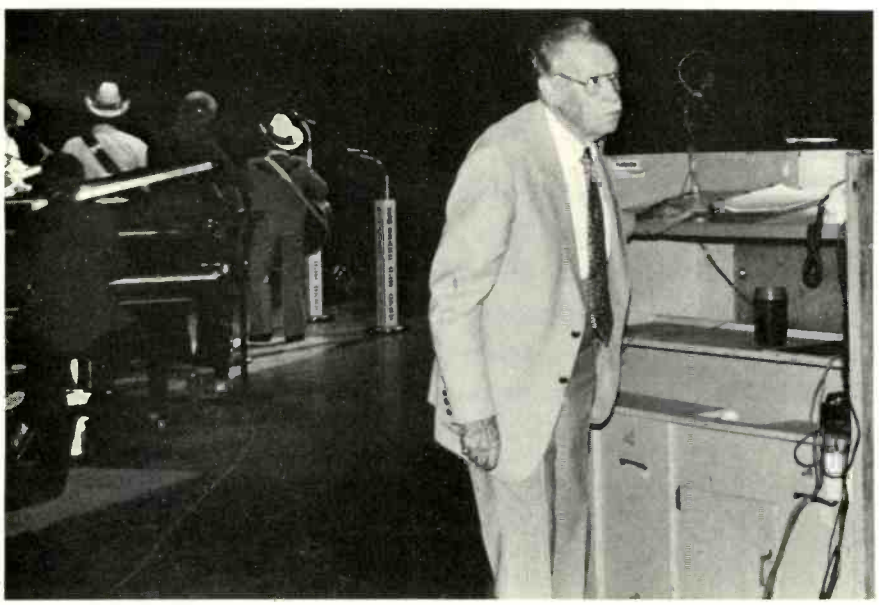
This month, the folks down at WSM, Nashville, will celebrate the sixtieth birthday of their most acclaimed show, the nationally famous Grand Ole Opry. The country music extravaganza started life in 1925 as the WSM Barn Dance and is broadcast live every Friday and Saturday night. Just one month older than the station itself, the Opry is as colorful as the Nashville music scene it represents.

The Opry's unique flavor is due to its commitment to country music as well as its freewheeling format. An average of 30 acts are presented each night in a show that is entirely unrehearsed. In fact, the lineup of performers isn't even determined until two or three days before the show. Nevertheless, the shows stay on schedule and move quickly, rarely missing a beat. A host of musicians, some known nationally, others only to diehard country fans, make up the Opry roster.

Originally held in the WSM studios, the Opry soon attracted an enthusiastic live audience that quickly outgrew the station's facilities—including the 500-seat Studio C built expressly for Opry broadcasts. The show was moved to a former movie theater, then to a tabernacle, and in 1939 to the newly constructed War Memorial Auditorium. Even an entrance fee of 25 cents failed to slow audience growth, however, and in 1943 the show moved again, this time to the Ryman Auditorium, an 1891 structure with a capacity of 3000. It remained there almost 30 years.



Sound mixer Conrad Jones at work on the Neve console during a Friday night performance of the Grand Ole Opry.



Announcer Grant Turner prepares a commercial message during set by Little Jimmy Dickens.

Down-home, updated

While the Opry's roots are pure down-home country, it is broadcast out of the up-to-date Opry House, centerpiece of Opryland USA, a 400-acre complex that also houses the Opryland Hotel, an amusement park, and a broadcasting and cable television complex including the radio station, the Music Country Radio Network, and the Nashville Network. The entire complex is owned by Gaylord Broadcasting, which purchased it in 1983.

The modern, 4400-seat Opry House opened in 1974, replacing the old Ryman Auditorium, built in 1891. It is an ideal setting for the Grand Ole Opry—even if radio listeners can't see the bright red "barn door" backdrop (occasionally replaced with curtain-sized ads for sponsors). Spacious backstage areas simplify lining up the 30 or so acts that appear each night, and the house itself is designed to allow a complete change of audience in the half-hour between shows.

The business of broadcasting the concerts, however, takes place in a sound booth at the rear of the Opry House orchestra section. Sound mixer Conrad Jones, a 10-year Opry veteran, took time out during a recent perform-

ance to describe the setup during the live shows.

Live mixing

The centerpiece of the booth is a 40-input, 16-output Neve console that Jones believes "was the largest in the country for a while" after its installation. The board sits in front of a large glass window that offers a panoramic view of the stage and is flanked by large UREI Time Align monitors. A pair of Electro-Voice Sentry 100A speakers sit on the console itself.

Two multitrack recorders—a 24-track Otari MTR-90 and a 16-track Ampex—accommodate the occasional recording work done in the booth. They are supplemented by an array of processing gear, also used primarily for recording, including an Eventide 910 Harmonizer, Lexicon Model 200 digital reverb, Valley People Kepex II, and several dbx compressor/limiters. According to Jones, the broadcasts themselves use "some limiting, maybe an echo, occasionally a little Harmonizer," but otherwise little processing. "We try to keep it as clean and pure as the music will let us, due to the tradition of where we work," he explains.

Jones estimates that about half of the Opry's commercials are aired from cart via the booth's ITC three-deck cart machine. The other half are broadcast the old-fashioned way—read live by the announcer who introduces the acts, so they entertain the Opry audience as well as WSM's listeners. Opry veteran Grant Turner shares the announcer's job with Charlie Douglas and Hairl Hensley.

Taping the breaks

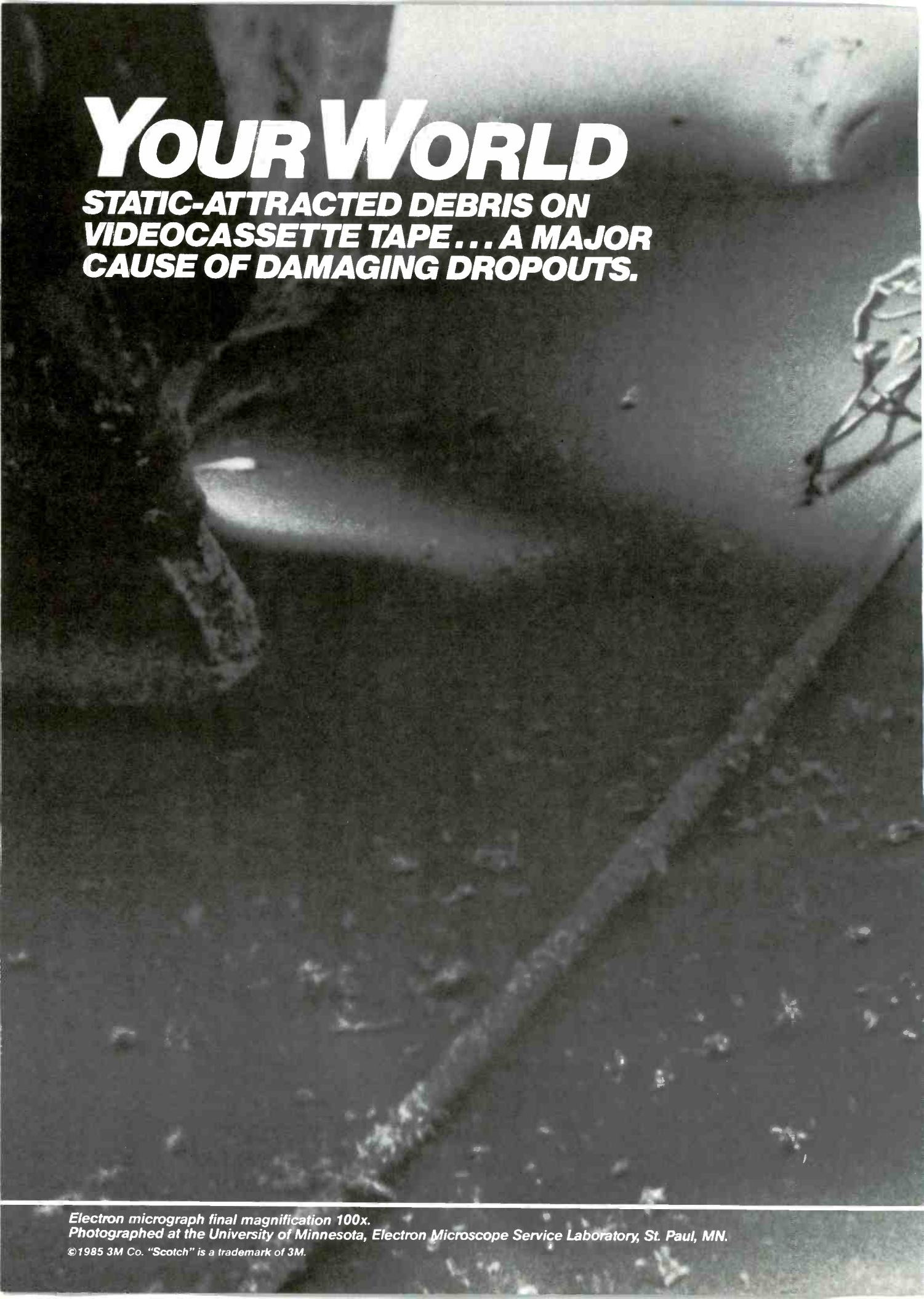
The Friday and Saturday night performances are aired live except for brief recorded portions that fill in the half-hour between shows, during which the house is emptied and reseated. Chief engineer Hugh Hickerson, whose responsibilities include the Nashville Network as well as the Opry and WSM, explains that the first half-hour of Friday's show, from 6:30 to 7:00 p.m., is taped on an Ampex 440 two-track ATR. The live broadcast begins at 7:00, and the taped segment is aired between shows. Later in the evening, the final half-hour is taped and saved to be played back between shows on Saturday. Leading into Saturday's Opry broadcast is a 25-minute program of recorded music (it starts at 6:05, right after the news).

From the Opry house, the audio heads back to the station over dedicated underground lines, then to the transmitter in Brentwood, south of Nashville, via STL. In addition, the Saturday night broadcast is picked up live by WKY, Oklahoma City via satellite. WSM has its own uplinking facilities, with equipment from Scientific-Atlanta, Modulation Associates, CoastCom, and Andrew.

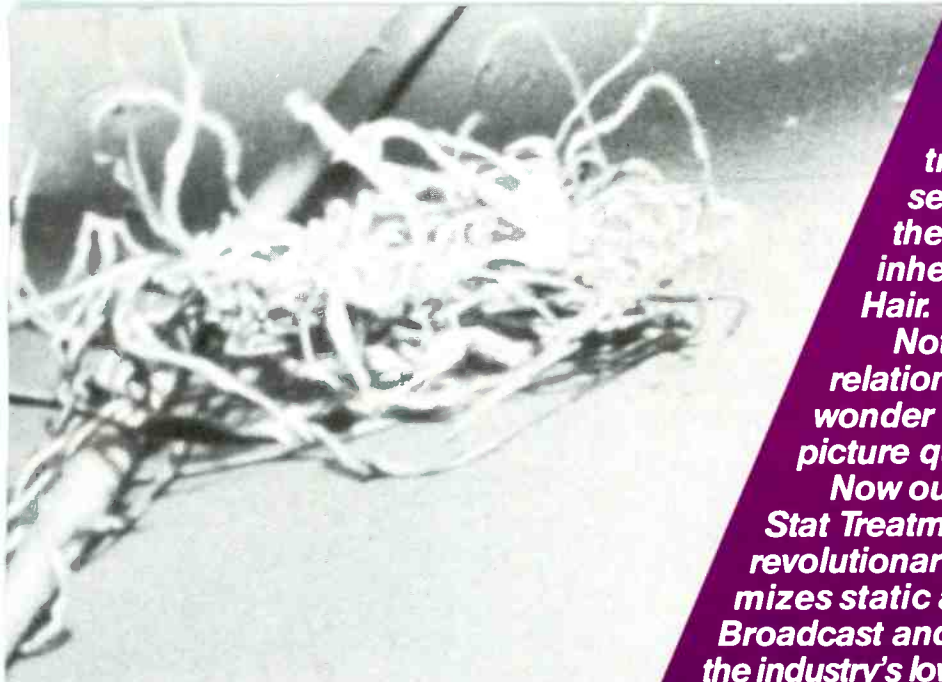
It's this combination of old and new that gives the Grand Ole Opry its flavor—just as country music itself is a blend of old traditions and new innovations. It's a formula for success that cherishes the past while embracing the future. **BM/E**

YOUR WORLD IS CHARGED ENOUGH.

YOU DON'T NEED STATIC FROM YOUR VIDEOCASSETTES.



Electron micrograph final magnification 100x.
Photographed at the University of Minnesota, Electron Microscope Service Laboratory, St. Paul, MN.



You're looking at an electron micrograph of videocassette tape. It dramatically shows the debris that a videocassette's inherent static charge can attract. Hair. Dust. Fibers. Cigarette ashes. Note the size of these particles in relationship to the read head. Is it any wonder they can cause dropouts and picture quality problems?

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These new Anti-Stat Videocassettes, recognizable by their distinctive red doors and hubs, are what you've come to expect from 3M. Still another example that no one in the industry is as consistently innovative. Still another demonstration of 3M's commitment to quality. Still another reason we're number one in the world of the pro.

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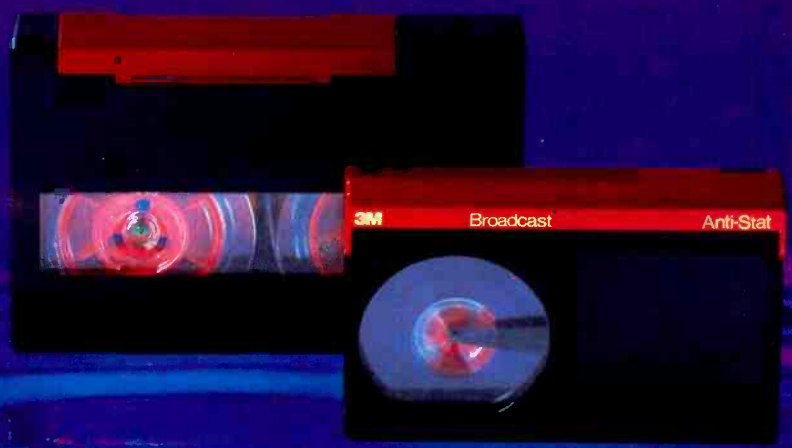

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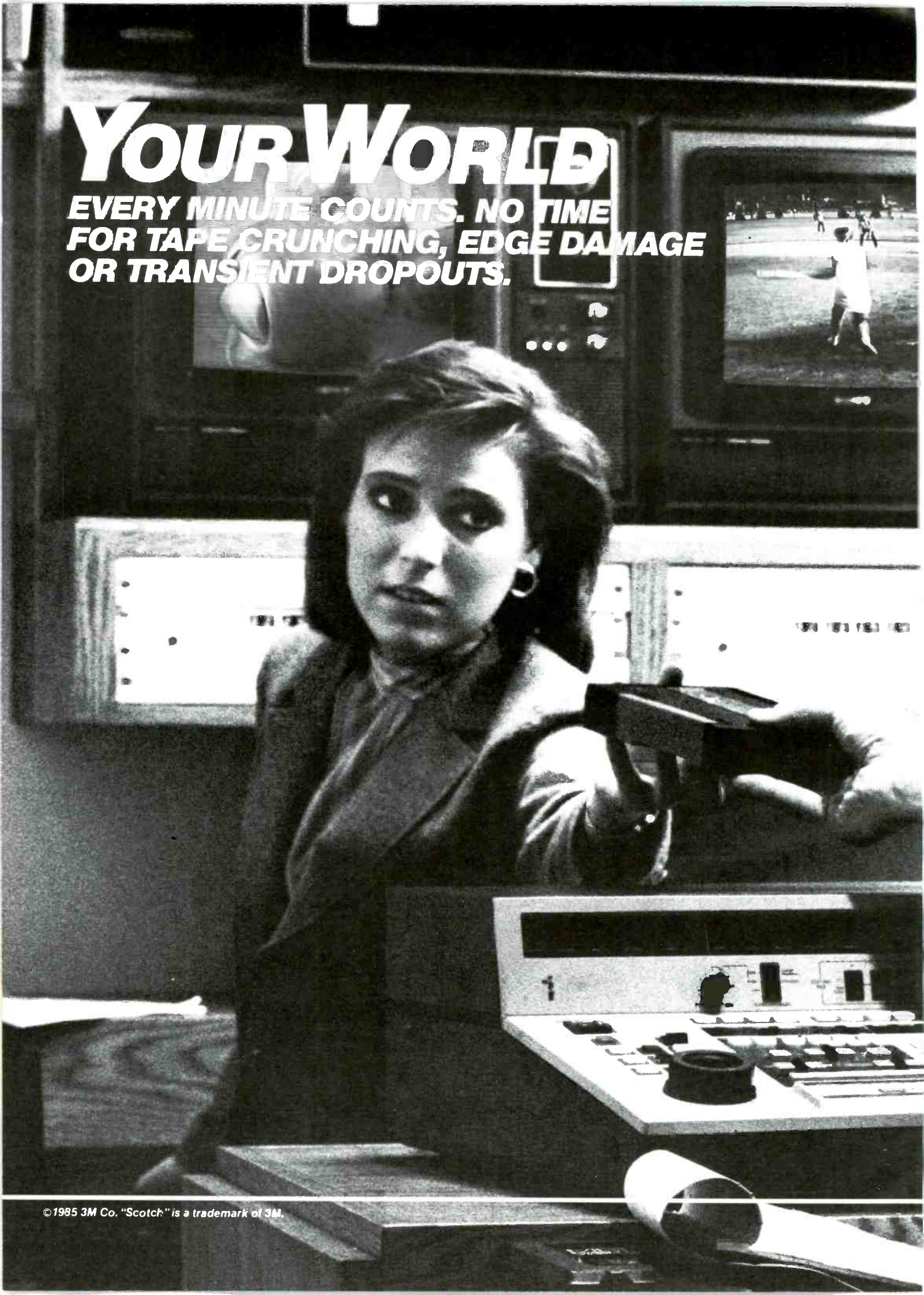
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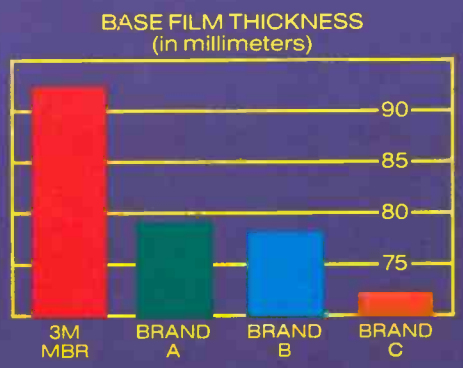

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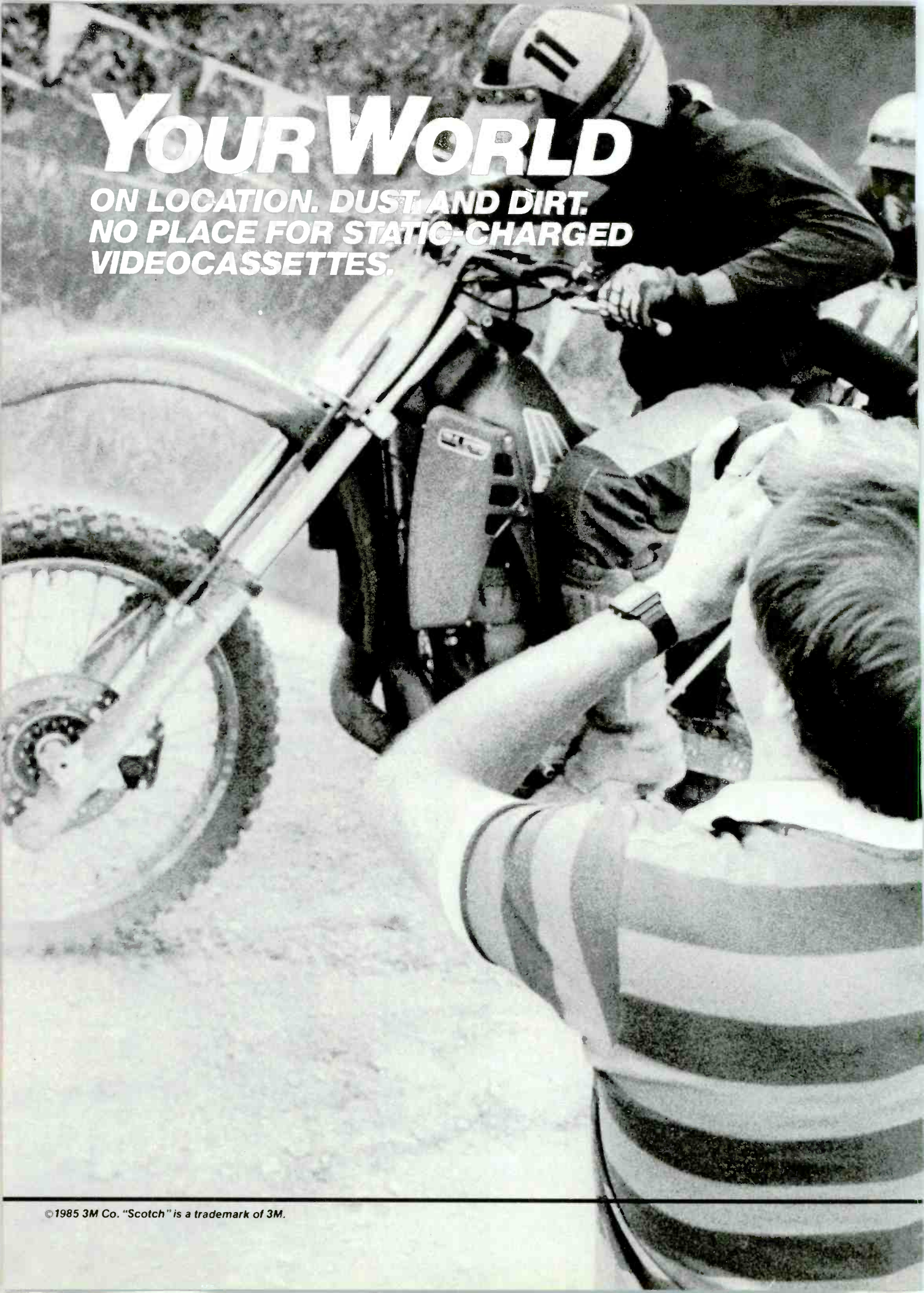

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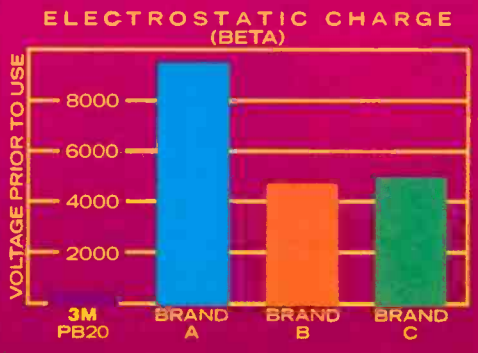

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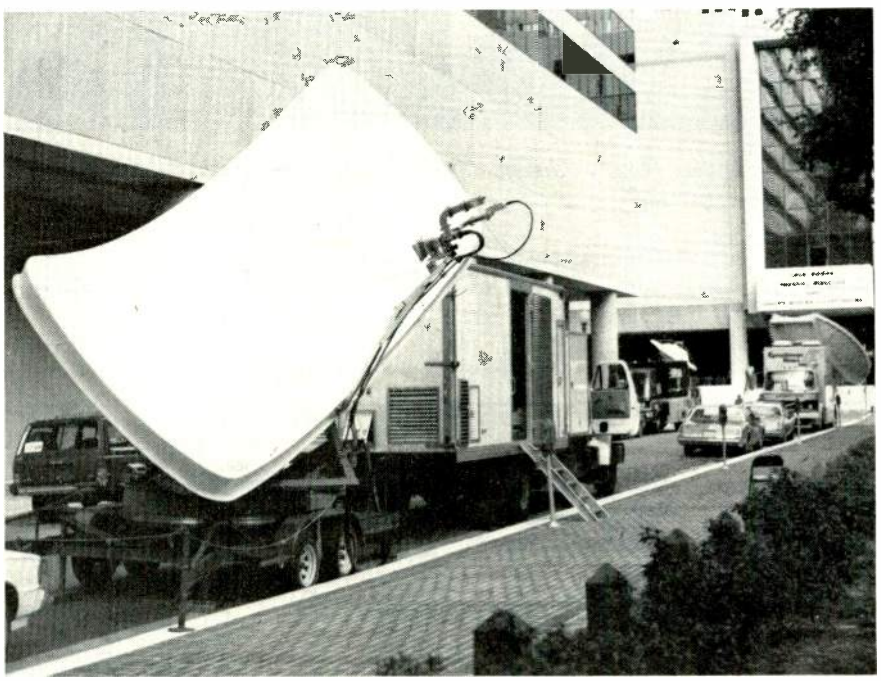
Louisiana Stations "C-Band" Together

By Judith Gross
Associate Editor

When Lousiana governor Edwin Edwards went on trial in New Orleans in September, stations throughout the state were faced with the task of bringing up-to-the-minute news coverage back home, which in some cases was as far away as 300 miles.

The stations were used to covering stories in the nation's capital, Baton Rouge, and had the usual option of renting portable satellite uplinks or microwave links, as they would for major election coverage. But physically, the task of getting reports back to the station each day seemed a difficult challenge, and financially, the costs of SNG rental seemed prohibitive to many news departments, especially for a trial that was expected to drag on, perhaps for months. Enter the idea of cooperative coverage.

Six Louisiana stations, five of them NBC affiliates, and one CBS affiliate in a market where there is no NBC affiliate, decided to split the cost of SNG rental, and since NBC's Ku-band satellite system is fully operational, the logical place to go first was the network.



Six Louisiana stations shared the rental of this portable C-band uplink, set up outside the trial of governor Edwin Edwards in New Orleans.

Ku problems

NBC was happy to cooperate, but the idea to uplink on Ku-band was frought with problems. For one thing, there is no Ku-band uplink in New Orleans, and the stations would have needed to use an AT&T line to Houston, uplink the transmission from Houston to New York, and uplink it a second time to the affiliates. Another problem, according to news director Phil Oakley of WRBT, the affiliate in Baton Rouge, is that the NBC system is not compatible with all portable Ku-band trucks, although the network is working on converters to solve that problem for the future. The Ku-band would also have meant less flexibility in the coverage, since it would have meant less available transponder time and only one package or report per day. In light of the problems, Oakley says, WRBT president Cyril Vetter suggested the stations rent a portable C-band truck, which they did, from AGC Corp. in Lafayette. They rented a 34-foot vehicle with a 12-foot dish. The dish is manual and requires hand feeding of tape into a tape machine set up on the truck, so setup time is a bit longer, Oakley says.

"But the dollar amount is about the same, and the C-band uplink is only about 10 percent less portable than the Ku-band," Oakley explains. "Plus, we have more transponder time." The staions uplink to Westar V and can send two reports per day.

There are six stations participating in the cooperative effort. In addition to WRBT, KPLC, the NBC station in Lake Charles, and KLFY, the CBS station in Lafayette, have crews at the trial every day. KTAL in Shreveport, KALB in Alexandria, and KTVE in Monroe, all NBC stations, send crews only part of the time; the rest of the time "pool" coverage is provided to them by WRBT.

KPLC and KLFY have mobile news trucks at the courthouse where the trial is taking place; WRBT has a standard news car and has set up an edit/production room in a rented office across the street from the courthouse.

In the temporary edit facility are two

WRBT-TV engineer Mike McNamee monitors a news report from the trial from inside the "Skycom" unit.

Sony 5658 edit stations, a makeshift audio room where voiceovers are recorded on BVU 50s, and a Sony 800 monitor. All Chyron supers and graphics are inserted back at station headquarters during the live reports.

Cooperative effort

There are regular telephone communications back to studios and for IFB. Each station has one ENG camera at the scene: WRBT uses a Sharp, one station has a Sony and one a JVC. Interestingly enough, even for a story as important as this one, there are no backup cameras. Instead, Oakley says, the stations will share cameras if something goes wrong with the one they normally use. In this way, it's more than just the satellite uplink that is a cooperative effort. If one station is editing and an important event requiring taping occurs at the same time, another crew will get the footage and both stations will use it.

"We trade video back and forth quite a bit," says Oakley, "it's really a cooperative effort of NBC stations in Louisiana." The stations also share artwork of the trail proceedings.

KPLC and KLFY go live with reports from the trial each day at 5 p.m. and 6 p.m. Since each station schedules

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its reports around the same time, there was an initial conflict as to which station would get to use the uplink first.

"We flipped a coin the first time, and then just rotated the order," Oakley explains. His station, WRBT, only does one live report, at 5:30, so there is no conflict.

To intro the live reports, the anchors back at the studios call attention to "Channel 33's live Skycom in New Orleans" reinforced with a Chyron super saying the same thing. For graphics, WRBT will usually freeze some trial video on its DVE then label it with Chyron.

For KTAL, KTVE and KALB, who are not at the trial continuously, WRBT will produce a "doughnut" for the live shot, then WRBT reporter Robyn Ekings produces a custom open and close for each station.

Oakley says the trial is usually the top story for each station each night. He also says the magnitude of the trial, a governor accused of financial misdeeds, was enough to insure management support for the cost of the coverage. All six stations are assuming the cost, which Oakley declined to specify.

Oakley says the formation of the ad hoc network is a first in news coverage for the region.

News sharing

"It represents a breakthrough in the way local television stations organize to cover major events of statewide or regional importance." Oakley adds that they hope to put the network together whenever a major event calls for such coverage. The only other time such news sharing has been done in previous stories, according to Oakley, was in use of a Conus truck, which is also at the trial for some of its stations. The six stations involved in the Skycom effort have pooled election coverage, but usually not with portable SNG uplinks.

Banding together might have actually been more of a necessity than just a nice idea, however. Microwave links are not as numerous in Louisiana as in some states, and the cost of portable satellite uplinks would have made it impossible for each of the six stations to rent one separately. Their only other alternative would have been to physically transport tape back and forth from New Orleans to the station, which would have meant no live coverage for most of the six, and no coverage at all, perhaps, for the stations situated the farthest from the trial site.

The cooperative effort has been a learning experience for the Louisiana NBC stations, and as much as the criminal trial of the top state official will change political matters in the state for some time to come, the formation of the Louisiana Skycom should change TV news coverage in the region, probably for good. **BM/E**

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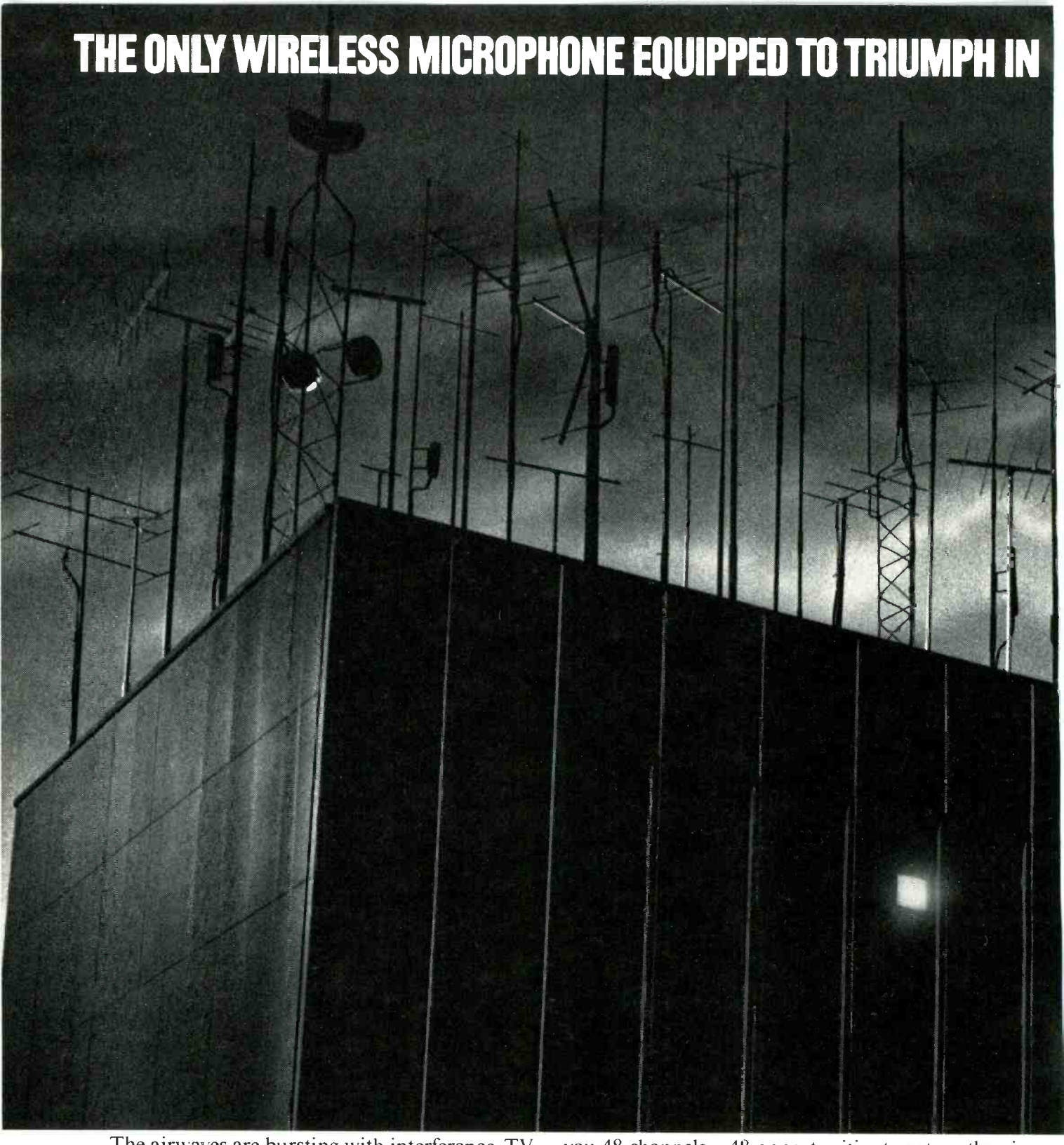

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PRODUCING STEREO

MTS' SECOND STAGE

By Robin Lanier

The first network show to go stereo.

Now that many stations have been equipped for MTS, the next step is producing programming with high fidelity stereo audio, which carries a new set of engineering challenges.

At WCAU-TV in Philadelphia, when the stereo generator was taken out for testing and the sound returned to mono for about four hours, 400 listeners called to complain that stereo was missing.

At WPRI-TV in Providence, RI when a stereo program went out with channels reversed, about a dozen listeners called to complain specifically of that fault in the short time it took the staff to correct matters.

More than 100 television stations are currently putting out stereo sound, and the cases cited show that stereo audio is gaining a foothold among TV viewers. We may be getting near the critical mass for a fast spread of stereo through the industry as MTS becomes an essential competitive tool in market after market.

As that rapid spread approaches, there are likely to be a number of broadcasters who must get into stereo sooner and faster than they had expected. They will encounter three initial problems: equipping the studio for stereo; equipping the transmitter and adjusting it; and instituting the studio practices for putting a stereo program properly on the air. Much has been discussed of the first two challenges, but when it comes to setting up stereo programming, other than that provided by the networks, many stations have had to take on the role of pioneers.

Top quality mono

Assuming the studio has been properly reequipped regarding such necessities as reducing noise and distortion to vanishing levels, and that the station meets exacting "high-fidelity" standards and is ready to handle stereo in every technical consideration, the next crucial need is to consider the mono signal. The broadcaster must put out a mono signal of high quality for that large proportion of the audience that will be listening in mono for a long time. It's important to note that the quality of the mono signal in the BTSC system does not automatically match the quality of the stereo signal. The stereo can be splendid and the mono virtually unlistenable—a guarantee of a massive audience tuneout problem.

The source of the disparity (FM broadcasters have been struggling with the problem for two decades) is that when there are phase errors (more correctly, time errors) between the L and R channels, the L + R can be subjected to comb filter effects seriously destructive of quality. There can be loss of top highs, selective cancellation of highs, mushy, thin and reedy, rough, peaky quality, or missing mid-frequencies. If there is a polarity reversal in the plant that puts the L and R 180 degrees apart, there can be a disappearance of bass, given that the bass is strongly correlated in the two channels, as it often is.

Essential to the control of this problem is, first, monitoring that alerts the staff immediately to any marked degradation of the mono signal. Most effective for that is a three-channel monitoring system, L, R, and L + R. The operator can hear the mono (L + R) along with the stereo, or in quick alternation. Any peakiness, roughness, loss of highs, or mushiness, will stand out sharply in the mono in comparison with the stereo. An experienced operator can spot trouble in seconds. Continuous monitoring of the mono is therefore essential for TV stereo.

If trouble does turn up, the first check should be on the head alignment of the tape machines involved. Out-of-

NBC sitcoms heard in stereo.

line heads are the most common seat of the L-to-R phase errors. In FM stereo, the carts and cart machines were the locus of the trouble, with tape handling and head alignment that lacked precision. A new generation of cart equipment with far better handling of tape brought the "phase problem" under reasonable control in FM stereo. The maintenance program in a television station must therefore include a much heavier emphasis on alignment of tape heads than it usually had in the past.

There are, of course, many other points in a complex studio plant at which a time difference between the L and the R channel can be inserted. The experienced engineer will have some means of "signal tracing" to spot the offending unit (in and out checks with an oscilloscope, for instance). Correction may involve nothing more than proper adjustment of the unit; or, it may need a delay circuit in the leading channel.

Preview mono monitoring on incoming material is also a necessity. At WTTW in Chicago, the first station to broadcast stereo sound, chief engineer James Swick has put an L - R output on all tape machines used for stereo material. The operator can hear the mono at the throw of a switch. Incoming material, in fact, whether arriving on tape, by satellite, or by terrestrial line, must be previewed more carefully than ever. Television engineers report getting programs billed as "stereo" that were really mono, or that had a polarity reversal, or a channel reversal, or even serious phase errors.

The staff can put in switching for quick correction of reversals. Phase errors may be more difficult to handle, however. Eric Small of Modulation Sciences, which manufactures and markets MTS equipment, has recommended the temporary misalignment of a tape head to make the mono acceptable, if a badly out-of-phase program must be used.

Audio processing

It is becoming increasingly clear that the function of audio processing is quite different in TV stereo from what it is in FM stereo.

As Geoff Mendenhall of Broadcast Electronics puts it, in FM, the product being sold is sound. The qualities of the sound are central, and extra loudness does attract and hold listeners, at least in the view of most FM broadcasters. Hence, we have the long-running "loudness war," and loudness means heavily compressed signals, with the dynamics squeezed down to a minimum so that the modulation level can be pushed to the top.

In television, says Mendenhall, the picture is the main product, the element the audience tunes in for. The TV viewer, it now appears, is put off by sound that is distracting or very "different." Being a lot louder than other stations is one form of unacceptable distraction. If the sound has very high quality, including good projection of stereo, that is a big plus; but uncomfortable loudness means a tuneout. Stations going into stereo sound have found they must reduce the audio modulation level so it matches approximately that of other stations in the market.

The two types of programming differ in another important way. FM programming to a large extent comes down to a certain type of recorded music with limited dynamics. The FM processors are very closely fine-tuned to this kind of material, so closely, in many cases, that even the announcers' voices are poorly reproduced. But TV programming covers an extremely wide range of material: interviews, voices over crowds, concert music, sports, and many others. The processing must have the variety to handle each kind of material well, bringing all to a reasonable modulation level. Very important is sophisticated gating so that background noise does not bump up during pauses in the sound, or during a tapered falloff when the volume goes up.

Broadcast Electronics' TZ-30 stereo generator omitted audio processing with the idea that TV programming should be processed further back in the studio, under close control of the studio personnel. Modulation Sciences' TSG stereo generator included processing aimed at TV stereo sound, adaptable to many kinds of input and including gating for smooth in and out action.

Bob Orban of Orban Associates adds further clarification of this important consideration. He notes that the processing used must be in some sense an average, or a compromise between the needs for top-grade, truly hi-fi receivers and the run-of-the-mill class. The latter kind need somewhat more control of dynamics to make a sound of acceptable consistency for the listener. Orban says that something on the order of 10 dB of compression is a good average for TV stereo sound, and he notes that Orban's Optimod stereo generator can be set for any need in this area.

Multichannel Programs Via Satellite

Nowhere was the need for high-fidelity multichannel audio transmission via transcontinental satellite link more clearly demonstrated than at the televised Live Aid concert. Sending live music around the world and attempting to approximate the music fidelity that most listeners are used to hearing as the result of exacting multitrack recording techniques was no small task. The success of the transmission was due to a coupling of BrightStar's transatlantic satellite link with an audio modulation system developed by Wegener.

BrightStar's direct transatlantic system was constructed by linking international and U.S. domestic satellites via co-located earth stations. However, its Atlantic transponder, in common with all Intelsat satellites, transmits a video signal with an associated mono circuit for sound. There is not sufficient bandwidth to allow a second audio channel to be transmitted, but without a second, balanced audio channel, together with an overall improvement in sound quality, events such as Live Aid would never have achieved the audio fidelity needed to insure a receptive audience.

A second channel was needed, not only for the growing popularity of televised music, but also to give broadcasters the option of one channel for natural sound and a second for local commentary.

Wegener Communications had successfully developed a frequency modulation system that enabled several subcarriers above the video signal to be used for narrowband services such as audio and data. The system had gained wide acceptance in the U.S. where, on domestic satellites, up to eight subcarriers could be added to a conventional video circuit. By using very low-level subcarriers relative to the video signal and companding techniques, there is no deterioration of the video signal and the audio quality is greatly improved.

BrightStar's U.S. domestic transponder has two FM subcarriers at 6.2 and 6.8 MHz that can be used for high-quality stereo, but lacked a method of transmitting the same high-quality stereo on its transatlantic transponder that has less available bandwidth.

The Wegener Panda II audio modulator operates by combining the vision signal with separate left and right audio channels using individual, narrow bandwidth, low deviation FM subcarriers into a composite signal requiring 5.6 MHz when the vision signal is transmitted in the 525 NTSC standard. This allows BrightStar's regular associated audio circuit to be used as a third audio channel over the Atlantic.

Because of the bandwidth needed for the composite signal, transmission on U.S. terrestrial lines is not possible. However, BrightStar's satellites are linked by two earthstations in the same location, so the composite signal can be carried over the whole transmission path without using terrestrial lines and therefore without problems.

With the addition of Wegener equipment, BrightStar can provide stereo or three audio channel transmission with video between London and any point in North America. Stereo material originated in the U.K. can be received by one or several points in North America either in stereo or with mono sound depending on the preference of the receiving company. This is possible because the majority of receiving stations in the U.S. are equipped with low-pass filters for the video signal.

BrightStar transmits the modulated composite signal from London to its earthstation in Andover. A demodulated audio signal is then transmitted on one or both of the existing FM subcarriers on the U.S. satellite transponder at the same time as the composite signal. Receiving earthstations equipped with demodulators can then accept the stereo audio signal that can be used directly or may be fed into any other stereo system such as radio or cable. Earthstations without demodulators take the composite signal through a low-pass filter, which strips the vision signal clean of additional information, and take their sound from the normal audio circuits.

Stereo material originated in North America can be modulated at source and transmitted directly onto BrightStar's U.S. domestic transponder, or it can be received by the earthstation at Andover using the normal FM subcarriers.

Material originated in Europe can be fed on line as a video signal with a separate stereo audio pair of lines to BrightStar in London for modulation and transmission to North America.

Three-channel audio transmission was used in both directions between the U.K. and the U.S for the Live Aid concert and stereo sound was broadcast on FM radio on both sides of the Atlantic simultaneously with the television broadcasts.

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Solid State Logic

Special mic needs

The mic techniques for recording music in stereo are a 25-year-old story. FM stereo has not added much to that story because most of the programming for FM is recorded programming.

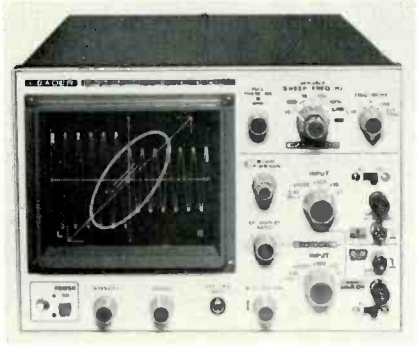
But television stereo seems likely to be originated by live microphoning in the studio much more often, for popular and concert music and especially for sports. In Japan, stereo sound had been extremely popular in televised sports, and also in drama. In sports coverage, the stereo gives a feeling of being "right there," in a wide space with the spectators and the players spread through it visually and aurally.

Basic principles of microphone technique familiar from music industry practice can be taken over in television stereo. The overriding need for top-grade mono imposes special requirements on TV stereo miking, aimed at preserving the time relations of the L and R signals.

The three general stereo mic techniques differ in their handling of this requirement. The first, the "spaced apart" technique, uses two microphones some distance apart in front of the music. This produces a mass of sounds that are doubled by out-of-phase repeats, because many of the sounds reach the two mics over different distances and are added to the total. This can make a wide, phasey effect, but the stereo image locations tend to be unstable because the locations are very sensitive to phase differences.

The phase differences are likely to make the L + R mono a disaster. Comb filter effects will create disagreeable qualities in the mono, as outlined earlier in this article.

The second general stereo mic technique, the multitrack-plus-mixdown, is the one most widely used in the music industry. Each track is a mono recording from one small section of the music. Stereo is produced in the mixdown.



A stereoscope like that above can be used to check channels switched together before a stereo program is put on the air. A pattern like the oval seen indicates a phase difference that must be analyzed and corrected.

This is how NBC produced July's All Star baseball game for stereo broadcast. This technique can produce firm stereo images if the separate sections of the music are well isolated acoustically from each other. Many recording specialists follow the old "Lou Burroughs Rule," which puts each section of the music at least three times as far from any other section as each mic is from its own section. Another rule of thumb is for at least 20 dB of acoustic isolation between sections.

If enough acoustic separation is maintained, the multitrack technique can produce stable stereo images. It can also produce a good L + R if the mixdown engineer monitors carefully in mono during the process, and tries to correct by ear any trouble that comes up.

The third general mic technique, coincident miking, is free of phasing dangers because the two mics are in the same position in the room and all sounds arrive at the same time in the two channels. There are several coincident mic techniques, but the one of most importance to television stereo is the M − S method. It uses an "M" or "mid" mic pointed straight ahead toward the center of the music; the M can be an omni, a cardioid, or a bidirectional. A second mic, the "S" or "side" mic, is a bidirectional mounted at right angles to the M, but directly below or above it, on the same vertical axis.

If the outputs of the two mics are taken to a sum and difference matrix, the M + S will be more or less a cardioid pattern, leaning leftward (if the S mic is pointed left), and the M − S will be an identical pattern leaning right. Thus, the matrix outputs are the normal L and R signals of stereo.

M − S is an old technique, going back to Blumlein's original stereo patents in 1931. Most engineers in au-

Checklist for MTS

1. Make sure all tape heads that will be involved in program production, for recorded programs, are precisely aligned, for preview, for edit and for on-air playback.
2. Preview the entire program with simultaneous three-channel monitoring: L, R, and L + R, to insure the mono sound is acceptable. (Mono faults stand out clearly in contrast with L and R channels.)
3. If the program is to be aired directly from a satellite or land line, monitor it closely and be ready for fast adjustments. If possible, it is better to record satellite and line feeds prior to playback to insure high-quality audio.
4. Check for polarity reversal in the channels switched together for the incoming program, and make sure there is no phase inversion or cancelling out of the L + R by monitoring it in mono. Reversals are easy in elaborate studio setups, and the inputs may have to be inverted.
5. Make sure the program channels set up for the incoming program have enough headroom, as lack of sufficient headroom in a program line as established is one of the most common sources of error.

The Networks' Role

Those TV stations that are affiliated with one of the three commercial networks or with the Public Broadcasting System have more motivation to provide stereo audio and less need to create their own stereo programming, although they will probably do so for a competitive edge in the market.

PBS was first in the stereo game with simulcasts, and now has multichannel audio for *Austin City Limits, Compleat Gilbert and Sullivan, Evening at the Pops, Great Performances, National Geographic Special, Nature, Sneak Previews, Sound Stage,* and specials such as *Live from the Met.*

NBC has made the strongest commitment to stereo programming with multichannel audio on its late night variety shows: *The Tonight Show, Late Night With David Letterman* and *Friday Night Videos.* Also in stereo are many of its half-hour comedies: *The Cosby Show, Family Ties, Cheers, Gimme A Break, Facts Of Life, Golden Girls, Punky Brewster, 227,* and *Silver Spoons. Miami Vice* is also in stereo, along with various specials such as The All Star Game.

The ABC program *The Insiders* has been offered to affiliates in stereo on a "limited basis," and CBS experimented by offering its program *The Twilight Zone* in stereo on WCAU in Philadelphia only.

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Current microphone techniques on WNET's Live From Lincoln Center *show the necessities of BTSC stereo. The broadcast is going out simultaneously with the long-standing simulcast technique and also in BTSC stereo, in order to get stereo to all listeners who want it. In the photo, a soloist mic is visible in front of the singer Kathleen Battle and violinist Schlomo Mintz. Approximately 12 other mics are in position above the various sections of the orchestra. During rehearsals mixdown to stereo is made always with three channel monitoring—L, R, and L + R, to make sure mono quality is good.*

dio know about it, but it has slipped from attention in recent decades as other techniques, especially the multitrack, have taken over. The great advantages of M – S are reviving it for MTS. It can also be used today with top-grade microphones made especially for it.

The M – S stereo will have extremely stable images, spread across the space, because there are no phase differences between the two channels, only amplitude differences. The ambience has the same spectral content in both channels but has amplitude differences because of the pattern directivity: the ambience is spread across the space for a very high realism.

On top of these advantages, M – S has one other advantage no other mic technique can offer: a perfectly true mono. When the L and R are folded together to form the mono, the S microphone is cancelled out—(M + S) + (M – S) = 2M. So, the M – S mono is from a single microphone pointed toward the center of the source. It is free of the compromises and errors that affect other L + R signals, at least to some degree. These errors have been accepted by the industry for years because the L + R mono is central to mono-stereo compatibility in FM stereo.

M – S has some good operational flexibilities, too. The stereo width and the perspective—the ratio of direct to ambient sound—both depend on the ratio of M to S output in the mix. Thus, a control adjusting the relative amounts of M and S will adjust the stereo "spread" and also the perspective—the apparent distance of the sound source.

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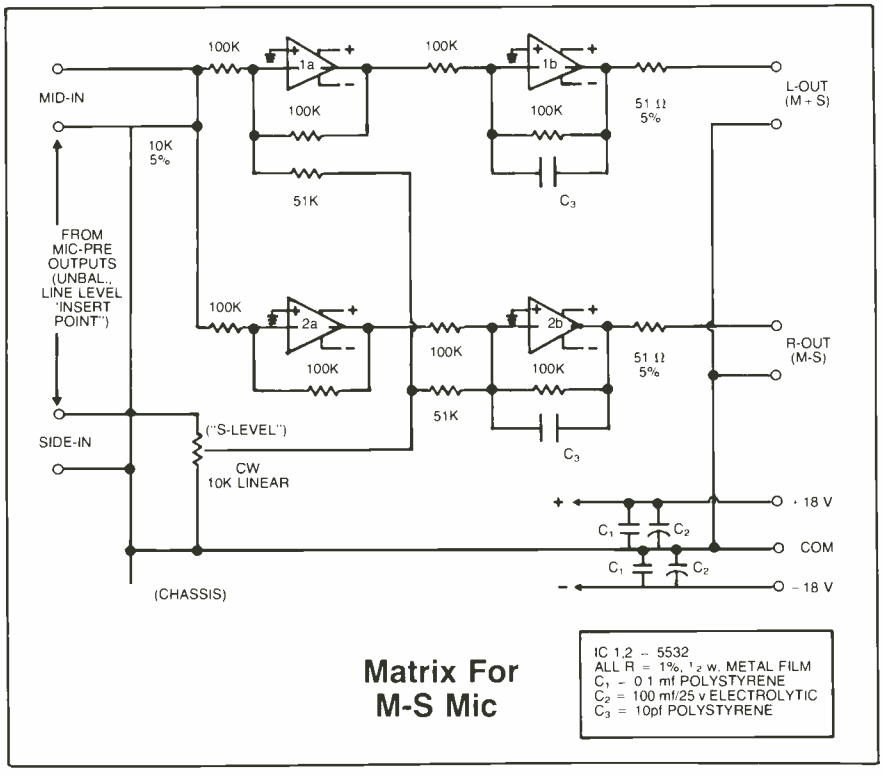

Matrix For M-S Mic

Another flexibility lies in the fact that the M and S outputs can be recorded directly, without going through the matrix. Then the stereo can be produced in post-production, allowing the operator to set the stereo width and the perspective to match the need at each point in the program.

There are a number of excellent two-mic assemblies that work perfectly for M – S: Neumann, AKG, Schoeps, and MiLab are among the manufacturers. The engineer can build his own matrix circuit, using active sum and difference circuits rather than transformers for extremely low noise and distortion. A very good ready-made matrix is the M-38 of Audio Engineering Associates in Pasadena, CA.

One final word: the situation in TV stereo sound has a parallel in FM stereo in the sense that the equipment for handling tape was not originally designed with the very exacting needs of phase-coincident L and R in mind. The cart equipment used in FM had to be upgraded before an L + R reasonably free of trouble was available. We can expect further work on the audio sections of Type-C VTRs aimed in the same direction. Until this upgrading occurs, however, broadcasters who want trouble-free mono of very high quality may turn to double-system audio, using top-grade audio machines, with their precise tape handling, synchronized to the video machine. **BM/E**

Robin Lanier, formerly *BM/E's* senior editor, is now an independent writer and consultant living in New York City.

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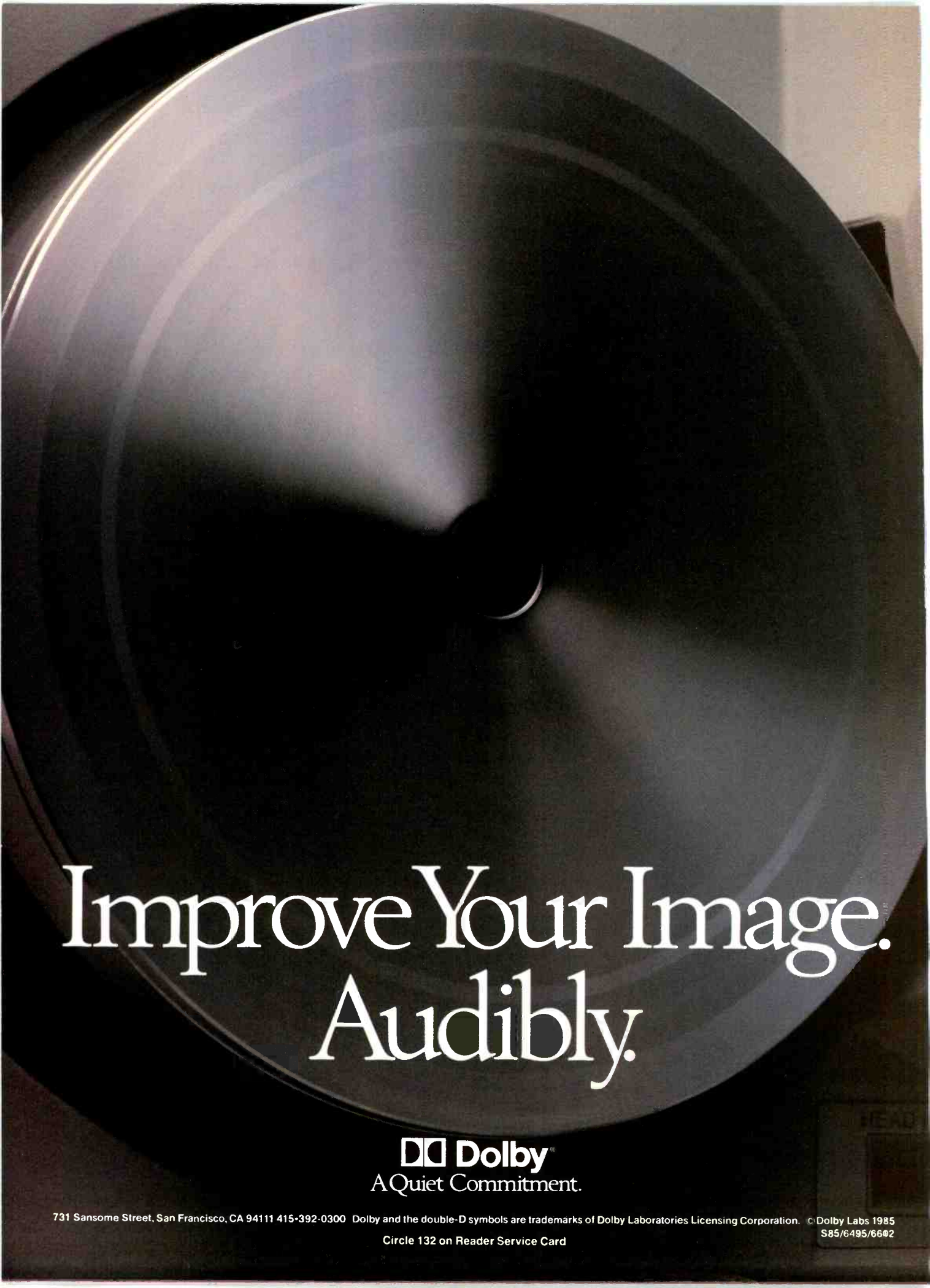

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TIME BASE CORRECTION COMES TO AUDIO

Solutions to the widespread but often ignored problem of audio time and phase errors have come about largely as a result of MTS, AM stereo, and satellite audio.

By Judith Gross
Associate Editor

It used to be that when an engineer at the NAB said he was going to look at time base correctors, he invariably headed for the video exhibits to look at video TBCs. No longer is that the only case. More than ever, audio time base correctors are in demand, not only at the radio stations they were originally designed to service, but also increasingly for use in multichannel TV sound and satellite transmission.

There would be no need for audio TBCs if all audio transmitted in stereo was received in stereo. A survey by the NAB has revealed that as much as 60 percent of all stereo audio is actually heard on mono receivers, and that many listeners aren't aware of exactly what the difference is. Phase and time errors aren't always noticeable to the untrained ear when the reception is stereo, but when it is in mono, the L + R signal can be severely degraded.

Audio time-base correction first appeared as a solution to time delay problems such as those that occur in cart machines, but these days, some cart machines have phase correction built right into them. The next great need for time base correction in audio is in the audio chain of FM radio stations, where left and right channels with phase error or time delays can cause phase cancellation.

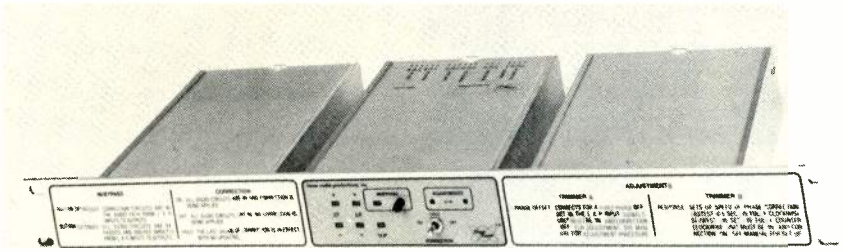
Time delay and phasing problems are inherent to stereo, where even a slight time error between channels can be disastrous. One of the places where phase error becomes apparent is in STLs, where there are left and right microwave paths and the two signals are almost always subject to arrive at slightly different times.

Recently, other important needs for audio time base correction have come about with the emergence of MTS, AM stereo, and stereo transmission via satellite, of MTS or other audio. The need to correct phasing errors becomes even more important in MTS and AM stereo because stereo TVs and AM stereo radios are still scarce and most stereo audio from those sources is still listened to in mono. If channels are out of phase, the high frequencies, or an entire part of the sound, completely disappears.

Time delays

The most common type of phase error associated with two-channel audio is time delay. This occurs because the left and right signals are received at slightly different times. A time delay error causes high-frequency signals to be combined out of phase. As time delay error increases, the frequency at which it occurs and becomes noticeable is lower. This was a characteristic problem with early stereo records, which were incompatible with needle and cartridge pickup.

A time delay problem generally occurs in cart machines, STLs, remote phone lines, tape recorders, CD players, and satellite links with two channels. Digital to analog converters or filters such as those used in satellite transmission also cause time delay. One case where it is an unavoidable problem is in transmission of a live concert, either for recording or live broadcast. Multiple miking means that signals from two mics placed even rela-



The Howe Phase Chaser uses cross correlated signals and uses active phase correction to address time delays.

tively close to each other will invariably arrive at their destination at different times. Time delay isn't always a problem in audio; some recent digital effects equipment, such as the Eventide Harmonizer, make use of it to create unusual sounds.

While time delay is the most common type of error, Dave Howe of Howe audio has defined another phasing problem that can degrade the L + R. This is a frequency-related phase problem, caused in part, according to Howe, because a signal's velocity is a function of its frequency. Another reason this type of problem could occur is because the transmission media acts as a kind of filter, requiring a phase shift in order to "roll off."

When a phase shift as a function of frequency occurs, audio at the receiving end can be affected even though the amplitude response may be flat, Howe says. The phase can be seen to advance as the frequency increases.

The problem with frequency-related phase error is that it is never equal in the left and right channels, and when combined, as in a mono receiver, the L + R is combining more and more out of phase as the frequency increases. According to Howe, the most common places to find frequency-related phase errors are in filters, band limiting equipment, processors, mismatched transformers, and equalizers.

A third type of phase problem is really an extreme case of time delay. Phase inversion occurs when the two channels are completely out of phase and L + R is nonexistent, or cancelled out. One case where this has occurred more often lately is in producing stereo for MTS. Many TV audio technicians are not used to keeping track of two audio channels, and if the L + R and L − R are inverted at the inputs, the L + R signal can be cancelled out when combined for mono. Most of the time, if a complete phase inversion occurs, it will be caused by human error, or failure to modify existing equipment to accommodate two-channel audio.

Chasing phase problems

Phase and time-delay errors show up as loss or change in high frequencies, a hollowness or "whirling" effect. In stereo, good ears can hear a phase problem. The L + R sounds like a "middle" speaker, and the L and R channels are heard separately, and if there is a phase problem the L + R, or "middle," appears to be degraded, or in some cases, missing altogether.

Typically, phase problems have often remained unsolved. In the past, FM stations would live with the problem, while the recording industry was aware of the problem, but not particularly sensitive to it.

The awareness of the problem began when stereo cart machines began to be used at FM stations. Time delays began to show up, either to an engineer listening to the station or on an oscilloscope, which shows a signal's phase. The solution at that time was to adjust the azimuth of the cart machines, and other detected time delay problems were solved by aligning all equipment from source to listener. The ITC 99 cart machine can make the necessary alignments automatically, as can the Ramko Phase Master, but these will solve the problem for carts recorded on those machines only, and time or phase problems could show up elsewhere in the audio chain.

In the recording industry, time delay problems are solved first by detection with an oscilloscope, and then by making necessary azimuth adjustments to the equipment and retesting. A more recent solution to phase and time delay problems that is aimed especially at the broadcast industry is the Howe Phase Chaser, which has been on the market for about four years. Originally, only very precisely engineered radio stations would see the need for the device, Howe explains, but lately, with MTS, its use has been on the rise. The Phase Chaser employs what Howe refers to as active phase correction, inserting an audio "model" and cross correlating it with the actual program material to pinpoint discrepancies in time or phase.

For "first order" or time delay problems, the cross correlator delays one channel with a fixed time delay. Specifically, a fixed time delay is introduced into one channel, but only in the detection unit, not the correction portion. Then the fixed time delay is introduced into the second channel. The two signals are multiplied together, and the multiplied signal is fed to a synchronous detector, a full-wave detector synchronized to a local low-frequency oscillator. The oscillator signal modulates the time delay of the second channel both forward and back, similar to the way a listener tunes to an AM station, turning the dial until the "center" of the frequency is reached. Howe explains that the modulator is tuning up and down respective to the fixed time delay. If it doesn't find the center, it means there is a time delay, and the integrator feeds the second signal to another time delay device which then corrects it by mimicking the time delay error, but in reverse. By adding the same time delay to the other channel in reverse, a time correction is made. If

The Phase Fixer, a digital audio TBC, inserts a stereo pilot tone to correct time delays.

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the output of the integrator is positive, the delay is on channel one; if negative, it's channel two, and the corrector will add the delay to the least delayed of the two. If no time delay is sensed, the Phase Chaser leaves it alone.

Quadratic phase shifts, the so-called "second order" or frequency-related phase errors, are addressed after the "first order" or time delay correction, according to Howe. A different circuit "models" an estimate of the error, which he says appears as a phase dispersion, and takes care of residual dispersion as it goes along. Once again, Howe says, a "model" is introduced, cross correlated for discrepancies, and corrected accordingly.

"If you take care of the first order correction, which is a time delay, and the second order correction, a quadratic or frequency-related error, you've taken care of 99 percent of the problem," says Howe.

The Phase Chaser marketed by Howe for four years is the 2100. A newer version, the 2200 is a "beefed up" 2100, designed more for heavy-duty professional use. It has a slightly larger time delay range as well. While the range of the 2100 is ±300 microseconds (full signal period is 100 microseconds for 10 kHz and full phase inversion occurs at half that, or 50 microseconds), the range of the 2200 is ±600 microseconds. A newer model, the 2300, is the same as the 2200 except it also includes correction for automatic phase inversion by sensing the amount of power in L + R and L − R (independent of phase) and cross correlating, since the effect of a phase inversion is that the L + R ends up with insufficient power.

In addition, both the 2200 and 2300 have a missing channel feature that senses when one channel is missing completely, and mixes the other channel into the missing channel. It doesn't correct the stereo signal, but would allow for a tolerable signal in mono reception, and Howe stresses that such a correction would only occur in an extreme case.

There are price differences in each of the Howe Phase Chaser models. The 2100 costs $1250, the 2200 is $1795 and the 2300 is $2395.

Problem fixer

At this year's NAB show Harris Corporation entered the audio time base correction field with a digital audio TBC called the Phase Fixer. It was de-

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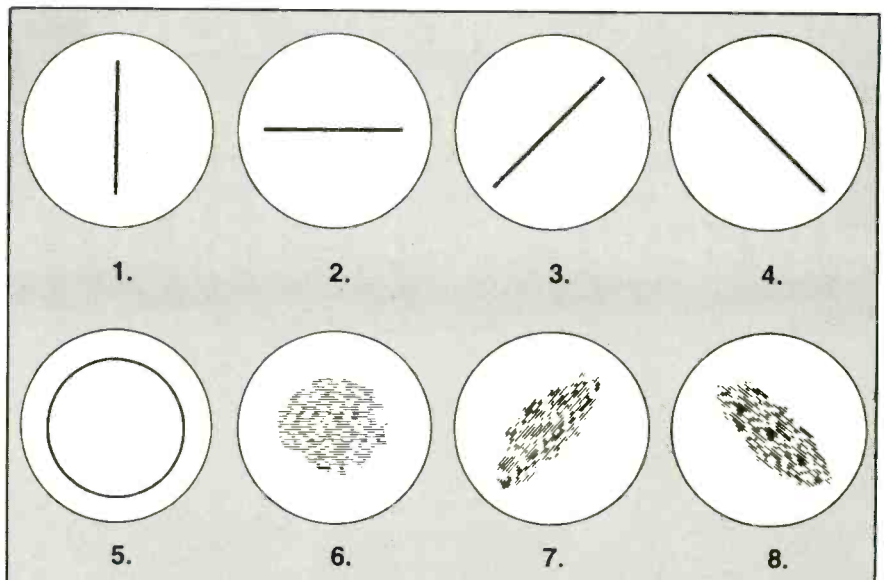
veloped by engineer John Pate and is currently being marketed by Harris to radio and TV stations.

The Phase Fixer is designed to correct time delay problems, and instead of using the actual program material, it uses an encoding unit to record a 19 kHz stereo pilot tone onto tape and a decoder to detect and correct any time delay that might occur.

Pate says that the encoder is typically in the production room, and it adds 19 kHz in a complex waveform, recorded at such a low level that it doesn't show up on a VU meter, and doesn't increase S/N or affect the audio. The decoder, he explains, is inserted in program line of station, and when the pilot tone is detected it activates the time correction: where no pilot signal is sensed it leaves the audio as is.

According to Pate, the 19 kHz carrier is amplitude-modulated by a 300 Hz sine wave, and the decoder detects 300 Hz modulation in each channel, compares the phase, and detects any time error. Also, in the decoder are two digital delay lines, and the delay of those lines is served to be zero, so that the air voltage is null to zero. Pate emphasizes



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that the Phase Fixer is a closed-loop, nonprogram dependent system.

One other problem that the Phase Fixer can solve that is not time or phase error is the existence of "wow" or "flutter" caused by a tape not moving at uniform speed, or capstan motors not running uniformly, creating an elliptical pattern in the tape path. "Wow" is actually a low-frequency flutter, and to correct it, the Phase Fixer examines the 19 kHz pilot tone for frequency modulation. Frequency modulation doesn't exist when the pilot tone is recorded, so any subsequent frequency modulation will be caused by wow or flutter. Then through another closed feedback loop the delay is fed back and corrected like a time delay.

Pate notes that the Phase Fixer was designed primarily to deal with problems encountered with analog tape and cart machines. Its cost is higher than the Phase Chaser, with the decoder priced at $5475, and the encoder priced at $875. A typical configuration would be one encoder for each production room, plus one decoder for the program line.

The development of the Howe Phase Chaser and the Harris Phase Fixer means that the audio industry is ready to take the problem of time delay and phase error more seriously. But they also represent a difference in concept and philosophy in how much of a problem phase error is and how much should be done to correct it.

The Harris Phase Fixer requires the encoding, so it would not be appropriate for time delays that occur in STLs or satellite transmission, where it is not possible to encode the signal with the pilot tone.

The Howe Phase Chaser addresses "second order" errors that are frequency-related time shifts, and have previously fallen into the realm of transmission theory. But Pate says he doesn't see how such problems could be addressed by audio TBCs, and he adds that errors which cause audio problems are all time delay errors. Pate also questions whether the Howe Phase Chaser would make corrections when they are not needed, such as in specially recorded music or effects where time delays are purposely used, or in the case of a live concert, where multiple mics will by nature cause a slight time delay in separate channels.

Howe maintains that the Phase Chaser would only correct actual problems and not tamper with audio effects, because, he explains, time delays of that sort "would not fit the model fed into the system." He says that the device might correct severe time delays associated with live concert multiple miking, however, but believes that that would enhance the end result for mono listeners. Pate maintains such time delay correction "interferes with or destroys the original stereo image" of the audio. Basically, Howe says the bottom line aim is to improve the mono signal, and Pate agrees, but adds "not at the expense of the true stereo sound."

Their differences promise to be an ongoing debate of the purists versus those aiming for a more precision or controllable audio product.

For most broadcasters, however, the main concern seems to be putting out the best sounding audio quality they can, and phase problems are to be avoided at all costs. **BM/E**

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POST BRIDGES THE GAP PRODUCTION

With many of the capabilities of the largest post-production systems, the new mid-sized video editors are displaying their versatility.

By Eva J. Blinder
Senior Editor

In San Francisco Production Group's CMX 330XL editor, Richard Childs (right) of Colossal Pictures discusses an edit with colleagues Maria Rodriguez (left) and Dick Blair. Photo by Bob Hsiang.

As high-quality production work becomes more and more of a necessity at many television stations, interest in mid-sized video post-production systems is growing. Matching that interest is a spate of new midrange editors designed to bridge the gap between the full-featured on-line systems, usually the province of production houses and large-market stations, and the small, cuts-only controllers, relegated to news editing or simple off-line work. These new systems often incorporate many or all of the features of their larger siblings in a smaller, more affordable package. They make top-of-the-line editing available to the more modest user.

Their position in the middle of the video editing range makes these new mid-sized systems suited to a wide variety of applications. For some television stations, acquisition of such a system may represent the first step toward quality post-production of locally produced shows. Because these systems typically control four or more machines and a switcher, they give users the option of incorporating digital effects—or of controlling an audio tape recorder for more sophisticated audio work. A mid-sized system may also serve as the main editor at a modest post-production house. For larger production and post-production facilities or large-market television systems, the mid-sized editor may function primarily in an off-line mode, freeing larger systems for assembly work.

According to Christin Hardman of CMX, the company introduced its new 330XL editor "to get people into the CMX product line at a lower starting price." Hardman states that CMX "felt there was a gap in the market," with nothing in the product line between a three-machine Edge and the 340. The four-machine 330XL carries a price tag of $29,000 complete, compared to $27,000 for the 340XL controller plus $20,000 for the interfaces. It is, of course, fully compatible with the larger CMX systems and fully upgradable all the way to a 3400. While many purchasers of the 330XL have been current CMX customers looking for a compatible off-line system, a number have been industrial users making their first entry into high-end editing.

One production house that recently added a 330XL is the San Francisco Production Group. Facility manager Don Ahrens says that the 330, which replaced an Edge system, is the facility's third CMX system. CMX rooms include Suite 1, with a 3400, used mostly for one-inch mastering; Suite 2, with a 340, used primarily for ¾-inch or Betacam to one-inch work; and Suite 3, with the 330, used largely for ¾-inch off-line work. In addition to the CMX suites, the facility has a Convergence ECS-90 editor with two ¾-inch decks and an edit lister, used strictly for off-line applications.

San Francisco Production Group was a pioneer user of the 330XL, buying CMX's demonstration model off the NAB floor last spring. According to Ahrens, the purchase was motivated by the desire for a flexible, smaller on-line editor that could double as an off-line system when needed.

"We wanted a bigger edit decision list [than the Edge offered], the ability to control more VTRs, and the ability to use I²s for one-inch VTRs and audio tape decks," Ahrens explains. The room can actually control any of the facility's VTRs, including the one-inch decks, via master control, so ¾-inch-to-one-inch or even one-inch-to-one inch edits are possible. Ahrens estimates that about half the work done in Suite 3 is ¾-inch to one-inch on-line editing. Three Sony BVU-800s are located in the 330 suite. In addition, the

system often controls the facility's Otari MTR-90 eight-track ATRs. (One-inch VTRs at San Francisco Production are Sony BVH-1100s and BVH-2000s.)

Functional compatibility was an important reason for San Francisco Production's choice of a third CMX editor. "Keyboards for all the CMX systems are pretty much the same," Ahrens comments. Finger placement is almost the same on all three editors, so "any editor can walk into any suite" without losing speed or accuracy. The 330XL, which lacks the special function keys found on the 340 and 3400 keyboards, instead features submenus "that are easier for our junior editors to learn," according to Ahrens. In addition, the 330's CRT display is the same as that of the larger systems, "so the editors don't spend a lot of time looking around." The system's expandability was another plus in Ahrens' eyes.

Interformat uses

Also new at NAB was the ACE Micro, with all the features of Ampex's full-sized ACE editor but limited to control of four machines plus a switcher. According to Steve Smith of Ampex, one of the major applications for the Micro has been as an interformat system for producing a one-inch master from ¾-inch and/or half-inch originals. Both he and CMX's Hardman see the addition of a third source machine as a critical step for smaller users, since it creates the option of controlling an effects box or ATR.

ACE editors, including the Micro, have found a home at WBBM-TV in Chicago, where director of technical operations Charles (Chuck) Upton says the three ACE systems are used for editing of promos, documentaries, and local programming. In addition to the ACE systems, the station has 11 news editing booths, three with Sony BVE-3000s (two of which are 3000As), two with Videomedia Tempo editors, and the remainder with Sony BVE-800s. Because the station is in the process of converting to the Betacam format, almost all the edit booths can handle both ¾-inch and Beta playback.

Upton states that station personnel are "ecstatic" with the performance of the ACE systems, the first of which was installed last June. The systems are in use eight to 12 hours a day, sometimes including weekends, and are interfaced to a Thomson-CSF Vidifont Graphics 4 character generator (soon to be updated to a Graphics 5). In the future, the station may interface an ADO to the editors.

At present, the ACE editors are interfaced with WBBM's 12-channel Ward-Beck Systems audio console for audio work; the editor itself has dual-channel automatic audio fading capability. According to Upton, the WBBM ACE systems in their present configuration control two BVW-40s and a BVW-800 as players, with a third BVW-40 as the recorder. The station is also considering interfacing the ACEs to its Ampex VPR-3 one-inch VTRs via RS-422.

High-end mid-range

Grass Valley/ISC's mid-range video editor, the System 41, and the smaller System 31 both control up to eight devices, half the capacity of the top-of-the-line System 51. The 41 lacks several of the 51's features, including a film mode that interprets foot-frame information, and animation picture lock, which locks the color frame of the source machine for graphics applications. Nevertheless, the 41 has its share of capabilities. Along with the 31, it can control a graphics box via a machine port, and it has program motion, which allows control of VTR slow-mo. The 41 is a faster processor than the 31 and comes with a jog wheel as standard (it is optional with the 31).

Henninger Video's EECO EMME on-line edit room.

One user of the 41 is KCNC, Denver, which installed the system last January. According to manager of operations Dave Layne, the 41 is KCNC's first computerized editor (the station has a number of ¾-inch edit bays with Sony controllers in its news department). Layne says the 41 is used to build opening and closing billboards for newscasts and local sports programs, for "heavy-duty" promotion work, and to edit material produced by GE Video, the station's in-house production arm, which produces material for various divisions of General Electric, KCNC's owner.

The editor is interfaced with two Ampex VPR-6s for playback and a VTR-2B for record, as well as a ¾-inch and a Betacam deck. In addition, the System 41 edit room has access to the station's ADO and has a Grass Valley 1600 switcher and a Chyron 4100 with the graphics pallette and font compose options. "Anything that's one-inch or post-produced goes through" the System 41, Layne says. "We're real pleased with it—the room just sits there and hums along."

Another System 41 user, WTIC in Hartford, CT, also bought the unit as its first and only computer editor. According to director of engineering Ted Szypulski, the 41 went into service recently for promos, commercials, and public service announcements. Szypulski says the station plans to use the editor daily and assign two full-time employees to post-production. The editor is hooked up to four Ampex VPR-3s and a Grass Valley 300-3A switcher.

The year-old WTIC has broadcast SAP and stereo programming since sign-on, and Szypulski says the System 41 will be used in preparing dual-channel material for broadcast. Presently the station is still doing its dual-language editing machine-to-machine, but Szypulski envisions a system whereby all raw videotape stock will be striped with time code and the programs dubbed to ¾-inch for off-line editing on the station's ¾-inch viewing station. From there it will go upstairs to the GVG editor and switcher for effects programming and assembly.

Expandability

The BVE-3000, Sony's midrange editor, bridges the gap between the simple BVE-800 and the high-end BVE-5000. It controls only three machines in its standard configuration, but can control an additional three VTRs with the addition of the BSBX-100 player delegation switcher. The 3000 can communicate serially with switchers such as the GVG 100 or 1600, but lacks the "effects learn" capability of the 5000. Unlike some of the other midrange editors, the 3000 cannot be upgraded to a high-end editor, although it is upgradable to the latest model, the 3000A, which adds such features as dynamic motion control (the ability to

control dynamic tracking of Sony VTRs) and an improved internal switcher.

Lorimar Distribution in Los Angeles, an arm of Lorimar Productions, currently relies upon a BVE-3000A as its sole videotape editing system. According to Bob Souders, chief videotape editor, Lorimar Distribution uses the 3000A for off-line editing and some on-line ¾-inch work. The simple configuration uses BVU-800 U-Matic VCRs and no switcher.

"We use it to syndicate and reedit prime-time shows such as *Dallas* and *Knots Landing*," Souders says. He explains that Lorimar shortens the episodes by two or three minutes by editing, then cuts a 60- to 90-second recap that runs at the beginning of each episode. This editing is done off-line on the 3000A, with the EDL taken to Compact Video or another post-production facility for effects work and assembly.

Lack of a switcher limits Lorimar Distribution's effects capabilities, of course, but the 3000A's built-in dissolves and wipes provide more than enough flexibility for the small amount of in-house on-line work done on the system. This consists mainly of promotional tapes that stay on ¾-inch. Souders terms the 3000A "a very sophisticated off-line system," but adds that the company is considering upgrading to a BVE-5000 in the near future.

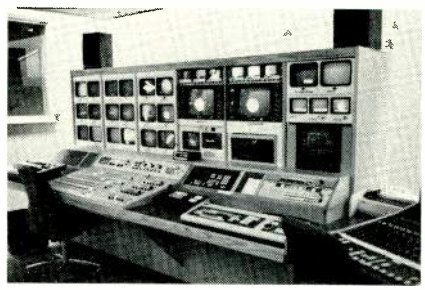
Convergence Corp., of course, makes a range of editors widely used in both broadcasting and industrial applications. According to Frank Jackson, the 204 editor, currently the top of the line (the eight-machine 205, introduced at NAB, has not yet been delivered), sells for $24,000 with an 800-event edit decision list. The line has several mid-range models, including the 203 and the 202, which has a 250-event memory and is priced in the $13,000-$14,000 range. Jackson says that despite Convergence's popularity with broadcasters (all three networks, for example, have multiple Convergence editors), most of the midrange systems have been purchased by industrial users.

"Broadcasters tend to buy either the very top of the line or the 90 [Convergence's single-source, cuts-only editor]," Jackson notes.

Interface choices

Although EECO's EMME editing system can control as many as nine machines, most of the sales have been three- and four-machine systems, according to product manager Eloy Chairez. The greatest interest has come so far from post-production facilities and high-end corporate users. EMME comes with a choice of user interfaces: the Video Editing Workstation, a dedicated-style keyboard with a variety of function keys, and the Cinemagraphic Workstation, which features a mouse controller.

Peter Martino, editor/manager of Centel Video Productions in the Chicago suburb of Oak Brook, says that Centel's three-machine EMME system probably will be expanded in the future as the facility adds one-inch and half-inch capability. Presently, a BVU-820 with slow-mo and two BVU-800s are interfaced to EMME, which is configured with the Video Editing Workstation. Centel also has a Sony BVE-800 editor, which is set up for off-line use.



Video Troupe's edit suite features the Paltex Edit-Star editing system.

According to Martino, the Centel operation "is geared toward people who are committed to ¾-inch," including corporate users and some small production houses. The two-year-old facility decided to add the EMME for its high-end list management capabilities.

"The EMME was really the best system on the market for what we do," Martino states. He adds that EMME helps Centel make the most of its GVG 100 switcher. "It controls the entire panel of the 100 and lets you access the E-MEM registers," he explains.

A larger EMME installation is found at Henninger Video in Arlington, VA. According to Bob Henninger, the facility keeps six machines on-line in an interformat configuration that mixes one-inch, ¾-inch, and Betacam decks. Henninger praises EMME's ability to assign any of the decks as the recorder from the editing console, as well as its ability to directly control an ATR.

According to Henninger, his facility uses the EMME for audio work in several ways. For example, he says, "We can dedicate one of the Betacams as an audio source. We put the sound effects on it and include it in the edit." In addition, an MCI GH-110 eight-track ATR is part of the system and can be slaved to the master recorder (typically one-inch for these applications).

"We have the ability to handle a fairly large number of audio tracks," Henninger states. "One of the keys to that is being able to run several sources at once," which the EMME is capable of doing.

Star editing

The Paltex Edit-Star is an on-line/off-line system that controls four VTRs and has most of the features of the five-machine Esprit, the top of the Paltex line. For example, Edit-Star is available with the Esprit's Backtrac software, and comes with a HELP key that displays relevant portions of the user's manual on-screen as desired. One of the most recent Edit-Star sales was to KHJ-TV, Los Angeles, where chief engineer Buck Evans says the system is "still in the box." The station has a smaller Paltex editor for ¾-inch news editing, but plans to use the new Edit-Star to post-produce station promos and programming on Ampex VPR-6 one-inch VTRs. KHJ has a GVG 1680 switcher and NEC digital video effects, which will be interfaced with the Edit-Star when it goes on-line early next year.

Video Troupe, a post-production house in Windham, NH, has two Edit-Stars. General manager Fred Connors, Jr., says that both systems are used on-line, one with three Ampex VPR-80s and one Sony BVU-800 and the other with one VPR-80 and three BVU-800s. Any of the interfaced machines may be selected for recording. Both editors are hooked up to Grass Valley switchers—a 1600 and a 100, respectively—and have NEC E-Flex efx and Chyron graphics available. Video Troupe's clientele, which draws heavily on nearby Boston and Manchester, NH, is about 80 percent industrial, with the remainder of the work consisting of local and regional TV commercials.

Connors suggests that a key element in his success with Edit-Star has been identifying the right technical support people within the company to facilitate quick question answering and problem solving. "We can't say enough good things about" Paltex's east coast engineer/sales rep, Tom Belford, Connors states. "When we have a

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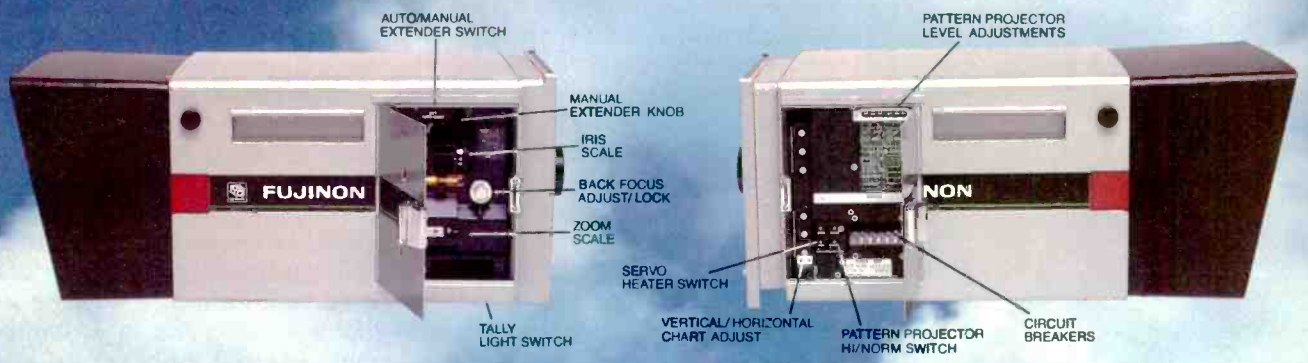

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Parallel/serial choice

The Magnum editor, which Videomedia introduced at the last NAB, can handle a maximum of three parallel interface machines but up to six serial interface machines. Parallel and serial machines can be mixed in an editing setup. The record machine can be delegated from the keyboard, and the Magnum includes such features as block edit moves, slow-mo VTR control, and an eight-inch disk operating system with CMX translation. It will operate with either SMPTE time code or Videomedia's proprietary Micro-Loc.

Seattle's KING-TV recently installed a simple Magnum system for its news department (the station also runs a post-production facility that has a CMX editor). News engineering supervisor Fred Albert says the Magnum was acquired to enable the station to do more sophisticated news edits than had been possible with its previous machine-to-machine editing setup.

The Magnum uses Sony VCRs, with a BVU-820 and two BVU-800s for playback, another 800 for record, and a Grass Valley 100 switcher. "We wanted to be able to do dissolves for stories or build programs using simple effects without having to tie up our post-production facility," Albert relates. "The main reason we chose the Magnum was that for the money involved, it manipulated the 820 as an 820, with its slow-mo and still frame capability. The others we saw in the same price range wouldn't do that automatically." The Magnum had just been installed at press time, and "our editors are definitely on a learning curve with it," according to Albert. He says he was impressed with the Magnum's software control and with its "learn" function.

On the Horizon

Not only is the Horizon System Four editor new, but its manufacturer, Horizon International, is a new company that attended its first NAB last April. The System Four controls three VTRs and a switcher and is designed to be "editor-compatible" to the CMX 340, operationally and electronically. The editor interfaces directly to serial VTRs and switchers.

One of System Four's first users is Face Broadcast Productions of Burbank, CA. According to owner Ron Malvin, the System Four is the facility's only editing system at present, although they may add a second in the future. It replaced a Sony BVE-800 controller and is interfaced with two Sony BVU-820s, a Sony audio mixer, a fully loaded GVG Model 100 switcher, and a Chyron VP-2.

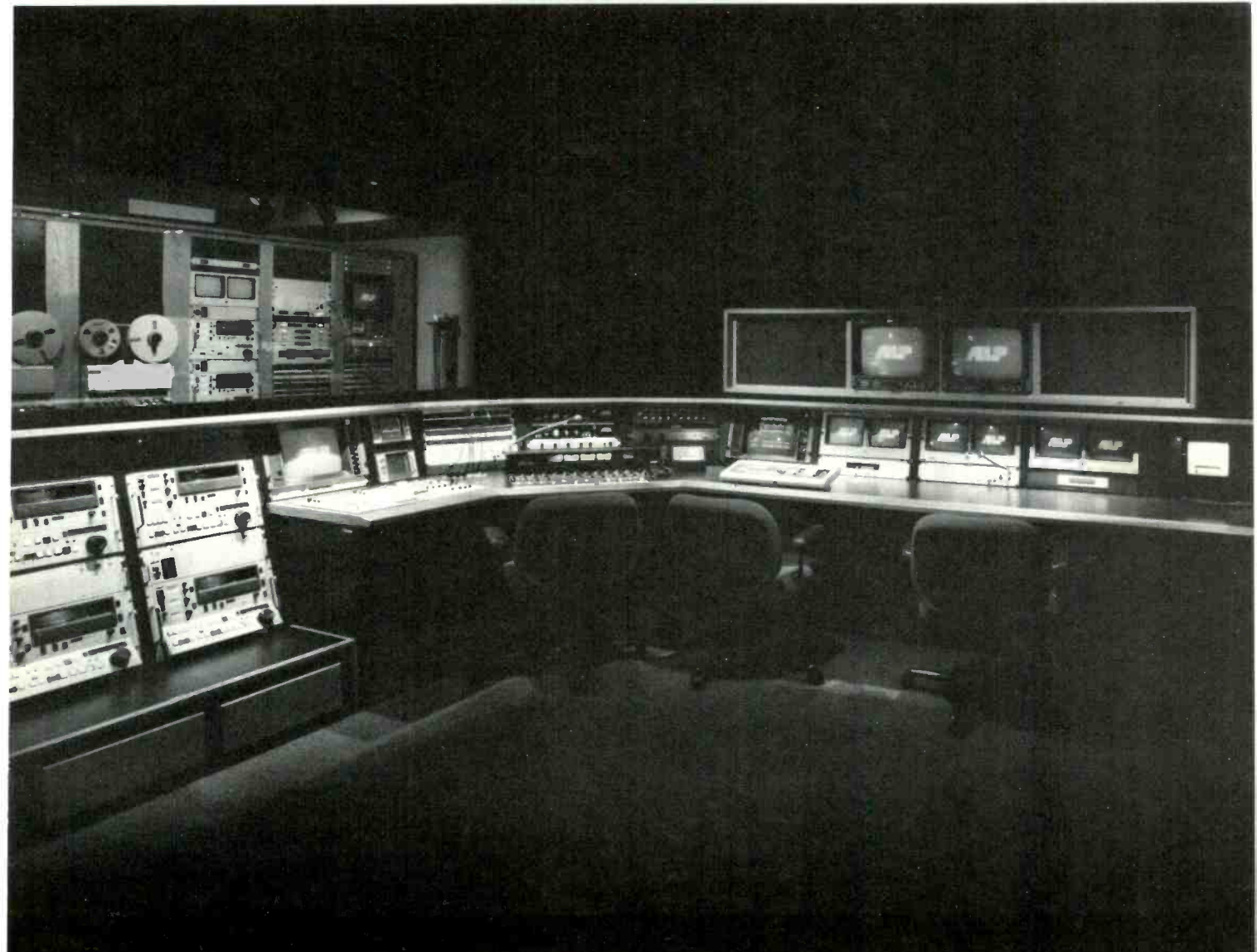
Although the System Four has done only a few jobs so far—a project for the *MacNeil-Lehrer Newshour* and some industrials for the Bank of America—Malvin is pleased with its features and will soon use it on *It's Showtime*, a half-hour promo piece for the Showtime cable network. "We have about 100 hours of editing to do for Showtime, so we'll really put the system through its paces," Malvin adds. He especially likes the way the system reinitializes itself after a change of serial VTRs.

New entrant

Although its systems are widely used in Japan, Elecon is just entering the U.S. marketplace and recently introduced its EM-7100 midrange editor to broadcasters here. The system can control up to four VTRs and a switcher and features intelligent machine interface with serial data transmission over distances of up to 1500 feet. One of the first U.S. users is Group W Cable in Seal Beach, CA, which got the EM-7100 about a year ago. The Elecon is Group W's main editor and is configured as a simple A/B roll system with two JVC ¾-inch VCRs and an Omicron switcher. It is used to post-produce local origination and leased access shows as well as commercials.

Chief engineer Evan Guyer says that Elecon was very responsive in dealing with some initial problems with the system, creating interfaces for the JVC decks (the system usually works with Sonys), smoothing out some time code problems, expanding the memory to 512 events with no charge, and providing explanations as needed. "They're really taking care of us very well," Guyer states. In addition to the Elecon, the cable company has two small cuts-only editors, a JVC and a Sony.

Clearly, the availability of such a variety of midrange editors gives broadcasters a range of possibilities, from upgrading their news opens to sophisticated one-inch post-production of local shows and commercials. They bring high-quality video editing into the realm of the affordable. **BM/E**



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UNDERSTANDING COMPONENT VIDEO

Component video, in its various analog and digital forms, is an essential ingredient in state of the art television systems

By S. Merrill Weiss

Component video, now a hot topic among U.S. broadcasters, began to attract attention a few years back with the introduction of broadcast-quality half-inch field recorders. Since then, the market has produced component production switchers, component TBCs, and other equipment exploiting the advantages of component processing. But component processing has been a critical part of broadcast plants since the introduction of RGB chromakeyers and digital effects boxes that operate in component form. Looking to the future, component processing is basic to the make-up of both digital video and high-definition television. The excellent signal quality that arises from keeping signals in component, rather than composite, form has been widely noted, as well as component's freedom from the artifacts inherent in NTSC and other encoding schemes. The mixture of analog and digital component techniques is a hallmark of today's state of the art television studio.

History

The origins of analog component video date back to 1977, when the movement to standardize digital television got underway. Digital video offered many interesting possibilities for studio equipment beyond the digital VTR. Engineers quickly saw, however, that certain kinds of digital signal processing, such as that involved in spatial manipulation of the video signal, could not function in the presence of the composite subcarrier. This realization led them away from digital composite video toward digital component. It was reasoned that as long as equipment operating in the digital domain performed its processing in component form, it made sense to interconnect equipment in component form throughout the system. Staying in component would save the expense of encoders and decoders, with the tradeoff being a slightly more complicated distribution scheme.

Engineers soon noted that the component signal resulted in significantly better picture quality. Interest in component video was further encouraged by the introduction of digital special effects devices and high-quality chromakeyers, all of which operated in component form. In the process, engineers discovered that much of the benefit of digital component video derived from its component, rather than digital, structure. That discovery prompted a closer look at analog component signal processing, which was easier to implement with current technology than digital component.

The real reason for the move to component signal processing, however, is an attempt to overcome the difficulties of NTSC. NTSC was originally developed as a transmission scheme, not for signal processing in production. Its purpose was to get the three signal components—red, green, and blue—through to a display device. It was designed to utilize minimum bandwidth in the process and to be compatible with monochrome.

NTSC artifacts

From the first implementation of NTSC for transmission, however, it was also used in the studio. Engineers felt that since video was going to be transmitted in NTSC, NTSC was the most economical way to handle the signal in the studio despite its inherent weaknesses.

The problems, or artifacts, associated with NTSC derive from its composite structure. NTSC video is generated as a luminance signal and two color difference signals. Luminance is a matrix of RGB, and the color difference signals are matrices of red, blue, and luminance. After the color difference signals are matrixed, their bandwidth is limited prior to modulating them onto a subcarrier. The subcarrier with the color difference signals is mixed, or composited, with the luminance and then transmitted.

In the process, interference is generated between the luminance and color difference signals. This interference causes cross color and cross luminance, artifacts of NTSC that are visible in the picture and cause serious problems during such processes as color matting. Cross luminance is the interference of the color signal into the luminance signal, visible, for instance, as dot crawl moving around the edges of colored letters on a colored background. Cross color is a form of interference between the luminance signal and the subcarrier that interferes with the proper demodulation of the subcarrier. In the picture, it is visible as color rainbows in areas of fine patterns in the luminance signal; e.g., the sportscaster's infamous plaid jacket. These artifacts are also known as the NTSC "footprint."

Simply decoding NTSC doesn't solve the problem because once the signal is encoded, it is very difficult to decode it with high quality. Frequency combing or filtering can begin to separate the components of the composite NTSC signal. However, the overlapping of the spectral elements of the luminance signal with the interleaved spectral elements of the subcarrier's sidebands makes it impossible to perfectly separate those signals in the demodulation process.

For this reason, component signal processing has been in use in most

Figure 1

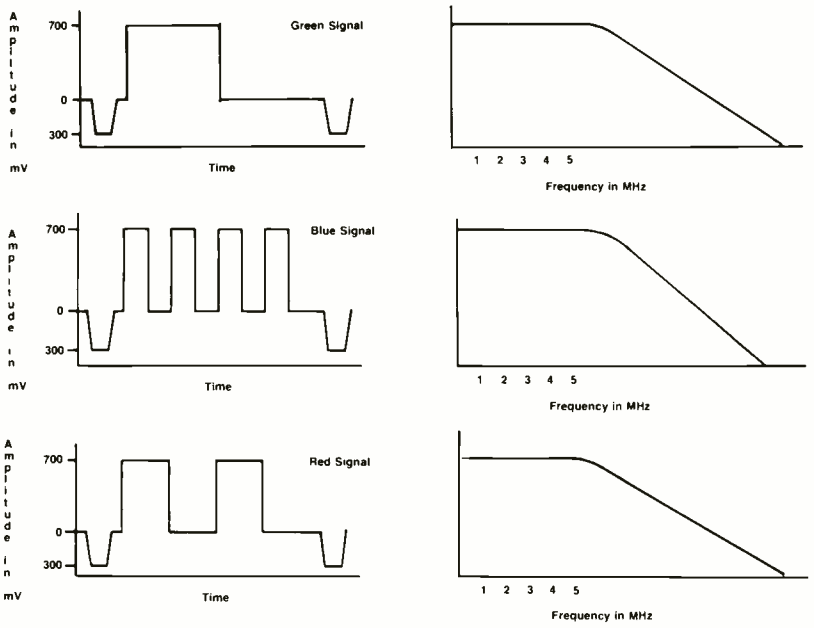

Figure 1. Color bars are shown on three channels to serve as a reference for examination of the various forms of component signals. Amplitudes are 700 mV for the video signals; 300 mV of sync is added for a total of 1 V. The spectrum of each signal is also shown. A baseband bandwidth of 5.5 MHz minimum is assumed. Interconnecting RGB signals over separate channels and circuits yields the most basic form of analog component interface.

Figure 2

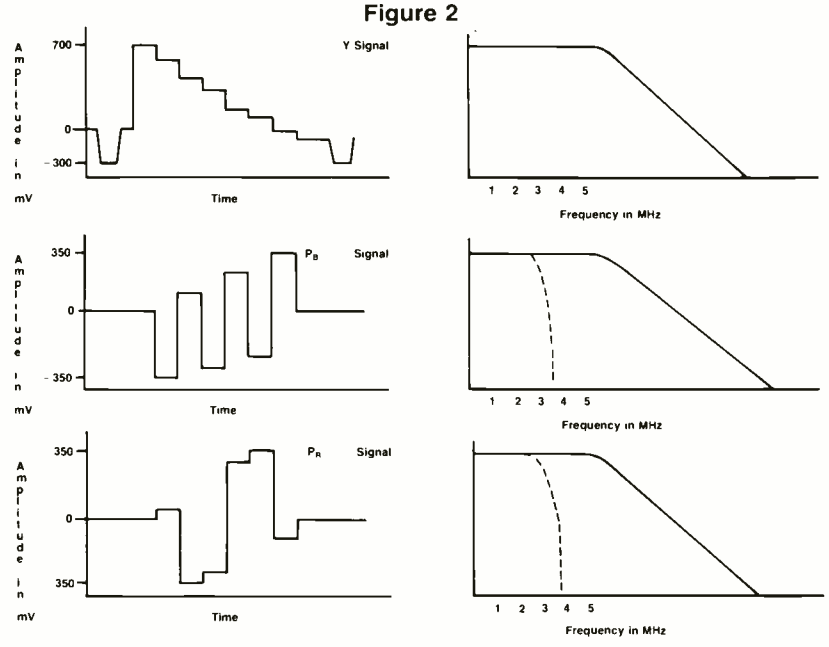

Figure 2. R, G, and B are matrixed to form luminance (Y) and two color difference signals based on B − Y and R − Y. These signals have reduced susceptibility to errors relative to RGB. The amplitudes of the color difference signals are scaled to occupy the same range as luminance—700 mW. The scaled signals are called P_B and P_R. Shown dotted are narrowband versions of P_B and P_R that have been filtered to 2.75 MHz to match the bandwidths used in several other component forms. Figures 1 and 2 represent the parallel analog component signals that are being standardized.

plants for many years, even if its recent position in the limelight has made it seem like a new process. For example, the RGB signals fed to chromakeyers or color mattes are component signals. The use of component signals to feed chromakeyers is necessary because the artifacts of the NTSC process make it impossible to get a clean chromakey or color matte with an NTSC input to the control path of the chromakeyer.

The popularity of digital video effects provides another cogent argument for component processing. Image processing for digital effects machines demands a very clean separation of the signal. The presence of the NTSC subcarrier makes it impossible to vary the size of a picture. Therefore, when a picture is resized or manipulated in a composite environment, the composite signal must be decoded into the baseband component elements. Those component signals can then be adjusted in size and must be reencoded to pass back into the composite system. Since picture manipulation often requires several layers of processing, the picture is degraded by the demodulation and remodulation process on each pass through the image processing system. This can lead to footprints on top of footprints in the resulting picture and is the principal cause of the degradation we see in image processing devices.

Another area that can benefit from the use of components is simple keying. It has been demonstrated that luminance keying of, for example, colored characters over a colored background in components for display in composite form yields far better results than doing the same key in composite form for display in composite. Furthermore, doing an RGB chromakey of component pictures yields a significantly better result than doing an RGB chromakey of composite signals when the result is displayed in composite form.

The promise of component video is in overcoming the NTSC limitations and eliminating artifacts in the final image. Component video consists of discrete elements of the signal, whether they are RGB or color difference, that are kept separated in time or space. They can be on a single channel if they are time multiplexed, or can occupy separate channels. They could, in fact, occupy different spectra within a given channel.

Analog forms

Analog component video comes in three forms: frequency division multiplex, time division multiplex, and space division multiplex. Space division, or parallel component video, is probably the simplest because the signals already exist in red, green, and blue as they exit the pickup device. The signals can easily be matrixed into luminance and two color difference signals, which is generally a better choice than RGB because it is less susceptible to distribution problems. Once the signal is in parallel form, the components are sent down three identical channels using an individual connector cable for each, or a connector with several coaxial circuits and a cable with several coaxial elements. For small systems such as edit suites or small studios, parallel

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component is the cleanest and most economical technique. (A single connector to carry three coaxes, in a cable about the same size as a video cable used for NTSC, is under development and will be available in the near future.)

Another form is frequency division multiplex (FDM), in which each of the three components is put on a carrier and distributed on a single cable. The various carriers can be mixed onto that cable without interference, similar to the methods used in triax camera systems. This method requires a significant amount of bandwidth, however. It is the least expensive form of single-cable component video, but it is difficult to equalize across the bandwidth and it is not adaptable to existing plants. The widest-bandwidth routing switchers currently in use have a bandwidth of 30 MHz. This is insufficient for adequate-

Figure 3

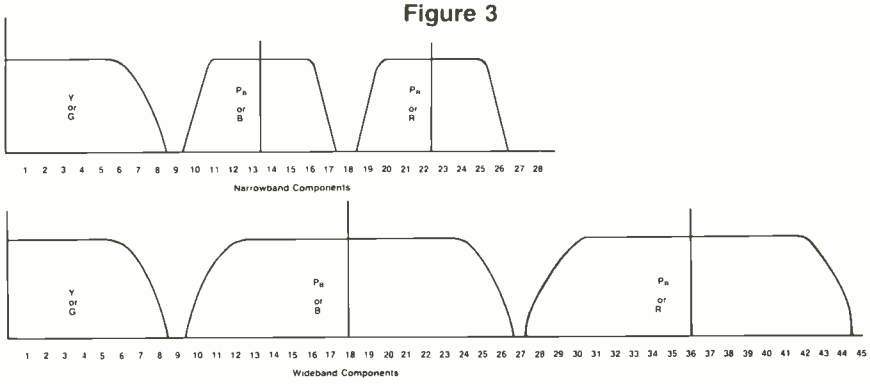

Figure 3. Spectra of frequency division multiplex (FDM) schemes in both narrowband and wideband forms. Luminance or green is carried in baseband. The other components are modulated on carriers. Amplitude modulation is shown because it minimizes bandwidth. Frequency modulation would yield better performance and would be preferable, but it would increase the bandwidth.

ly carrying high-quality FDM signals.

It was principally for the purpose of compatibility with existing facilities that time division multiplex (TDM) was developed for studio applications. With TDM, the component signals are placed sequentially on a single cable. Since those signals start out occupying the same amount of time, all three cannot fit on the cable sequentially in real time. For this reason, the signal is time-compressed via one of several schemes. The original scheme uses a 3:2 squeeze on luminance and a 3:1 squeeze on the color difference signals, with the two color difference signals occupying alternating lines. Together, the luminance and one color difference signal occupy the same amount of space as one original line. The luminance takes up two-thirds of the line and the color difference signal the remaining third. This scheme was developed for satellite transmission.

For studio applications, it was deemed necessary to have both color difference signals on every line, an important consideration for chroma-keying and spatial image manipulation processes. To accommodate this, a compression scheme was developed utilizing a 2:1 squeeze on luminance and a 4:1 squeeze on each of the color difference signals, yielding one-half line for luminance and one-quarter line for each of the color difference signals. The result is a signal that can be transmitted in analog form. Starting with a 5.5 MHz bandwidth in luminance and squeezing it by 2:1 yields a doubling of the bandwidth to 11 MHz. Similarly, starting with a 2.75 MHz bandwidth in the color difference signals and squeezing them by 4:1 results in an 11 MHz bandwidth. A very robust picture results with this technique. The signal is virtually impervious to differential phase and gain distortions and it degrades gracefully under conditions of reduced bandwidth. This type of component signal is called Multiplexed Analog Components for the Studio, or S-MAC.

Digital forms

Just as analog components come in three forms, digital components also come in three forms. The most basic form of interconnection of digital component signals involves the use of multiple pairs in parallel, with separate groups of pairs carrying each of the components. Bit-parallel digital words representing each sample point in the picture are placed sequentially on each of the appropriate groups of pairs. The luminance group operates at 13.5 megawords per second and the color difference groups each operate at 6.75 megawords per second. This scheme, however, requires the use of a mini-

Figure 4

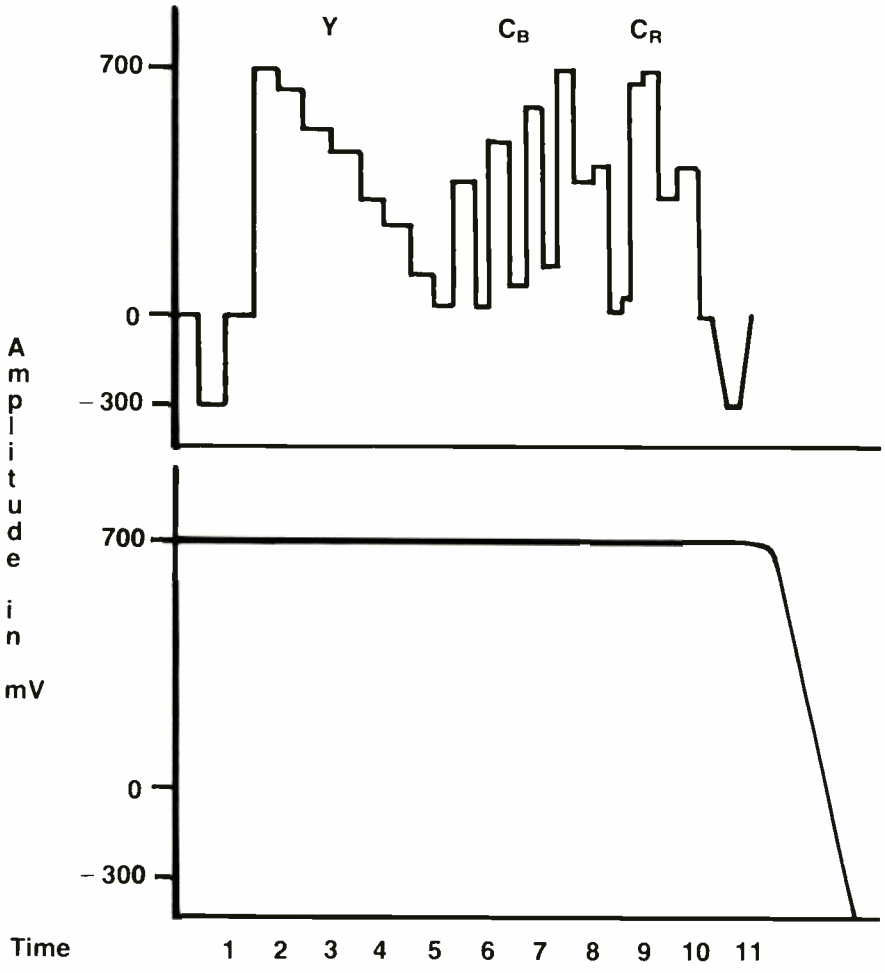

Figure 4. Waveform and spectrum for the time division multiplex (TDM) form of analog components, S-MAC. It consists of Y compressed 2:1, C_B compressed 4:1, and C_R compressed 4:1. The C_B and C_R portions of the waveforms are derived from P_B and P_R by offsetting their baselines to +350 mV. The time compression yields a bandwidth of 11 MHz.

mum of 27 pairs (three groups of nine) and three connectors for its implementation; it is impractical for studio use because of the space that it takes and its difficulty of installation.

The next step is to time-multiplex the digital words into a bit-parallel scheme in which words of luminance alternate with words of color difference information down a single group of nine pairs. It is necessary to double the data rate on that group, however. Whereas before 13.5 MHz was the maximum bandwidth required for luminance, 27 MHz is now needed for a luminance and two color difference signals. That gives each of the color difference signals half the number of samples of the luminance for a digital 4:2:2 system.

The third technique is an extension of the scheme that multiplexes the luminance and two color difference components into a single signal. It takes the multiplexed result of the second technique and converts each parallel word into a serial word at a much higher speed. The resulting signal can then be sent down a single channel. If the original parallel signal operated at 27 megawords per second and there are eight bits of data, the resulting serial signal is at 216 Mbits per second. Because an error protection scheme is applied and adds one bit to each word (for a total of nine bits per word), the resulting data rate is actually 243 Mbits per second. This signal can be transmitted over either coaxial cables or optical fibers.

Which of the techniques is likely to be used in any particular application depends upon the size and structure of the facility. If a given plant is built as a group of "islands" that serve specific functions (such as post-production suites, graphics creation stations, or studios), it is likely to be most economical to use a parallel form of interconnection within these islands. This will be the case whether the components are in analog or digital form. When it is necessary to interconnect a number of islands, or to distribute and route large numbers of signals, then a serial form is

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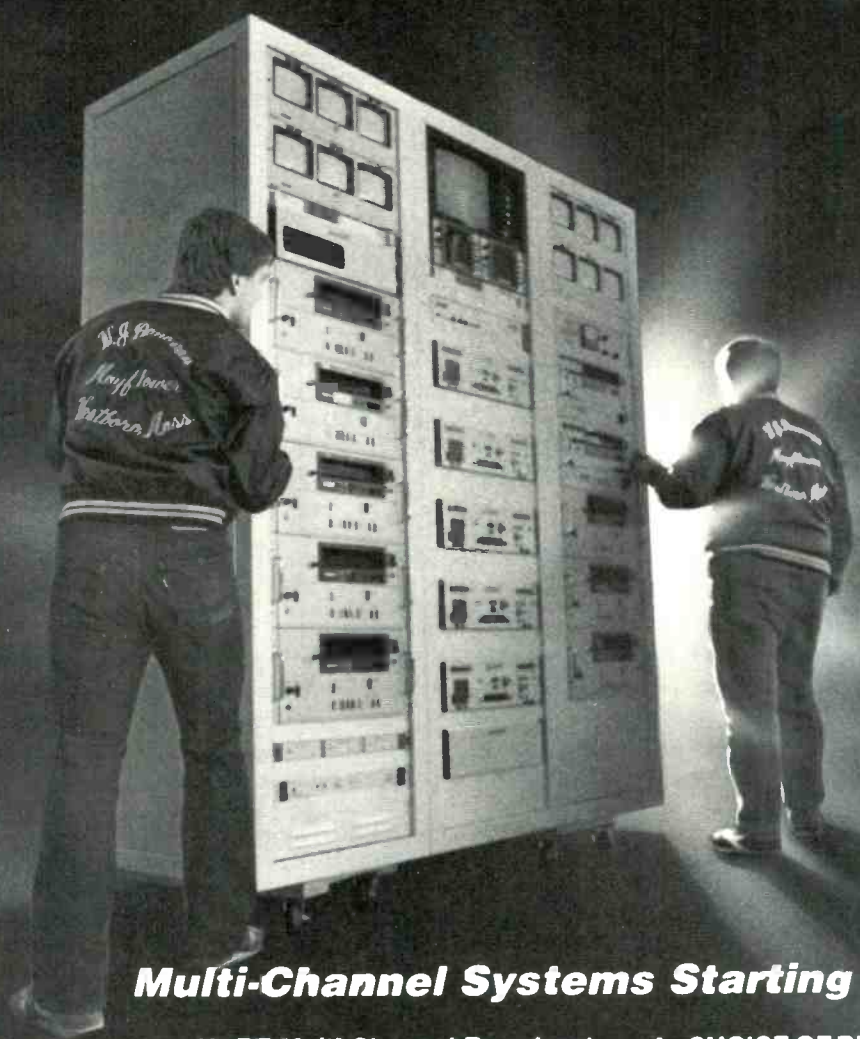

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likely to be more economical. The decision between the two forms can be made by weighing the additional cost of converting the signals into serial form against the cost of carrying those signals on multiple cables or pairs, through multiple connector contacts, through multiple parallel amplifiers, and through multiple switching paths.

Advantages, problems

Analog components can serve as a transition either to the all-digital studio at standard scanning rates or to high-definition television. The use of analog components as a step toward the all-digital studio is desirable because it allows component signals to be incorporated into existing facilities. Furthermore, it allows components to be incorporated sooner because many functions that are not yet available in digital are available in analog. Once the transition is made to components, then sections of the system can be converted to digital, as needed, with little difficulty.

The high-definition systems currently under consideration are all component systems, which so far have been demonstrated in analog form. A standard-definition analog component video system, therefore, can be upgraded gradually to high-definition by extending the bandwidth of each part as it is replaced. Once a complete path has been upgraded to the wider bandwidth, it can then be used to carry high-definition signals. Interestingly, this cannot be done with a digital component system because the digital clock places an upper limit on the bandwidth of the signals that can be carried.

Analog components are not without their problems, however. They are subject to differential timing and amplitude errors. For example, the three signals may arrive out of time with one another. For the three components to be superimposed properly over each other in the picture, they must be properly timed. When RGB components are out of time with one another, the result is similar to misregistration in a camera. When color difference components are out of time with one another, the results are similar to chrominance-to-luminance delay in a videotape recorder. Consequently, it is important to minimize differential timing between the components.

Other problems involve amplitudes and offsets. When dealing with RGB components, a baseline differential offset will result in improper black balance. An amplitude differential will result in improper white balance. In the

Figure 5

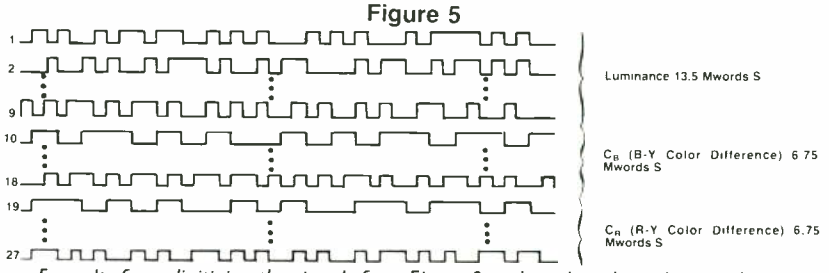

Figure 5 results from digitizing the signals from Figure 2 and sending them down eight pairs for each signal—a total of 24 pairs carrying signal data. Each group includes a ninth pair for a reference and timing signal. All 24 bits are sent in parallel, while words representing sample locations are sent serially through the 27 total pairs. The data rates are 13.5 Mwords/s for the luminance group and 6.75 Mwords/s for each color difference group.

Figure 6

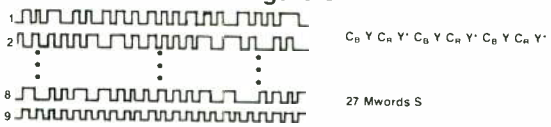

Figure 6 results from multiplexing of the data from Figure 5 by alternating betwen luminance and color difference data. Nine pairs are required: eight for data, which now include the timing signals in the data stream, and the ninth for a clock signal. The order of transmission of data is shown, with the Y representing luminance samples with no corresponding color difference samples. The other luminance and the two color difference samples are all co-sited.*

Figure 7

Figure 7 is the result of taking the data from the eight data lines in Figure 6 and serializing them. The clock is not needed as the signal is self-clocking. A ninth bit is added to the data to provide error detection. This results in a final data rate of $27 \times 9 = 243$ Mbits/s. The signal can be sent through a single channel such as coaxial cable or fiberoptics.

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case of color difference components, a baseline offset will result in black balance error, although less than in the RGB case. An amplitude differential will result in hue and saturation changes, but will not affect white balance. This is one reason among many that recommend the color difference form of components over RGB for distribution.

The potential errors just outlined can be overcome through careful plant design and/or maintenance. Modern distribution equipment is very stable and, if carefully adjusted, can yield very high quality results. In development currently are special control signals to permit automatic correction of timing and amplitude. This will allow the construction of adjustment-free analog component facilities once equipment utilizing the control signals becomes available.

Standardization efforts

The full realization of component technology's potential is dependent upon the creation of standards that simplify the implementation of systems and allow for easy translation of signals from one form into another. Two working groups within the Society of Motion Picture and Television Engineers have been developing four interrelated standards for component video. These include two parallel standards, one analog and one digital, and two serial standards, one analog and one digital. The parallel digital standard has been fully approved and is in effect. The two analog standards have been approved by the working group that developed them and are on their way through the approval process. The serial digital standard will soon begin wending its way through that process as well. In addition, the two working groups are jointly developing other supporting standards, such as a sync scheme that can be used for both analog and digital component systems. They are also jointly studying the problems of interfacing NTSC signals into the component environment, in particular the problems caused by setup in NTSC.

The goal of the two working groups is to create a series of complementary standards that will allow selection of the most appropriate techniques for each part of a facility, and easy interconnection with parts for which other choices are more appropriate. This goal largely has been achieved. The techniques that have been standardized provide the ability to move signals from one form to another with minimum complexity and cost and maximum signal fidelity.

The use of components in studio applications eliminates the interference of NTSC artifacts with the production process. This promises to yield improved picture delivery to the viewer, even when he or she views the production through an NTSC window. **BM/E**

At the time of writing, **S. Merrill Weiss** was president of Imagex of Emeryville, CA. He recently moved to NBC as director of broadcast systems engineering. Weiss is chairman of the SMPTE Working Group on Component Analog Video Standards and member of the Working Group on Digital Video Standards.

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Telecine Techniques Retain Film Subtleties

Technological differences between the broadcast and film media have always complicated the airing of shows produced on film. Now, new transfer techniques allow for fewer losses in translation.

By *Russell McMurtray*

From the earliest days of the usually happy marriage between the filmmaking and broadcasting communities, one of the biggest frustrations has always been the television system's inability to translate the rich subtleties of the "film look" to the video screen. There are variances in line resolution, contrast ratios, luminance, chroma, and even sound, to name just some of the main areas where these two media simply see things differently.

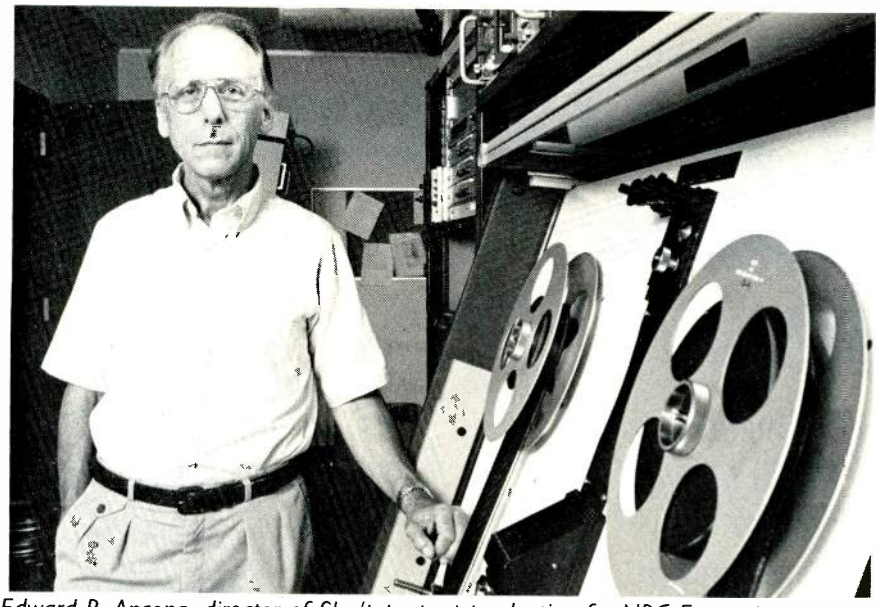
Many visual niceties that directors of photography painstakingly paint with light in order to render a mood or to make a story point are lost when film imagery is transferred to videotape, which is then displayed on a television system. Many a director and cinematographer has suffered much anguish when the lustrous black hair that helps to define a character turns dull brown, or a lush pinstriped suit loses its air of authority and comes across as chalky, solid gray.

And that doesn't begin to touch the emotions aroused when objects and characters simply disappear in shadow areas. Many a remedy has been tried, and some have worked better than others. During an earlier period, a serious attempt was made to restrict the lighting ratios that camera operators could use when shooting film for TV. That was something like trying to cut down on a home run hitter's strikeouts by taking his bat away. This strategy quickly proved to be impractical since so much television film is also shown in theaters, where optical projectors can make good use of the broad range of the tone scale.

Nevertheless, film is looking better on television today as a culmination of various efforts that have been in the making for a long time. ABC, NBC, CBS, and the cable television networks are all making extensive use of the latest generation of production telecines, which are designed to preserve the intentions of the filmmaker during the video transfer process.

Both ABC Television and CBS Television have installed Bosch CCD telecines at their respective facilities in the Los Angeles area, and these machines are seeing heavy-duty use for transferring prime-time evening programming to videotape for airing.

NBC Television is encouraging producers to provide them



Edward P. Ancona, director of film/tape post-production for NBC Entertainment, stands besides the network's Rank Cintel flying spot telecine.

with one-inch videotape transfers made at any of a number of post-production houses equipped with Rank Cintel flying spot telecines. These video transfers are made under the direct supervision of Edward P. Ancona, director of film/tape post-production for NBC Entertainment. Not uncommonly, the show's producer or director of photography is also present.

"The objective is to obtain the most faithful reproduction of the original intent of the production team," Ancona says.

He estimates that Los Angeles area post-production houses alone operate some 75 advanced design production telecines, the large majority of which are Rank Cintel flying spot scanners. The network specifies one-inch transfers for all the theatrical features it airs and gives producers the option of providing either 35 mm prints or one-inch tape for movies-of-the-week, miniseries, and episodic TV.

In contrast, ABC specifies that if a program is produced on film, an air-ready film print must be delivered. The video transfer is then made with the network's own Bosch telecine.

New film stocks

Another significant development that is favorably affecting the look of film on network television is the rapid acceptance of Eastman low-contrast color print film 5380. Robert B. Hudson, Jr., director of network film services for ABC Broadcast Operations and Engineering in Los Angeles, refers to this as "telecine-optimized film." This product was introduced in late 1982 and is already in wide use for film destined for videotape transfer.

Both Ancona and Hudson specify this procedure, and Eliot Bliss, director of quality control at CBS for films for TV, recommends it in most cases. This low-contrast print film was designed for the specific purpose of making high-quality video transfers. It is exactly the same as Eastman color print film 5384 in all respects except that it has about 15 percent less upper scale contrast.

This reduced upper scale contrast keeps the shadows from getting so dark the telecine "eye" can't see through them. It does not hurt the images recorded on film, and in most cases it allows the telecine to transfer shadow details almost as clearly as they would appear during projection of a "normal" contrast print. The timing is exactly the same for the two print films, which saves both time and money; some timers, however, claim the tracking is not always identical. Bliss beleives this may be an experience problem that time will solve as the changes to be made in timing differ, at least in degree, for the low contrast print stock as compared to the normal contrast stock.

Hudson points out that when ABC Television produced the movie *Silkwood* a couple of years ago, the same timing instructions were used to make both theatrical release prints and a TV-optimized master on LC stock for release to the home video marketplace, where it became a very big hit.

Gus Dato, general manager of broadcast operations for ABC Television in Los Angeles, points out that people who own VCRs have high expectations for the cassettes they buy and rent.

"For both network prime-time programming and VCR releases, we specify that we want to make the video transfer from an LC print which was made from the original negative," he states.

Transfers from negative

Not all film transfers are made from prints, however. Many film commercials are transferred directly from negative with a Bosch, a Rank Cintel, or another advanced telecine as part of the post-production process. This tactic has also been used with both episodic TV and movies of the week, including *Fame*, *After MASH*, *Partners in Crime*, and a handful of others.

"It's a great look," says Bliss. "You can preserve shadow details, highlights on hair, and eye catchlights exactly as they are recorded on the original film, but it is not necessarily the classic 'film look' that some people may want."

"You can get remarkable image quality [with this method]," Ancona comments. "However, the extended luminance scale may make it difficult to maintain midtones."

So, with this kind of results, why isn't more negative-to-video transfer work being done on prime-time productions? The reasons are both subjective and practical.

"When you are shooting a commercial, you have a director who is also often the cameraman sitting there looking over the telecine operator's shoulder," Bliss says. "He knows exactly what he was looking for when the film was exposed, and what he wants now, so nothing is lost in the process." For example, the hit miniseries, *George Washington*, contained a scene in which Martha walks through a dark hall illuminated only by the flickering candle in her hand. Bliss recalls that the first time a test transfer from negative was made, Martha appeared to be walking down a sunny hallway at 10:00 a.m.

"We need to be very careful to maintain the integrity of the artist," Ancona agrees. "Very often, the people who are shooting film are dealing in subtleties rather than absolutes."

These subtleties may include such things as the small, flickering light on a paneled wall that allows viewers to "feel" the opulence of an interior, or

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the shadow passing over an actor's face as an expression briefly changes, indicating the character's momentary thoughts. Ancona observes that a talented cinematographer, working in conjunction with a sensitive director, is like a painter. The problem, he notes, is that they are taught to paint for a display on a theatrical screen, while television presents a whole set of comparative physical limitations.

Ancona believes, however, that some cinematographers are now lighting and shooting for the video system, though this isn't feasible for television programming produced originally for theatrical release. A larger part of the answer is finding ways to improve the technology for video display.

Cost savings

There are other important reasons why the great majority of prime time network programming is taking the negative to LC print to video release route. "There are places in the syndication market where you need film prints," Bliss observes, "though tape is being accepted more and more each season." Another reason, CBS finds, is that reprocessing tapes for reruns when placement of commercials is changed is more costly than with film, as Moviola/editor time is less expensive than video edit room time, at least at this point.

If you time and color-correct film and then make an LC print for video transfer, you are set to release in any format, Bliss points out. You can make a theatrical release print, or LC prints for TV markets that prefer film, or a video transfer.

Hudson says ABC prefers to receive edited, timed, and color-corrected LC prints. "That saves us a lot of time in making the transfer," he explains. "Often we can make our transfers in real time, since the low contrast print almost automatically resolves any problems with contrast."

"It would quadruple our transfer time if we did color timing and corrections with the Bosch," Dato claims. "Our objective in making our own transfers is to eliminate scratches and handling problems and to faithfully replicate the images recorded on film."

Just about the only regular ABC program scheduled in prime time that is not following this route is *The Love Boat*. "They have a well-established look that the producer wants to preserve," says Hudson. These video transfers are made from Eastman color print film 5384.

As an incentive for producers, who after all retain long-term distribution rights after the original network run, ABC will allow them either to duplicate the original tape or buy it at a moderate cost.

Ancona estimates that it takes approximately four hours to transfer and time a 96-minute made-for-TV movie from an LC print, presuming that there are no "problems" with the cinematography, such as extreme contrast ratios and so on. In comparison, he notes that a theatrical film released on TV typically takes three to four days to transfer because of the editing that needs to be done to meet the sex, language, and violence standards of the broadcasting industry.

As a point of reference, he adds, it typically costs $300 per hour to rent telecine time at a broadcast-quality post-production house.

Bliss believes that over the longer term, as more and better equipment becomes available for video post-production, we will see more programming shot on film and transferred directly from negative to tape for post-production as well as distribution. "I think that this will happen with episodic TV first," he says, "because they will have the opportunity to gain familiarity with the electronic post-production system and learn how to make it work for them."

It will be longer before many miniseries and movies-of-the-week are handled this way, he adds. "Some of the people who have tried this have found that costs are higher than they expected," Bliss says. "I think that it will be some time before there is a base of video editing equipment, and people who know how to use it, to support this aspect of the production industry."

Meanwhile, the broadcasting industry has considerably improved the look of film on TV, though it hasn't been easy for people like Dato, Hudson, Bliss, and Ancona. They have had to deal with a lot of anxious producers, directors, and cinematographers who originally had a hard time believing that everything would be okay the first time they looked at LC prints.

"I remember sitting in a screening room with one guy who was just pounding the desk screaming, 'That's gray; it's never going to be black!' " says Hudson.

It has been a educational process, and both camps—the producers and the

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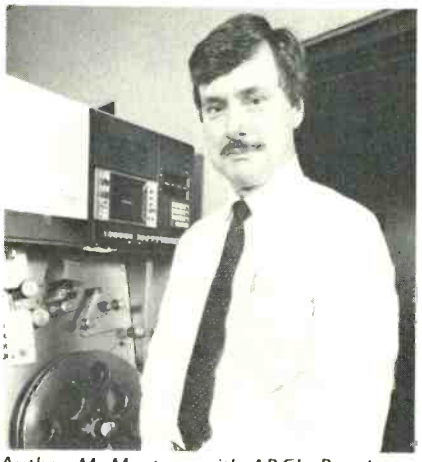
TV technologists—have been party to the learning. Ancona tells of the time he was with a producer looking at an answer print for a movie-of-the-week. The scene was shot in a bar. It was dark; the lighting was best described as psychedelic; the camera operator had used diffusion filters that caused the practical lights to flare; and the producer asked for the print to be made a little more red. "We were sitting there looking at that print, and I was wondering how we were ever going to get the look that he wanted on a TV screen, when the producer asked the lab's color timer if he could give him some more jellybeans," Ancona recalls.



Author McMurtray with ABC's Bosch solid-state production telecine.

Translating terminology

First he had to find out what "jellybeans" looked like. More recently, Ancona was looking at an LC-to-video transfer with John McPherson, the talented cinematographer who shot *Hot Pursuit* for NBC. "John was saying that he wanted a more 'creamy' look, like something else that he shot," says Ancona. "I finally figured out that he was talking about a commercial shot at 30 frames per second [instead of the 24 fps used for conventional film production], which was then transferred directly from the original negative.

"My own perception is that for dramatic and action-adventure shows the LC-to-video look has advantages over negative-to-tape, and certainly over dupe negative or interpositive to tape," he says.

The main point, Ancona insists, is that "we aren't buying color bars. We are buying a creative product from innovative people. Our job is to get that product on the air the way that they made it to be seen, as faithfully as possible."

To achieve this, he believes, more work has to be done to improve the dialog between filmmakers and the technical people, as well as manufacturers and labs, all of whom make a contribution toward putting the product on the air. "We speak in gammas, densities, chromas, and pedestals, and filmmakers are talking an entirely different language.

Does it really matter? The network representatives contacted for this article all agreed with Ancona's view. "I don't think that the average viewer sits there and says, 'I can't see the pinstripes in that suit,' " Ancona says. "However, I believe that at least subconsciously, the viewer is aware that he or she isn't seeing texture. They have a feeling that something isn't right with these pictures. It may not be much. But it's enough. You don't ever want that to happen." **BM/E**

Russell McMurtray is an electronic specialist in the Motion Picture and Audiovisual Division of the Eastman Kodak Co.

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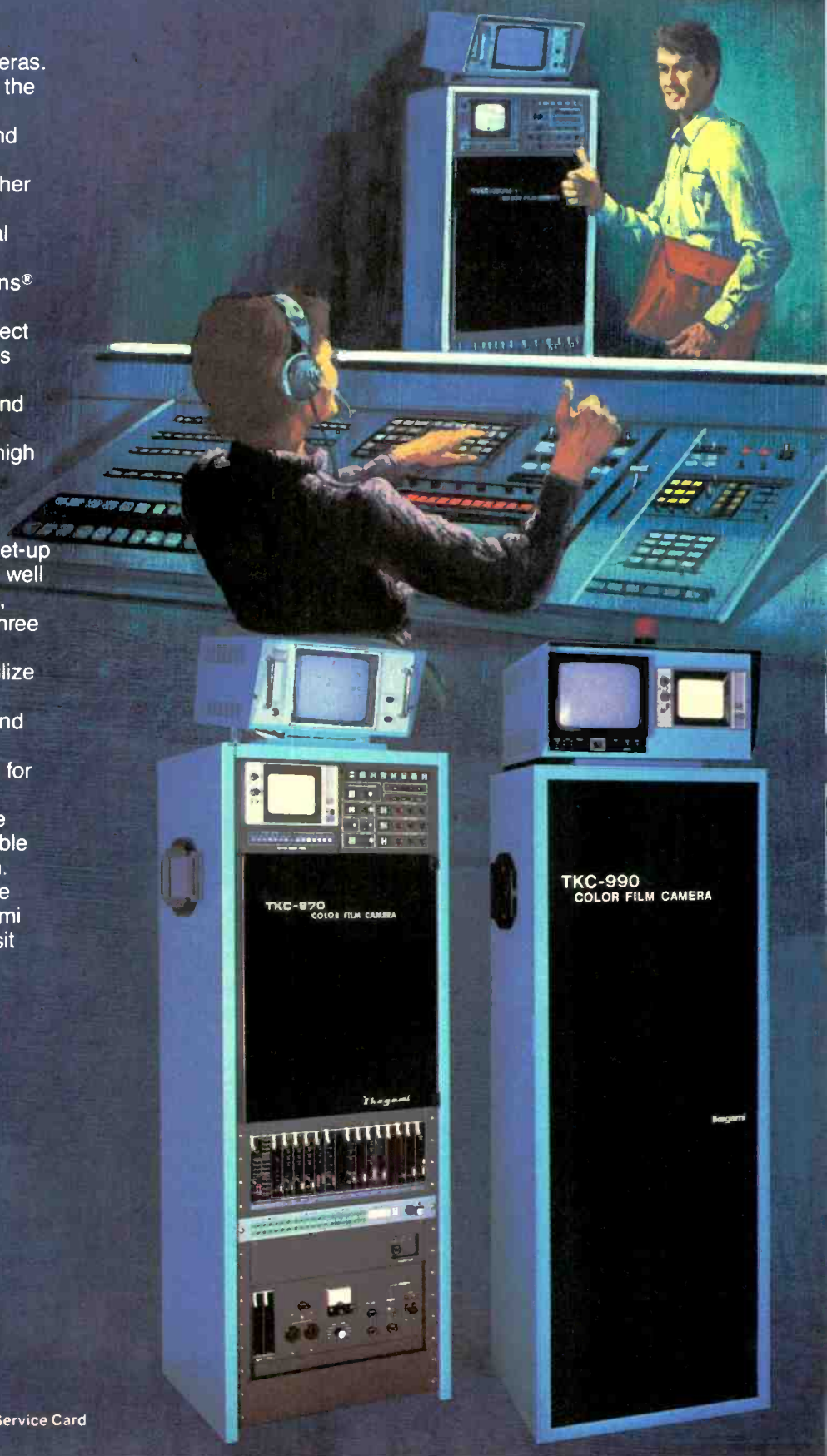

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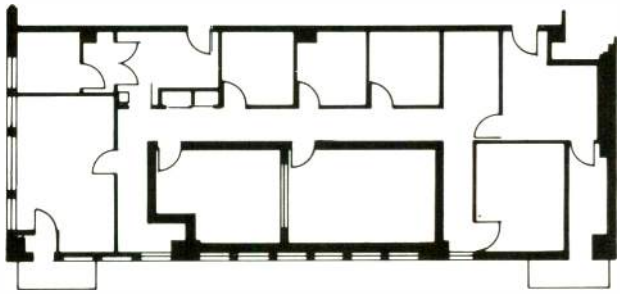
PART 16



PLANNING THE NETWORK RADIO PLANT

BY MAURICE W. WASSERMAN, AIA, AND JANET WATERHOUSE, AIA

This summer, NBC Radio Networks completed the relocation of their radio facilities from their old home at 30 Rockefeller Plaza to 1700 Broadway. The final move capped two and a half years of planning, design, and construction work, supervised by our firm and a team of four consulting firms, working in concert with each other and with a group of extremely competent people at NBC.

As with any architectural project, careful preplanning and communication among all concerned played a paramount role during all phases of construction. With a project of this complexity, planning is especially crucial to success. NBC Radio Networks' new home occupies four areas at 1700 Broadway: the 16,500-square-foot ninth floor, devoted to NBC Radio Networks and the broadcast facilities; the 16,500-square-foot third floor, occupied by the Radio Networks' executive administrative and sales offices; the cellar area housing the emergency generator and fuel storage; and a portion of the roof, with antennas and a prefabricated building for receiving equipment.

During planning and construction, we collaborated with several key NBC people: John Bailie, director of engineering, NBC Radio; Craig Simon, director of operations and engineering, NBC Radio Network; Warren Vandeveer, project design engineer; Ray Weiss, manager of technical operations; and H. Delaney Young, project coordinator. It was this collaboration that led to the successful completion of this project.

Maurice W. Wasserman, AIA, was principal architect for the NBC Radio Networks project. **Janet Waterhouse,** AIA, served as project manager.

The NBC Radio Networks newsroom area was designed for efficiency in both arrangement of equipment and placement of staff.

Our role began in December 1982, when John Bailie contacted our firm to prepare a construction budget report on NBC's utilization of an existing broadcast facility, recently offered for lease, on the ninth floor at 1700 Broadway. This facility had been designed by our firm and constructed during the spring of 1982 for the proposed ABC Radio Enterprises Network. That service never came to fruition, and the ninth floor proved attractive to NBC, which had grown beyond the limits of its home at 30 Rockefeller Plaza.

Equipped with a thorough knowledge of the floor and the building's services, a suggested layout prepared by

NBC, and preliminary input from NBC staff, we developed a schematic design and prepared a construction budget. The facility already had sufficient power, as well as a supplementary heating, ventilation, and air conditioning (HVAC) system to serve 50 percent of the floor, required because the building system shut down at 5:30 p.m. each day and over the weekend. It was immediately clear that NBC would require supplementary HVAC for the remainder of the floor as well as an emergency generator. In addition, over half of the floor required partial or full reconstruction, including the demolition and replacement of all utility power, technical power, and lighting.

NBC Radio Network evaluated the project and proceeded with lease negotiations during the spring of 1983. At this time, we provided NBC Radio Networks with architectural requirements and documents to be incorporated within the lease.

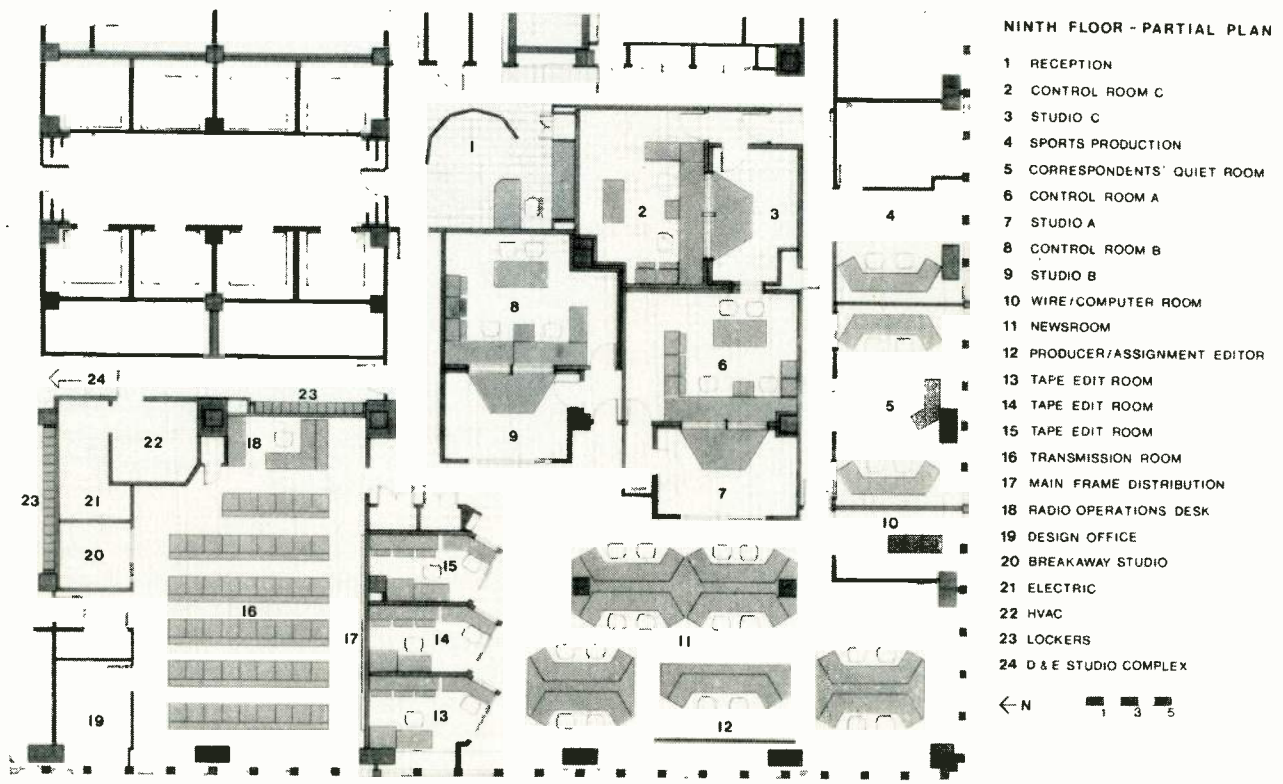
EXECUTIVE OFFICES

While the complexities of the ninth floor lease were being ironed out, NBC's Architectural Planning and Construction Department contacted us to design and monitor construction for the recently leased third floor space at 1700 Broadway—the future home of the executive, administrative, and sales departments of NBC Radio Networks, then scattered throughout 30 Rockefeller Plaza. The project was a challenge. We were to bring together disparate departments with varied functional and storage requirements, utilizing a modular "open office" approach.

As the project progressed, we incorporated a system of energy efficient direct and indirect lighting and central storage shelving mounted on ball bearing rollers. Since vertical wireways and underslab wiring were not permitted, we developed an intricate routing of utility and communications wiring from conduit in columns or perimeter convector enclosures to runs of "raceway" through interconnected workstations. From these positions the wiring would run to 30 Rockefeller Plaza and to the ninth floor at 1700 Broadway.

DESIGN CONSTRAINTS

As the working drawings for the third floor were completed in June 1983, we received formal notice from NBC Radio Network to begin our preliminary design studies for the ninth floor broadcast facility. At this point we called in our team of consultants: Goldman Sokolow Copeland (mechanical, electrical, plumbing); Hayden McKay, AIA (lighting design); Robert Silman (structural); and Robert Hansen (acoustical). During these early months of the project, our efforts were directed to obtaining a thorough understanding of the project requirements and the available building space. We completely surveyed the existing site, visited the existing broadcast



Floor plan for the broadcasting and technical areas of the ninth floor at 1700 Broadway.

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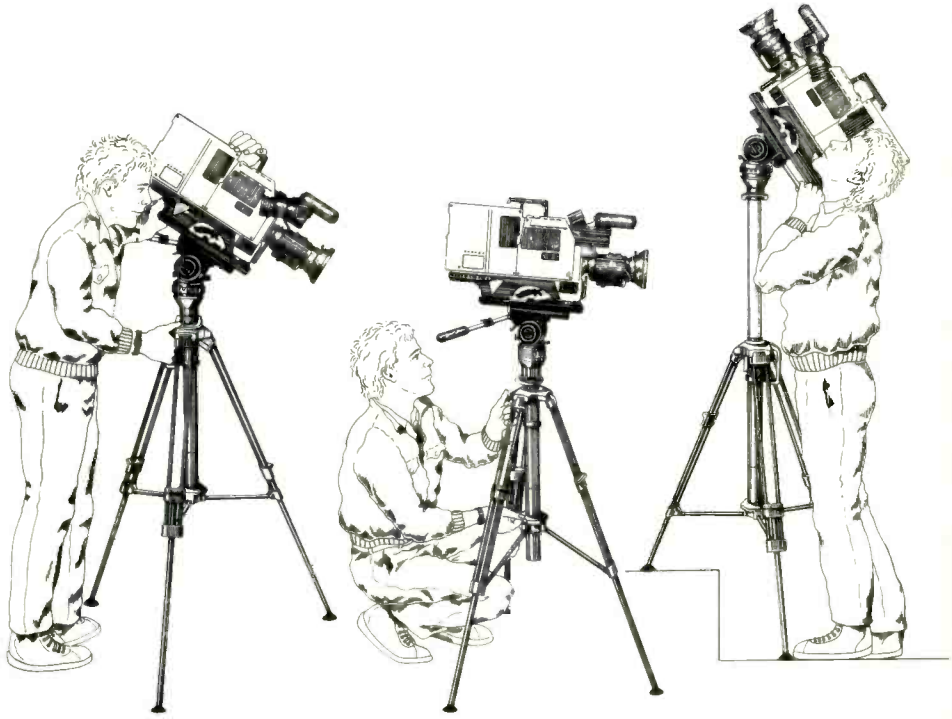

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facility at 30 Rockefeller Plaza, and discussed the needs of the technical and news staffs.

The surveying quickly revealed several constraints with which we would continue to struggle throughout the project. Due to the uniform depth of beams and girders, the maximum vertical dimension on the ninth floor was nine feet, 10 inches. In several critical areas, existing ductwork and conduit runs brought the vertical clearance to a very tight seven feet, six inches. Column bays were 22 by 20 feet. Since 1700 Broadway was constructed as an office building, the existing floor slab was four inches deep and the allowable live load 50 pounds per square foot. The future floor loading was constantly checked throughout the design process as each new piece of equipment was introduced and located.

The greatest obstacle proved to be the routing of vertical conduit runs from the cellar to the ninth floor and on to the roof above the forty-second floor. The original shaft

Producer's desk, foreground, has a clear view into Studio A and Control Room A.

space was inadequate, and we knew from our previous experience during the construction of ABC Radio Enterprises that the vertical runs were extremely tight. Our engineers, with the aid of the building manager, explored the building in order to locate the required number of vertical runs prior to preparation of working drawings.

WORK PATTERNS

At this time, we carefully observed the functioning of the existing NBC Radio Networks facility, constructed in 1955 at 30 Rockefeller Plaza. This study and ongoing discussions with staff members revealed critical circulation patterns and sight lines that became the basis for the area's layout. We also determined desirable locations for equipment and local storage requirements.

We quickly decided that the large masses of newsroom, control room/studios, and transmission area would control the layout within the U-shaped geometry of the floor. The newsroom itself is positioned at the southwest corner of the floor, permitting daylighting of the area and a view of lively Broadway. (This exterior location is unusual for New York broadcast facilities.) The three control room/studio complexes, after additional studies, were placed at the interior of the building. This location was advantageous for security as well as sound control.

At this point, sight lines from the newsroom, particularly the producer's desk, to each of the studios and control rooms were carefully studied and window openings established. The area was laid out with tape edit rooms flanking the north side of the newsroom. Sliding doors, a window, and 30-degree angling of the rooms permit views of both the producer and newsroom traffic. The transmission room was sited directly adjacent to the newsroom, permitting the shortest wire runs to equipment.

The newsroom workstations, designed by NBC, allow maximum utilization of two adjacent surfaces. Each station is equipped with a TV, clock, timer, cart machine, terminal for the Basys newsroom computer, telephone, and output of the 125-input Nemo audio switcher for monitoring.

The Basys system is a major functional hub for the network operation. Through it, correspondents at each station can compose and edit stories and access wire service copy. At various locations on the floor, laser printers produce hard copy. The central computer equipment is separately located in the computer/wire room with its individual system of environmental controls. This room is also linked to 30 Rockefeller Plaza and the NBC News computer.

It is from the control room and Studio A that the news is broadcast on a daily basis. The B studio serves as a support area; the C studio is the sportscasting facility. The dimensions and layout of each room are similar, altered only by the imposition of the building's structure. The equipment in each area is identical: McCurdy consoles, ITC Delta cart machines, Rodgers Studio 1 monitor speakers powered by Bryston amps, and Sony 5002 reel-to-reel tape decks.

The studios and newsroom, as well as the remainder of the broadcast facility, are raised five inches by the installation of computer flooring. Each floor pedestal is grounded to building steel. The newsroom ceiling is composed of 12-inch-square acoustic tile, installed tightly to the labyrinth of ducts running across this area. This system was continued in the studios with an additional sound isolated ceiling.

LIGHTING DESIGN

The quality of lighting, lighting control, and glare through multiple panes of control room/studio window glass was identified as a major issue. We brought our lighting consultant, Hayden McKay, to the existing facility at 30 Rock to observe these problems and for staff discussions regarding desired lighting and control.

Glare and lighting problems in the three studios were solved by installing three separate systems of lighting. In each studio, six-inch recessed fluorescent fixtures, covered with half-inch black egg-crate louvers, were placed directly above each work surface. One side wall surface was washed with light from a continuous recessed fluorescent fixture, again with black louver. Indirect light was bounced off the wall above each window so that the announcer's facial expressions could be read easily. All fluorescent lighting ballasts were remotely located and the

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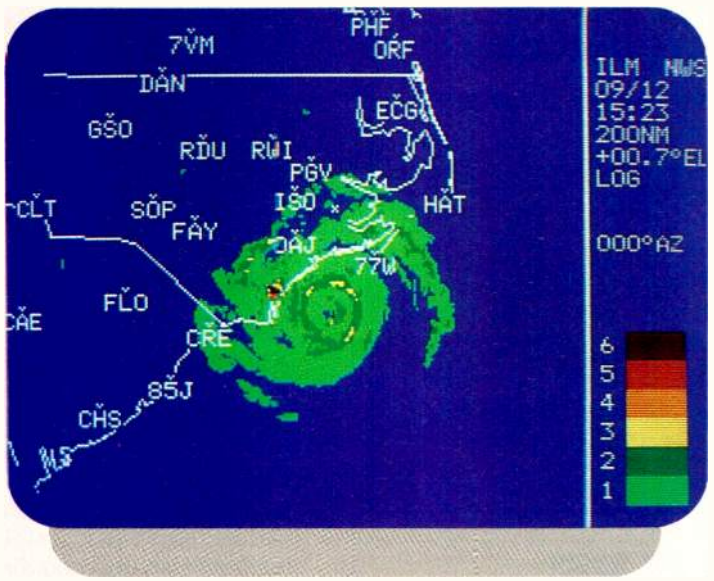

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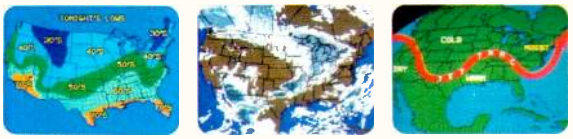

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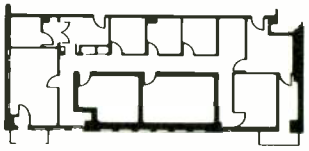

FACILITIES DESIGN AND ENGINEERING

A workstation in the correspondents' quiet room.

light systems controlled by individual dimmers. In addition, the color of each wall surface and the plastic laminate on the work surfaces were selected for specific light reflectance; the reflectances varied between 20 and 70 percent, effectively controlling glare. In the newsroom, light and glare are controlled by vertical blinds and Mylar reflecting shades, particularly important during the afternoon hours.

ACOUSTICAL CONSIDERATIONS

The acoustical design criteria for the studios, control rooms, edit rooms, and adjacent support areas was established by John Bailie for NBC and Robert A. Hansen. Acoustical separation was defined as the value of noise reduction at 125 Hz, ⅓ octave band measured between contiguous spaces. In his work, Hansen has found 125 Hz to be the critical design frequency for rooms of this size because at this frequency, room partitions are efficiently excited and actually act as loudspeakers, rather than deadening sound as intended.

A particular challenge arose from the close proximity of the mechanical room to Studio C and its control room, mandated by the location of the building's fresh air shaft in this area. To isolate the studio from the air conditioning units, an acoustic plenum lined with four-inch fiberglass insulation was installed. Ducts into Studio C, Control Room C, and Control Room B were lined with two-inch insulation. All other ductwork was lined with one-inch insulation. Air volume dampers were deleted from room interiors and airflow was controlled upstream of each area by motorized dampers.

The effectiveness of the acoustic design was insured by close monitoring during construction. The sound-barrier system was tested before construction of the isolated ceilings, and at completion of all sheetrock work. Finally,

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Circle 163 on Reader Service Card

acoustic readings were taken at the conclusion of the project after the installation of acoustic panels within each room, identifying a number of substandard panels that were replaced.

POWER AND TRANSMISSION

At the core of the NBC Radio project are the transmission room, the electric power system, and the backup emergency generator. The power is divided into three distinct systems: emergency lighting, technical power, and general building power (lights and utility). The technical power is conditioned by a Liebert 75 kVA unit that handles all technical requirements for the ninth floor. All technical power is distributed through conduit below the computer floor to hospital-grade isolated ground outlets throughout the facility. These individual grounds ultimately tie to an isolated ground from the basement. Audio grounding is via homeruns of 3/0 copper insulated cable that tie directly to building steel. Continuous operation of the power system is insured by the Cummins 150 kW generator in the cellar.

Heavy structural loads imposed by the generator and fuel tank necessitated installation of dunnage beams set on grout beds and cut into wall pockets at the perimeter walls. The generator was then mounted on a system of vibration isolators. Since cooling air was not available at the cellar level, a heat exchanger system was installed, working off the building's cooling tower 42 stories above. In

Stepped panels of glass bricks provide a dramatic entryway to the NBC Radio Networks facility.

the event of power failure, the system can be on-line in four seconds. Due to space constraints on the ninth floor, an uninterrupted power system was not installed.

The transmission area is monitored by the radio operations supervisor. From this position the supervisor can also observe remote annunciator panels for the generator and security system as well as temperature and security alarms from the prefabricated Bally building on the roof. The operations desk, designed by NBC, is a model of efficiency that contains a computer, printer, typewriter, four video monitors, clock, counter, intercom, Nemo monitor, and a Jerrold selector. Seated at the desk, the supervisor has quick access to the first and second row of racks—the transmission area where audio patching is performed. Via the two side aisles he can easily reach the remaining racks, which hold the mainframes for the 125x125 Datatek Nemo routing switcher and the Datatek channel switcher, Ward-Beck intercom/IFB system, and RCA DATS equipment.

ADDITIONAL AREAS

When plans for the newsroom complex were approved in September 1983, we were able to develop the remainder of the floor—reception, offices, shop, storage, conference, and employee lounge—as well as the technical systems. Warren Vandeveer laid out the transmission room and the newsroom complex while we, in turn, refined plans and sections to accommodate. At this point actual power requirements could be defined and engineered, lighting designed, and cooling loads calculated.

With the beginning of 1984, the final design drawings were approved by NBC and we entered an intense eight-week period of working drawings production. Daily conferences among our office, Goldman Sokolow Copeland, and Warren Vandeveer facilitated this process. The drawings and project manual were delivered to the NBC purchasing department in time for the March 5 deadline. The bid was awarded one month later to general contractor James E. Mitchell and Son, and we held our first job meeting on May 15, 1984. By February 23, 1985, Phase One construction was substantially complete, and the facility aired its first broadcast at 11:54 p.m. that evening. Plans for Phase Two, construction of Studios D and E, were produced during construction of Phase One. With careful phasing of work and construction of temporary partitions, this work proceeded within the occupied space and was completed by September 1985.

This brief glimpse of the NBC Radio Networks illuminates the great complexities of this project. Thorough work at the planning stage provided a strong base. The successful integration of the project was a result of the excellent collaboration between NBC, our firm and consultants, and all of the construction workers who helped to build the facility. **BM/E**

All photos by John William Farrell

RADIO 85

Radio '85 Scores Some Successes in Dallas

Staff Report

Some 2500 radio broadcasters, of an estimated 6000 conventioneers registered, gathered in Dallas for the 100 exhibits and 82 workshops devoted entirely to radio for the annual RMPC in mid September. It was generally regarded as a success; but the convention was not without its problems.

The main complaint from exhibitors was that workshops and seminars were scheduled to conflict with exhibit floor hours, forcing broadcasters to choose between the two—to the detriment of the manufacturers, who pay premium dollars to exhibit at the show. Many manufacturers threatened not to return to the show next year if the scheduling is not improved. To counter this situation, the NRBA showed a spark of creativity in sponsoring a "free lunch" on the second day of the show. A rousing marching band led broadcasters into the exhibit hall where tables of Mexican food and hot dogs were set up, and where food and drink were given away without charge. The exhibit hall saw its biggest crowd flock in for the food, and stay to look at the booths.

The workshops covered topics from sales, to on-air talent, to transmitter maintenance, and the ongoing hot topic, now that the furor over ads for beer and wine has all but receded into the background, was how much action should be taken to warn parents about so-called "pornographic" song lyrics, and how involved radio stations who air such songs should become.

AM stereo came under discussion, again, as always. A panel attended by representatives of Motorola along with Leonard Kahn, who market competing systems, rallied radio broadcasters to the cause for AM stereo as a way to improve an AM signal overall. A multimedia presentation made a strong case for AM stereo with clear and impressive audio recorded from actual stations. That presentation, produced by panel moderator Ron Frizzell, whose WLAM in Maine is broadcasting AM stereo, is now being used by the NAB in presentations to state broadcasting associations and other groups to help champion AM stereo's cause.

The NAB also had an AM stereo demonstration on the exhibit floor,

Some 100 companies exhibited their wares to station general managers, program directors, and in a few cases, engineers, during Radio '85 at the Dallas Convention Center, which most agreed was an improvement over last year's show.

with mono receivers by Yamaha, Jensen and Sony compared with a Sony multisystem AM stereo receiver, a Kahn receiver, and Pioneer and Panasonic C-Quam AM stereo receivers. The idea, according to Michael Rau, from the NAB's science and technology staff, was to show that even nonstereo AM signals sound better on the AM stereo receivers, and that stereo represents an improvement of the overall AM signal. That was the main point made at the panel discussion as well, and it appeared to be well supported among broadcasters. Unfortunately, panel moderator Frizzell pointed out that most of those who attended the panel discussion were already won over to the cause of AM stereo, and he would have liked to see more of those who have not yet switched in attendance at the discussion.

Neither Kahn, nor Motorola representatives were involved in the actual panel, but Kahn brought along a prototype of a Sony multisystem AM stereo receiver for cars, which he says is being marketed in Japan and will be in the U.S. in the future. Motorola, meanwhile, had cars with C-Quam AM stereo receivers and other receivers from its several dozen receiver manufacturers, on the exhibit floor.

Other topics focusing on AM improvement were also discussed. In response to the NAB's AM Improvement Subcommittee, the National Radio Systems Committee, a joint NAB-EIA effort, announced just prior to the convention that it will study proposals to standardize AM transmission preemphasis and AM receiver deemphasis with the objective of establishing an industrywide voluntary standard for both.

The Radio convention is not generally considered a very equipment- and technology-oriented show, however, that appears to be changing somewhat, as several manufacturers brought along new products to exhibit, and others generated interest in equipment shown at the April NAB.

Fidelipac Corp. introduced the CRT 10 Series cart machine, a "no-frills" version of its CRT-100.

Fidelipac introduced the CTR 10 Series cart machine, a no-frills version of its CTR 100. There will be four models in the series: the CTR 11, which features mono playback, the CTR 12 which has stereo playback, the CTR 13 which is a mono rec/play, and the CTR 14, which is stereo rec/play. It takes "A" size carts, and three stereo recorders can be mounted in a 19-inch rack.

The new machine has the same mechanics and is basically an evolution of the CTR 100. Both include cart scan, and can vary the cart speed. The CTR 10 also features fast forward, secondary and tertiary cue tones, audio and test metering, 1 kHz defeat on the front panel, and a built-in audio switcher. The CTR 10 will be available for delivery in the first quarter of 1986.

Broadcast Audio introduced the IV Series Extender, which is related to its IV Series console and has the same mixing cards. The extender adds four inputs to a larger mixer, or can feed all four inputs of the extender into one output of a larger mixer. It can be used with any Broadcast Audio mixer and is an upgrade to the IV Series that was introduced at this past NAB.

ATI (Audio Technologies Inc.) had a new console, their aim being to manufacture one console for those who need five or eight inputs, in mono or stereo. It has dual stereo outputs, and a summed mono output. It also features a raised, silent, tactile feedback backlighted membrane switch control panel, digitally scanned and stored. Five-color graphics are protected by a poly-carbonate overlay on the panel. There is an optional expander to raise the number of inputs to 12. It's cost is low at $2995.

One of the products exhibited at the show may be able to play a role in the preemphasis of AM signal issue. Potomac Instruments showed its Quant Aural QA-100 audio program analyzer. It successfully quantifies what has previously been left up to the engineer or station manager's ear, and tries to make comparison of the station's sound less subjective.

The QA-100 can compare a station to others in the market, or measure it against an "ideal" or "target" sound of the station itself. The device takes audio from any source: receiver, tape recorder, production output, processor, and measures: maximum peak level (which is subject to FCC limits), the average level, or overall effectiveness of processing; the peak density, or tightness of sound; the total balance, with a four-band real-time analyzer; the L − R to L + R ratio; preemphasis; and "punch," with aural intensity measurements. Potomac has geared it toward improving a station's bottom line. The QA-100 was introduced at the NAB and quickly sold out; there was much interest at the Radio show, as well.

LPB introduced a new all-digital console. Its prototype received lots of interest at NAB, and the company is in the process of making it smaller, with a production model scheduled by the end of the year.

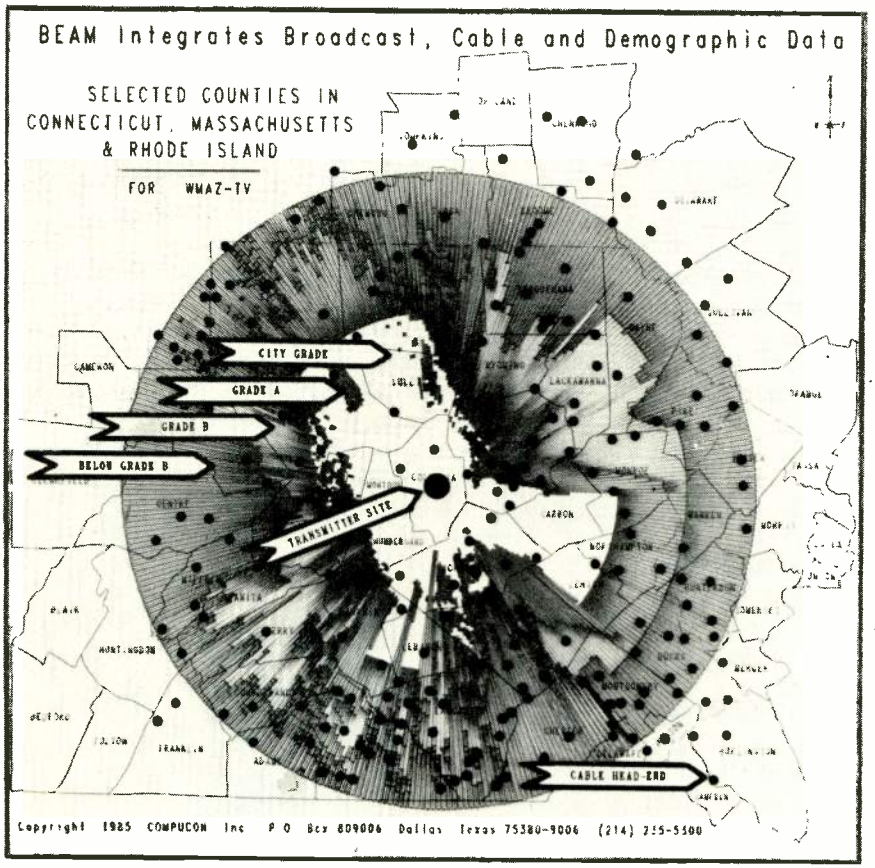
At the Marti booth, there was interest in what the company is calling "Telco Busters": using STL and microwave equipment where radio stations used to use phone lines.

Radio Systems has new LED meters, that it developed as part of its other equipment but is now selling separately. The red, yellow and light green indicators show L and R channels in horizontal patterns, and monitor both peak and average levels at the flick of a switch. The company says they aren't new for radio stations but are generating interest at stereo TV stations, where audio monitoring is being taken more seriously than before.

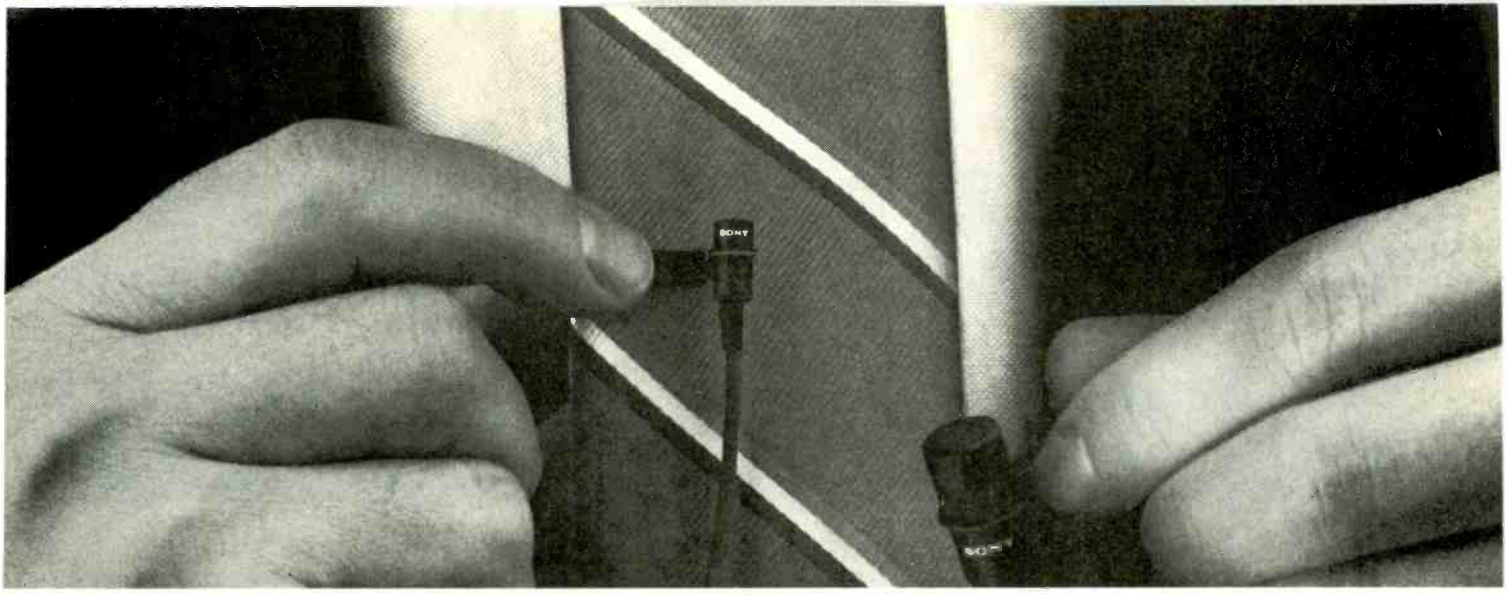
Also from Radio Systems is the DCX, a dc external series of small utility amps: preamp, mic amp, all modular, which fit into common boxes and share a common dc supply.

Although not introducing new products, most of the RF and antenna manufacturers reported much interest in equipment that allows several stations to combine on one tower, mostly because of new rulings regarding antenna radiation, and because of 80-90 docket considerations. Dielectric, Tennaplex, and Shively Labs each reported much activity in this area.

Also kept busy at the show were companies which specialize in information or consultation on new station builds or upgrades. Dataworld and Antek were featuring a menu of each of their services, and Compucon, in addition to showing its other services, introduced BEAM: Broadcast Engineering and Marketing. Computer drawings of maps show a station's signal, demos, and other information on transparent map overlays. It can be used for any broadcast technology, and is especially suited to stations concerned about the recent demise of must-carry legislation since Compucon can plot cable coverage and illustrate how much coverage would be lost through lack of "must-carry." **BM/E**



Compucon's BEAM service shows a computer-drawn map detailing broadcast, cable and demographic data.



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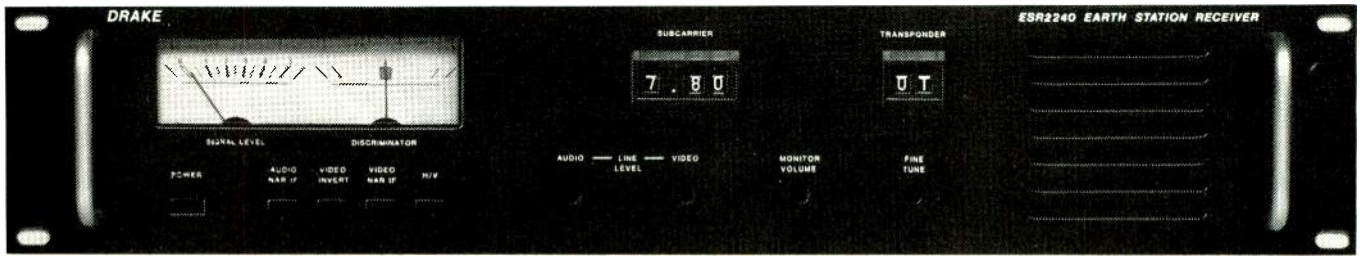

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Circle 169 on Reader Service Card

At Expanded RTNDA Show, Spotlight Shines on Computers, Satellites

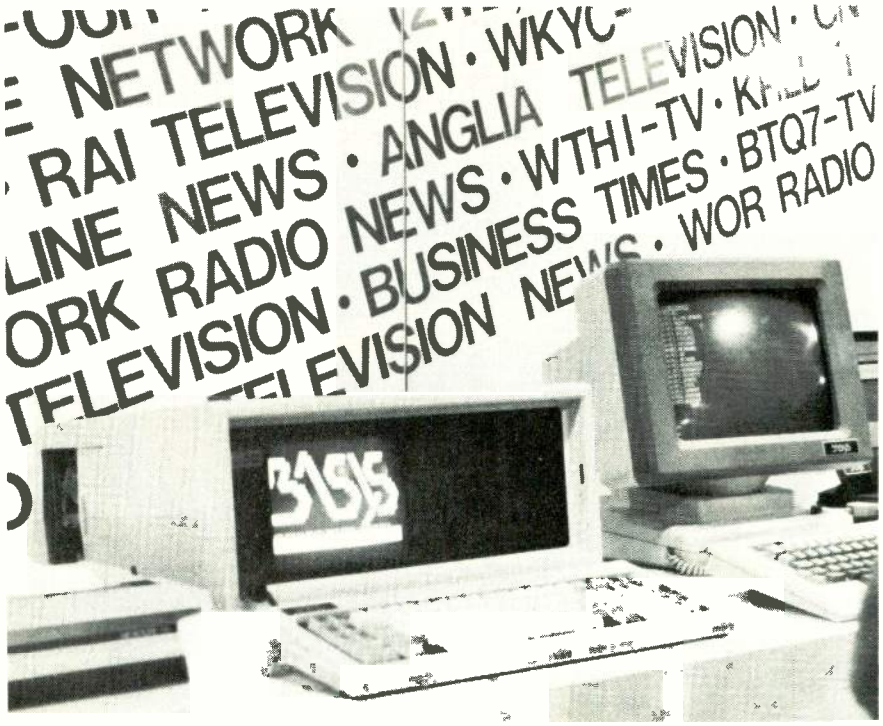
Staff Report

Satellite newsgathering and newsroom computers stole the show at September's RTNDA Convention, the largest ever for that organization. The 2000-plus attendees were greeted by a significantly expanded equipment exhibit that spilled into the parking lot, where satellite dishes sprouted in almost NAB-like numbers.

The growth in the RTNDA exhibit area—with many first- or second-time exhibitors and many others returning after a long hiatus—reflected the increasing ability of news directors to control their own budgets and specify purchases. With news becoming a profit center at many stations, managements are seeking the competitive edge that state of the art equipment can give.

In the satellite field, Conus Communications and Hubcom shared the largest indoor exhibit, promoting Hubcom's SNG vehicles and Conus's network of SNG-equipped local stations. Almost 30 stations have joined Conus so far. The booth featured a Hubcom SNG truck built for Omaha TV station WOWT, a recent Conus affiliate, along with a microwave van for WGN-TV, Chicago, constructed by Hubcom and Wolf Coach. Outside, Hubcom's SNG truck built for Conus member WTVF, Nashville, stood next to a Hubcom SNG trailer.

Cluster of SNG vehicles in outside exhibit area resembled a mini-NAB.



Basys showed a newsroom system based on the Compaq personal computer.

Other makers of SNG vehicles showed up in force. Dalsat exhibited two SNG-25 satellite vans, one for WWL-TV, New Orleans, and one for KSL-TV, Salt Lake City. Microlink System showed its SNG Series satellite vehicle. Comsat General featured a prototype Ku-band van with a roof-mounted antenna for 360-degree azimuth and maximum interior space. In addition, GEC McMichael featured its transportable Ku-band SNG system, which can be carried in a truck or on an airplane. Scientific-Atlanta described its satellite equipment and services.

Inside, microwave vehicles

Centro's ENP microwave van.

abounded. Centro's booth featured its ENP (electronic news production) vehicle, first seen at NAB, while Midwest showed a spiffy black microwave van built for a nearby television station. Both companies, of course, build SNG vehicles as well. Television Equipment Corp. brought a microwave van with telescoping mast built for Nashville's WTVF, while Wolf Coach showed a van built for WGN, Chicago. Other microwave vans were displayed by MZB & Associates and by E-N-G Corp.

New technology for gathering news was matched with the latest technology for handling it in the newsroom. Newsroom computers are finally coming into their own, with interest high on the floor and in the sessions. At a panel on radio news technology, news directors praised the efficiency and usefulness of newsroom computers, but cautioned that they should not be seen as a means of reducing staff. The main benefits of newsroom computers, panelists suggested, are information management, especially of wire service reports, and better writing.

Newsroom computer manufacturers made several significant announcements during RTNDA. ColorGraphics Systems said it had increased its installed base of NewStar systems from 20 to almost 40 systems during the preceding eight months, and had since received $1.5 million in new orders from eight major stations. This year's NewStar installations included electronically linked systems at CBS Network News in New York and Washington, seven systems at the CBS O&Os, and a system at CFPL-TV, London, Ont. In addition, ColorGraphics announced a new option for NewStar, the Attached Database Processor, or ADP, to be available next spring.

The other major player in the field, Basys, also announced a coup: the sale of a Basys newsroom computer system to ABC network news. This system will be Basys' fiftieth installation and gives Basys the edge in networks, if not affiliates. Basys systems are already installed at NBC and CNN, along with BBC Radio and ITN in the U.K., RAI television and radio news in Italy, and the Macquarrie radio network in Australia.

The new Basys system for ABC will supplement and enhance an already existing television newsroom system designed by the network and will be linked with that system's IBM mainframe computer. For radio, the Basys system will provide all newsroom capabilities.

Although it announced no sales, Data Communications Corp. promoted its BIAS Newsroom system, a modular computer system for both television and radio applications. The system provides full news automation capabilities, including wire service management, word processing, automatic reading time calculations, and producer's rundown. DCC also emphasized its BUYLINE electronic information service, linking stations and reps for efficient spot sales. These services are now available through DCC's Mini-Pak, Inc. (MPI).

A new player in the newsroom field, TUI, showed its NewsTech system, designed especially for election reporting on TV stations. Information is fed into the system through a high-speed card reader, which tallies votes quickly and accurately. The system interfaces directly with the Chyron IV for on-air display of results. NewsTech has been on-air at Channel 2, Nashville, for two years.

Other companies showed a wealth of equipment for news departments, including a scattering of brand-new equipment. Integrated Technologies premiered the Weatherwand, an electronic "draw-on-screen" device for live newscasts, for use with any weather graphics system. JVC introduced the CR-850U ¾-inch editing recorder, seen as an engineering model at NAB. Sony, Grass Valley Group, Quantel, Chyron, Kavouras, Abekas, NEC, Fujinon, Canon, A.F. Associates, Angenieux, Panasonic, Ikegami, and others took aim at the burgeoning news market. **BM/E**

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Important Actions

By Harry Cole, FCC Counsel

In July, the FCC concluded that radio licensees really don't need to file their network affiliation agreements with the Commission or place copies of those agreements in their local public records files. Television licensees (including low-power television licensees) were not so lucky. They must continue to send to the FCC copies of their affiliation agreements with national networks, and they must continue to place copies of those agreements in their local public records files; the Commission did, however, eliminate the need for TV licensees to file copies of transcription agreements or contracts for the supplying of film or videotape recordings which specify option time.

The rule requiring the submission of network contracts was first adopted more than 15 years ago. At that time, the Commission thought it would be a good idea to make available, both to the Commission itself and to the public, network affiliation contracts. In the FCC's view, the availability of such information could enhance competition between the networks and their affiliates. The Commission also thought that it would be nice and handy to have the information in its files, in the event that such information proved useful in any of its policy-making activities.

Now, however, the Commission has changed its tune, based on a number of observations. First, the FCC has acknowledged that it has not used the information in the agreements to any great degree. Second, the FCC has noted that radio network affiliation agreements are pretty standardized, and that it really doesn't make that much sense to have 3400 different radio network affiliates submit to the FCC separate copies of more or less identical contracts. While the availability of the information may still prove useful in some cases, the Commission has decided that any limited usefulness is far outweighed by the hassle of requiring stations to submit the forms, which then leads only to the Commission having to maintain them in its files.

Television licensees should note, however, that this decision does *not* extend to them. The FCC concluded that there are fewer national TV networks and program sources, and that TV networks tend to provide more programming to individual stations than do radio networks. Thus, according to the Commission, "there can be significantly more dependence of the television station on the national network for programming and . . . closer scrutiny of national network/affiliate relationships is warranted at this time." TV licensees should be sure to understand that the filing requirement involves only national networks. Those are defined by the the Commission as companies (or individuals, for that matter) that offer "an interconnected program service on a regular basis for 15 or more hours per week to at least 25 affiliated television licensees in 10 or more states."

As far as your local public records files are concerned, radio licensees will no longer need to place new or updated affiliation contracts in their public files; television licensees will still have to do so. The change in the rule for radio stations is not, however, retroactive. Thus, if you have affiliation agreements in your public file already, you should leave them there for as long as the rules require (although you may wish to consult with your own communications counsel as to how long that might be).

This change is something of a mixed blessing for radio stations. While the filing of network contracts may have been a source of annoyance, it was certainly not a massively burdensome chore. And, on the bright side, it assured that everyone else's contracts would be available for review, a factor that could be useful at renegotiation time. Now, stations will not have that easy access to others' agreements.

FOB fining authority

The Commission has, within the past year or two, started issuing fines to broadcast licensees again. This followed a brief hiatus during which virtually no such fines were issued. As we noted about a year ago, the Field Operations Bureau ("FOB") has authority to issue fines almost on-the-spot following an inspection that turns up violations of the Commission's rules. In exercising this authority, the FOB was previously limited to the issuance of fines of no more than $2000. However, the FOB has determined that its inspections frequently turn up multiple violations for which the appropriate fine often exceeds the $2000 limit; in such cases, the FOB must then refer the violations to the Mass Media Bureau for handling.

The impact of this change should be apparent to all licensees. The FOB, whose representatives are generally the ones who actually conduct on-site inspections, will now have the power to issue $10,000 fines. This development obviously raises the stakes substantially when the FOB inspector arrives (usually unannounced) at the station. Substantial fines used to be referred to the Mass Media Bureau, and ultimately to the Commission, for final resolution. This tended to add a buffer of time and procedures which often served to soften, if not eliminate, the seriousness of any violations uncovered by the FOB. Now, that buffer has been removed for fines up to $10,000 (which, it bears noting, used to be the highest fine even the Commission itself could levy). If a licensee decides to gamble on his ability to convice the inspector (as opposed to the Mass Media Bureau or the Commission) that no fine is warranted, it's no longer a game.

Probably every licensee, at one time or another, has

FCC RULES & REGULATIONS

had to ask the Commission for a Special Temporary Authorization ("STA"). These are necessary when, say, a tornado blows your tower over and you have to operate with an unauthorized antenna system until you can get your station put back together again. In essence, an STA permits you to operate in an otherwise unauthorized manner. In order to obtain an STA, you usually have to send a letter request to the Commission setting forth the circumstances justifying the STA; the FCC's staff will then review the request and act on it by telegram, often within days of the filing of the request. Except in very limited, emergency-type situations, you cannot begin operating with the unauthorized facilities until you have received the STA.

Obviously, some STAs arise from unforeseeable events beyond the control of the licensee or the FCC. However, the Commission's rules themselves also created the need for certain STAs. For the most part, such situations involved directional AM stations. In July, however, the FCC sought to make life easier for directional AMs, at least in the STA department.

For example, AM stations operating directionally during the daytime previously had to request an STA to permit them to operate nondirectionally during the daytime for the purpose of performing a nondirectional proof of performance. The same was true of stations operating directionally at night who wished to perform a directional proof during daytime hours. The Commission has now eliminated the need to obtain an STA for such proofs (as long as power is reduced to a level specified in the rules).

In the same vein, directional AM licensees who were (pursuant to a construction permit) modifying their existing facilities were required to request an STA before they could operate with temporary facilities. FM, TV and nondirectional AM stations in the same circumstances could, by contrast, simply notify the Commission and then operate with such temporary facilities for 30 days. The rule has now been changed to permit an AM licensee holding a construction permit that involves directional facilities and which does not involve a change in operating frequency to utilize temporary (i.e., for 30 days) facilities and modes of operation upon notification to the Commission. This does not extend to stations that are changing their frequency, however; such licensees must still request and obtain an STA before commencing temporary operation.

All permittees of AM stations, whether or not directional, used to be required to conduct equipment tests during "experimental hours." Since "experimental hours" are those between midnight and local sunrise, this was not the most convenient rule in the world. In order to conduct such tests at other, more convenient times, AM permittees had to request an STA. Such requests were routinely granted by the FCC's staff. Because of this, the Commission decided it was not necessary to require the filing of STA requests in such circumstances. The rule has now been changed to permit AM permittees to conduct equipment test during daytime hours as long as they first notify the Commission in Washington that they are going to undertake such tests, and also as long as their antenna systems are first substantially tuned during experimental hours.

By and large, the Commission's other STA-related

rules and policies remain intact (although the rules themselves have been streamlined somewhat). The irony here is that, despite the adoption of these new rules to make life easy for AM (and especially directional AM) stations, the new rules were, during their first month, apparently generally ignored. As a result, the Commission continued to receive requests for STA where no such requests were necessary. Before filing for an STA, you should be sure that you do, in fact, need one.

Female preferences rejected

Those of you who read September's column concerning the comparative hearing process may recall that, in evaluating an applicant's comparative position, the Commission has historically awarded enhancement value to female owners who propose to be integrated into station management on a day-to-day basis. Also, those of you familiar with the FCC's lottery processes for low-power television and multichannel MDS authorizations probably recognize that an applicant's gender is not considered in determining what, if any, preferences that applicant might be entitled to in the lottery. These two positions are, of course, inconsistent. In August, the inconsistency was resolved, but not the way one might have expected.

For openers, the Commission decided that it does not have the authority to accord women any preference in the lottery process. This conclusion was based on the FCC's reading of the Congressional action which gave the Commission the power to adopt a lottery system in the first place. While Congress's language was open to various conflicting interpretations, the Commission opted for the interpretation that precluded any female lottery preference.

The Commission's decision in that regard did not, however, alter its policy according to women some "comparative enhancement" credit in the comparative hearing process. But as it turned out, that policy proved not to be long-lived: in late August the U.S. Court of Appeals for the District of Columbia threw out the female comparative enhancement in *Steele v. FCC*, Case No. 84-1176. In the court's view, the female preference policy exceeded the FCC's statutory "public interest" mandate, since that mandate does not, according to the court, constitute "a license to conduct experiments in social engineering conceived seemingly by whim and rationalized by conclusory data."

At the time of this writing, the court's decision is subject to reconsideration or appeal to the Supreme Court. However, it does not appear likely that the Commission—that has, after all, just concluded that it does not have the statutory authority to give women any preference in the lottery—will pursue either reconsideration or further appeal. And, in light of the Commission's own decision relative to lottery preferences, reversal of the court's decision seems equally unlikely (although not altogether impossible).

It is ironic that the court is now in effect scolding the Commission for going too far down the road that the court itself put the Commission on, and it remains to be seen whether the court's apparent about-face on preferences will be extended any further. **BM/E**

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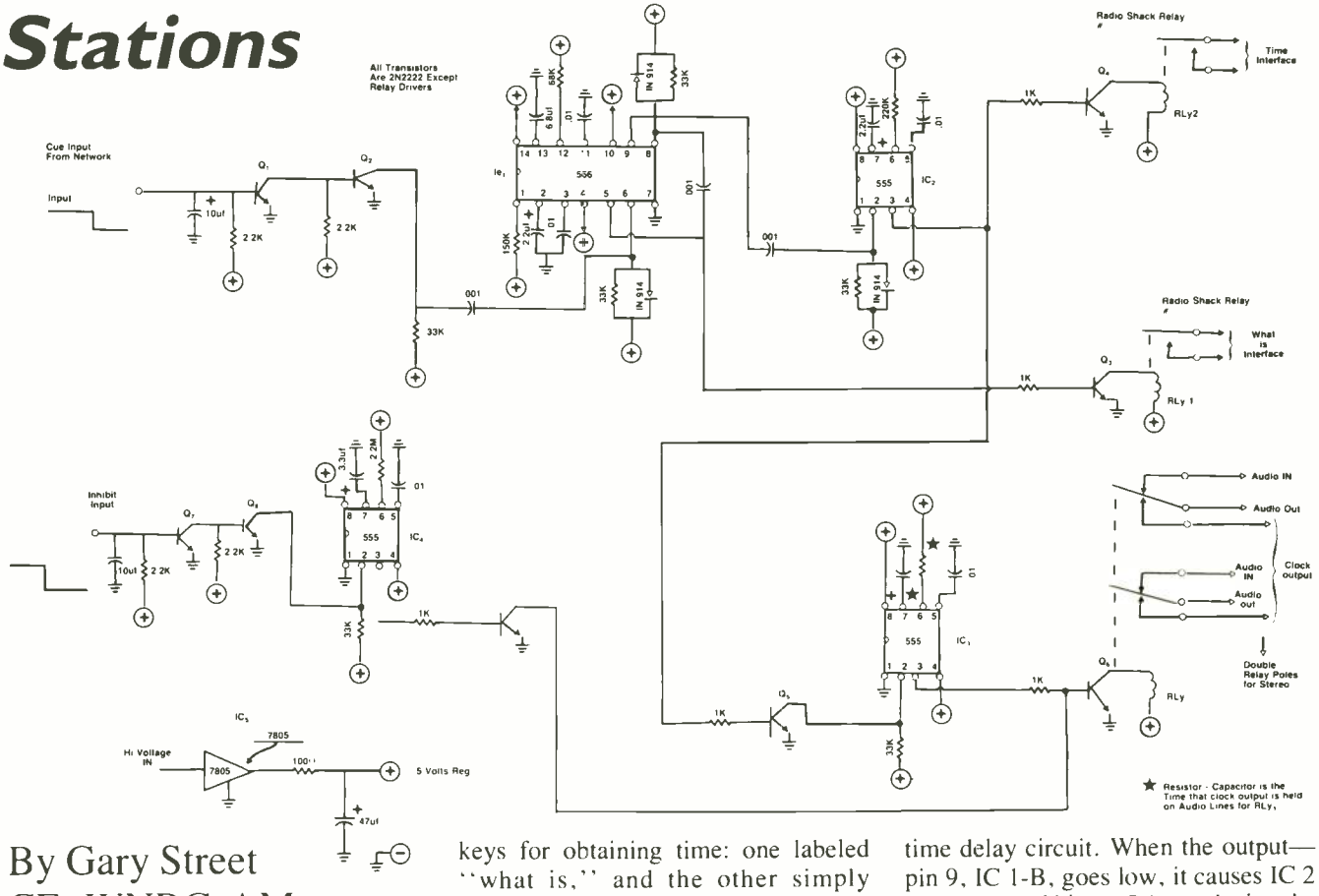
GREAT IDEA NOTEBOOK

Exact Time Check for Automated Stations



By Gary Street
CE, WNRG-AM, WMJD-FM
Grundy, VA

Since the advent of satellite service to radio stations, automation has again become a very popular and profitable system for small stations. But there are certain drawbacks to any automation system, and one of the problems we have is local time announcements. The network gives the time in minutes before or after the hour, but never the actual hour, since it is a service to all time zones. An automatic "time announcer" is a very simple solution to this problem.

I purchased a Radio Shack Duo Fone (cat.#43-165) and with some modification was able to interface it with our automation equipment and network. The voice that gives the time sounds mechanical, or computerized, but it gives the local time in hours and minutes a.m. or p.m.

The Duo Fone keyboard has two keys for obtaining time: one labeled "what is," and the other simply "time," I brought the Duo Fone's connections out to screw terminal of these two keys. I also brought out the positive (not regulated) and negative voltage, which I use to power my circuit. The circuit was built using NE555 and NE556 time chips (although all 556 can be used). These perform the same function as a finger pushing the keys on the Duo Fone. The circuit has a small time delay built into it to equal the amount of time it would take to move a finger from one key to the next. I use a tone, the #1 sent by the network, to trigger the time announcements.

How the #1 tone works to activate the time is simple. When the tone comes down the line from the network, the input to Q1 goes low, causing Q2 to give a negative going pulse to IC 1-A, which starts the timing cycle. When the output—pin 5, IC 1-A, goes high it biases Q3 on and Rly 1 contact closes, making connection to the "what is" key for a split second. Then pin 5, IC 1-A goes low, causing a negative going pulse to turn on IC 1-B, which is a short time delay circuit. When the output—pin 9, IC 1-B, goes low, it causes IC 2 to turn on and biases Q4 on, closing the contacts on Rly 2, which is connected to the "time" key. Q4 and Q5 are biased on at the same time, and this turns on IC 3 of the Duo Fone to give the time in hours and minutes, a.m. or p.m. The time announcement lasts approximately five seconds. The Q6 is biased on by the output of IC 3, which switched the clock audio onto the program lines. The circuit of Q7, Q8, and IC 4 is an inhibit for Q6, in case someone wants to inhibit the time announcer. A low condition is placed on the base of Q7.

The Duo Fone can also give the temperature, but unfortunately its temperature range is not low enough for our area. In addition, the alerts could be used to monitor other equipment, such as the EBS monitor in the event of activation. The Duo Fone can also call up to eight preprogrammed numbers until one is answered. It's a unique device, and it's helped solve our station's problems with automated time checks. **BM/E**

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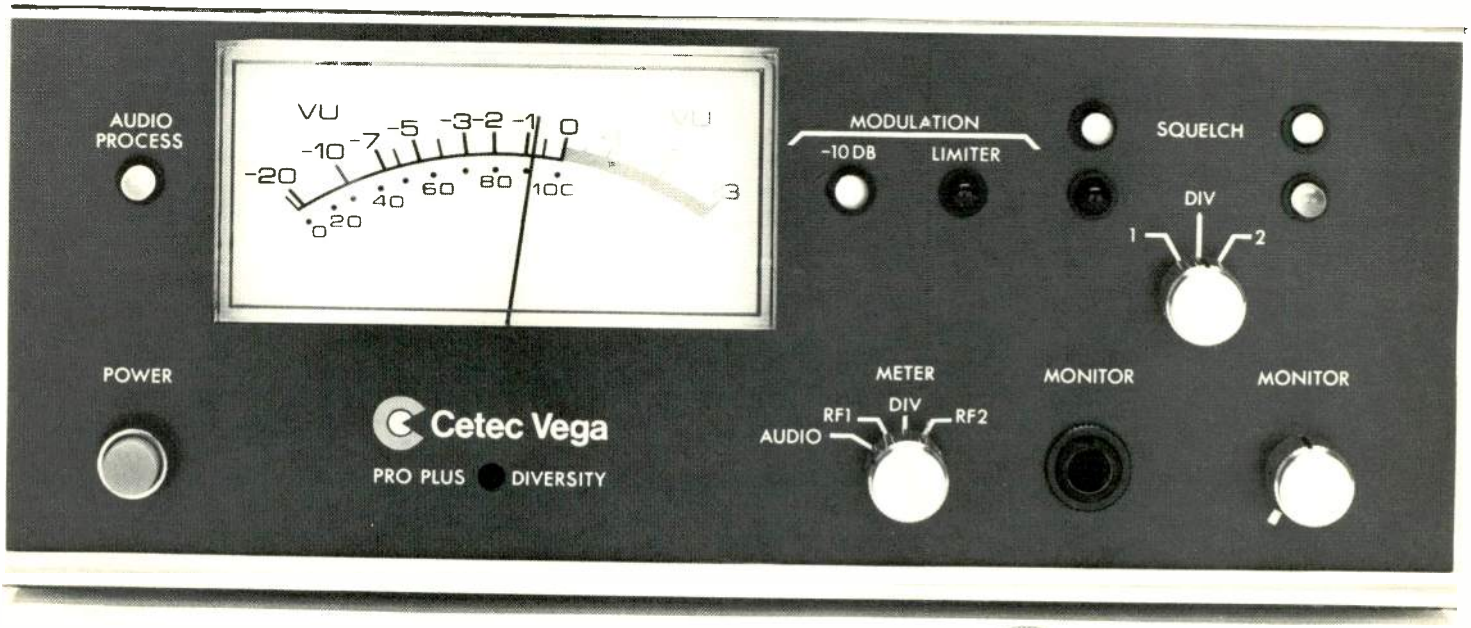

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broadcast EQUIPMENT

New Grass Valley DVE

Grass Valley Group has introduced a new DVE system, the Kaleidoscope DPM-1. It can create up to five channel effects, with rapid access to effects for real-time use. In addition, systems can be configured to allow assignment of channels among as many as four positions.

The system's keypath has full luminance resolution, and it has a full 4:2:2 signal path. NTSC systems include a hybrid active decoder.

The DPM-1 can select video or key inputs during an effect, and allows selection of two videos (front and back) and two associated key signals in each frame. The Kaleidoscope can perform translation, rotation, scale and perspective effects, and some effects previously possible only by multipass, or not possible at all are included in the repertoire of a single channel of the system.

The DPM-1 accepts composite video and analog component (R, R-Y, B-Y and RGB) as well as SMPTE/EBU parallel digital component standards. Input types may be mixed, and the input format is automatically accommodated. Full integration with Grass Valley's 300 switcher is standard, and an optional tally interface is available for other switchers.

Circle 238 on Reader Service Card

Mitsubishi Digital Recorder

The Mitsubishi Pro Audio Group formally introduced the Model X-850 32-channel digital audio recorder at the AES show. Its recording format complies with the recently-agreed-to PD pro digital format standard betwen Mitsubishi, AEG and Otari.

The X-850 provides a total of 45 tracks on one-inch tape, including two analog cue tracks, two digital auxiliary tracks and one time code track, in addition to the 40 tracks used to provide 32 channels of digital audio. It features cut-and-splice editing and overdubbing over the mechanical splices.

Other features include the RS-422/RS-232 serial interface to other recording or synchronizing systems, and the ability to accept sync inputs on 9.6 or 8 kHz, 50, 60 or 59.94 Hz, and composite video. The X-850 accepts up to 14-inch reels of tape providing more than one hour recording capability per reel. With its digital output ports, master multitrack tapes can be digitally dubbed for copying purposes without generation loss.

Circle 239 on Reader Service Card

New Intercom Features from Telex

An expanded and improved line of Audiocom intercom products is available from Telex. The line is called Phase 2 and consists of modular components to be purchased separately, allowing expansion of existing intercom systems. The line is compatible with all major intercoms, including Clear-Com.

The new IC-2M/A two-channel master station allows a PD to run an auxiliary program feed over one channel while using the other for communications, either selective, or with the entire system. It has a full duplex audio system for simultaneous talk and receive functions, and an IFB button for broadcast cueing. The master station can support up to 50 headset stations, 16 speaker stations or a combination, and can operate from external power supply. Its cost is $630 pro net.

The IC-2A belt pack is a new two-channel headset station which allows selection of either one or two lines at the remote stations. The IC-2B adds binaural headset capability. Each has a pro net price of $240.

The new JB-2 junction box enables the intermixing of two-channel intercom stations in installations dominated by single-channel units.

Also new in the line are four headsets in single and dual muff/monaural and binaural models.

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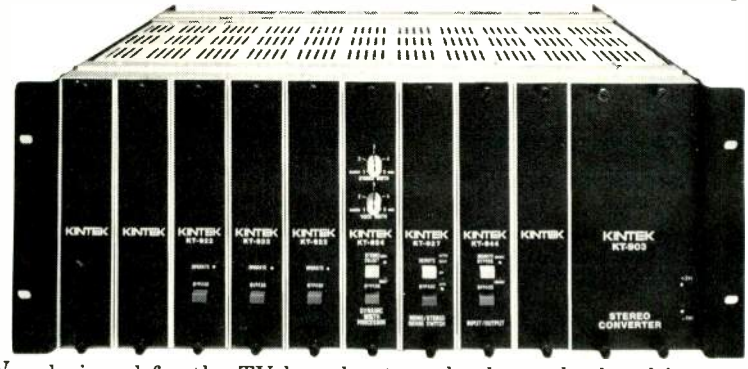
STEREO AUTOMATION



Was designed for the TV broadcaster who demands the ultimate stereophonic converter. With many years of audio research in the motion picture industry, Kintek has developed the KT-903, which automatically provides continuous dynamic conversion of mono to stereo and yet bypasses stereo originated programs. Its cognitive speech circuitry centrally focuses the dialogue, making it sound credible. Some additional features are:

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Circle 181 on Reader Service Card

TekSPANS Software from Tektronix

The Frequency Domain Instrument Division of Tektronix has introduced TekSPANS, the first in a line of application software packages for portable spectrum analyzers.

TekSPANS (Tektronix Spectrum Analyzer Software) enables engineers and technicians to automate many measurements now done manually. The packages are designed to run on the IBM PC and compatibles, the Hewlett Packard 200 Series (9826 and 9836) Controllers, and the Tektronix 4041 Controller.

GRASP, the first menu-driven software package, enables an engineer or technician to automatically make a variety of spectrum analysis measurements such as swept frequency, signal analysis, harmonic distortion, S/N ratio, amplitude modulation, and frequency response. It also provides for filter tests and signal search routines. In addition, GRASP allows the user to graph, store, manipulate, analyze, and compare data.

The first three software packages are priced at $875 each, and will be available for shipment on November 15.

S26RF00 Options 1 and 1A have been designed to operate on the IBM/PC and PC compatibles that have had a TEK GURU interface installed. The Option 1 provides the software on a high-density floppy for the IBM/PC-AT. Option 1A is a double density floppy for standard PCs and compatibles.

S26RF00 Options 2 and 2A are for the H-P Series 200 controller. Option 2 supplies the software on a double density floppy and Option 2A provides a 3.5-inch micro diskette.

S26RF00 Option 3 supports the Tektronix 4105A Color Graphics Terminal and the Tektronix 4041 System Controller.

Circle 241 on Reader Service Card

Magni has Measurement Equipment

Magni Systems has entered into the broadcast and professional video

markets with the introduction of the 1520 Integrated Measurement Package (IMP), the 1525 IMP Display Monitor, and the 2015 Personal Computer Aided Television Synthesizer (PCATS).

The 1520 IMP combines a waveform monitor, vectorscope, and precision test signal generator in a single package, and offers an optional display device. It can be used with the Magni 1525 IMP Display Monitor or with an oscilloscope with appropriate bandwidth. Other features include an automatic "signal follows measurement" mode, 14.3 MHz, 10-bit digitally synthesized test signals, source identification through 12-character overlay of test signals, and an optional audio reference tone.

Magni's 2015 PCATS utilizes the power of the IBM and compatible personal computers to generate test signals. It offers television system flexibility, and can generate test signals from 525/60 NTSC to 1125/60 HDTV and beyond. In addition, the 2015 is able to generate test signals for all new formats (SMPTE Parallel, Betacam, and M) as well as NTSC. It has two software-selectable clock frequencies—108 MHz and 114.5 MHz—both higher than any other NTSC-compatible test signal generator.

Circle 242 on Reader Service Card

Clear-Com Introduces IFB System

Clear-Com has introduced a new Program Interrupt System (IFB) that provides on-air talent with audio program monitoring and director/producer cueing.

Configured in "building block" modules (four channels each), the IFB System permits up to 96 talent people to monitor program and to be accessed from up to 50 locations. The system includes noise-cancelling gooseneck microphones, tally lights to indicate which talent is being cued, and an ALL IFB function that simultaneously accesses all talent.

The IFB System's interrupt capability insures that fast-breaking stories are communicated immediately to the talent. It is also available with optional split-feed operation to allow use of binaural headsets for news and sportscasting applications.

A basic four-channel system with one control position, one program controller, four talent receivers, a power supply, and all necessary cables has a list price of under $2000.

Circle 243 on Reader Service Card

CMC Introduces DPT Head for VPRs

CMC has developed a new Dynamic Parallel Tracking (DPT) head for one-inch video recording. It features a proprietary cantilevered spring assembly designed to support the playback head, permitting the tip to remain consistently perpendicular to

the recorded tape, which should improve tracking.

The DPT head is designed for use with all Ampex one-inch VPRs, and replaces the three separate heads Ampex requires for its five VPR models.

The DPT concept can be useful in slow-motion editing where skewing or incomplete tip contact can degrade the picture. Because the head remains perpendicular to the tape at all times, it produces a more uniform response across the RF bandwidth. It also eliminates the jitter during "audio only" edits. DPT heads are fully compatible with all VPRs.

Circle 244 on Reader Service Card

Data Precision Unveils Waveform Synthesis

The Data 2020 from Data Precision is a Polynomial waveform synthesizer that generates arbitrary waveforms quickly and easily and replaces a computer, signal generators, custom filters and switching gear previously needed to do so.

The unit allows front panel entry of mathematical formulas to define waveshape and duration, keyed in simply. The Data 2020 will also accept IEEE-488 buses for waveform entry, and data can be stored in a computer that can also be downloaded into the system to generate waveforms.

Sine, square, triangle wave and white noise are all available functions. Ten different three-pole lowpass filters can be selected prior to noise summing to provide a rolloff in noise amplitude at frequencies of 20 kHz and 20 MHz.

The Data 2020 has 64K bytes of waveform output memory that can be extended by memory management. It is especially suited for automated device testing and its 25 MHz version sells for $7990.

Circle 245 on Reader Service Card

FOR MORE INFORMATION on these products, use the Reader Service Card.

New 3M Broadcast Cartridge

3M has introduced the ScotchCart II broadcast cartridge which offers new high output, low-noise lubricated tape for recording at high levels without performance loss and with a longer average life.

The ScotchCart II uses a new temperature-stable, nonrotating hub to eliminate mechanical irregularities, and uses no pressure pads, to eliminate problems with tape steering, wear, and excessive audio side-band noise.

A patented dynamic tension control system provides constant tension and controls the tape loop inside the cartridge. The tape exits from the hub center instead of curling up over the pack like convential cartridge designs. There is also an adjustable cam to control tape loop.

The cartridge cover is made of break-resistant, rugged polycarbonate. The new tape is designed for high frequency response .

Circle 246 on Reader Service Card

BUSINESS BRIEFS

ISC Technologies' new computerized editing suite features the Paltex Editstar computerized editor, Hitachi HR-230 one-inch, two Sony BVU 800s, Chyron RGU-2, Harris HDE-100 digital effects unit, and Yamaha's M512 audio mixer.

CMX Corp. has received an offer from Chyron, its largest shareholder and principal lender, to purchase up to 10 million shares of CMX stock. If the purchase is approved, Chyron's equity position would be increased from 39.5 percent to approximately 83 percent.

Ampex Corp.'s Magnetic Tape Division recently signed a three-year contract to supply MTM Enterprises with its professional broadcast quality videotape.

The entire API Audio product line has been purchased by Wolff Associates. The new company is called **API Audio Products** . . . . A joint one-year marketing agreement has been reached between **CompuSonics** and **AT&T,** calling for the promotion of CompuSonics' telerecording equipment and AT&T's ACCUNET Switched 56 service . . . . **Modulation Associates** will provide the satellite data system for the MultiComm Satellite Service.

Roscor will design and fabricate **two remote televison production vehicles** for the Korean Broadcast Station for use at the 1988 Olympic Games in Seoul, Korea . . . . **Broadcast Electronics** of Quincy, IL has received a $135,000 contract from Radio Free Europe/Radio Liberty to supply 110 3000 Series Tape Cartridge Machines and accessories . . . . **Century Precision Industries** has acquired Los Angeles-based equipment case manufacturer Stanley Cases . . . . Also in California, Johnston Broadcasting has sold KMBY-FM of Seaside to **C&C Communications** for $1,100,000.

Ampex is offering a **free ADO 2000** to buyers of its AVC "Super" Series production switchers. To receive an ADO, the customer must order the switcher by November 15 and pay list price . . . . WLBT/TV-3 of Jackson, MS recently purchased **Shook's** Omega van Model 10-20 for ENG and location work . . . . Microdyne Corp. has received a $500,000 order from M/A-Com for **3.7-meter Ku-band television receive-only antennas** . . . . Soundcraft has sold a TS24 console to Saturn Sound of New York City. The console is a fully-automated 40-channel TS24, **the first of its kind** to be sold in the Manhattan area.

Positive Video of Orinda, CA has installed a Grass Valley component switcher into the facility's multiformat editing suite . . . . In New York City, **Compugraph Designs** recently installed an Abekas A-62 Digital Disc Recorder to its 3D animation system . . . . Allied Film & Video of Detroit has introduced **EFLM/CTAP** (Edit Film/Conform Tape), a process that blends film and video production and post-production techniques, does not require the presence of the producer or the editor during the video conforming stage, and results in a one-inch master . . . . Domain Telemedia, Carol Stream, IL has added its **fourth post-production suite** that features a CMX 3400 Phase Two computerized editing system and a latest revision ADO for special effects . . . . **National Video Center/Recording Studio** of New York City will renovate its Edison Hall, adding a Solid State Logic SL 6000 E console, two Otari 24-track recorders, and Ampex ATR-100 recorders . . . . Needham Heights, MA's Multivision now offers **four full-time network-quality ENG crews,** each with a complete ENG/EFP rig, as well as three one-inch edit rooms and duplication facilities . . . . Roscor Video Rentals was on hand at the recent Farm Aid concert, supplying **two separate equipment packages and crews** to tape 18 hours worth of interviews for MTV and VH-1.

Fuji Photo Film U.S.A. will move its corporate headquarters from Manhattan to Taxter Corporate Park, Elmsford, NY by early next spring . . . . **Peter Dahl** has moved into new facilities at 5869 Waycross Avenue, El Paso, TX 79924 (915) 751-2300 . . . . **Peirce-Phelps** has moved its western office from Santa Ana to 575 Anton Blvd., Costa Mesa, CA 92626 (714) 432-6305 . . . . San Francisco's **Aurora Systems** has opened two regional sales offices in Wantagh, NY (516/783-3650) and Atlanta, GA (404/365-0844).

Among the personnel changes this month, Michael Brinks has been appointed sales manager for the Equipment Sales Division of **Television Associates** . . . . At **RCA Broadcast,** Nick Hudak, Richard Boyland, and James Gimbel have been appointed director of domestic sales, manager of marketing operations, and manager of marketing programs, respectively . . . . **Lake Systems** has appointed Walter Kelly VP of Audio-Video Sales.

Audiotronics has promoted G.C. Oyama to assistant vice president, New Product Development . . . . At **Fortel,** George Wicker has been named southeast sales manager . . . . **Broadcast Electronics** has selected Bill Harland as its national sales manager, RF products . . . . At **AKG Acoustics,** S. Richard Ravich has been appointed VP and general manager . . . . Herman Schkolnick is now the new director of marketing and sales at **Panasonic.**

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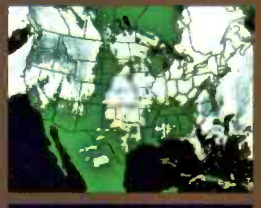

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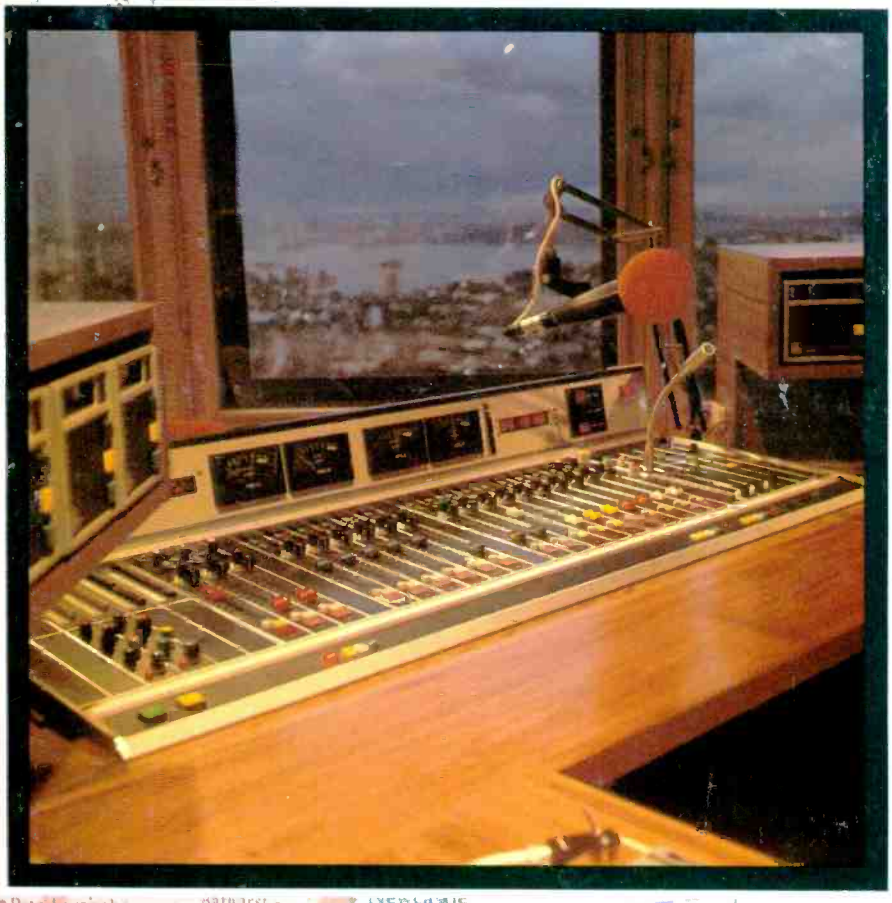

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