

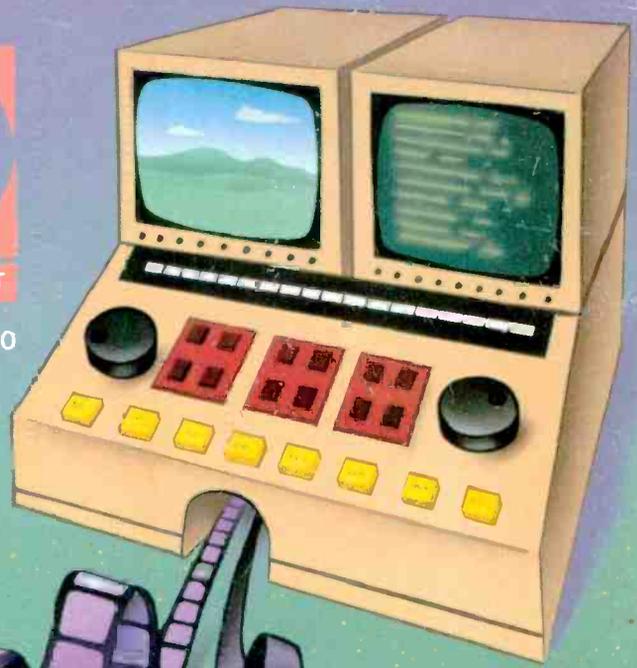
# BME

FOR TECHNICAL AND ENGINEERING MANAGEMENT

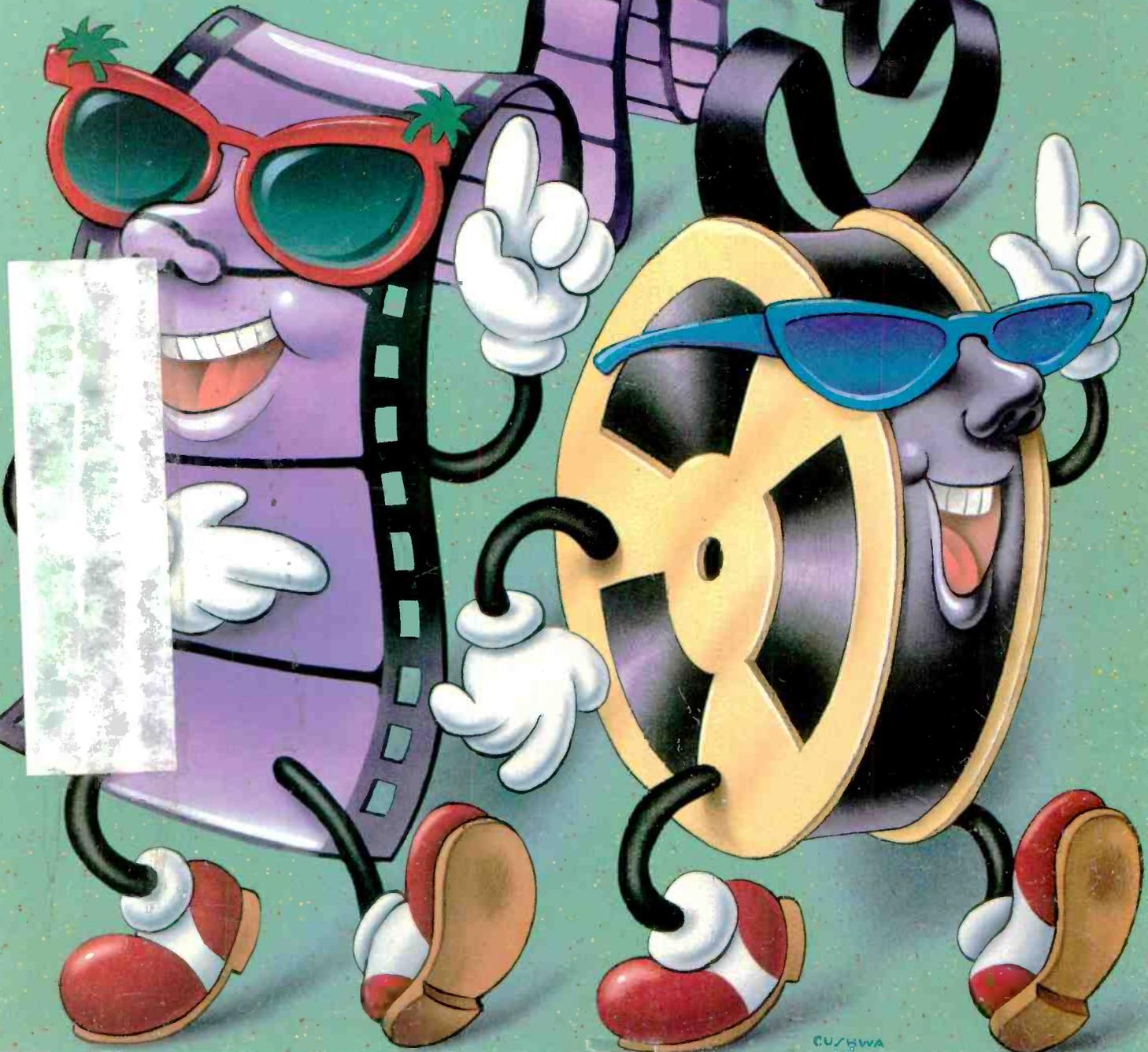
AN ACT III PUBLICATION

NOVEMBER 1988

\$3.00



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The SP-6 provides independent headphone, control room and studio monitor feeds, as well as stereo cue/solo. Control room and studio mute and tally functions are independently dipswitch selectable on individual input channels. Additional studio modules may be ordered to accommodate larger, multi-studio installations. The SP-6 may be configured with any combination of mono and stereo input modules, in mainframe sizes ranging from 16 to 32 or more inputs. The console is available in either an 8-track production format or a 4 stereo subgroup TV master control configuration. So why not profit from Wheatstone's experience and reputation? Call us today and learn more.

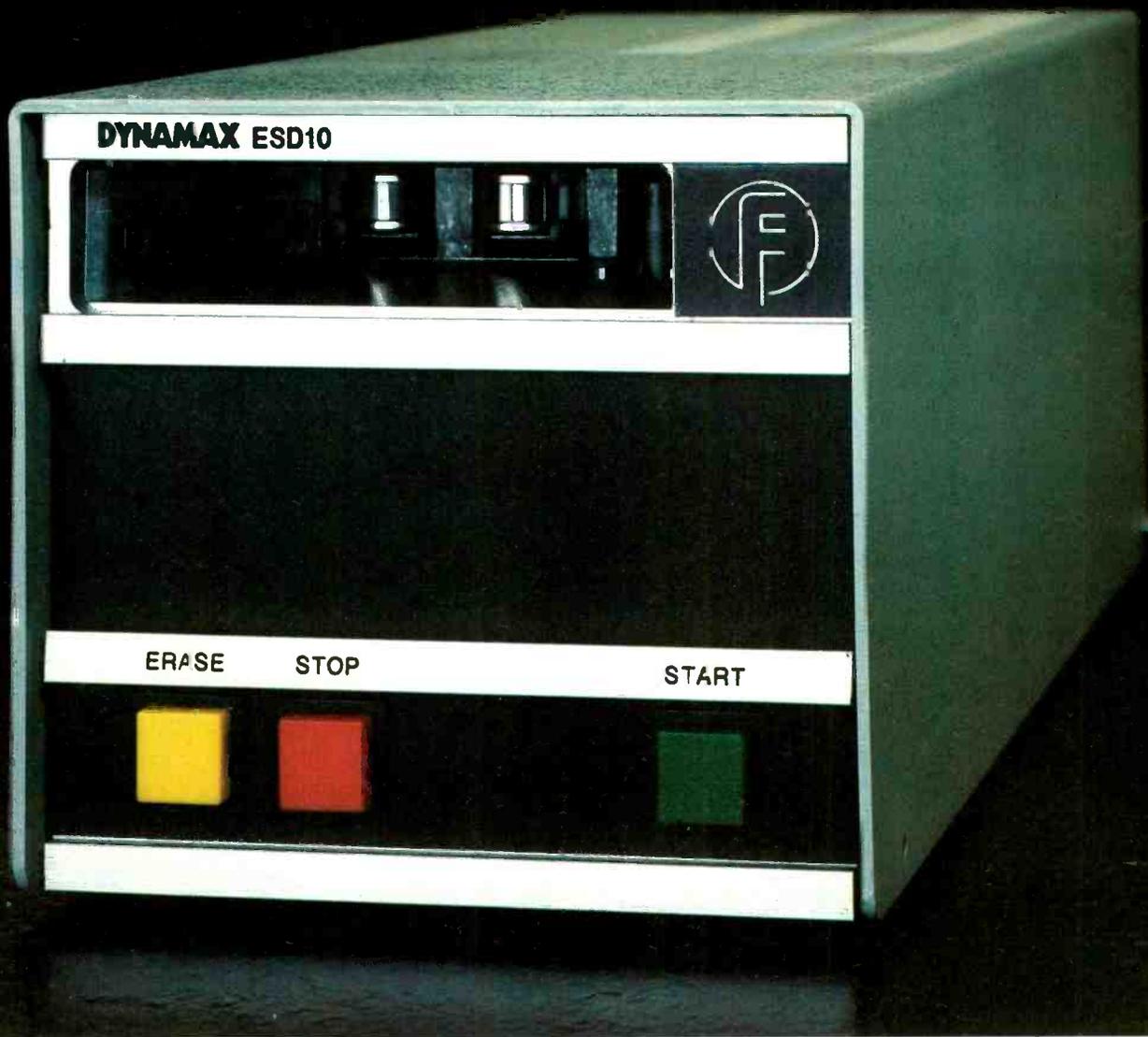


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# Why Sony cutting edge o

BVE-9000



One company has consistently managed to stay at the forefront of video technology.

Sony. We've been defining and redefining editing control units for more than 12 years. Which enables us to offer a wide range of sophisticated machines that are fast, accurate, easy-to-use and offer the most features possible for the money.

With that in mind, it's easy to understand why the BVE-9000, BVE-900 and BVE-600 editors differ, yet share Sony's key operating controls and features. For instance, they all automatically detect and identify the type of Sony VTR being used and set the appropriate control parameters through RS-422 serial control

ports. Plus, they can read Control Track, Time Code and perform video/audio split edits. The list of features goes on and on, so by all means, read on.



## The BVE-9000. State-Of-The-Art That's Top-Of-The-Line.

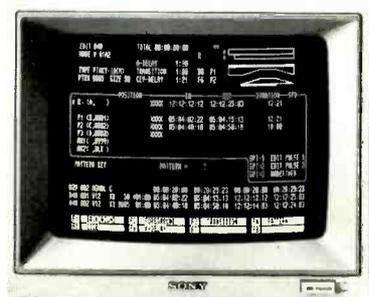
The Sony BVE-9000 is one of the most flexible and powerful editing systems in the world. It's designed to save the most precious commodity of all: time.

Among its significant innovations are multi-edit preview and full assembly look ahead. This allows you to preview an entire sequence of up to 999 events, before actually having to record a single edit. And then, with the flick of a few key strokes, you can automatically record the entire program.

Of course, there are many other incredible features that help you control your entire editing facility. For one thing, the BVE-9000 can work with 28 separate devices. It also has an optional color menu display that's user friendly and programmable for layout and color.

What's more, our Dynamic Motion Control Learn-With-Create and

BVE-900



# is on the f technology.

switcher Learn-With-Create features allow you to record a move without having to re-rehearse it. In addition, the temporary record assignment greatly speeds up multi-layering. And the most complete set of test diagnostics in the industry helps reduce system downtime. No wonder this top-of-the-line editing system can meet all your present and future needs.

## **The BVE -900. State-Of-The-Art Technology And State-Of-The-Art Economy.**

The next best thing to editing on a BVE-9000 is editing on a BVE-900. It, too, is an easy-to-use system and economically offers technical advancements and expandability.

It controls up to four VTR's in any A/B roll edit. So you can perform sync roll and sync play. In addition, the BVE-900 gives you full control of video switchers and audio mixers, including fader selection and VCA control for split audio/video edits.

What's more, its easy-to-use menu driven display puts edit accessibility at your fingertips.

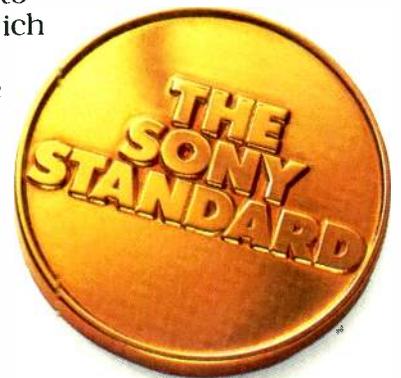
## **The BVE -600. State-Of-The-Art Technology Even More Economically.**

The BVE-600 is our most economical unit. It allows you to control three VTRs (two players and one recorder).

Which, depending on your needs, may be more than enough. You have the power to dissolve, wipe, or superimpose editing sequences, without the need for an external video switcher. Our optional built-in component/composite video switcher offers a selection of 10 wipe patterns. That, with our built-in MXP-29 Audio Mixer interface, make A/B roll editing a reality.

Of all the benefits of using Sony editing control units, perhaps the greatest is that they form an easy-to-use system. Which means you can connect them to Sony VTRs, switchers, audio mixers and video monitors. All of which are serviced by Sony.

For more information about Sony's entire line of editors, write to: Sony Information Center, P.O. Box 6185, Union, NJ 07083. Then you'll be able to see even better why Sony is on the cutting edge of technology.



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**Broadcast Products**

Sony Communications Products Company

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**Well Actually, Here's the Last Word... \$2,995.**

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The DPS-270 also offers many available and affordable interface options. Like automatic field correction, chrominance noise reduction and remote control.

So for those of you as concerned about value as you are about quality, remember... one last word... \$2,995. As always backed by Midwest.

For more technical and sales information contact your nearest Midwest office.

See us at RTNDA Booth #334 and Outdoor Exhibit Area.

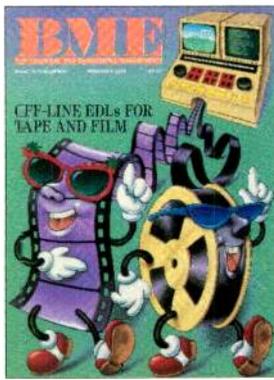


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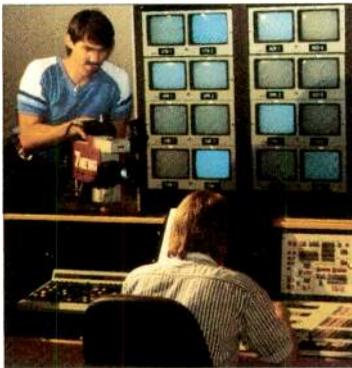
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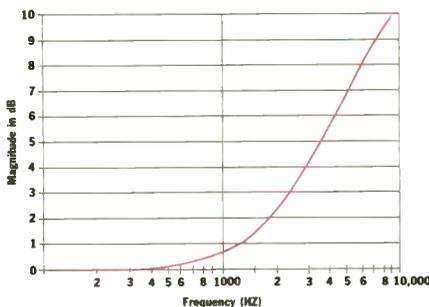
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\*Patent applied for.

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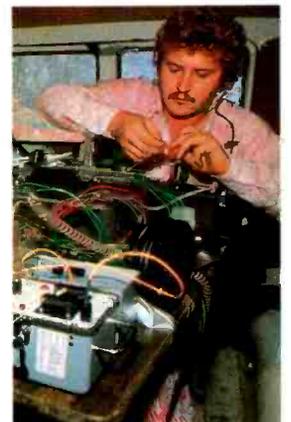
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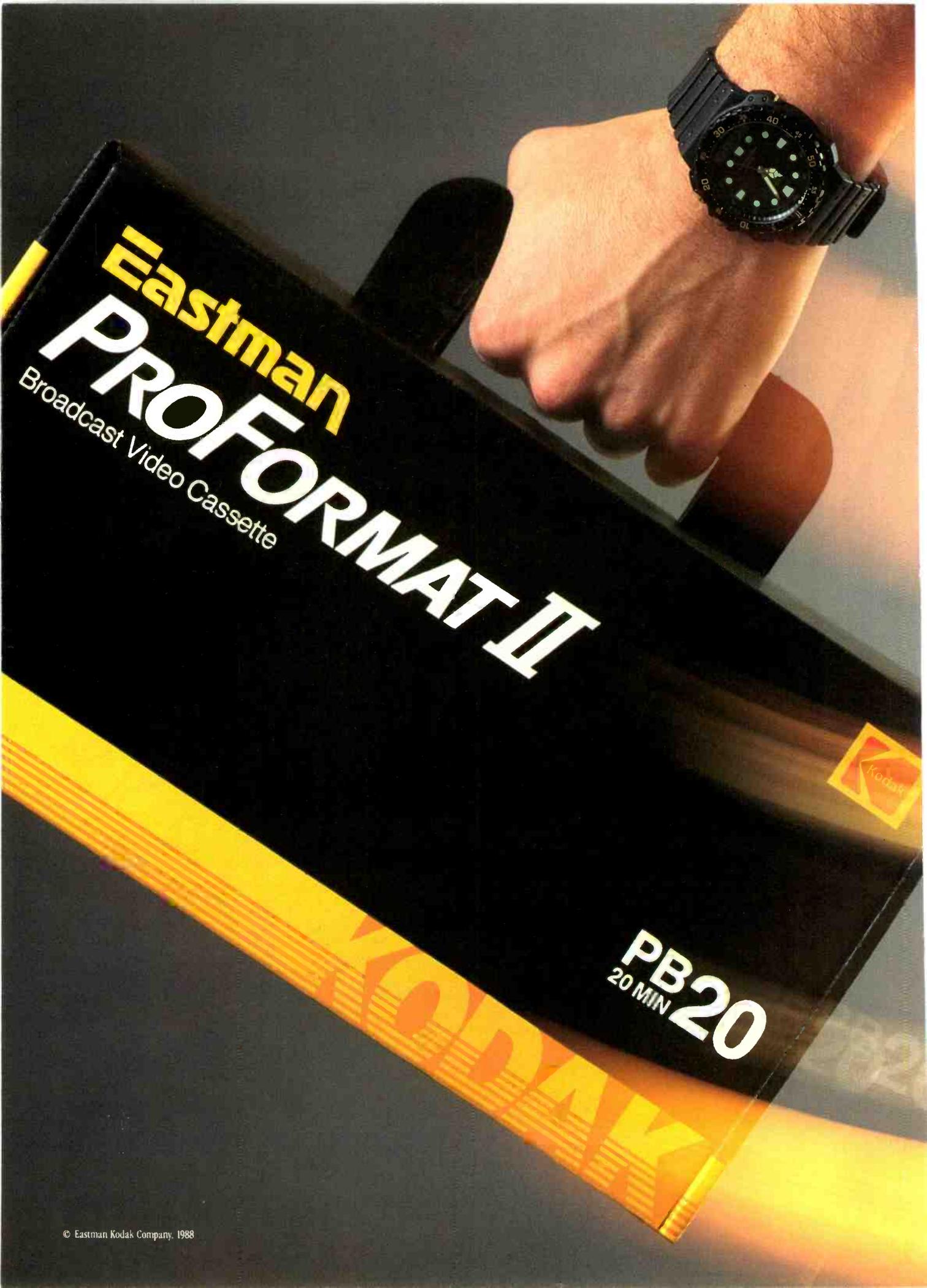
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**PROFORMAT II**

Broadcast Video Cassette



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**PB 20**  
20 MIN

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Our new PRO FORMAT II Production Pack makes carrying tapes for your Betacam system remarkably easy. Because each pack contains 10 high-quality broadcast cassettes in one, convenient case.

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The 600 Series Color Correctors from A•C•E, celebrating their 20th year in the design and manufacture of broadcast television equipment.

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# VIEWPOINT

**Engineers can do much to enhance the status of the profession.**



# W

here will the next generation of broadcast engineers come from? That question is on a lot of minds in these difficult times for broadcast engineering.

Broadcast engineering faces serious challenges. In the past few years, we have seen the elimination of the FCC First Class Radiotelephone Operator's License and of the licensing requirement for a station's chief operator. A related challenge has come from changes in the nature of station ownership. The elimination of the three-year holding rule and the resultant rash of station trading has placed many broadcast licenses in the hands of investors new to the industry. Selling such an owner on an increased technical staff or new equipment may be tougher than ever.

The mystique and glamor—real or imagined—of broadcasting used to attract many idealistic young engineers. Nowadays, computers are the “glamorous” specialty, and broadcasting seems to have lost its aura. Broadcast engineering's low pay scales don't help. The proliferation of “black box” equipment, while a boon in so many respects, has reduced the need for large engineering staffs—and may make the jobs that remain less creative for “build-it-yourself” types.

Nevertheless, engineers can do many things to uphold professional standards, individually and as a group. One of the most obvious is to support the organizations that exist for the benefit of radio and television engineers. Professional groups offer information, networking and support; in these times, we feel there's no excuse for not belonging. Memberships and professional certification, such as the excellent program offered by the SBE, help attract and identify individuals with good skills and high standards.

Another standards booster is continuing education. National Public Radio's planned series of training videotapes is a good example of what a committed licensee can do. Industry groups often offer valuable educational opportunities through their local chapters. Broadcasters can gain a lot, also, by sharing their expertise with local colleges and universities with programs in broadcasting—a potentially fruitful source of new talent.

It may take some effort and commitment, but those qualities exist in abundance in our industry. Upholding the status and standards of the profession will go a long way toward making it more attractive to younger engineers. ■

A handwritten signature in blue ink that reads "Eva J. Blinder". The signature is fluid and cursive, with a long horizontal flourish extending to the right.

Eva J. Blinder  
*Editor*

# DIGITAL SYSTEMS



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# FEEDBACK

## Strategic Gaffe

It was with great interest that we read Michael Rivlin's article on strategic planning and budgeting ("Applying the Engineering Yardstick," *BME*, August p. 42). The article discusses the budgetary problems facing facility engineers and their effect on operations. We were taken by surprise, however, when we noticed that two of the facility pictures as well as the one of the facility blueprints were of our own International Production Center (IPC). Nothing in the article referenced it or any of its personnel.

IPC's studios were fully refurbished only three years ago and serve as a model of facility design. We made a tremendous investment in equipment and redesigned the entire facility to afford us total flexibility and offer our clients a top-notch, state-of-the-art environment in which to edit or shoot. The tape room is one of the few completely centralized systems in New York that allows maximum use of all equipment from any of the edit

suites, electronic paint systems, or studios. Albeit inadvertent, your inclusion of pictures of our facility was an appropriate companion to an article stressing meticulous engineering.

Steve Fox, VP Marketing  
MPCS Video Industries  
New York, NY

## Synchronous AMends

In the September 1988 issue of *BME*, Geoffrey Mendenhall's article "Measuring Synchronous AM in FM Transmitters" (p. 66) leaves out one important point. If the sampling line SWR can have an appreciable effect on the measured synchronous AM, then the transmission line SWR can cause a similar error. For this reason, the transmission line must be sampled with a directional coupler only, oriented in the direction of the forward-traveling wave. (Likewise, the final-cavity sample loop cannot be used.) Thus, the RF samplers in Figures 3 and 6 (near the top) should be directional couplers, and

not bidirectional samplers.

Of course, the alternate method of using the DC output of a THRULINE-type element circumvents this problem, since the element itself incorporates a directional coupler.

Aldo G. Cugnini, Director  
Broadcast Systems Research  
Broadcast Technology Partners  
Greenwich, CT

## Reel Life

Having exhausted other possibilities, I am turning to you and your readers for help.

I have need for 14-inch audio reels and boxes, with or without tape. Locally, I was able to purchase some from a radio station. When I went back to obtain more, I was informed that the station engineer had left and that all remaining reels had been disposed of when they last "cleaned house." When I checked with another station that had some, I was told that they too had no use for them and had simply thrown them in the trash. If any of your readers know where any of these reels and boxes are sitting around unwanted, I would appreciate knowing about it.

Brian Ziegler  
ACE Hardware  
215 N. Spring St.  
Elgin, IL 60120  
(312) 741-8330

*Do you have any questions, comments, or criticisms concerning what you read in BME? Any bulletins or issues you want to open up to other engineering management readers? Our letter column, Feedback, is your forum. Write to: Feedback, BME Magazine, 295 Madison Avenue, 19th Floor, New York, NY 10017.*



Machine room at MPCS's International Production Center facility in New York.

# To improve your definition

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To get unbelievable definition like this you could do a lot of push-ups. And pull-ups.

Or you could just exercise good judgment. And pick up the new Sony ED Cam.™ For the ED Cam is a very special piece of equipment. Designed and priced for those who want to work with high resolution. At home.

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You'll also find TSS recording heads for improved performance with our newly developed, metal particle tape. Which allows for extremely high-density recording. And standard Beta II and III recording modes for up to 3 hours of recording time.

Then we added 2 high-density  $\frac{2}{3}$ " CCD imaging chips with an effective 760,000 pixels. And separate Y and C signal processing for direct playback with spectacular sharpness and color fidelity.

For incredible sound fidelity, there's Beta Hi-Fi® stereo. A detachable stereo microphone with dual sound level meters. And standard stereo microphone inputs.

And so you don't miss what you're shooting, there's a 10.5-105mm, 10:1 ratio, variable-speed zoom lens. And a bayonet mount that can use a variety of lenses.

We also bulked up on editing features. ED Cam has Flying Erase™ Head. Edit Search and Shuttle Edit capabilities. Audio and Video Insert Editing. A Control L Terminal. And a Synchro Edit Switch. All easy-to-use features that give your finished tapes a professional look.

With all this in one lightweight package, is it any wonder we think ED Cam is head and shoulders above any other consumer camcorder.

## You can't beat the ED Beta System.

ED Cam and the Sony EDV-9500 ED Betamax® Editing VCR are made for each other.

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For more information about ED Cam, just visit your nearest authorized Sony ED Beta dealer. Or call 1-201-950-7669.

Work out with the ED Cam soon. You'll notice an immediate visible improvement in your definition. **ED Beta**



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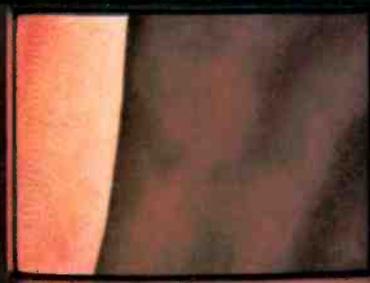
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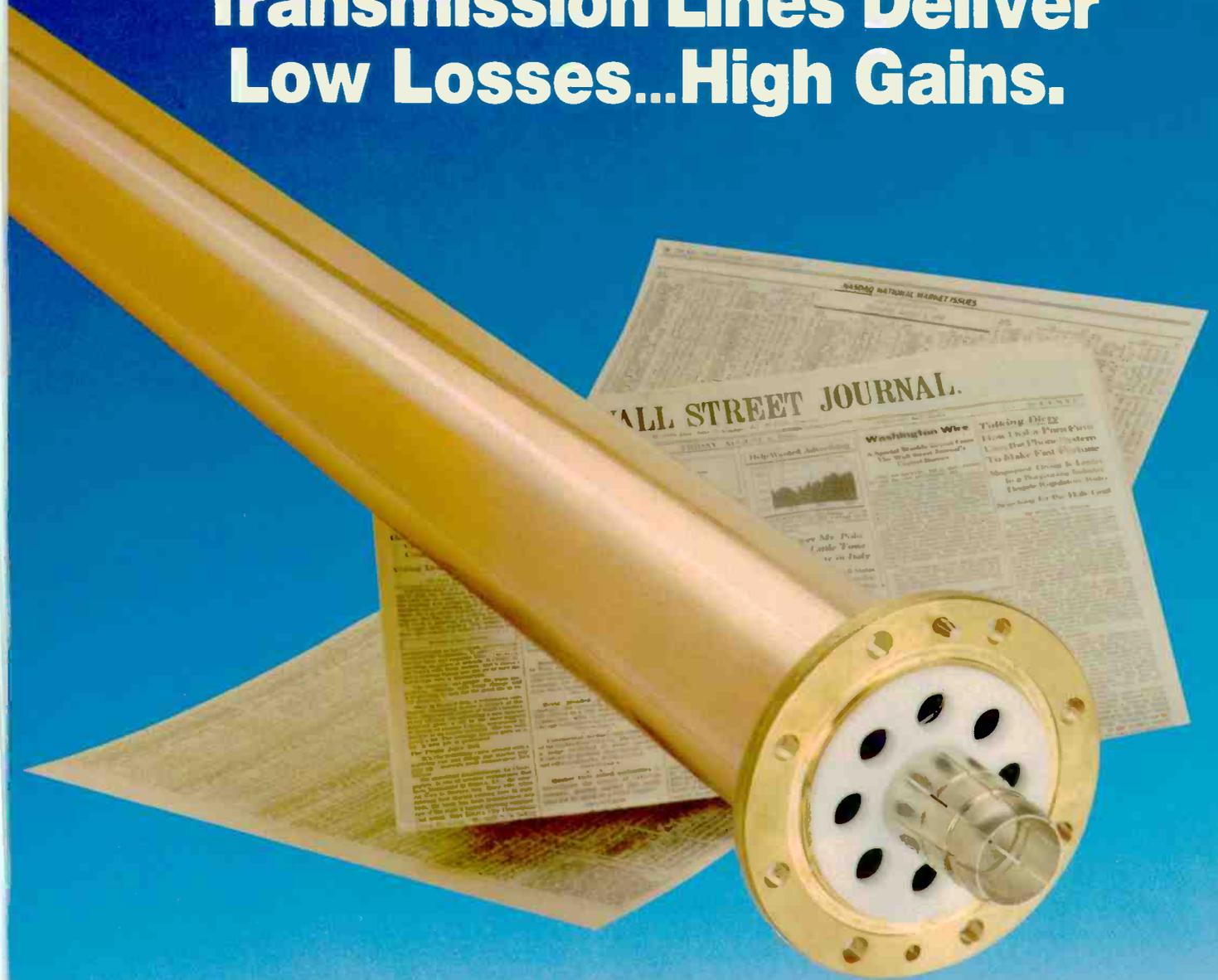
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To complement our full line of Rigid Coaxial Transmission Lines and accessories, Cablewave Systems also manufactures a complete line of semi-flexible air and foam dielectric coaxial cables and connectors.

For a copy of our 48 page Rigid Coaxial Transmission Line catalog and information on other broadcast and RF communication products, contact Cablewave Systems.



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# UPDATE

*Funding OK'ed for TV Marti...ANSI Votes HDTV Production Standard...LPTV Network Launched...Stereo TV Increases in U.S....NTIA Releases Telecom Report...SNV Uses Up, Says NAB*

## Funding OK'ed for TV Marti

**T**V Marti, the proposed U.S. government information and entertainment service to Cuba, moved closer to reality in October as President Reagan signed legislation authorizing \$7.5 million in funding. U.S.

broadcasters, however, remain concerned about possible adverse effects the service might engender.

Echoing these fears, NAB spokesman Walt Wurfel decried plans to suspend the TV Marti antenna from a balloon tethered 10,000 feet or more above the Florida Keys. According to Wurfel, winds could affect the direction of transmission and cause interference with U.S. stations. Wurfel also recalled the jamming last June of seven U.S. radio stations by signals from Cuba and expressed fear over possible future retaliation against TV Marti. "We are glad," he said, "that the project is funded for only a short time and that a public hearing is required by law before the project can be continued."

Mike Schoenfeld, public affairs specialist for the Bureau of External Affairs of the U.S. Information Agency, which will administer TV Marti, answered criticism by saying, "The technical setup is under study by the USIA, the Air Force, the FCC, and the National Telecommunications and Information Administration. Nothing is set in concrete."

Alex Felker, chief of the Mass Media Bureau of the FCC, confirmed that his agency would support TV Marti by supplying technical information. The jamming of U.S. broadcasts by Cuba goes back over 20 years to the NARBA treaty, to which Cuba was not a signatory. The FCC has been dealing with the problem by allowing sta-



*Castro: Smoking mad?*

tions to make changes in broadcast operations and by providing financial compensation. The TV Marti legislation, however, does not authorize compensation in its present form. Felker hopes final funding for TV Marti will include a provision for compensation.

As to whether last summer's jamming was deliberate, Felker said, "The FCC is relied on to measure signal strength and other parameters and to give technical advice not related to motivation." The Cubans claim the broadcasts were intended solely to advertise a jazz festival.

One radio station that felt the effect of the jamming was WHO-AM, Des Moines, IA. Ken Erickson, chief engineer at WHO, comments, "We are a clear channel station with great range out beyond our daytime coverage and we received several letters from people who heard the Spanish language. The greatest number of complaints were received in late June and early July."

Merlin Haymie, chief engineer of WSVN, Ch. 7 in Miami, FL, reports, "We are concerned with possible retaliation by Cuba, but we are more concerned about interference from TV Marti itself, since we hear it will operate on our frequency."

## ANSI Votes HDTV Production Standard

**A**ccording to information received at press time, the American National Standards Institute has approved 1125-line, 60 Hz HDTV as a production standard. The action by ANSI, while seen as a boost for MUSE-compatible 1125/60, does not preclude adoption of additional production standards. A consortium of U.S. and overseas manufacturers, the 1125/60 Group, has been pushing for the recognition of 1125/60 as the HDTV production standard since its formation several months ago. ANSI reportedly will soon commence work on NTSC-compatible HDTV.

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## LPTV Network Launched

Publicly held company Channel America (NASDAQ: LPTV) has launched a 24-hour-a-day low power television broadcast network. Headquartered in New York City, Channel America began broadcasting October 10 with seven owned-and-operated LPTV stations and 12 affiliate stations. Format for the new network includes viewer participation game shows, original programming and repertory theater productions.

Channel America expects to have 33 O&O stations on the air by the middle of 1989 plus an additional network of 50 LPTV affiliate stations, according to chairman David Post, former founder and chief executive of radio paging company PageAmerica. Channel America holds a five-year agreement to lease space on transponder 3, channel 5 of GTE's Spacenet II satellite. It will not scramble its signal so its broadcasts can also be received by home satellite dish owners, the company said.

LPTV signals cover a radius of 15-25 miles, compared to 40-70 miles for full power stations. There are currently some 300 LPTV stations in the United States, according to Channel America.



One of Hitachi's top-of-the-line MTS Stereo Television systems introduced at this year's SCES in Chicago.

## Stereo TV Increases in U.S.

Some 490 U.S. television stations are now equipped to transmit in stereo sound, according to recent industry figures. This number represents more than one-third of all TV stations on air and covers every major metropolitan market. Fewer than half that number were so equipped two years ago. Of the current group, 75 public TV stations have converted to stereo and an additional 175 plan to do so by 1990, according to sources at the Public Broadcasting System. Supporting this growth, figures recently released by the Electronic Industries Association report 22.5 percent of color televisions sold to retail dealers in the first half of 1988 were stereo models. This compares to 19.2 percent in the first six months of 1987.

## NTIA Releases Telecommunications Report

According to a future-oriented report recently released by the National Telecommunications and Information Administration the "transforming potential" of telecommunications will be stifled unless government policy makers

focus more on access to new services than on who delivers them. The report, called *NTIA Telecom 2000: Charting the Course for a New Century*, was issued October 4 in Washington, DC. The NTIA is the executive-branch agency responsible for the development of domestic and international communications policy.

Recommendations from

the report, which found that most of the nation's previous public policy goals have been accomplished, include expanding communication options to build universal service. The report also says that competitive communications and information markets remain the best guarantee of public service.

The less regulated a

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# UPDATE

given telecommunications sector, the faster it grows, said NTIA administrator Alfred Sikes. He further called for policies which slow the introduction of promising new services or retard their distribution to be discarded.

The report, which details an emerging "electronic national neighborhood," especially affects broadcasters concerned with satellite delivery to rural areas. Copies can be obtained from the Government Printing Office.

## New EPA PCB Numbers

**T**hanks to *BME* readers and John Smith, of the EPA's PCB Disposal Section, Washington, D.C., who have advised us of the following telephone numbers for broadcasters with questions concerning PCB disposal and compliance. In addition to the EPA Regional Offices, contact EPA National Headquarters (Chemical Regulation) at (202) 382-3933/3934 for general questions regarding PCBs, compliance and details of the Toxic Substances Control Act (TSCA) of 1976. For specific regulatory questions, contact EPA Environmental Protection Specialist Tom Simmons at (202) 382-3788. (Smith's section handles permitting for large-scale disposal.) The TSCA 800 Hot Line number printed in the September 1988 issue, p. 59, has been discontinued due to budget cuts.



KPRC-TV's (Houston, TX) SNV covered the crash of Delta Flight 1141.

## SNV Use Up, Says NAB

Over 122 commercial television stations currently use satellite uplink newsgathering vehicles, according to a telephone survey commissioned in August by the NAB. This compares to 71 stations using them in March 1987, and represents a 72 percent increase.

Average worth of each SNV is \$422,000. Ninety-eight percent of the vehicles are equipped with videotape editing equipment, 93 percent with cellular telephones, 69 percent with microwave capability and 64 percent with production mixers. Thirty-three percent of stations using mobile satellite uplinks are in major markets, up from 14 percent. ■

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# CROSSTALK

AN ENGINEERING MANAGEMENT JOURNAL

## *The Talk of SMPTE*

### **The Talk of SMPTE: One**

**E**very trade show generates some exhibitor dissatisfaction. The booths are too small, the convention center poorly run, the crowds too meager for *somebody* at any convention you can name.

At last month's SMPTE Convention and Equipment Exhibit at New York City's Jacob K. Javits Convention Center, however, the usual grumbles became a roar loud enough to drown out the IRT at rush hour. New York, it seemed, was working overtime to deserve its reputation as a tough town to play.

One exhibitor told of having to watch his highly paid booth construction team sit idly because the convention center's union carpet layers couldn't be persuaded to unroll the floor covering. He eventually discov-

ered what many others said they found out sooner or later: getting the work done involved liberal outlays of \$20 bills. Several exhibitors complained of the slowness of the facility's electrical crews. It was widely rumored that the convention center crews were deliberately slowing down in order to extend jobs into overtime hours.

Add to all this the little indignities of New York City: no parking and virtually no taxis at the convention center, high-priced hotels and restaurants, and the delights of staying in the center of Times Square. New York may be a nice place to visit, but do you really want to hold a convention there?

"I heard more complaints than two years ago when the show was first at the Javits Center and more than I heard last year in Los Angeles," ad-

mits Blaine Baker, president of MPL Film and Video, a lab and post-production house in Memphis, TN, and the SMPTE's conference vice president. "But since I've returned to my job," he adds, "I've had several notes from exhibitors saying it was a good show."

Baker had the unenviable job of conducting the exhibitors' meeting at 7:30 a.m. on the last day of the exhibit. Along with SMPTE representatives and exhibitors, representatives of the Javits Center service companies attended.

The meeting "was fairly mild-mannered at first, but then they got down to nuts and bolts," quipped one attendee, BTS's manager of marketing, Al Jensen. "One of the biggest complaints was that we had such a late move-in date that many people had to pay overtime and double time," he said.

"Electrical seems to be the heart of the majority of problems," Jensen added. "Two years ago we tried to get the electricians to understand that SMPTE is a big show with big power requirements. Some exhibitors, including BTS, sent wiring diagrams ahead of time and met with the chief engineer, but all the preplanning seemed to be in vain. The electricians as a whole were so much slower and took so much time...to put in three or four wires would take eight hours."

Will this, perhaps, be Gotham's last SMPTE show? That's unlikely, according to Baker.

"After the dissatisfaction expressed two years ago, SMPTE did a very extensive survey of the exhibitors asking where they wanted to be," Baker says. "New York was voted the most favorable spot and the least favorable spot," winning the most votes in those two seemingly conflicting categories.

"The SMPTE membership could feel equally comfortable in almost



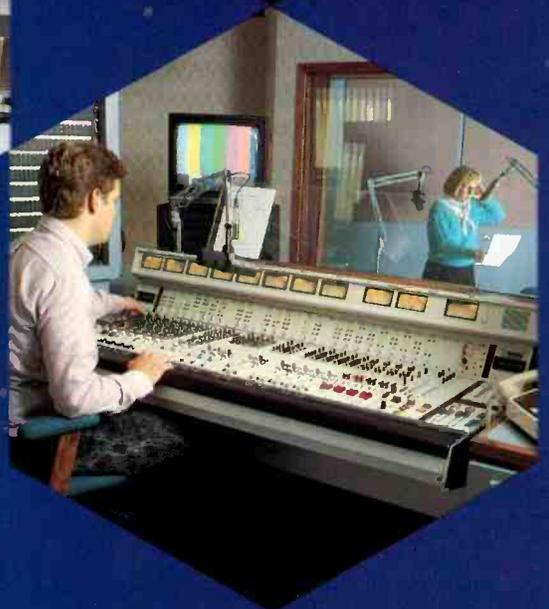
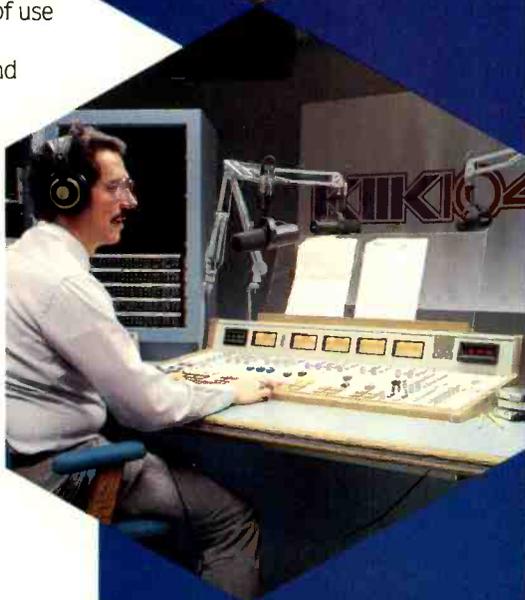
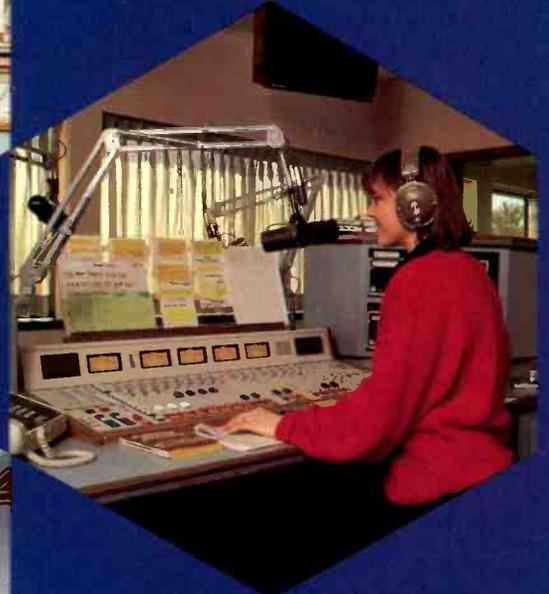
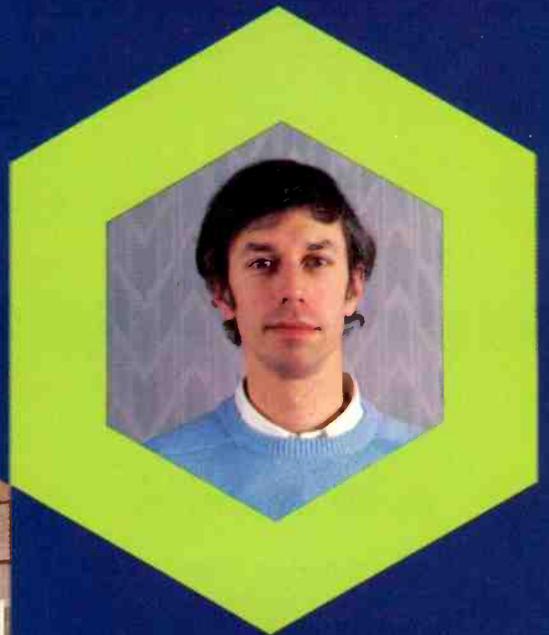
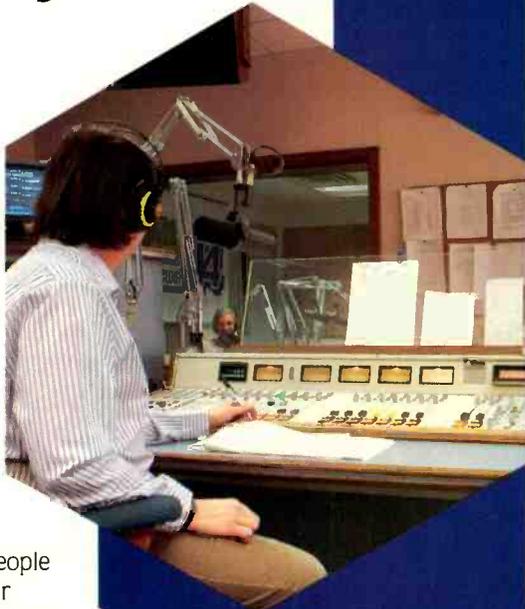
*Last month's SMPTE convention generated a roar of complaints from exhibitors.*

# Auditronics “because they work well and they’re so easy to use”

“**T**hat’s what I tell colleagues from other stations when they ask why I prefer Auditronics consoles,” says Jon Book, Engineering Manager, Studio Systems for WOC-KIHK in Davenport, Iowa.

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any city," Baker continues. "But the exhibitors, who are very, very important to the finances of SMPTE, have a need to exhibit in New York City. That isn't to say that it might not be moved some day...but we have to work three, four, five years ahead to find convention space of the kind we need. The location of the convention is the decision of the Board of Governors, which will meet next in early February the day before the television conference. I'm sure this subject will come up during the agenda."

## The Talk of SMPTE: Two

Now that D-2 digital composite videotape recorders have been in users' hands for a few months, it's a good time to find out if they've lived up to customers' expectations. At SMPTE, Sony brought five users of its DVR-10 D-2 recorder together for a roundtable discussion Saturday evening after the show floor closed. While none of the users had a radically new take on the D-2 issue, they were able to offer some interesting perspectives on how the new format is integrating into their facilities—and how their clients are accepting it. Participating in the roundtable were John Kohan-Matlick of Video It, Culver City, CA; Neil Feldman of Video Post and Transfer, Dallas; Scott Holmgren of Post Expressions, New York City; Bert Swackhammer of One Pass, San Francisco; and Jim Bartel of Post Effects, Chicago.

According to Bartel, Post Effects styles itself as a "boutique."

"We're not just a post-production edit house," he related. "We specialize in video special effects work, film animation, electronic graphics and imaging." Prior to acquiring the DVR-10s, Bartel had configured a room with three Abekas A62 composite disk recorders and two A53-D effects units, using a Dubner paint system and the Alias/1 animation workstation as input devices.

"It was a proprietary way of doing

composite digital," he recalled; D-2 "allowed us to market ourselves in a little different niche than some of the D-1 people. We can manipulate an image, play around with a piece of video and put it back in without any major technical problems, as opposed to D-1, which is a different approach. D-2 is a workhorse VTR that we can use day in and day out."

The Dallas market, according to Feldman, sees D-2 as a viable and cost-effective format for special effects work. "We were D-2 advocates before there was a box," he quipped. "The Dallas market, we feel, at present won't support the cost of real high-end D-1 effects," although his facility is slowly moving toward offering both composite and component digital. "We were a little skeptical of D-2 when it was first introduced," Feldman continued. "Now we see the D-2 machines as a workhorse, easily compatible with one-inch." He added, "The four channels of digital audio is a very big breakthrough for us."

Despite the higher cost of digital component, VP&T is moving toward more and more component capability and has installed a D-1 compatible Rank telecine. A D-2 noise reducer from Accom is on order.

*"People who begin to play with digital will begin to see some of the problems that are created by encoding and decoding."*

"D-2 is going to spur the development of D-1 in a big way," Feldman predicted. "People who begin to play with digital will begin to see some of the problems that are created by encoding and decoding....We have to find a pathway to bring our clients up to speed and keep the price low."

At Video It, which is not in the high-end graphics business, "we simply replaced our one-inch recorders with D-2 mastering machines in a standard interformat editing environment," says Kohan. The facility has mastered about a dozen projects on D-2 since installation.

"We told our clients D-2 would cost exactly the same as one-inch," Kohan added. "Of course, we raised our one-inch rates 10 or 12 percent."

Kohan summed up by saying, "D-2 is a way you can have your revolution and keep your compatibility, too." ■



Sony's DVR-10 D-2 recorder.

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## Fiber Makes the Switch

By James A. Ackerley

**F**iber optic technology is often viewed as a kind of wonder drug, guaranteed to cure noise, protect privacy, reduce loss, and provide bandwidth in excess of our greatest needs. Switching fiber optic circuits, however, poses problems far different from those encountered in switching standard electrical signals. Light is not electricity and it can't be transferred by making and breaking mechanical contacts.

One relatively new and promising way to switch fiber optic signals is wavelength-division multiplexing (WDM). Light from different frequency sources is channeled to a single fiber by individual fibers spliced together. At the other end, the same number of spliced fibers branch off from the single fiber. Each of these branch fibers carries the same light, but goes to a different optical filter. The filters remove unwanted wavelengths and thereby restore the original wavelengths along with the messages they carry.

This would seem like a very good way to handle long distance transmissions—just splice a hundred or more lead fibers to each carrier fiber and save a fortune in silicon. Unfortunately, only three windows in the infrared spectrum can be transmitted by commercial fibers and this limits the number of channels.

Dr. N. A. Olsson, on the staff of AT&T Bell Laboratories, was able to combine 10 channels on a single fiber during a laboratory experiment performed in 1985. He affirms, "If we are ever to use the full capability of optic fibers, we will have to use WDM." Olsson reports that AT&T is cur-

rently producing a two-channel WDM system for commercial use.

According to Dr. Ivan P. Kaminow, also of AT&T Bell Laboratories, "The lightwave technology that has been developed for use in long distance telecommunications has great potential for high speed data communication local networks." Kaminow describes a frequency-division multiple-access (FDMA) network that uses frequency-division multiplexing

(FDM) and assigns to each user one of a comb of optical carrier frequencies. It is theoretically possible to have as many as 1000 users at 1 Gbit/s each, or a network capacity of 1 Tbit/s, but the network described supports only four users at 45 Mbits/s.

In the FDMA network, the outputs of four semiconductor lasers are optically modulated by direct frequency-shift-keying (FSK). They could also be externally modulated by amplitude-shift-keying (ASK). After modulation, the four carriers go to a 4x4 passive single-mode star coupler. The star has four identical outputs, each of which is demultiplexed by a fiber Fabry-Perot (FFP) tunable optical filter. Demultiplexing could also be done, and with greater receiver sensitivity, by heterodyne detection. In that case, the signal received would be mixed in a photodetector with the output of a local oscillator (LO) laser to produce an intermediate frequency (IF) signal.

In a paper presented last September at the European Conference on Optical Communications in Brighton, England, Dr. Charles A. Brackett, District Manager of Exploratory Optical Networks Research at Bell Communications Research, noted that WDM "has evolved to experimental demonstrations of systems of up to 20 wavelengths (with projections extending to hundreds



Technicians at the Corning Glass Works using an arc-fusion splicer to join heterogeneous single-mode fibers without excessive signal loss. A single universal setting is used for all fiber optic splices.



# TECH WATCH

and even thousands of wavelengths) in network architectures where wavelength is used as part of the very interconnection fabric of the network."

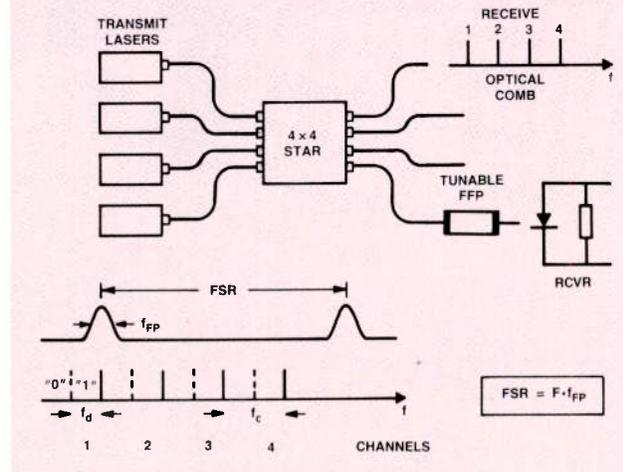
Brackett identifies three basic types of interconnection networks. In the first, the transmitters all emit the same wavelength and the receivers have no wavelength discrimination. The interconnecting network can either switch the signals or transmit them point to point. In the second, each of the sources and/or receivers is associated with discrete fixed wavelengths. In this case, the interconnection network can perform either wavelength routing or switching, or transmit multiple channels for selection at the fiber optic receiver.

In the third type of interconnection network, the sources and/or receivers are tunable, or switchable, to a set of discrete wavelengths. The size of such a switch is as yet unknown, but will depend upon the number of channels which can be resolved and independently addressed by tunable sources, tunable receivers, and wavelength routing components. The goals of this emerging optical network, or switching, technology include greater information bandwidth, relief of switching bottlenecks, cost reduction, and interconnection flexibility.

Not all observers are as sanguine about the prospects for WDM. C. Robert Paulson, director of television/graphics marketing for Artel Communications Corp., observes, "A great many predictions are made by laymen inspired by dreamers whose technology is well founded but not realizable in practice." The question, as Paulson sees it, is "whether the savings in the cost of optical cable is worth the expense of the combiners and decoders needed to make WDM work."

Another option for switching light

## FDMA-FSK EXPERIMENT



Frequency division multiple access.

is the use of an optical integrated circuit. This chip consists, in part, of a grid of light-conducting lithium niobate fibers. Light conduction is controlled by electrical inputs so that light can be allowed to go from any input to any output. Limiting factors include the number of circuits that can be switched and also the inevitable loss of light.

A device destined for a key role in optical switching and logic circuits is the bistable laser diode (BSLD). The BSLD is an optical flip-flop that promises to do for optical circuits what the original flip-flop did for digital circuits. Scientists at the Fujitsu Laboratories in Atsugi, Japan recently announced discovery of the wavelength and light intensity needed to reset the device optically. Before this, the BSLD was set by light, but reset by electrical pulse.

The previously discussed methods for switching light are, for the most part, experimental. The method in current practice is to convert light signals to electronic signals and then to use conventional ways to switch the electronic signals. Consider how a long-distance phone company handles the problem. An electrical analog of the caller's voice goes over the traditional twisted-pair to the local exchange. At that point, the voice analog is digitized by an A/D converter

sampling at the rate of 6.88 kHz. At each sample, the converter produces the binary representation of the amplitude of the voice and puts it out on eight parallel lines. These eight bits and the eight bits from each of 27 other callers become the parallel input to a shift register called a "concentrator." The shift register is triggered by the negative-going transition of the same clock pulse whose positive-going transition triggered the converter. The output of the concentrator for each negative-going transition of

the 6.88 kHz clock pulse is 224 bits.

The next stage is either a light emitting diode (LED) of the edge-emitting variety or, for longer distances, an injection laser diode (ILD). A logic "1" causes the light output to brighten and a logic "0" causes it to dim. In this way, bits of high and low intensity light are produced which leave the exchange on a single-mode fiber at the rate of 1.544 Mbits/s. This process of assigning signals to different time slots within a given period is called time-division multiplexing.

At the area exchange for the destination, the light signals are reconverted to electrical-digital signals by a photodetector, either a positive-intrinsic-negative (PIN) diode or an avalanche photodiode (APD). A shift register having serial input and parallel output separates the particular signal from the others and a D/A converter restores it to its original analog form.

It will be some years before the telecommunications industry needs the multichannel optical switches American and Japanese scientists are now developing. Not all approaches to the problem will prove fruitful, but it is already clear that a lack of proper switching will not impede the development of fiber optic technology. ■

Ackerley is BME's technical editor.

# How Good is Our 3rd Generation?



TBC-200 Time Base Corrector



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SVHS Video Cassettes

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Horizontal Resolution (Color Mode)	400	370	360	350
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Luminance (Color Mode)	57.2	51.7	52.0	49.0
Chrominance (AM)	51.8	47.5	51.4	44.5
Chrominance (PM)	44.3	40.1	43.8	35.2

Data represents measurements by independent engineering evaluation. VCRs taken at random from inventory.

• Signal Source: Shibasoku TG-7/1	• Noise Meter: Rohde & Schwarz UPSF2/UPSF2E2
Luminance: 50 IRE flat field w/burst	200 kHz HPF, subcarrier trap on
Chroma: 50 IRE w/100 IRE p-p	4.2 MHz, LPF, weightec
Resolution: Monoscope Shibasoku 58A/1	100 Hz HPF
	500 kHz LPF, unweightec

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# SIMULTANEOUS RELEASE ON FILM AND TAPE OFF-LINE EDLs

*With the right mathematical approach, a single edit session can yield videotape and film EDLs that are almost identical artistically and temporally.*

**D**espite the growing interest in videotape post-production, the majority of domestic prime time television programming still is originated on film. In many cases, producers find it advantageous to generate simultaneous video and film cuts of a program. The tape cut, of course, is required for NTSC release. The film cut may be intended for PAL conversion or theatrical release. With HDTV looming on the horizon, a film cut becomes even more desirable for eventual use in HDTV conversion.

When releasing simultaneously on film and tape, it is highly desirable to produce the identical tape and film cuts from one edit session. Generating in a single session a video EDL and film cut list that will produce identical programs results in obvious time and money savings. In addition, if the film and tape cut are identical (within  $\pm 1$  TV field), only one sound track is required.

Several problems must be overcome to generate an EDL that will produce an identical film and tape cut. Some of these problems arise from the divergent frame rates at which video and

film are recorded.

In order for film to be edited electronically, the optical image must be converted to a video signal. This conversion is done on a telecine whose output is then recorded onto videotape. Film is normally shot at 24 fps and video runs at approximately 30 fps. In the transfer process, this discrepancy is resolved by scanning every other film frame three times instead of the normal two field scans which make up the frame of a television picture. This "3-2 pull-down" technique results in the generation of 60 fields of video from 24 frames (one second) of film. (See Figure 1.)

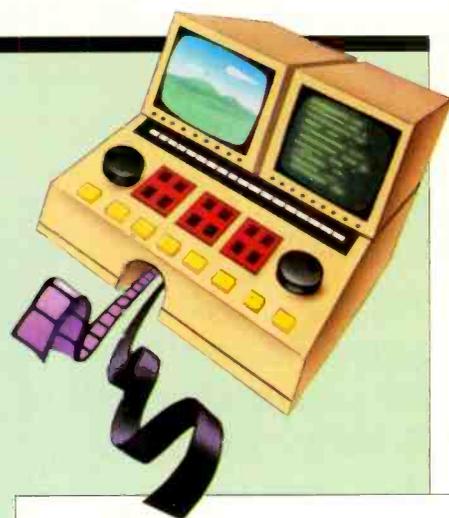
The 3-2 conversion technique, however, does introduce a problem: two of every five video frames will consist of fields that contain information from two different film frames. The resulting effect is that images displayed in freeze frame will appear to flicker. If the editor were to select this artificial frame as an edit (splice) point, an edit ambiguity would result. The obvious solution is to identify and give still frame access to only the first two video scans of each new film frame. This can be easily done by frame numbering on the laservision disc.

In order to generate an edit decision list (cut list), a film roll "index" frame

BY STANLEY D. BECKER

**TABLE 1**

IN	OUT	TOTAL EDIT ERROR	EDIT ERROR COMPONENTS
A IN	A OUT	- 1/2 fld	0 + (- 1/2)
A IN	B OUT	- 1 fld	0 + (- 1)
A IN	C OUT	+ 1/2 fld	0 + (+ 1/2)
A IN	D OUT	0	0 + 0
B IN	A OUT	0	(+ 1/2) + (- 1/2)
B IN	B OUT	- 1/2 fld	(+ 1/2) + (- 1)
B IN	C OUT	+ 1 fld	(+ 1/2) + (+ 1/2)
B IN	D OUT	+ 1/2 fld	(+ 1/2) + (0)
C IN	A OUT	- 1 1/2 fld	(- 1) + (- 1/2)
C IN	B OUT	- 2 fld	(- 1) + (- 1)
C IN	C OUT	- 1/2 fld	(- 1) + (+ 1/2)
C IN	D OUT	- 1 fld	(- 1) + (0)
D IN	A OUT	- 1 fld	(- 1/2) + (- 1/2)
D IN	B OUT	- 1 1/2 fld	(- 1/2) + (- 1)
D IN	C OUT	0	(- 1/2) + (1/2)
D IN	D OUT	- 1/2 fld	(- 1/2) + (0)



*The videotape equivalent edit point is obtained mathematically by taking the number of film frames from the reference to the edit point.*

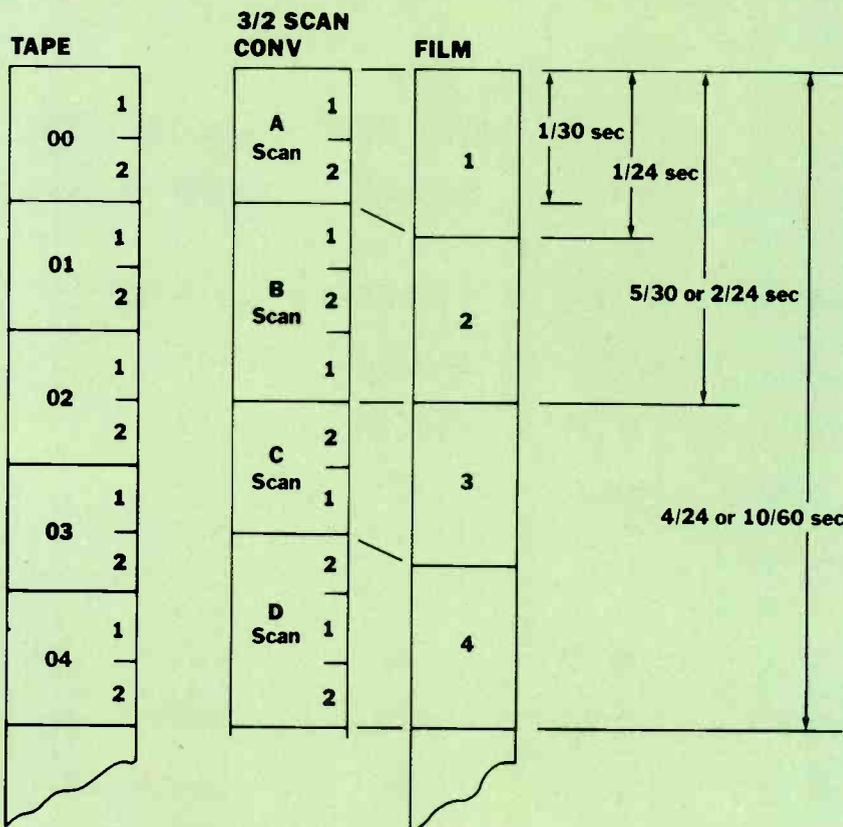


*The 3-2 pull-down technique results in the generation of 60 fields of video from 24 frames (one second) of film.*



Stanley D. Becker.

**FIGURE 1**



Note: If A Scan = time code :00, next A Scan = :05, next :10 etc.

## OFF-LINE EDLs

must be physically identified at each key number discontinuity. The disc frame number, key number and associated SMPTE time code number are logged for the "index" frame. As editing proceeds, only complete film frames are available as edit points and, therefore, the film cut lists will be identical to what the editor viewed.

The next problem is to generate a tape EDL that will conform a videotape master identical to the film cut.

Figure 2 shows all possible film in and out edit points and the tape frame that would most closely correspond to the selected film frame. Noted is the accuracy of the video edit point when referenced to the film. The 16 combinations of in- and out-points are tabulated in Table 1.

The uncorrected videotape equivalent edit point is derived mathematically by taking the number of film frames from the reference to the edit

point (either in or out) or multiplying by five-fourths to get the number of television frames and adding the result to the reference. The computation will yield the video frame which first scans the selected film frame in a 1/2 sequence with "In" on field one and "Out" on field two.

For example, the calculation for the video edit point is five-fourths the number of film frames from ref (round if greater than 0.5 with an A Ref). If the in point is film frame 4, then the video edit is at:

$$\frac{5}{4} (4) = 5 \text{ video frames} \\ (\text{Time Code \#04})$$

As shown in Figure 2, this point is half a field after the actual start of film frame 4, introducing a half-field edit error.

If the out is film frame 6, then the video edit is:

$$\frac{5}{4} (6) = 7.5 \text{ or } 7 \text{ video frames} \\ (\text{Time Code \#06})$$

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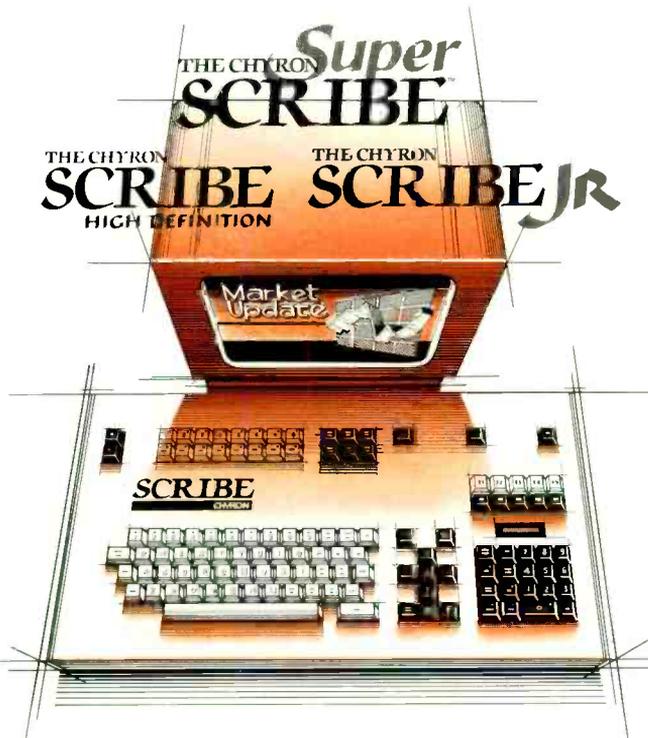
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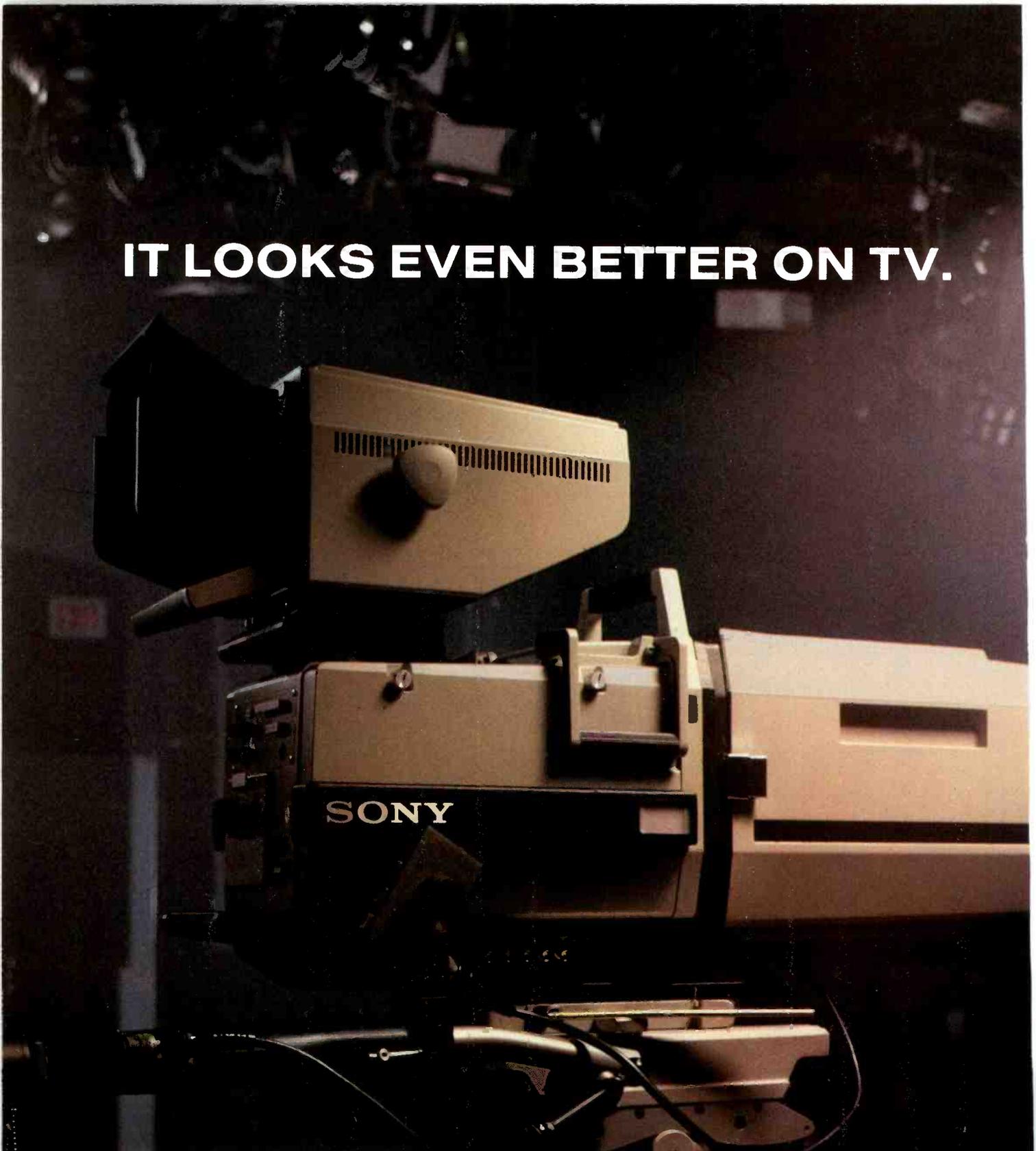
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Circle 118 on Reader Service Card Page 67



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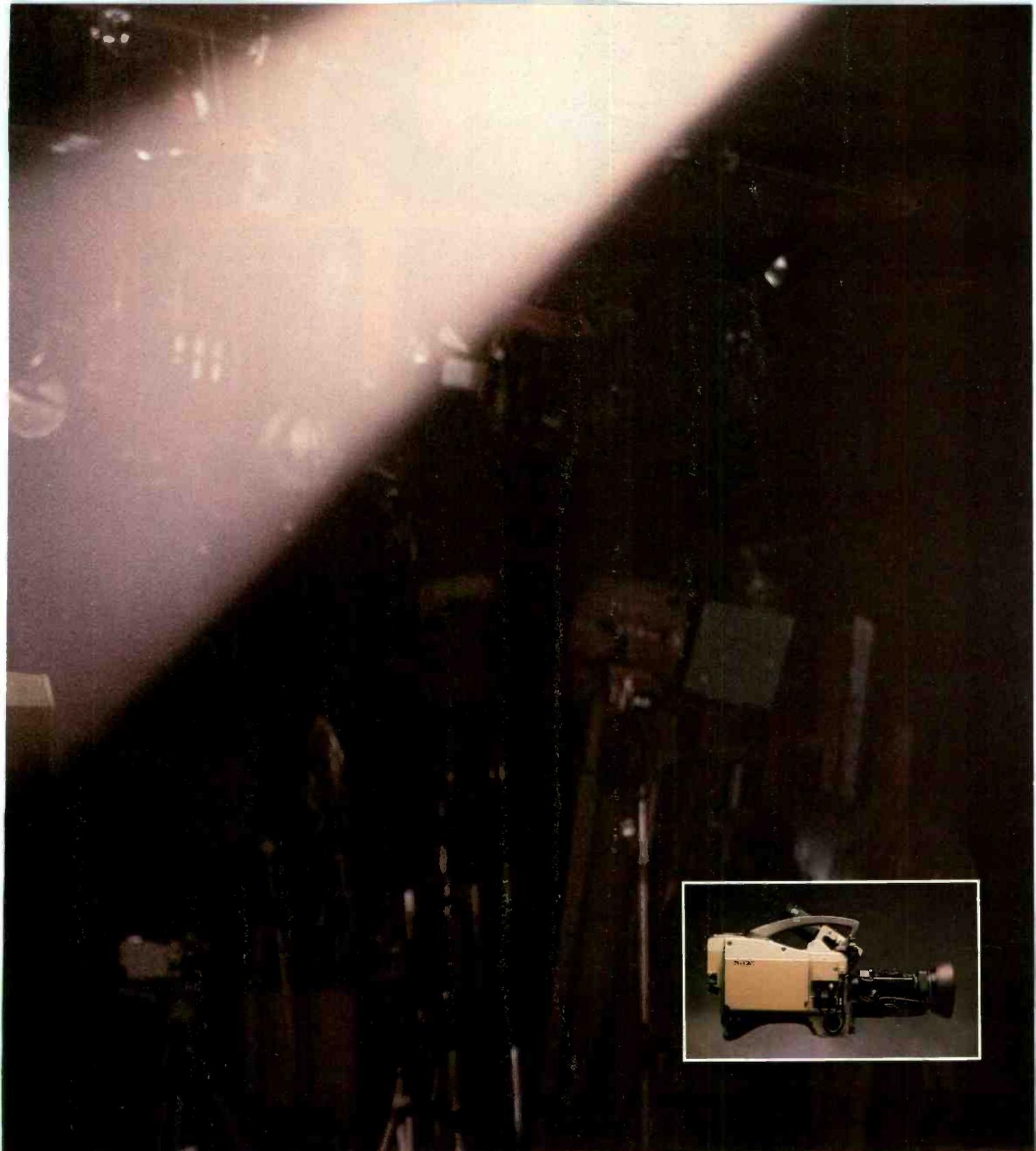
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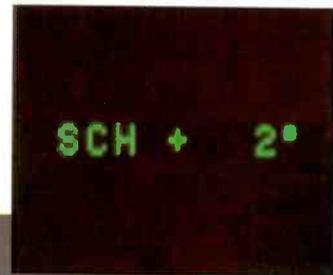
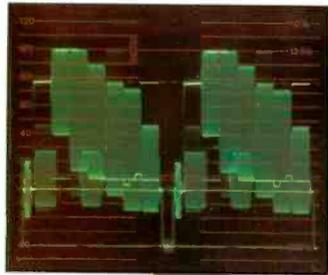
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# LEADER

FOR PROFESSIONALS WHO KNOW  
THE DIFFERENCE

Circle 111 on Reader Service Card Page 67 for Demonstration

Circle 112 on Reader Service Card Page 67 for Literature

# INTELLIGENT HARD DISK EDITING:

## THE NEXT GENERATION

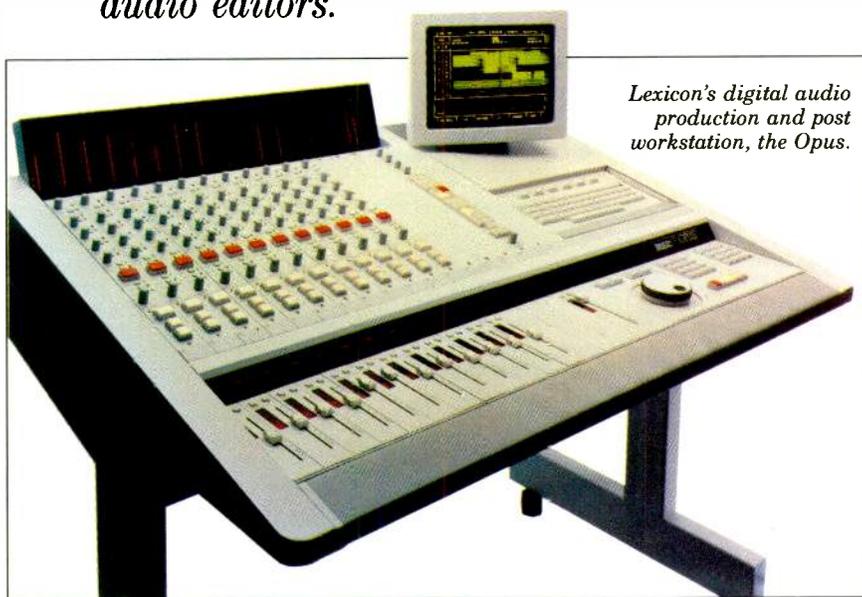
**C**omputerized digital audio editors are rapidly becoming viable, reliable alternatives to traditional razor blade editing. These marvels of technology handle massive amounts of data in perfect sync with picture, producing impressive lists of numbers on video screens and allowing operators endless tries to get a perfect edit. In many respects, however, they are still very primitive beasts. An awful lot of untapped computer power is available in these editors. I'd like to suggest some ways to unleash that power, based on my facility's experience using some of the first-generation of hard disk-based audio editors.

Finding that perfect edit has always been tricky. You can't tell where any piece of audio is until you get the piece of tape (or a computer simulation of it) moving across the heads. Once it is moving, however, your edit point has become a moving target, making it difficult to find.

One aid offered on some systems is a waveform display. With this, one can view the audio waveform and distinguish the spaces from the words, or the snare drum hits from the kick drum. Back in the 1930s, when optical soundtracks on film were used for editing, editors had the same capability (so much for modern innovation). One had to use a magnifying lens to really see the tracks, but it was all there on the film. Even on a computer screen, the display becomes too dense to read when more than a minute of material must be displayed.

Waveform editing is certainly an

*Computerization offers huge benefits to audio post. One engineer offers his suggestions for the second generation of audio editors.*



*Lexicon's digital audio production and post workstation, the Opus.*

acquired skill, and still includes a great deal of guesswork when interpreting the display. The computer can help us by analyzing the recordings and representing them in a way that is more intuitive. Several improvements could be made to the waveform display to make it more useful for editing. First of all, the exact wave

BY TOM MILLER

*Waveform editing  
is certainly  
an acquired skill,  
and includes a  
great deal of guesswork  
when interpreting the  
display.*

shape is not that important, and might not need to be preserved. Instead, the computer could perform some calculations to make the sounds more easily visible. A logarithmic conversion would make soft sounds much more visible than on the current linear displays. Also, the waveform below the 0 V axis is nearly identical to that above the line. Eliminating the negative part would allow the useful part of the display to double in size while still occupying the same amount of precious screen space. The envelope (sometimes called the energy-time curve) of a signal is a smoother-looking display which still properly shows the energy of the signal, but without all of the zero crossings. Just showing the envelope of a signal should be just as useful for editing as showing the complete waveform, while eliminating some display clutter.

Having the computer mark word divisions would help the user for voice work. Once the audio is broken down into words, editing can be much more like working with a word processor. Words or phrases can be "grabbed"

and moved to new locations, and matching words from alternate takes can be quickly swapped with each other.

The task of separating words may not be that difficult. If a simple noise gate does a good job of discriminating signal from noise, why not a computer? It does not take a lot more processing to separate speech into voiced and unvoiced sections. This would help the operator recognize words and other noises while searching for places to edit. When editing within words, it is usually much safer to edit on a vowel than on a consonant since there is a risk of creating a double consonant if the edit is not perfectly placed. A waveform or envelope drawing of the audio could use colors to highlight vowels, consonants and the gaps between words.

If a script were available in computer form, say from a word processor, it might be worth lining up by hand key words in text form with the appropriate waveforms on the screen. Key words could then be dragged from the script up to the waveform using a mouse.

It would be nice if the computer could just figure out what the words are. Unfortunately, computer voice recognition probably could not be expected of any hard disk editor that we could afford. Having a script available makes voice recognition a much simpler task, however. If there are 10 words in the script and 10 bursts of sound in the recording, the computer should be able to match them up.

A rudimentary task performed when mixing is to fix the changes in level across edits. A computer editor could be used to ride gain in an intelligent manner. To determine how to match levels from the end of one piece to the beginning of the next, the computer could average the level of a group of words before and after the edit point. Better yet, there could be a short-term level fudge at the edit to make it work, along with long-term level riding to keep the dialog at a consistent level. The hard disk system should work much better than any analog automatic level controller.

Ambient noise poses some problems. As the gain is increased, the background ambient noise will also rise, giving away the edit. It is customary to mix a little prerecorded ambient noise into clean recordings to make them match the noisy ones and hide the edits. Again, the computer can help. Since it knows what the level fudges have been, it can also suggest how much noise should be added to the clean tracks. The computer could create a separate ambience track to match the dialog track for future mixing, or the ambient noise could be mixed directly in with the dialog. The end result should ap-



*The edit control  
panel of Digital Audio  
Research's Soundstation II workstation.*

# INTELLIGENT HARD DISK EDITING

*Ambient noise  
poses some  
problems.  
As the gain  
is increased, the  
background ambient  
noise will also rise.*

pear consistent, regardless of the edits.

When complex edits are being performed, a lot of short pieces of audio end up on clip boards or in trim bins. It soon becomes very hard to tell which pieces ended up where. A few graphic aids could help the user. One currently used method is to show waveform displays of the trimmed pieces. Unfortunately, this ties up a lot of screen space without telling the user much.

A simpler system would be to label the pieces as they are being cut using a system of numbers and icons. These take very little screen space and could be very informative. There could be symbols for virgin material, cut material, lip sync voice, off-screen or non-sync voice, ambience, impulsive effects, music, and more. The icons could even have qualifiers to show how the sound had been cut. A left bracket, for example, would show that material had been trimmed off the beginning, a right bracket would show that material had been trimmed off the right, and both would indicate the material had been excerpted from a larger piece. Colors might be used to indicate the quality of a clip.

When editing audio for video, the audio editor should be able to use the edit decision list (EDL) generated by the video editor. With the audio properly SMPTE time coded to match the picture elements, a lot of audio editing could be done in a snap. An audio editor could even do the same kind of auto assemble videotape editors do now.

Here's how it might work. The EDL created by the videotape editor would be transmitted via modem or floppy disk to the audio editor. A printout of the EDL would let the operator know which reels of tape to bring to the edit session. A remote control cable between the tape machine and the audio editor would allow the editor to control the tape transport functions.

(Some tape machines and editors already feature serial control ports.)

The computer would then go through each tape, copying the needed material onto the hard disk. The order of the material on the tape wouldn't matter, since the computer editor can shuffle the audio later when retrieving it from disk. A little extra audio at the beginning and end of each useful piece is also copied into the editor, so that edit points can later be nudged a little. When one of the reels is finished, the computer instructs the operator to thread up the next one.

Once all of the useful audio is loaded onto the hard disk, the computer uses the EDL to retrieve the

pieces in order. No additional processing time is needed.

The operator may then wish to slide some edit points, add crossfades, or swap in a different reading of a word from an alternate take. If a proposed change requires audio not on disk, the computer would request the appropriate tape reel. This would save time and disk space. All of the hardware required to carry out this whole procedure already exists in studios. What remains is for someone to write the appropriate software and coordinate the appropriate equipment.

Auto assembly does require a lot of preplanning and coordination. The computer can help to find takes in several other ways that don't require special preparation, however. For example, certain standard signals are commonly used to mark the endpoints of recordings and synchronizing information. Field recordings generally begin with a snap of the clap stick. The recordist also places two short beeps on the tape to mark the end of a



*The Synclavier,  
NED's answer to the  
digital audio  
workstation.*

# INTELLIGENT HARD DISK EDITING

*When editing audio  
for video, the  
audio editor should  
be able to use  
the edit decision list  
(EDL) generated by the  
video editor.*

recording. Studio recordings may have a low-frequency tone present during the slate, and a one-frame-long beep often marks the point that is two seconds before program start. When editing music, a basic requirement is to preserve the beat. A computerized editor could display the beats on the computer screen. A snap to grid feature, as in computer-aided drafting programs, could adjust edit points so that the beat is fully preserved.

Some devices on the market claim to extract rhythmic information from recordings and convert it to MIDI information. A hard disk system should be able to do an even better job. Since the whole recording would exist on hard disk, the computer has the benefit of hindsight to figure out the beat and tempo changes. By looking at a few measures at a time, it is possible to see the difference between loose playing and real tempo changes.

A simpler way to show the computer the beat would be to feed the metronome track or snare track to the system while the audio is recorded into the system. The beat track could then easily be converted to tempo information. Many hard disk-based editors already feature MIDI ports, and there are some signs of standardization for floppy disk storage of sequence information.

A common and time-consuming

task in compact disc preparation is level setting. A disk-based system could scan the material and locate the loud and soft spots of each song. The mastering engineer could quickly set the overall level, and balance the level of the songs relative to each other.

Many of the techniques previously described for voice editing could also apply to music. The display of voiced versus unvoiced sounds might differentiate between pitched and unpitched instruments. Automatic level matching techniques could be used to match music levels across edits. The ambience editing techniques discussed earlier would be especially useful in automatically creating continuous "air" between selections with classical music recordings.

The audio industry is actually several fields with varying needs. A manufacturer can choose to ignore certain parts of the marketplace, or can continue to develop a generalized "jack of all trades" system. A third, but more difficult, solution is to develop the software in several personality mod-

ules, one devoted to music editing, another for sound effects, and yet another for EDL-based dialog editing, for example. Regardless of which development path is taken, the best systems will be those whose developers camp out with professional editors (the human type) in order to learn what they do and how quickly they need to do it.

One thing that will truly sway the future of computerized editors is feedback from the marketplace. If you, the users, can accurately tell the manufacturers the abilities you need in an editor, and you are willing to back up these specs with a purchase order, the manufacturers will do all that is economically possible to suit your needs. We can all look forward to some exciting new developments and technological breakthroughs as the second generation of hard disk-based digital audio editing workstations develop. ■

*Miller is chief engineer of Universal Recording in Chicago.*

**Disk-Based Audio  
Editing System Manufacturers**

For more information on hard disk audio editing systems circle the following numbers on the Reader Service Card.

E-Mu Systems .....	300
WaveFrame (AudioFrame) ....	301
New England Digital (Synclavier) .....	302
AMS Calrec (AudioFile) .....	303
Lexicon (Opus) .....	304
Digital Audio Research (Soundstation II) .....	305
For-A (Sirius) .....	306
Quantel/SSL (HarrySound) ....	307
Dyaxis/IMS .....	308
Fairlight (MFX Series) .....	309
CompuSonics (DSP-1500) .....	310



*The CompuSonics DSP-1500 disk-based editor now offers a "MacSonics" Macintosh interface.*

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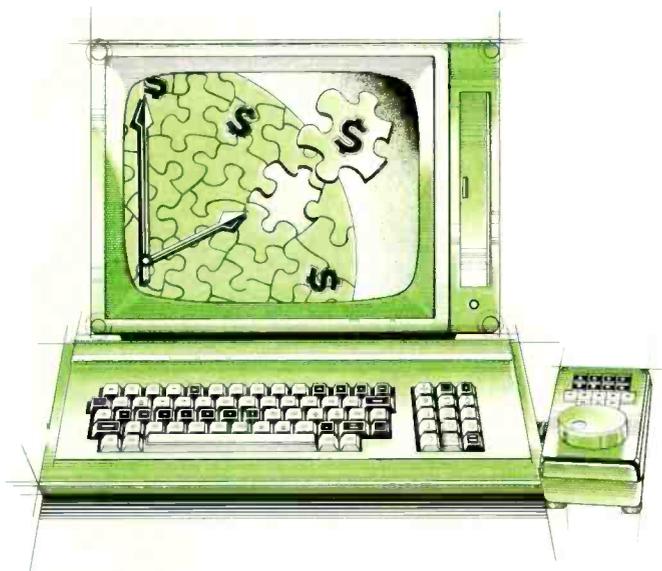
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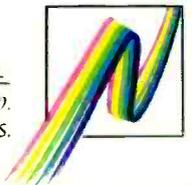
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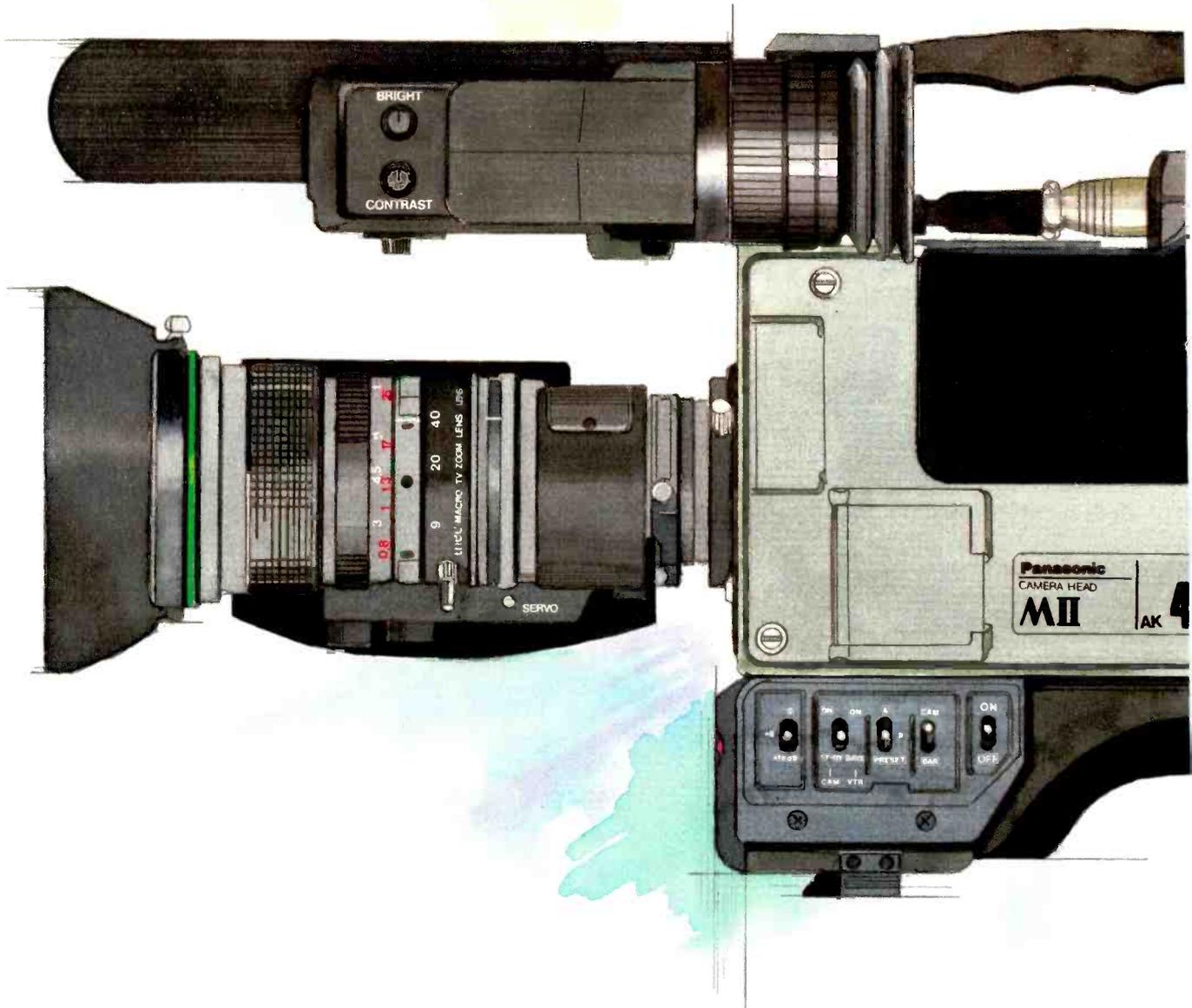
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# Panasonic introduces the a field camera/recorder



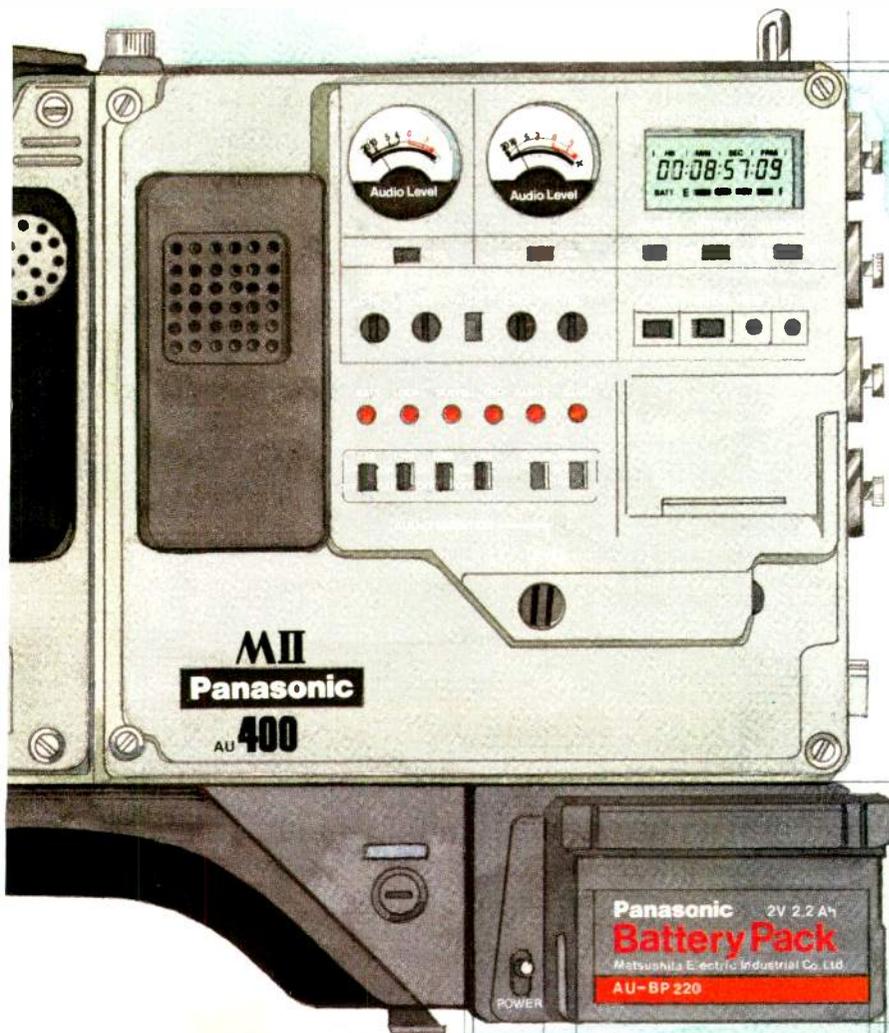
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# STUDIO

**W**hether a station's facility has been built from scratch, relocated, completely renovated or merely upgraded, the manifestation of or changes in a teleproduction system immediately establishes a unique set of challenges. Careful attention to technical detail in the overall design is an integral part of both an effective structural plan, and well-integrated construction. An examination of new facilities at three TV stations illustrates this.

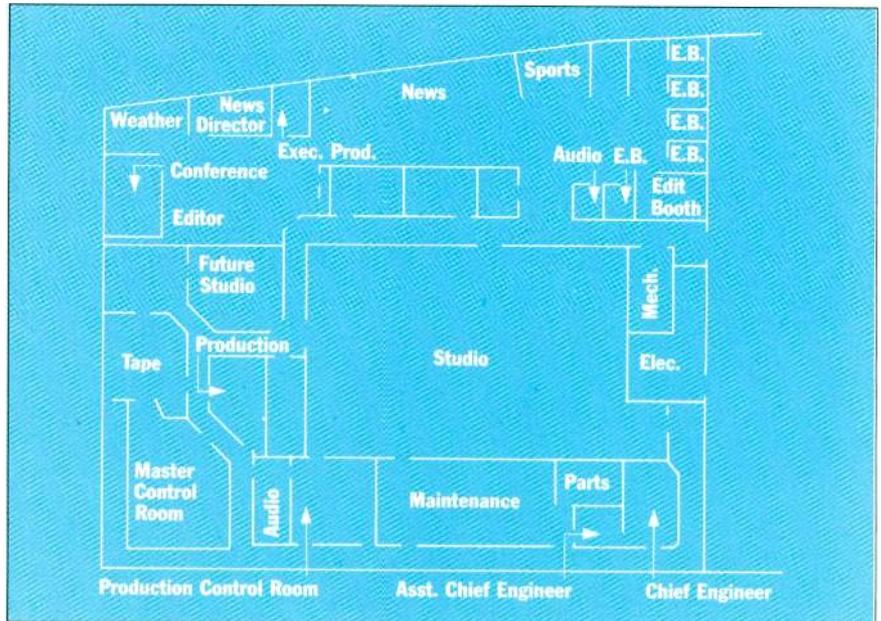
WMUR-TV, Manchester, NH, recently relocated to a renovated mill originally built in 1872. The modernized facility, which hosted ABC's coverage of the New Hampshire primary, was built to provide needed ventilation and smooth-running operation. Complete overhaul of the 22,000-square-foot space required changing the entire switching matrix and routing system.

According to Joe Paciorkowski, director of engineering at the Imes Group, which owns WMUR, preplanning is the key to a successful redesign.

"Integrate everything at once," he recommends. "Build in enough expansion so that you don't have to reinvent the wheel three or four times. Put a lot of wiring in at various points in the place, so you can foresee things coming down the road, even though they might not be here today."

The 30- by 40-foot master control area, with its on-air switching capacity, is the core of the station. All the control panels for the other equipment come into this room. The area allows for patching everything in and out "which a lot of stations have gotten away from," Paciorkowski says. Lenco distribution amplifiers and 75 PVA 350 and 352 video DAs and Hedco HDA 201s for audio fan out to various locations in the plant.

The Grass Valley stereo routing



switcher system has split matrices to keep the audio and video separate, and incorporates a Grass Valley integrated machine control system. The master control switcher is a Bosch MCS-2000, again with split matrices.

At present, WMUR airs its commercials off 3/4-inch tape; a cart system is being considered for future installation. Except for the Abekas A52 effects unit and an Abekas A42 still store moved from WMUR's old location, most of the equipment at the facility is new. The station was the first in the country to take delivery of a Dubner Graphics Factory.

Master control also houses a Grass Valley Group 300 production switcher, as well as Microtime frame synchronizers on all the network feeds.

Space was a big consideration in the room's design. "We don't have the luxury of having a lot of operators in there," Paciorkowski comments. "Most of the time, there's one person in there running things, except for peak load situations, when they'll be a

couple of people. Everything had to be close and tight."

The audio/video production control room measures 16 by 20 feet, with a partition to separate audio from video. The six- by 16-foot audio portion, utilized for all on-air and production/promotion, houses a Neotek 24-channel console, two Gentner hybrids, telco hybrids for taping traffic and phone-in information, two Broadcast Electronics phase track audio cart machines, and 120 mic lines running in and out.

"You can look through a wedged glass partition into the production control room above the director's head and see all the monitors," states Paciorkowski. "For acoustic purposes, we have some heavy-duty tiles, and all the walls are 11 inches thick. We used Therma-Fiber insulation rather than fiberglass" because of its superior sound transmission characteristics.

The video portion of the production control room measures 18 by 16 feet and is used mostly for on-air news. It contains Ikegami monitors—PM9 5s for source and TM 16-20s for preview

BY TOBY COHEN

# DESIGNS

## THAT WORK



and program. The control panel for the Grass Valley switcher is located there, along with the Dubner Graphics Factory keyboard and 20K character generator, the control panel for the Abekas A52 and A42, and an extensive RTS and Symetrix intercom system. The acoustic provisions were basic, a simple hanging ceiling and 11-inch walls everywhere. Like the audio area, everything in the video portion of the room is interconnected with E-MEM, and can be controlled with the push of a button. Everything is hubbed on one bus, with the Dubner Graphics Factory and Abekas effects all interfaced to the E-MEM of the GVG 300 switcher. Control of those peripherals, therefore, is accomplished entirely through the E-MEM, and adding an interface simply means adding a cable. The staff is thinking about adding another channel of effects and some more communications equipment.

Studio A, a 44- by 64-foot studio with five sets, is utilized for public affairs, five news shows a day, and a variety of other programming. Paciorkowski recalls that when the



*WMUR's master control area (floor plan, opposite page) is located 90 degrees from the production control room on one side and 90 degrees from the tape room on the other. Construction of the 44-by-64-foot studio involved removing several weight-bearing posts. The studio has direct access to the maintenance shop.*

*The audio portion of the production control room (top left) looks directly into the video area with a glass window. The audio console is a 24-channel Neotek. The only interfacing needed was a couple of crosspoints of the GVG switcher and a basic cart system start for the Broadcast Electronics cart machines. Master control (right) was almost entirely custom-wired by WMUR's engineers on a star-type system, so the loss of any single output doesn't affect anything else.*

*Whether it's an upgrade or a top-down construction project, designing a broadcast studio is the toughest thing engineering management is called on to do. Here's how some folks have met the challenge.*

# STUDIO DESIGNS

station moved in, the floor of studio A (on the third floor of the building) was six or seven inches out of level from one corner to the other. Lightweight cellular concrete was poured to get the floor level within one-half inch. Next, gypcrete (a gypsum derivative) was poured on top of that to level the floor within one-quarter inch per 10

or 12 feet. The final layer is a solid vinyl Tarkett floor covering 0.090 inches thick, making the floor perfectly level.

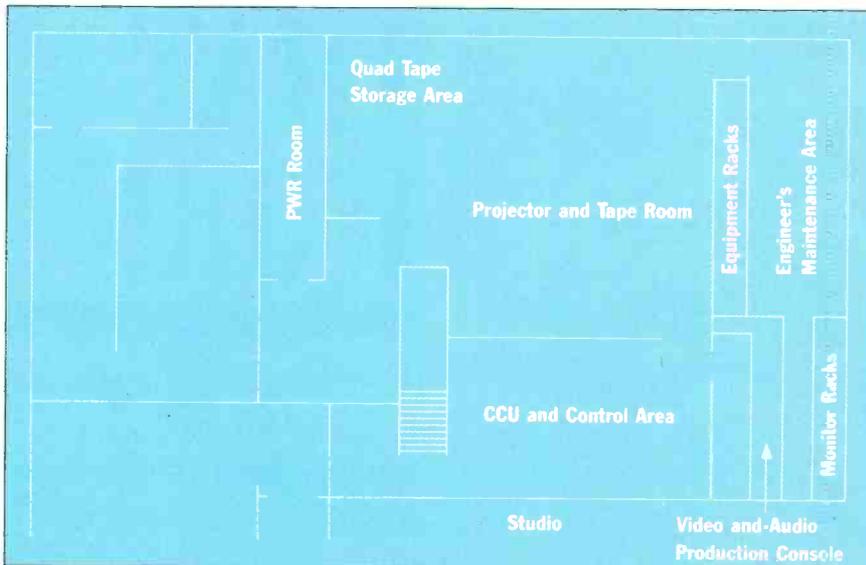
"When we first looked at the building, there was no place to accommodate a studio the size of studio A," Paciorkowski recalls. Freeing up the studio space involved removal of seven 12-inch by 14-foot high, weight-bearing posts that helped hold up the four-inch-thick floors. To allow the posts to be removed, the station installed special 48- by two-foot glued, laminated beams that act as a large truss spanning the studio. At eight-foot intervals, the new beams were needed into the existing beams, linteled into the post, and transferred down to the first floor. A lighting grid was pumped in between the glued laminated beams on a four- by six-foot grid, effectively ending up with a four- by four-foot grid at about 13 feet. Two-inch conduit runs through the wall every 10 feet. "We've got every kind of signal going in and out of there you can possibly imagine," Paciorkowski remarks.

At KPLC-TV in Lake Charles, LA, chief engineer Ron Blansett says the station's new 3000-square-foot technical production facility was designed from the start with the input from the operators and engineers.

The 10-foot by 10-foot master control room is the hub of daily broadcast operation. Structural problems posed challenges right from the beginning. "We lowered the ceiling due to air conditioning problems," Blansett recalls. The dropped ceiling required to fit in the air conditioning ducts lowered ceiling height to seven feet. The walls of the room are insulated with Sound Soak 65.

"Up until the first of January," Blansett adds, "we were not a remote control site. For us to go remote, we had to build a room that would enable us to control the transmitter in the needed broadcast day-to-day operation."

The Utah Scientific MC 500 master control switcher is fed via the Utah Scientific AVS-1 router, and the transmitter control is the Moseley MRC-1. A Fluke terminal controls the NBC affiliate's Ku-band receive dishes, and a M/A-COM MA-2CP live van receiver enable them to set up live shots.



Technical areas of KPLC's renovated studios are shown in floor plan at top. Video production control (above, seen from audio control) features an Ampex ESS-3 still store, Ampex ADO digital effects, and a Clear-Com intercom system. The associated audio control area has an ADM STV-32 console with 24 inputs, plus two Ampex reel-to-reel ATRs, an RCA CD player, and a Harris three-tier cart machine. Tech ops (right) houses the station's VTRs, including two Ampex VPR-6s, four Sony BVU-950s, the ACR-25 cart machine and two quad VTRs. KPLC plans to replace the ACR-25 with a D-2 ACR-225.



The KPLC production control area measures 17 by 13 feet and is used to produce the station's five daily newscasts. It is also utilized for straight production of in-house material for outside industrial and commercial clients.

Structural problems forced certain design decisions in production control as well as master control. The room had a low, weight-bearing wall that could not be moved, so the station had to design around it. Because of the constraints, the console for production control was designed in-house. Its modular design allows it to be moved easily if the need arises. Sound Soak 65 insulation was put on all the walls, and the ceiling was dropped for air conditioning installation, as well as for soundproofing purposes.

Since KPLC also services outside clients, Blansett feels that the production control room is "more a focal point for the people of the community. Outside clients spend maybe 60 percent or more of their time in that room if they want to be there to watch their spot being produced. So, that room is really our best foot forward in the community."

The 22- by 25-foot tech operations (or tape) room is utilized for commercial and news playback, as well as editing. The room is home to the Ampex ACR-25, used for commercial spot playback, along with two Ampex VPR-6 one-inch decks, three Sony BVU-950s with TBC for playback, and one Sony BVU-950 for recording C-band or special Ku-band feeds. The station also has two quad machines, an Ampex VTR-1200 and an RCA TR-600. A Storeel condensed tape storage system houses the large library of quad tape.

Down the rack side of the room are M/A-COM transmitters and receivers for STL and TSL. A Tektronix VITS processor is used for on-air VITS control, and a Grass Valley video processor controls video for on-air. Also housed in the tech ops room are a Utah Scientific MC-500 master control switcher mainframe and the AVS-1 mainframe. Located here as well are a Grass Valley sync generator with auto-switchover, Grass Valley video DAs, Utah Scientific audio DAs, an Orban 275A stereo synthesizer, and the Orban 8182 audio processor with its corresponding 8185

stereo generator, located at the transmitter site. The mainframes for both the Ampex ESS-3 still store and the Ampex AVC-33 switcher are each located in the equipment racks, as are CCUs for three RCA TK-46s.

Again, a low, weight-bearing wall created design obstacles. This time, the staff brought in a team from the

outside to freespan it and take it down in order to provide room for more equipment.

"At present," Blansett estimates, "we probably have close to twice the amount of equipment that we had in the room a year-and-a-half ago, but we have twice as much room because of the way it's laid out."

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# STUDIO DESIGNS

All the old carpet was taken up to reduce static, but the low ceiling made computer flooring impractical. The floor was retiled, and the room's noise level was reduced by removing the vacuum pumps from the Ampex ACR-25 and moving them into a garage area.

Routing outputs on the AVS-1

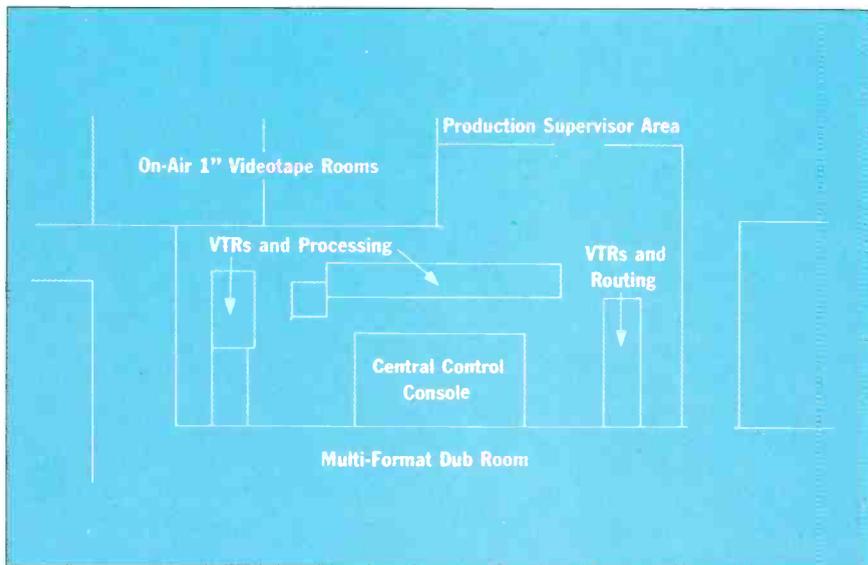
router feed the ACR-25, the one-inch machine, both quads, and two of the 3/4-inch machines in the tape area. For operator convenience, the inputs to these machines are controlled at a location right next to the one-inch machines. No special automation, wiring, or interconnection devices are needed in the tech ops room. The machines form a U-shape facing inward to enable one person to operate everything easily.

Designing a small room in the middle of a large facility poses its own set of problems. NBC Television in New York City, which recently completed construction of a new 580-square-foot multiformat dub room, found that integrating the new studio into NBC's busy network HQ took careful planning and attention to detail.

According to Rick Morris, project manager for the new facility, the room was built for conversion of out-of-house material to make multiple dubs of programs, promotional, sports and editing material. It is also used for direct feeds in from other places, and to work with studio for reference and burned-in time code feeds, to record sports feeds, and to feed in-house viewings.

"The room was built to increase productivity in videotape operations," says Morris. "From this room, one person can perform multiple jobs and control any quantity of tape machines in an assignable manner. If a person needs a one-inch machine and three MIIs, for example, they have it here in this room, whereas in a regular videotape bay, the machines are fixed at the time the bay is built." The room was also built with ergonomics and productivity in mind. According to Morris, "From each of the three operating positions in this room, one operator can control more than one job. They can preset their work, and can roll their videotape machines from their operating position."

For the network, the new multiformat room was "the first instance of the new concept of a workstation for videotape," Morris says. Operators have full control of all their machines from a central custom-built console, including time-base correction functions and gang dub preset and start. When an operator is starting a dub, for instance, the machine control automatically switches all the



NBC's multiformat dub room is designed to give operators full control of all their machines from a central custom-built console (floor plan, top). The room interfaces to the net's studio control rooms and EJ areas, and can record anything on the NBC master grid. The control console itself (above) allows operators to control time-base correction functions and gang dub preset and start, controlling any number of tape machines in an assignable manner. The desk has three operating positions. Within the room itself, equipment racks (right) make virtually any tape format available, including MII, one-inch, and Betacam.



router crosspoints of all the record machines to the play machines, with no need to touch the router control panel.

Soundproofing was a major consideration from the start. A 3/4-inch layer of Sound Soak was applied to the extra-thick walls for sound absorption. The room was carpeted, and an acoustical ceiling was installed. In addition, the air conditioning unit for the room was moved across the hallway to isolate noise vibrations.

With seven master grid outputs, the multiformat dub room is fully interconnected to the rest of NBC. According to Morris, the room can record anything on the NBC master grid, which links to the network's SkyPath satellite system, and can feed out to anywhere, including the eight 30 Rockefeller Plaza studio control rooms. It also feeds NBC's other EJ areas and two channels of the house cable system. During the recent Olympics, the room served as a source feeding out to Seoul, Korea.

The videotape machines available in the dub room include 10 Panasonic AU-650 MII's, 10 Sony 3/4-inch machines, 10 VHS decks, four Sony BVH-2000 one-inch Type Cs, one Sony BVW-10 Betacam deck and a Sony Betamax, along with an Ampex VR-2000 quad machine. Other equipment includes a Bosch CNR-7 video noise reducer and a Tektronix 110-S frame sync.

Audio capability is provided by a Tascam reel-to-reel ATR and two Tascam audio cart machines. A central pair of UREI 809 loudspeakers with a 100 W -Bryston amplifier feed the central console. The monitor speakers are switchable to any of the three operating positions with headphones provided for the other two positions.

A Graham-Patten computerized operator-assist remote control unit provides for a gang-start of up to six presentable gangs of up to 12 machines per gang, with a CRT readout. The Graham-Patten can also control the time base correctors of all the videotape machines, and features monitor switching and complete control of all the router crosspoints necessary for the dubbing operation. The room also has a GVG Horizon router, with 48 x 48 composite video, a 16 x 16 component video level, four levels of audio,

and one level of time code.

The new dub room will play an active part in the network's continued migration to MII. "We'll be dubbing from other formats into MII for the rest of NBC's facilities so that they don't have to support a myriad of formats," Morris explains.

Morris maintains that a good de-

sign and careful consideration of operator needs allows the operator to complete jobs quickly and error-free. "In a network setting," he says, "being error-free is of utmost importance." ■

*Cohen is a New York-based freelance writer who specializes in video production and post-production.*

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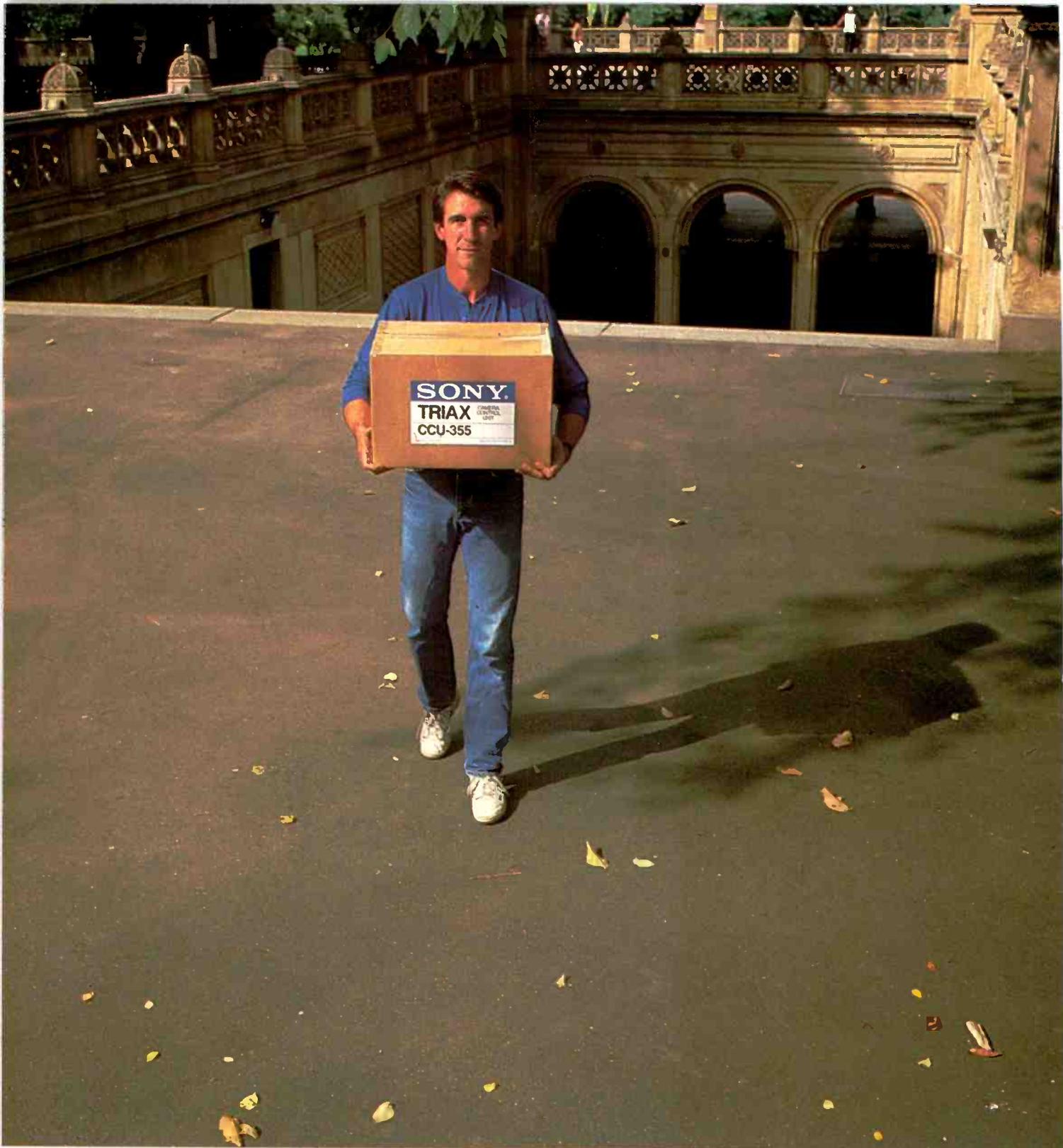
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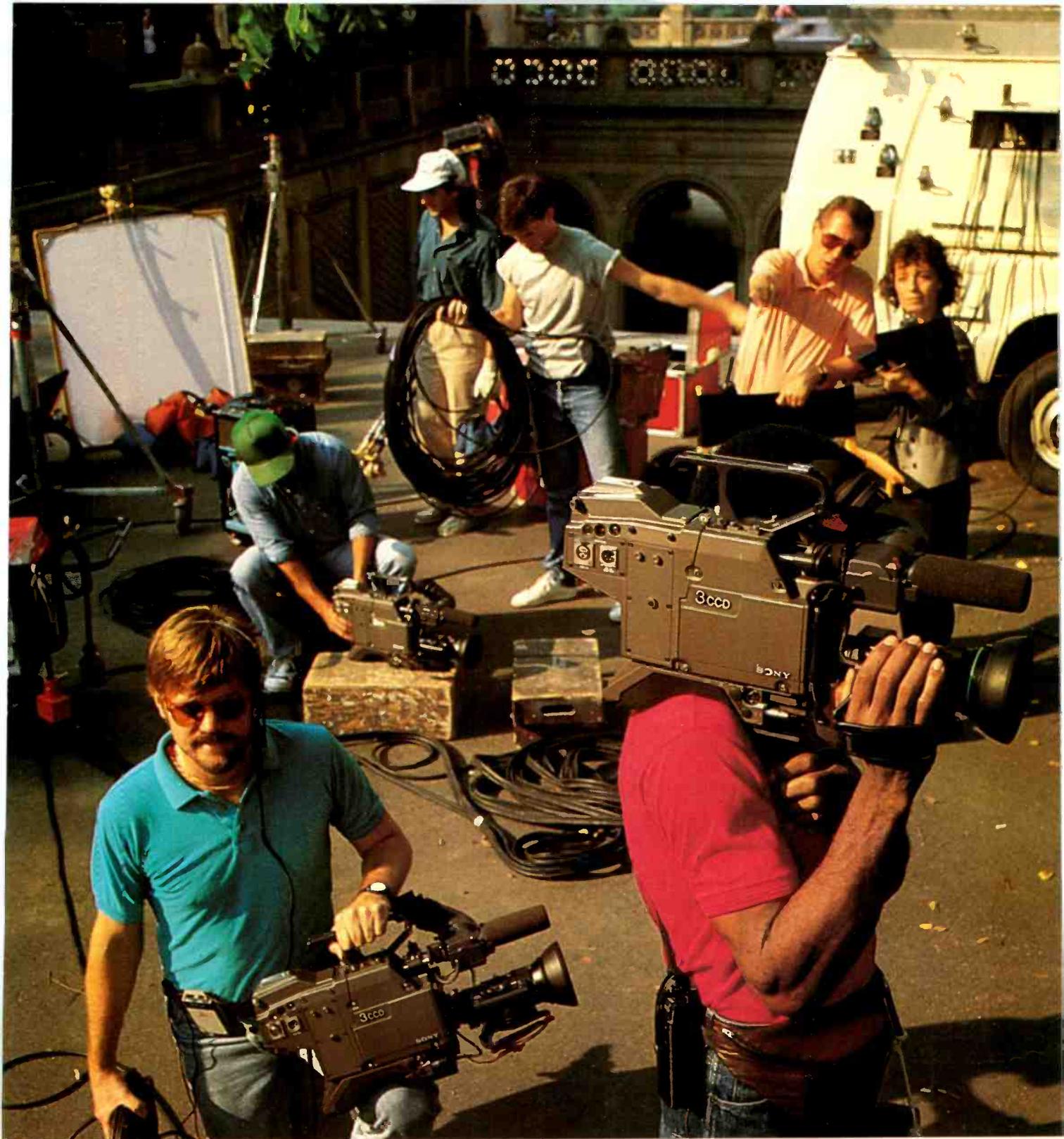
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BROADCAST PRODUCTS

# PRODUCT BENCHMARK

**T**his month's *BME* premieres *Product Benchmark*, a new series featuring our readers' critical evaluations of equipment in daily use in their facilities. Each edition of *Product Benchmark* will focus on a different product; current users of that product will be asked to comment on its quality, reliability, usefulness, and how well it fulfills the manufacturer's promises. Our first edition features the Tektronix VM700 Video Measurement Set.

We welcome our readers' suggestions for products to review in future editions of *Product Benchmark*.

## TEKTRONIX VM700



*First in a new series!  
Three end-user engineers evaluate  
a significant piece of equipment  
based on their own experiences.*

**PRODUCT DESCRIPTION:**

The Tektronix VM700 is a complete video monitoring and measuring instrument that performs automatic measurements and monitoring as well as manual measurements. According to the company, it makes standard television measurements automatically, including those specified in RS-250B/EIA-250C, NTC-7 and RS-170A. These measurements can be compared with user-defined limits and an alarm is generated when those limits are violated.

Any sequence of operations may be identified with a user-defined function. For example, a series of measurements to be made on a transmitter demodulator output could be identified with a function labeled "DEM0D."

The unit's display operates in both waveform and vector modes to allow detailed manual analysis of the waveform. In waveform mode, cursors are available to aid in measuring time, frequency and amplitude. These cursors allow rapid and precise location of the 10 percent, 50 percent or 90 percent points on any transition. The waveform display can be expanded

around any point both vertically and horizontally. Because the data is digitized, the display remains bright at all expansion factors. The axes automatically expand with the waveform, so all units are correct as displayed.

The vector mode provides a normal vectorscope display. Vectors may be rotated or expanded, with the rotation angle and gain values displayed numerically on the screen. A Line Select function allows the user to specify any line for display or automatic measurement with a test signal. A picture mode allows quick source verification.

All information on the screen may be printed on computer printers supporting either PostScript or 24-pin Epson graphics via RS-232C.

**USER REPORTS:**

*Howard Meiseles,  
Manager of Technical Quality Control,  
Capital Cities/ABC, New York, NY.*

**A**BC first acquired the VM700 during April of 1988. The device has been in service at ABC New York for seven months. It was ac-



*The Tektronix  
VM700 automated  
video  
measurement set.*

quired to replace the Tektronix 1980 ANSWER system.

We use automated measuring sets such as the VM700 and the ANSWER to evaluate the video performance of the many studio systems, distribution systems, and transmission systems used by the ABC Network. Technical Quality Control at ABC New York is responsible for ensuring that the nu-



Howard Meiseles, ABC.

merous facilities meet the high technical standards the operations and production departments expect.

Our department is staffed seven days a week, 18 hours per day, and the VM700 is in continual use during that time. We have encountered very little downtime with this equipment, and the manufacturer has been very responsive to our unique requirements. One of our two units required a new power supply and Tektronix was able to effect repair overnight. We believe that this was an isolated problem.

We have had the unique experience of meeting with the manufacturer during the development of the product to ensure that our needs would be met. The design staff of Tektronix was very open to this working relationship. After delivery, support from the factory has been excellent although very little was required.

The device integrated easily into our operation at ABC QC with very little time spent in training and installation. It solved problems we all have with time management. It is at least 10 times faster than the devices

we were using. I believe that the human interface and display methods are the VM700's strong points. The touchscreen CRT coupled with a very friendly software system are paramount in the device's acceptance and use here. One thing we would like to see incorporated in future versions is an IEEE 488 bus connection. We would also like the ability to output the graphics from the machine to a computer file as well as to a printer. That would make the graphics accessible to our HP 9000 technical workstation.

---

Jim Gonsey,  
Manager of Technical Operations,  
KGSW-TV, Albuquerque, NM.

---

**W**e first installed the VM700 in July or August of this year.

At this time, it has been in use about five or six months. We acquired the unit because it allows us to make measurements we were unable to make before because we lacked the equipment, and to make measurements we didn't have time to make before. We use it for all of the waveform measurements that are required to meet FCC regulations for a video signal and also for signal to noise measurements of tape machines and cameras. We have found it to be very quick and accurate for anything it was set up to do. We use it whenever a problem is suspected, maybe three times a week.

For studio use, the VM700 has operated almost perfectly. We had hoped to use it for service of our translators in the field, but for this purpose it has proved to be almost unusable because of software problems. The device requires a known signal reference or white pulse to give accurate readings. If a piece of equipment is too far out of tolerance, the VM700 cannot deal with it. We are presently working with the manufacturer to help solve this problem.

In all other respects, the device has functioned reliably. The manufac-

# PRODUCT BENCHMARK

turer has generally been very responsive to any problems we have encountered.

Operation of this device is pretty straightforward, and our technicians have needed very little training.

I would like to see future versions of the VM700 include a means of making audio measurements in the same device. The device currently can do half of your proof of performance, and it would be useful to be able to measure audio to the same degree of accuracy.

---

*Cloyde W. Anderton,  
Department Manager, KSL-TV, Salt  
Lake City, UT.*

---

**W**e ordered the VM700 in late May of 1987, shortly after it was introduced at the NAB show. After several revisions in the availability date, we received our unit in June 1988.

In our operation, it is used to accurately and continuously measure and monitor FCC standards regarding the pulse measurement parameters. The VM700 is capable of giving visual measurement data, and of giving an alarm if any parameter is in error. It can also give a computer printout record of the visual displays and of the numerical values. This is much more accurate and exact than the previous methods, and also standardizes the data to eliminate operator error and/or subjective interpretation.

We have realized a great savings of operator/engineer time as we have automated printout functions available at any time desired with no employee downtime. Previously we had to allocate about half an hour of employee time each time a full set of measurements was desired.

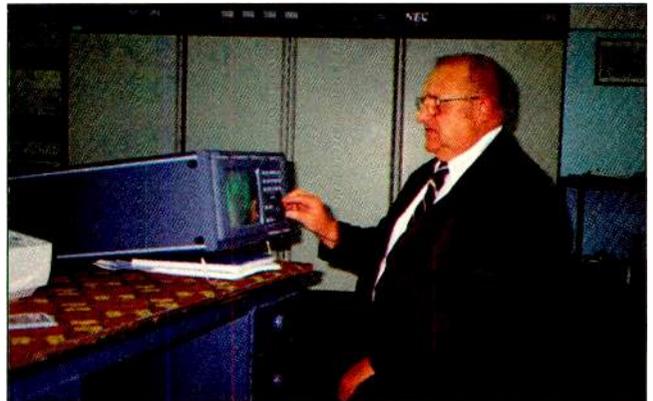
The VM700 is in use in our operation 24 hours a day. We do not at this time involve remote operations or remote readout, but we have the capability for future use if needed. We are saving about four employee-hours each 24-hour period with this device.

More importantly, we have more dependable and more accurate monitoring of our TASO 1 signal.

There have been no problems with the device. However, it is a new concept and a new operation, and the permanent manual for operation has not yet been supplied. The preliminary manual is not entirely accurate; it is not clear in some areas and obsolete in others where it does not match the software included internally. We are told that a correct manual will be received shortly.

The unit has functioned reliably and has never broken down. The manufacturer has been very responsive and cooperative. I would rate their support as excellent.

Integrating the device into our operation has been no problem at all. Of course, we will be making some installation changes to better integrate the VM700 into our equipment lineup. We had to make some slight changes to our accustomed procedures, but this was simply progress and no problem at all.



We feel that the VM700 gives us an improved method to more accurately evaluate our operations and picture quality, and to do so in much less time with a resultant substantial savings in labor. This will not result in a smaller staff, but it allows the present staff to perform more duties in other much-needed areas. ■

*Cloyde  
Anderton,  
KSL-TV.*

*Further product benchmark articles will appear in upcoming BME issues.*

# ICEBERG . . . *A thick mass of floating ice*

*Webster Illustrated Contemporary Dictionary*

The dictionary doesn't mention that *most* of the thick mass of ice is *under* the water. Ads and photos of "floating" or recessed audio consoles don't mention that *most* of the console is *under* the tabletop. For example, console "B" is recessed 6-9/16 inches; console "A" is recessed 6-1/2 inches; and some manufacturers brochures don't even list the under-the-table dimensions of their "kneebreakers".

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# RADIO ENGINEERING

NUMBER THREE

SPECIAL SECTION

NOVEMBER 1988

## Radio '88: What Rough Beast?

Over 6500 broadcasters attended the NAB's annual Radio '88 convention in Washington, D.C., September 14 to 17. They were treated to a conflict worthy of Faust: On one hand, forces of regulation and technology attempted to make whole an AM band which market forces had rent asunder; on the other, proponents of free market forces, translators at the ready in the FM band, "interference-tolerant" in the AM, prepared for Armageddon.

Overarching it all, radio-only license renewal legislation will be an issue in the next session of Congress, according to NAB Radio Board chairman Lowry Mays, Clear Channel Communications, San Antonio, TX.

If there was one key topic, it was AM improvement. On one hand, FCC support for NRSC-1 and NRSC-2, greater acceptance of AM stereo and the NAB's quixotic attempt to boost the band to almost "audiophile" quality via its "Ultimate Radio" met with indifference from most receiver manufacturers—notable for their absence—and, apparently, from the public, broadly indifferent to what "AM Stereo" means to them.

Further, the FCC's proposed rulemaking handed down September 12 just before the show (MM Docket No. 88-376) proffers a very mixed blessing. On one hand, the Commission proposes to require AM stations to comply with NRSC-2 and suggests that stations implementing NRSC-1 will presumptively comply with NRSC-2. At the



Charlie Bates (ITC/3M), Mike Sirkis (Radio Systems), Stevel Bellinger (Systemation), Rick Cruz (WQIO-FM, Mt. Vernon, OH), and the NAB's Stan Salek (L to R) discuss digital systems in radio broadcasting (Digital Radio Station Seminar).

same time, the rulemaking proposes to allow AM stations the option of constructing transmission facilities whose coverage areas would be subject to interference.

And ironically, according to an NAB-sponsored survey released publicly at Radio '88 four days after the FCC proposal by B. Angell & Associates, Chicago, IL, interference standards for AM radio set 40 years ago are no longer acceptable to radio listeners. In 1946 listeners accepted a desirable/undesirable (d/u) ratio of 28.6 dB for talk programming with music interference; today the ratio is 40 dB.

Translator abuses were the hot topic for FM broadcasters. They too had an FCC proposed rulemaking to consider (MM Docket No. 88-375), also issued September 12. This proposes the establishment of a new intermediate Class "C3" station and an upgrade of Class A FM broadcast stations to 6 kW.

## Radio '88: Trends to Watch

Digital audio and digital control are flowing inexorably into the radio broadcast environment. The evidence was ample at Radio '88: an entire day-

long seminar devoted to the Digital Radio Station (see next month's *BME* for a full explanation of a ground-floor technology announced there, Direct Digital Synthesis—DDS—and its application in digital FM transmitters), acceptance of new products

devoted to automating and controlling R-DAT, hard disk, floppy disk and pseudovideo systems and the first viable product in what will be digital's new "sleepers" category, Grass Valley's DDP digital signal processor, a full digital *continued on next page*

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processor with independent digital control. The unit keeps the signal in the digital domain at 44.1 kHz and can accommodate heavy processing without artifacts. Available from Allied with delivery before the end of the year, the DDP lists for a suggested \$19,000.

Digital disk-based recording/production/editing systems based on PCs appear to have hit the right combination of features and price for radio broadcasters. Two such Radio '88 stars were New England Digital's Post-Pro, now mercifully with-

*Valley International's DDP full digital audio multiband processor also features digital control.*

out keyboard and with a Macintosh interface, and the Dyaxis system, which now offers a MIDI interface for its dedicated Mac. In the wings are a touchpad for sound effects and Foley from NED and a continuously variable sampling rate converter from Dyaxis.

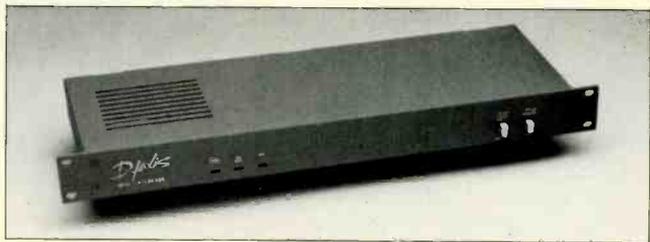
Other new products included Delta's AM splatter monitor, an Omega FM sync repeater and a new loader for Concept Productions' CAPS II system. The CAPS system "bolts together" configurations of R-DAT tape machines, generating the equivalent of 60 players from eight in one setup. In the same mode, although not new, the Dyaxis-controlled Schafer Digital System based on Beta videotape appeared to gain ground. Radio System's modified Sony RsDAT RS-1000 adds microprocessor control to change tape handling functions, preprograms up to 99 cuts and, in effect, "makes the unit act like a

*Harris' new HT 35 FM transmitter offers typical PA efficiency of over 80 per cent.*

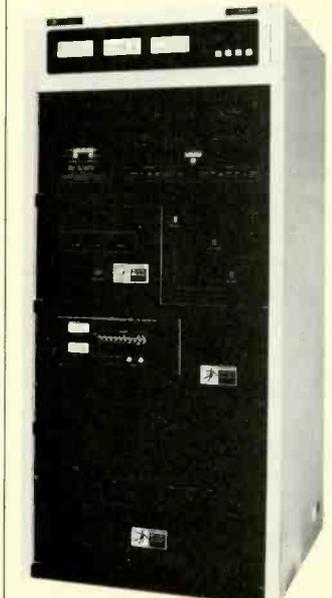
cart machine," according to the company. Clearly, a category to watch is digital tape-based systems for automation, storage and control—and maybe on-air broadcast.

Finally, Harris launched three new families of HT FM transmitters. Available in power levels from 3.5 kW through 35 kW, each transmitter features a single, high efficiency tetrode in a standard quarter-wave cavity. The

transmitters also all feature Harris' fifth generation solid-state FM exciter, THE-1, a linear voltage controlled oscillator and a direct drive air system. A ramp-up soft start to eliminate turn-on transient overloads and automatic VSWR foldback are standard. Harris also introduced the DX-50 50 kW solid-state digitally modulated AM transmitter (see December BME's New Products section).



*The Dyaxis MIDI interface combines a time code reader and generator with SMPTE-to-MIDI and MIDI-to-serial conversion.*



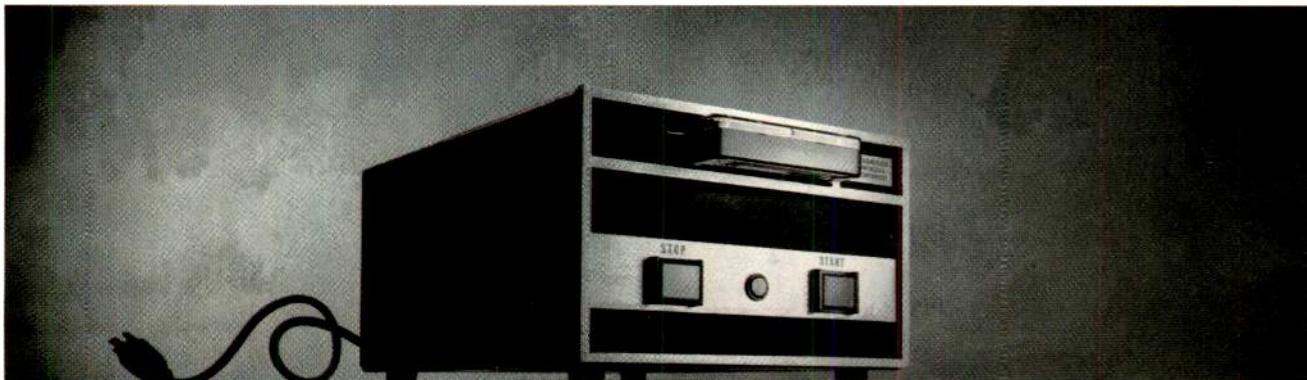
## Texar Acquired by Gentner

Gentner Electronics Corp., Salt Lake City, UT, has acquired the assets of Texar, Inc., manufacturer of bellwether audio processing units including the Audio Prism. Formerly headquartered in Monroeville, PA, Texar operations were relocated to Gentner facilities in Salt Lake City in early September. Texar founder and former president Glen Clark will act as consultant as the company becomes a Gentner "product division."

Gentner will continue to manufacture and market Texar products under the Texar name. They will be available from Gentner dealers and authorized under Gentner warranty backdated to September 1, 1987. It's not known at this time whether the new owners will greenlight development of Texar's new Lazer production, shown as a prototype at the 1988 NAB.

Gentner thus adds audio processing to its new capability in digital audio storage and playback, acquired through its recent purchases of Advance Design Technology and MEI. ■

# It's withstood nineteen years of raps, bops, swings and hits.



Reliability. It's what ITC audio cartridge machines are all about, even after years of pounding and playing. In fact, you'll find many of our original models still in use today. Like this one from KOMA-AM radio in Oklahoma City.

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To find out more, call International Tapetronics, 3M Broadcasting and Related Products Department toll-free at 1-800-447-0414. (In Illinois and Alaska, call collect, 309-828-1381.)

Tell them you heard about it from a reliable source.



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# 3M

**T**here may be some light at the end of the tunnel for AM radio. But is it just the headlamp of an approaching train? Several recent industry observations have shown that AM improvements recommended by the NRSC (National Radio Systems Committee—a joint effort of the EIA and the NAB) are gaining momentum. Over 800 stations have already implemented the NRSC's audio preemphasis and bandwidth-limiting recommendations voluntarily (NRSC-1). Meanwhile, the FCC is considering a mandatory institution of both these and the NRSC's suggested RF emission limits—the so-called "RF mask" of NRSC-2—by January 1, 1990.

But nay-sayers still exist, and an early criticism was that NRSC implementation will only help "the other guy." Well, of course, if acceptance is high, or made mandatory, there would be no "other guy." But even short of that, NRSC implementation would help stations by eliminating wasted power out in the sidebands (which no one can hear anyway), making the station easier to tune in by those listeners without digitally tuned receivers and improving sound by reducing the excess sideband energy.

Another apparent misconception is that older AM transmitters could not be easily converted and would have to be replaced. In fact, noted consulting engineer Harrison Klein has observed—and others have confirmed—that interference problems in older installations are generally the fault of misadjusted audio processing. Older transmitters themselves have behaved well in cases where NRSC has been installed so far.

For AM improvement to occur, receivers must also implement the required upgrades. This has begun to happen, and along with it a trend towards a wider and switchable bandwidth AM radios. Some receiver man-

# TESTING FOR AM COMPLIANCE

*There's more to AM improvement than just installing an NRSC filter. Testing, monitoring and permanent compliance to the NRSC standards are required for the senior broadcast band's survival and growth.*

ufacturers have welcomed the move since it provides them with a standard deemphasis curve where none has existed before. Contrast this to FM broadcasting, where a similar 75  $\mu$ s characteristic has been used from the start. The NRSC has also recommended a 50-5000 Hz response for a "narrow" bandwidth characteristic, and 50-10,000 Hz as "wideband," for those radios offering switchable bandwidths.

NRSC further advises against the implementation of a wideband response characteristic in a receiver without including a switchable narrow function, due to possible first adjacent channel interference, even after full NRSC adoption. However, high-Q notch filters for first adjacent suppression are also recommended by the NRSC as an optional enhancement to AM receivers.

Once NRSC is implemented by a station, of course, monitoring must be performed to verify that operation within the standards' constraints is maintained. The NRSC has proposed testing and monitoring methods for

both NRSC-1 and NRSC-2, in mono and stereo applications. For testing the preemphasis, NRSC recommends standard static tone tests, with all audio processing bypassed. Off-air monitoring of test tones is preferred, although monitoring just ahead of the transmitter is acceptable if transmitter and SCA are reasonably broadband. Results with these tones should replicate the NRSC preemphasis curve as closely as possible without causing the overloading of any downstream component in the transmission chain. Ideally, any such component should be isolated and repaired or replaced, so the curve can be fully implemented. It is to a broadcaster's advantage to do so, since if his/her preemphasis is short of the standard, but listeners receive with the standard deemphasis, the station's signal will seem dull compared to the rest of the band. On the other hand, simply not addressing the problem and running full preemphasis without regard for overload and overmodulation will cause the same sort of "trash" and interference that the new standards are trying to eliminate.

To verify the performance of the audio stopband, NRSC recommends us-

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BY SKIP PIZZI

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# AM COMPLIANCE

ing standard test tones with all audio processing bypassed and observing results on a standard AM modulation monitor's meter. At the same time NRSC further recommends using a special new test signal with all normal audio processing operating and observing results on a spectrum analyzer. NRSC places more weight on

ation from results with static tone test schemes.

The test signal NRSC specifies is designed to imitate typical program material but be universally available, repeatable and standardized. It consists of USASI (United States of America Standards Institute) noise, pulsed at 2.5 Hz with a duty cycle of

the latter, since audio processing on program material may introduce great deviation from results with static tone test schemes. The test signal NRSC specifies is designed to imitate typical program material but be universally available, repeatable and standardized. It consists of USASI (United States of America Standards Institute) noise, pulsed at 2.5 Hz with a duty cycle of 12.5 percent. USASI noise is a white noise signal filtered by 6 dB/octave networks at 100 Hz on the low end and 320 Hz on the high end. This noise spectrum is intended to simulate that of the long-term average of typical program material. The pulsing is added to imitate the transient character of typical program audio. A crest factor of 20 (i.e., 20 dB peak-to-average ratio) is provided by this pulsing.

Monitoring of this signal can be performed using spectrum analysis. For swept-frequency-type analyzers, the NRSC specifies the following setup:

- 300 Hz resolution bandwidth
- 2 kHz/horizontal division
- 10 dB/vertical division
- Reference: 1 dB above 200 Hz sine wave @ 90 percent negative modulation
- Display: maxi-

mum peak hold

The operating span and sensitivity of the analyzer should be set as necessary to determine compliance. For FFT analyzers, setup is as follows:

- Reference: 1 dB above 200 Hz sine wave @ 90 percent negative modulation
- Window: Hanning
- Horizontal span: 20 kHz
- Dynamic range: 80 dB or available range
- Display: maximum peak hold

For NRSC-2 (RF occupied bandwidth) measurement, spectrum analysis is again required. This standard of maximum occupied RF bandwidth is determined by the maximum peak output of a swept-frequency analyzer over a 10-minute period. Setup here is as follows:

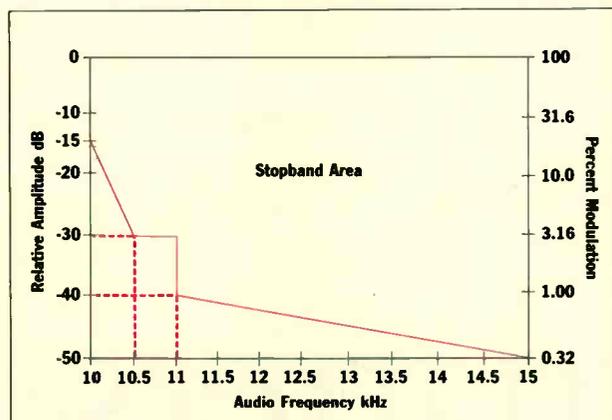
- 300 Hz resolution bandwidth
- 5, 10, or 20 kHz/horizontal division, as appropriate
- 10 dB/vertical division
- Reference: carrier peak
- Peak Hold: 10-minute duration
- No video filter

The pulsed USASI noise described above should be used as a test signal with all audio processing operating, along with static tones, used without processing engaged.

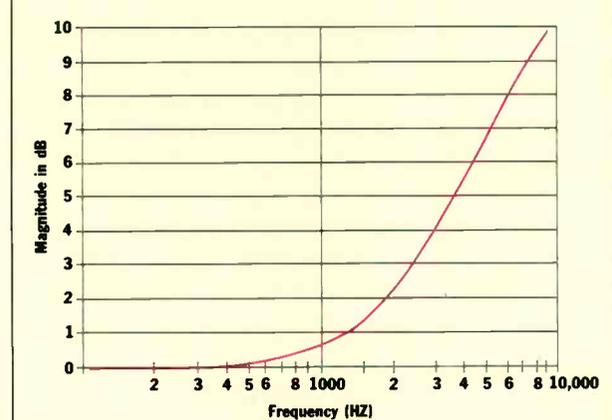
For AM stereo operation, the pulsed USASI noise signal is modified to include a stereo correlation of 1.4, again typical of program material. This provides an L-R level 3 dB below the L+R level. Both left and right channels must have identical spectral characteristics.

All measurement observations should show total emissions from a station to be within the RF mask limits.

Compliance with NRSC-1 and 2 can be an expensive proposition for the station without a spectrum analyzer. Moreover, the spectrum analyzer does not directly display information about the quadrature signal (L-R) in the C-QUAM format, yet it too should conform to the NRSC standards. For both these reasons, a purpose-built mea-



The NRSC Stopband specification, one part of NRSC-1, defines the envelope of the audio spectrum at the input to the AM transmitter.



The NRSC Standard Preemphasis curve is the second part of NRSC-1. It is a modified 75 μs, single-zero curve with a break frequency at 2122 Hz, similar to that used in FM broadcasting. A single pole with break frequency at 8700 Hz is added to reduce HF boosting as the stopband is approached.

# AM COMPLIANCE

surement device known as a "splatter monitor" was proposed, the first models of which are now being produced by Delta Electronics of Alexandria, VA. Their unit, the SM-1, costs about one-tenth of a typical spectrum analyzer; it also incorporates other useful features, such as a 12 V dc power input and portable active antenna for field measurements and a built-in loudspeaker. The unit is frequency-agile and can look at (and simultaneously listen to) either in-phase or quadrature components of the signal independently, at varying distances from the carrier frequency. Both I and Q synchronous detectors' outputs are

available on rear panel BNCs. A chopped combination of both can also be observed,

which provides the most realistic measure of overall splatter performance. Off-air and program audio can be A/B compared as well,

## References

National Radio Systems Committee, *NRSC AM Preemphasis/Deemphasis and Broadcast Audio Transmission Bandwidth Specifications* (NRSC-1), January 10, 1987.

National Radio Systems Committee, *Interim Voluntary National Standard: Emission Limitation for AM Broadcast Transmission* (NRSC-2), June 1, 1988.

Harrison J. Klein, P.E., *Modulation, Overmodulation, and Occupied Bandwidth: Recommendations for the Broadcast Industry*, Proceedings of the 41st Annual NAB Engineering Conference (1987).

Thomas G. Wright, *The AM Splatter Monitor*, Proceedings of the 42nd Annual NAB Engineering Conference (1988).

Federal Communications Commission, *MM Docket 88-376, Notice of Proposed Rulemaking*, September 12, 1988.

# Splatter matters.

Splatter is a form of radio interference that can drive listeners away from AM radio. It creates distortion in your signal, wastes transmitter power on undesired sidebands and interferes with other stations. Even with an NRSC audio filter, misadjustment of the transmitter or audio processing equipment can still produce an RF spectrum that can exceed NRSC or FCC limitations.

That's why routine monitoring of your station's RF spectrum is a must. But it doesn't mean you'll have to bust your budget on a spectrum analyzer. It just means you need the rugged SM-1 AM Splatter Monitor from Delta Electronics.

For just \$2,150 you can now accurately measure your transmitter's spectral output, monitor transmitter IPM levels and make adjustments to improve clarity. An external audio input helps identify splatter sources.

The Splatter Monitor's unique offset feature tunes spectral segments for closer examination 10 kHz to

100 kHz away from the carrier. Unlike a spectrum analyzer, you can listen to the front panel speaker or your own headphones as you measure splatter levels on the front panel meter. The Splatter Monitor also has an alarm output to drive your remote control.

In this day and age where splatter matters, monitoring it doesn't have to cost you a fortune.

To find out more about the new Delta Splatter Monitor, call (703) 354-3350, or write Delta Electronics, Inc., 5730 General Washington Drive, P.O. Box 11268, Alexandria, VA 22312.

The Above Standard  
Industry Standard.

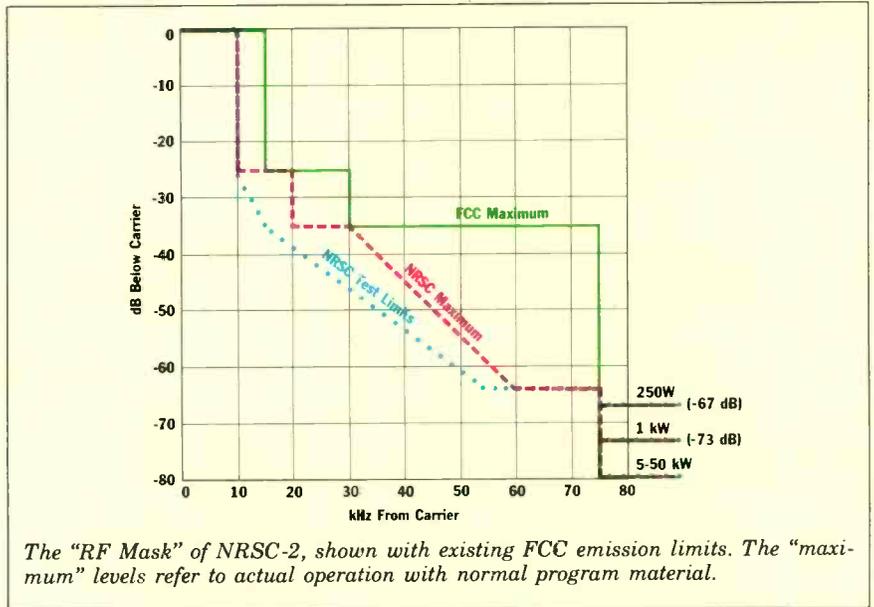
DELTA ELECTRONICS



© 1988 Delta Electronics, Inc.

which aids in tracking down problems. An adjustable alarm with external contact-closure is featured, along with NRSC prescribed "narrow" and "wideband" receiver characteristics. Operation of the unit seems simple and reliable. The device should serve as a model for others in its field, providing the AM broadcaster as it does with an inexpensive means of accurately measuring spectrum occupancy, NRSC notwithstanding. It is currently available at a list price of \$2,150.

Delta Electronics is also developing some other specific products for the NRSC era. One is a stereo noise generator, producing the pulsed USASI noise test signal as well as standard white and pink noise, pulsed or continuous, with stereo correlation ad-



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This microphone's unique floating capsule design shuts out vibration and handling noise. And its superior transformer shielding blocks electrical hum and hash from cameras. What you get is the crisp, disciplined sound that Sony shotgun mics are famous for. All in a compact, one-piece package.

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# AM COMPLIANCE

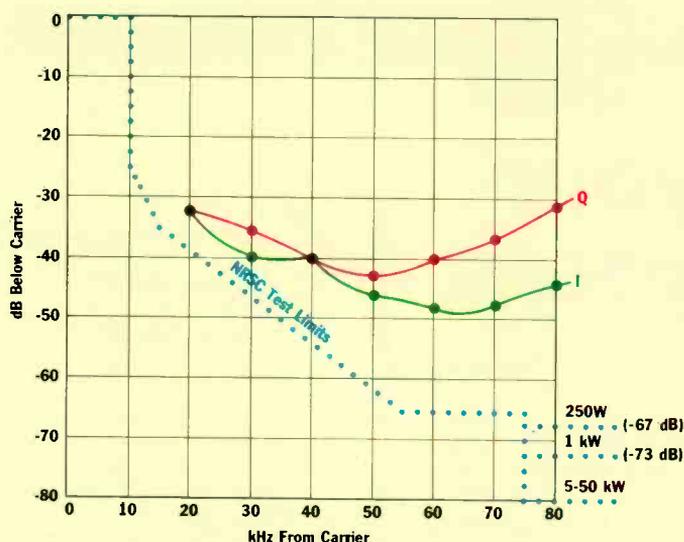
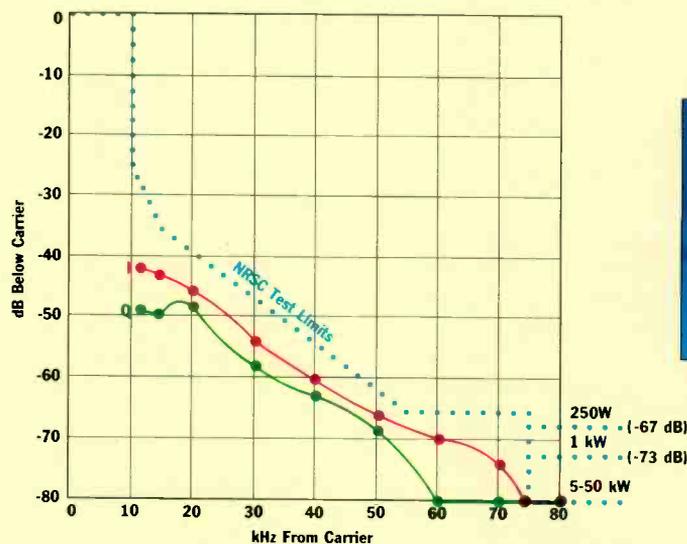
justable from 0 to 100 percent. Another is an NRSC preemphasis monitor, designed to monitor the demodulated audio from the off-air signal and verify its compliance with NRSC-1.

air chain.

Meanwhile, other manufacturers including Orban and CRL are shipping products which incorporate NRSC-1 standards. All Orban Opti-

Again, this may be helpful in isolating a problem to the audio or RF segments of the

mod processors shipped since June 1987 are in compliance with NRSC-1, the company says, and retrofits are available for all earlier models, including the 9100A and 9000A. All CRL AM limiters (PMC-400A, mono; SMP-900, stereo) shipped within the last 15 months also include the NRSC standards. CRL now makes an NRSC preemphasis and low pass filter conversion unit for mono processors (SPF-300) to work in conjunction with a final peak audio limiter and a retro-



Actual field test results of two NRSC-equipped stations, using the Delta SM-1 Splatter Monitor. Although NRSC stopband and preemphasis has been installed, misadjustments at this 50 kW station cause both in-phase (I) and quadrature (Q) modulation to fall outside NRSC limits. A properly adjusted 5 kw station is also shown. (Courtesy Delta Electronics.)



The Delta Electronics SM-1 Splatter Monitor.

fit conversion board for older AM stereo limiters.

In addition, the MDF-400/MDF-800 is an NRSC deemphasis and low pass filter monitor that updates AM modulation monitors and wideband monitor receivers. It replicates the sound of properly produced NRSC standard audio and therefore facilitates audio processing setup, CRL says. Suggested retail price for the MDF-400 (mono) is \$495; the MDF-800 low-pass filter monitor (stereo) is \$665. ■

Pizzi is BME's contributing editor.

## For Further Information

- Hank VanDeursen, FCC Mass Media Bureau, (202) 632-9660
- Stan Salek, NAB Science and Technology, (202) 429-5391
- John Bisset, Delta Electronics, (703) 354-3350

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—Bryan King,  
Chief Engineer, KLBJ AM-FM

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Circle 129 on Reader Service Card Page 67

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# OLYMPIC DIGITAL AUDIO FOR RADIO

If you weren't exactly riveted to your sofa throughout the 1988 Summer Olympics, transmitted for two weeks from September 9 from Seoul, Korea, don't shoot the messenger. In fact, radio listeners should thank IDB Communications Group, called in at short notice by the Korean Telecommunication Authority (KTA) to supply digital audio, voice and data transmission.

Although the KTA was initially reluctant to call in an outside carrier, "overwhelming demand" for satellite transmission services from Seoul during the period exceeded KTA capability, according to the company. Headquartered in Los Angeles, CA, IDB is recognized for its track record providing satellite communication services for politically-sensitive remote broadcasts. Events included the Reagan-Gorbachev INF Summit Meeting in Reykjavik, Iceland (1987), the Reagan-Gorbachev INF Summit Meetings in Moscow, U.S.S.R. (1988) and transmission for NBC-TV's "Today" broadcasts on the Orient Express and the People's Republic of China (1988).

Things started early for a six-man technical team headed by Howard Miller, director of operations, which flew in for tests September 4 to 8 prior to transmission September 9. Dan Weinberg, digital systems engineering manager, directed system design from U.S. headquarters. "We laid thousands of feet of cable because we had to run the last mile between our channel bank operation area and our customers," said Weinberg, recalling that some 20,000 feet of cable were "bought and brought" in addition to 64 kbit line drivers installed at each end of the "last mile" operations. IDB also undertook all wiring, to discover Korean electricians make no distinction in wiring color for ac power. "All the wires and cables were black—we'd ask which one was hot and just hope for the best," Weinberg said.

*Satellite communications firm IDB brings it all back home. Keeps it digital. And sends it halfway back around the world.*

IDB and KTA worked together to supply satellite transmission services from two primary sites at the Summer Games: the Main Press Center and the International Broadcast Center. An additional microwave link was run to ABC Radio at the Munwah Broadcasting Company on the other side of the city.

Equipment used included Intraplex (formerly Tau-tron) T-1 channel banks with program audio input modules and modules for voice and data. These converted program audio in 15 kHz or 7.5 kHz analog to digital signals and multiplexed them onto a T-1 carrier at 1.544 mbps. A total of seven T-1s were transmitted from Seoul; six were received at IDB's international teleport in Los Angeles, where three were transmitted to the East Coast for distribution via terrestrial fibre connections, and a fourth was transmitted in a double satellite hop to Geneva, Switzerland for the Swiss PTT. A fifth T-1 was also sent in a double hop on domestic satellite for ABC Radio in New York. The Swiss T-1, which contained four 15 kHz program audio channels and originated from the International Broadcast Center,

was a digital circuit all the way from Korea to Geneva, where it remained in the digital domain during backhaul to studios in Zurich. Simplex audio voice return cues were also established from East Coast radio studios (including Westwood One-owned NBC Radio/Mutual and ABC) to Korea for voice communication during programming.

Set-up at the Main Press Center included one modified transportable fly-away Vertex 4.5m Ku-band earth station and a 3.5m Comtech antenna, which uplinked 7.5 and 15 kHz audio, data and voice signals across the Pacific and Indian Oceans. In addition to U.S. subscribers served by IDB's digital audio radio network distributed from its Staten Island, NY, downlink backhauled from Los Angeles, clients for the Olympic feed from the Main Press Center included CBS Radio, USRN, VOA, Radio Free Europe/Radio Liberty, Time Inc. and the Associated Press Wire Service.

Signals for Olympic audio, data and voice were sent across the Pacific Ocean at 174 degrees East via Intelsat POR 174 degrees. Three T-1 connections from POR 174 degrees were received and distributed from IDB's international teleport in California. At the same time, a second antenna

BY BETH JACQUES

# OLYMPIC AUDIO

was positioned for Intelsat IOR at 63 degrees East, which delivered a T-1 connection to London, England for the Associated Press. An additional three

tem in order to accommodate four T-1s on one path established between the Main Press Center and the earth stations. This was done by multiplex-

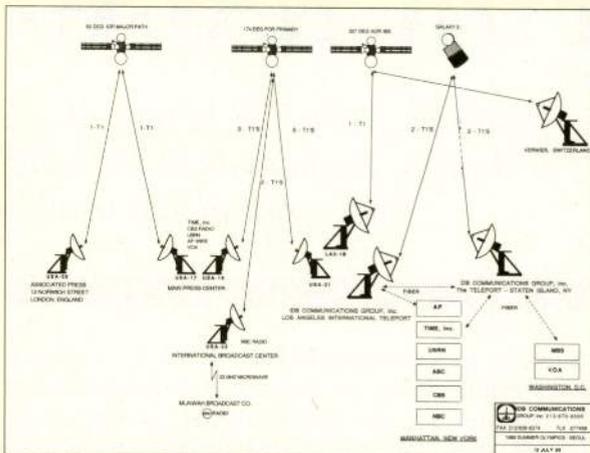
ing four T-1s onto one microwave carrier with a Digital Microwave Corporation DMC-23 23 GHz shorthaul sys-

tem, DC and NBC Radio in Manhattan via its Staten Island hub, so Olympic digital audio was fed to NBC and Mutual directly from the Los Angeles downlink via their dedicated Staten Island link.

Other radio subscribers to IDB's digital audio network handled their patches via IDB-installed T-1 channel bank equipment at the beginning of Olympic transmission, while IDB did its patch at Staten Island, Weinberg added. Material was transmitted 24 hours a day on a wide open channel on a dedicated basis. Feeds could be taken live via an audio routing switcher or audio patch bay, or taken on to tape. No special equipment or time considerations were required.

Radio stations using IDB transmission took either live feeds from remote locations or taped material into their own booth, mixed and EQed it to their

specifications there and then fed it through IDB-cabled connections to the IDB TOC, Weinberg said. IDB currently operates a full-time digital audio link between the Mutual Broadcasting Network in Wash-



Intelsat POR (174 degrees East) carried six T-1s and then to New York and Europe; Intelsat IOR (63 degrees East) took a direct feed to London.

T-1s from the International Broadcast Center were also sent on POR 174 degrees into Los Angeles.

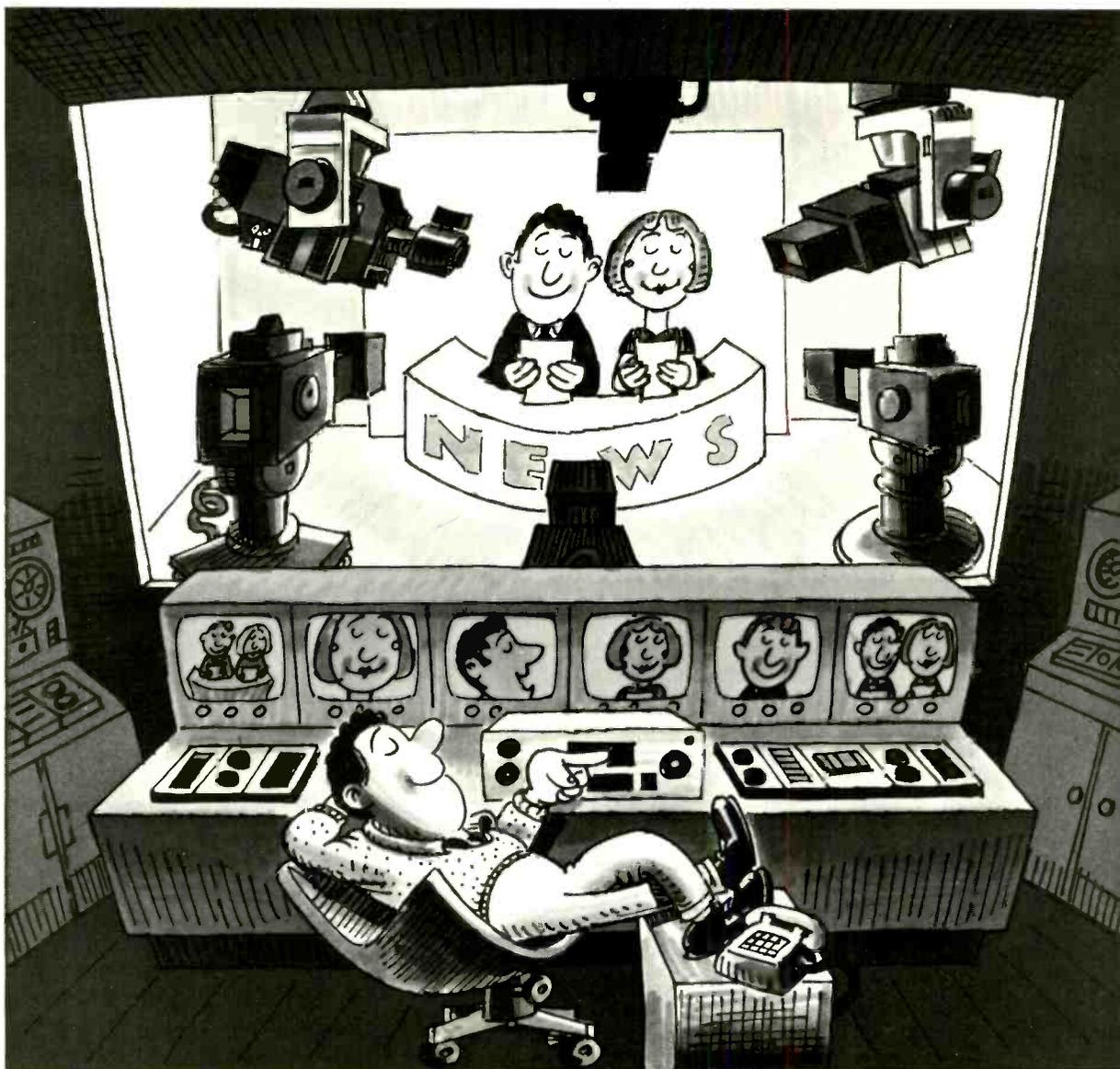
On location there, IDB set up a Vertex 4.5m Ku-band antenna, which was co-located and linked by cables with their Technical Operations Center and multiplexers on a different floor. Service for NBC Radio was also provided from the International Broadcast Center. In addition, IDB also established an exclusive microwave interconnect for ABC Radio from the Munwah Broadcasting Company located across Seoul to the 4.5m antenna at the International Broadcast Center.

The most difficult part of the job was to get signals from a location convenient to customers to a location convenient to site antennas to accommodate both power requirements and different "look angles" of the satellites, Weinberg explained. IDB therefore had to design and bring its own shorthaul microwave system. He

selected a Digital Microwave Corporation DMC-23 23 GHz shorthaul system in order to accommodate four T-1s on one path established between the Main Press Center and the earth stations. This was done by multiplex-



IDB's earth stations on site at the Main Press Center, Seoul, Korea.



# MULTIPLE CAMERAS. ONE OPERATOR.

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# COMPUTE

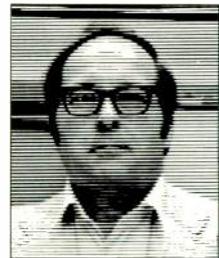
## Finding Geographic Coordinates

By Ronald F. Balonis

**T**he important, but infrequent, problem encountered in broadcast engineering is finding the geographic coordinates for a site or location for any new facility or transmission-related construction. When making an application for a new station, STL, or RPU, or, when installing a satellite antenna for its interference study, orientation, and sun outage time computations, a working knowledge of topographical maps is a useful skill every engineer should have. This month's program, GEOLOC.BAS, steps you thru the *ratio method* for finding the map coordinates

using a standard 7.5 minute geographic map.

Geographical coordinates are based on grid-like lines of longitude and latitude on a circular globe matrix. The location of a site, then, is a point on a circle on which the positions of the lines are specified using degrees, minutes, and seconds. Lines of latitude begin at 0 degrees at the equator and increase to 90 degrees at the poles, positive (+) latitude at the north and negative (-) latitude at the south. Lines of longitude begin at one (1), the prime meridian, and proceed west (+ longitude) and east (- longitude) for 180 degrees in each direction.



The advantage of this map system for broadcasting is that it forms the basis for the orderly allocation and efficient use of the radio spectrum.

A standard 7.5-minute topographic map, used by the U.S. Geological Survey, represents a quadrangle of land area bounded by parallels of latitude and meridians of longitude and covers 7.5 minutes of latitude and longitude. (See Figure 1.) It is drawn to a scale, map-to-earth-surface ratio, of 1:24,000 (1 inch = 2,000 feet), and it is plotted with a tolerance of 40 feet—that's about one-half second.

The geographic coordinates are marked on the map at each corner: There are 7.5 minutes of difference between the latitude at the upper corners and the lower corners and 7.5 minutes of difference between the longitude at the right and left corners. It also has two intermediate 'tick' markings for 2.5 (2' 30") minutes of latitude and longitude on the map edges and on the map itself. For measurement and location purposes, the 7.5 minute map is made up of nine smaller 2.5 by 2.5 minute subquadrangles.

The ratio method for locating coordinates works like this: On a 7.5-minute

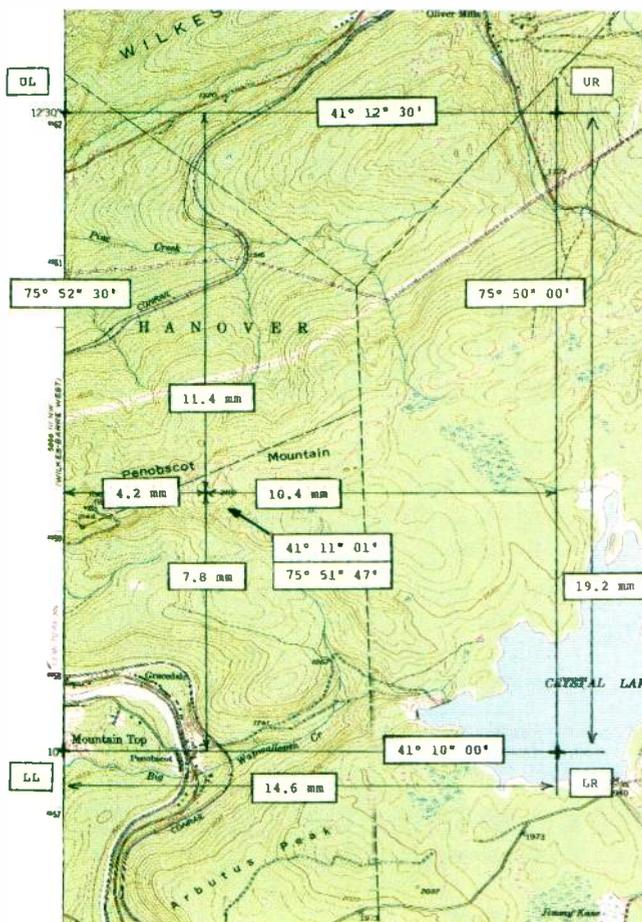


Figure 1: Standard 7.5-minute topographical map, with demonstration measurements indicated.



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Circle 131 on Reader Service Card Page 67

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# COMPUTE

```

0 'GEOLOC.BAS --Find A Geographic Location --
5 'By Ronald F. Balonis on May 30, 1988
10 '
20 TIC$="2' 30"+CHR$(34):MAP=2.5/60:HI=25:'-(MM)
50 TLES$="-- Find Geographic Site Coordinates --"
60 MP$=" - Using a 7.5 Minute Topographic Map -"
90 '
100 CLS:PRINT TAB(0) TLES$
110 PRINT TAB(0):MP$:PRINT
120 PRINT "Location of nearest ";TIC$;" MARK?"
125 PRINT "UL = Upper Left, UR = Upper Right"
130 PRINT "LL = Lower Left, LR = Lower Right : ";
135 INPUT MARK$
140 IF MARK$="" THEN STOP:'--OR SYSTEM
150 I=INSTR(" UL UR LL LR",MARK$)+1
155 IF I=1 THEN I=0:'--ERROR
160 PRINT
165 '
170 PRINT"MARK's coordinates <LAT/LONG>? ";
175 INPUT L$:J=INSTR(L$,"/*")
180 IF J=0 THEN I=0:'--RESTART ON NULL
185 GOSUB 400:LA=D:L$=MID$(L$,J+1,7)
190 GOSUB 400:LO=D:PRINT
195 '
200 PRINT "Length of ";TIC$;" of Latitude (mm): ";
205 INPUT L1:IF L1<.1 OR L1>HI THEN 0
210 PRINT "Length of ";TIC$;" of Longitude (mm): ";
215 INPUT L2:IF L2<.1 OR L2>HI THEN 0
220 PRINT
225 PRINT "DIST of LAT line to Point (mm): ";
230 INPUT D1:IF D1<.1 OR D1>HI THEN 0
235 PRINT "DIST of LONG line to Point (mm): ";
240 INPUT D2:IF D2<.1 OR D2>HI THEN 0
245 '
250 D3=MAP*D1/L1:D4=MAP*D2/L2
255 IF MARK$="UL" OR MARK$="UR" THEN D3=-D3
260 IF MARK$="UL" OR MARK$="LL" THEN D4=-D4
270 LA=LA+D3:LO=LO+D4:PRINT
280 '
300 PRINT "Site coordinates LAT/LONG:":PRINT
310 PRINT TAB(5);USING"DD.DD ###.###/###.###";LA;LO
315 GOSUB 500
320 PRINT TAB(5);USING"DDMM.MM #####.##/#####.###";LA;LO
325 GOSUB 500
330 PRINT TAB(5);USING"DDMMSS ##### /#####";LA;LO;
350 INPUT " ";X:RUN 0:'--WAIT TO RESTART
390 '
400 '-----CONVERT TO DECIMAL DEGREES
405 L=VAL(L$):I=INSTR(L$,".")
410 K=(I>0)*(I<5)-2*(I>4)-3*(I=0)
415 ON K GOTO 420,430,425
420 D=L:RETURN
425 GOSUB 430:L=D
430 D=INT(L/100):D=D+(L-D*100)/60:RETURN
500 '-----CONVERT FROM DECIMAL DEGREES
510 LA=INT(LA)*100+(LA-INT(LA))*60
520 LO=INT(LO)*100+(LO-INT(LO))*60:RETURN
550 '-----END OF PROGRAM-----

```

Figure 2: Program listing for GEOLOC.BAS, a coordinate location scheme.

topographic map, mark the site or location for which the coordinates are desired. Then locate and mark the 2.5 minute tick marks and draw the framing and reference lines through them to box in the 2.5 by 2.5 minute subquadrangle that contains the point of interest. On the horizontal reference lines mark their latitudes—top will be 2'30" (2.5 minutes) more than the bottom; on the vertical reference lines mark their longitudes—left one will be 2'30" (2.5 minutes) more than the right one.

Next, using a metric ruler with mm graduations, measure the distance for 2'30" of latitude on the map (for the map of Figure 1 it's 19.2 mm) and the distance for 2'30" of longitude (for the map of Figure 1, it's 14.6 mm). Then measure the distances of the point from each line of latitude and longitude.

Now, finding the coordinates is just a matter of some simple calculations of converting to and from decimal degrees, calculating the ratios and keeping track of the directions of latitude and longitude. The location of the point in the 2.5 subquadrangle is given in decimal degrees by the equations: Latitude of the site equals reference line of latitude (in decimal degrees) +/- 2.5 x the map distance (in mm) to the point / the map distance for 2.5 of latitude. And, longitude of the site equals the reference line of longitude (in decimal degrees) +/- 2.5 x the map distance (in mm) to the point / the map distance (in mm) for 2.5 of geographic longitude.

The GEOLOC.BAS program is relatively simple and straightforward—no algorithm to speak of. Enter the data prompt by prompt: The coordinates for the reference tick mark—the program accepts the formats DD.DD, DDMM.MM, or DDMMSS (the map format); The distance for 2.5 minutes of latitude—vertical distance between two 2.5 minute tick marks; the distance for 2.5 minutes of longitude—horizontal distance between two 2.5 minute tick marks; The distance from the reference latitude to the site or location; and, the distance from the reference longitude. GEOLOC.BAS then displays the coordinates for the site in the three formats. Lines 400-430 converts measurements to decimal degrees using a bit of recursion, regardless of the input data's characteristics or format.

The coordinates found by GEOLOC.BAS can be no more accurate than the map used and the accuracy of the distance measurements made on it. Maps can change size because they are printed on paper that stretches and shrinks with use and exposure to the environment. The precision to which the framing and reference lines are drawn and the precision of the actual distance measurements read from the ruler have their affect too. But with care, even the occasional coordinate finder can find them with the required FCC accuracy of within one second. ■

Balonis is chief engineer of WILK-AM, Wilkes-Barre, PA.

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### HELP WANTED

The Washington DC Bureau of Conus Communications is seeking a full time Engineering Maintenance Supervisor. This person must be capable of supervising a small engineering maintenance department and must have experience in servicing Sony Betacam field equipment, and studio edit facilities. Candidates for this position should have experience in operating a wide variety of broadcast video and audio equipment, as well as, the use of a spectrum analyzer. Experience with satellite equipment or transmitters is desirable, but not required. Individuals seeking this position must be able to work in close quarters with an active news organization, and make decisions quickly, frequently while under pressure. Salary is open, depending on qualifications. Resumes should be sent to Scott Goodfellow 1825 K Street, NW, Suite 601, Washington, DC 20006.

**REGIONAL SALES MANAGER**—Growing manufacturer of broadcast video products seeks two regional sales managers. Positions based in California and Chicago area. Require aggressive self-starter capable of working with minimum supervision. We offer competitive salary, excellent benefits including profit sharing. Interested individuals should send resumes with salary history and requirements to: [redacted] NY NY 10000

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Top fifty VHF affiliate in the Southeast seeks chief engineer. Job entails supervision of all engineering and maintenance personnel. Individual will be responsible for all technical functions. Must have SBE Certification. College graduate. Must be forward-thinking. Technologies as well as art equipment. 10-15 years experience. Budget [redacted].

**Assistant Chief Engineer. Top Philadelphia CHR Station** seeking self-motivated Ass't Chief Engineer. Studio and RF experience required. FCC General. Strong company; good benefits. Resumes to: Chief Eng. WEGX-FM, Three Bala Plaza, Suite 580E, Bala Cynwyd, PA 19004.

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# SPECTRUM

THE REGULATORY ENVIRONMENT

## ATV: Where's the Beef?

By Harry Cole

**A**dvanced Television (ATV) is under starter's orders as the next major technological development in the broadcast industry—and the FCC will play a crucial if not dispositive role in the form it will take.

In a proceeding in early September which could have tremendous impact beginning in the 1990s, the Commission gave the green light to further studies looking toward adoption of standards and the resolution of related questions concerning ATV and one of its variants, "High Definition Television" (HDTV). Although final decisions aren't likely to be made until next year at the earliest, the FCC appears to be working to keep the issue on track and moving quickly. A brief overview is important now because of the likely impact of the authorization of ATV on the overall television industry.

First, what exactly is ATV? The principle is to provide video images which are substantially more clear than those already transmitted by standard broadcast stations; at the same time, the images should be receivable in the home on equipment similar, if not identical, to standard television sets. Although not especially quantitative, the easy way to visualize the difference is to compare the video quality of a standard over-the-air broadcast station with the quality of a 35mm film. ATV supporters indicate that the latter quality can be attained over-the-air with at least certain forms of ATV. As we will discuss below, not all ATV forms are alike—while HDTV generally refers to an ATV system capable of quality similar to 35mm film, a second form known as "Enhanced Definition Television" (EDTV) falls short of that mark, even though it is superior to conventional broadcast television.

Second, will ATV work with existing stations? From the FCC's perspective, the important point is that this technology is still emerging. At present there are many

ATV systems in development, many of which are incompatible with each other and with conventional broadcast transmission systems (which we will refer to as "NTSC" systems). The FCC has announced preliminarily that it wishes to ensure any ATV system it adopts will be compatible in one way or another with NTSC operations, so that the broadcast television industry and the public at large will be able to use existing equipment even if ATV takes hold. (This is similar to its decision decades ago which ensured color television transmission is compatible with black-and-white signals.) We can therefore expect that any ATV system which the FCC authorizes will be compatible with existing broadcast gear.

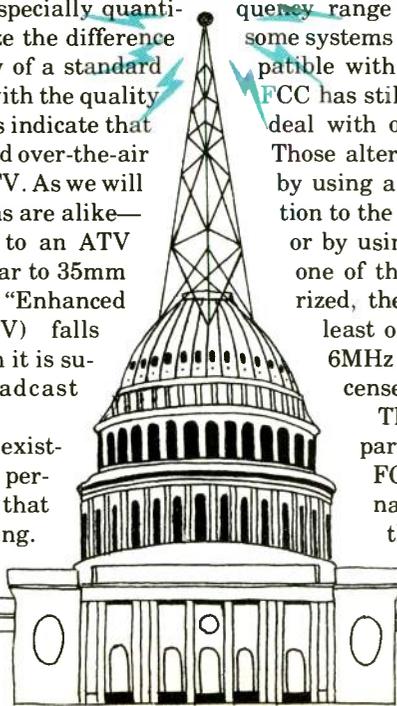
Third, one of the most important questions facing the Commission in its analysis of alternative systems is where to obtain the spectrum space required for ATV. Television stations presently operate on 6MHz channels.

To transmit an ATV signal in the broadcast frequency range requires at least 6MHz. While some systems claim to deliver ATV signals compatible with NTSC on a 6MHz channel, the FCC has still expressed concern about how to deal with other, not-so-compatible systems. Those alternatives deliver their ATV signal by using a separate 3MHz channel in addition to the existing 6MHz broadcast channel or by using another full 6MHz channel. If one of these two latter systems is authorized, then the FCC will have to find at least one 3MHz channel and possibly a 6MHz channel for each television licensee who wants to upgrade to ATV.

That search could be difficult. As part of its September decision, the FCC indicated that its present inclination is to take spectrum *only* from that portion of the spectrum presently allocated for broadcast



*Cole is partner in Bechtel, Borsari, Cole & Paxson, a Washington, DC-based law firm.*



television use, a portion which is already acknowledged to be scarce. With a certain amount of squeezing, however, and with the understanding that an existing station on, say, a VHF channel might likely have to use extra spectrum from, say, the middle of the UHF band (*i.e.*, non-contiguous channels), the FCC thinks that most broadcasters interested in upgrading to ATV could probably be accommodated.

Fourth, how would the additional channel space be allotted? A number of alternative methods are on the table. The two most obvious are: (1) interested licensees could apply for the extra space (in a "demand" system); or (2) the FCC could simply allot the space, designating what existing channels it is to be used with. It would seem natural to use some variation of the latter in light of the FCC's relative success in the FM allocation area with MM Docket No. 80-90. By taking firm control of the allocation reins, the Commission accomplished in a limited time what otherwise might have taken a lot longer. Bolstered by that experience, the FCC could very likely do the same on the television side of things.

Fifth, if there is not enough extra spectrum to satisfy all interested licensees, how will the shortfall be dealt with? The Commission can be expected to try to avoid the need for comparative hearings, but it is not clear that it will be able to do so successfully. Also, it is at least possible that, if new spectrum is to be made available for broadcast use, non-licensees will claim that they, too should be entitled to apply for it.

Sixth, what technical standards will apply to ATV (and, for that matter, to NTSC) stations? The FCC has indicated that it is not interested in trying to change the standards governing conventional broadcasting at this time—ATV is still in its developmental stages, and there is no point in upsetting the existing system unless and until there is a clear reason to do so.

By the same token, the Commission is not will-

ing to adopt strict ATV standards at this early date. Rather, it wants to encourage maximum technological research and development. As a result, while the FCC is asking for suggestions about possible standards, for the present its primary concern is that ATV not impair the public's reception of existing stations.

In this connection, though, the Commission has demonstrated a clear desire to avoid the same lack of standards which, many claim, has consigned AM stereo service to a frustrating limbo. That is, the Commission is torn between its deregulatory impulse to adopt minimal technical requirements and its recognition that a lack of

such requirements could seriously retard acceptance of ATV service by both consumers and manufacturers.

To the extent that the television broadcast industry perceives there to be a likely public demand for ATV programming, it certainly does not want to cede any of that potential audience to the nonbroadcast video market.

And finally, bear in mind that although the development of ATV could be a boon

to segments of our population, ATV is only a transmission system, a means of sending a signal from one point to another. The substantive content of that signal will not be affected by ATV, and it's possible that the actual usefulness of the technology will be limited to broadcasting certain types of programs such as feature films and professional sports. As opposed to cable television or a new satellite-delivery industry, the broadcast industry and the broadcast consumer may question the time, trouble and expense of transmitting a soap opera, game show or cartoon in ATV. The Commission, however, does not appear to believe this consideration will be an issue and is going forward full throttle.

If you need more information or would like to submit comments to the Federal Communications Commission about ATV, contact your communications counsel. ■

*Is it possible that usefulness of the technology will be limited to the broadcast of certain types of programs—feature films and professional sports?*

# EQUIPMENT

## *Lake Has Patch Panel Assemblies...Sony Debuts New A/B Roll Editor...Bulk Tape Eraser From Garner...JVC Unveils New RGB Camera...And More New Products*

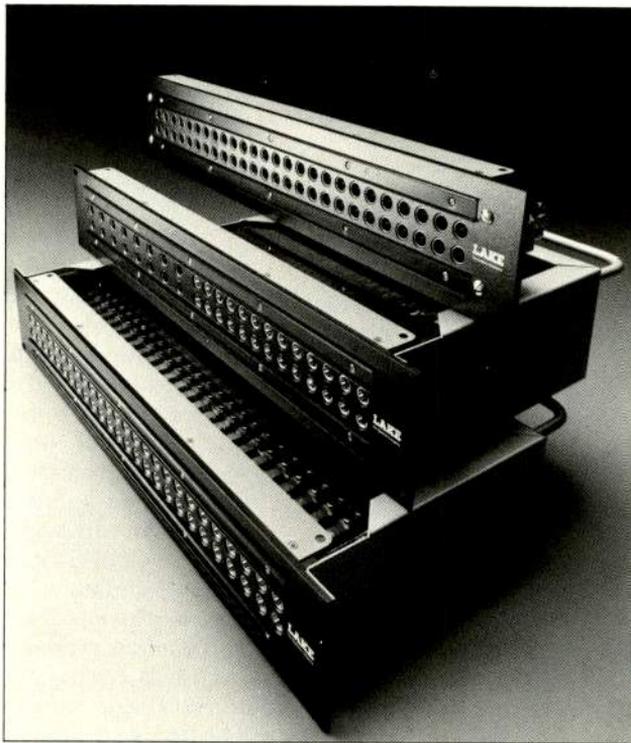
### **Lake Has Patch Panel Assemblies**

**L**ake Systems has announced pre-wired audio, video, and combination audio and video patch panel assemblies. Audio patch panel WPP-26SS features a terminal strip which eliminates shielding-induced crosstalk for mic or line level, high or low impedance, and balanced or unbalanced circuits. Solder terminals offer flexibility and the convenience of split-collar connectors. The 26 jack pairs have gold crossbar contacts for lowest noise. Combination audio and video patch panel WPP-300A has eight self-normalizing video jack pairs, 13 audio jack pairs, and the same terminal strip as the WPP-26SS. The VPP-26 video patch panel includes 26 self-normalizing jack pairs with Western Electric .90 inch center pin. Jacks are fully operational to 100 MHz. **Reader Service #200**

### **Sony Debuts New A/B Roll Editor**

**T**he BVE-600 editor is capable of controlling two videotape players and one video tape recorder to provide a cost-effective component

or composite post-production system. Designed for either industrial or broadcast applications requiring a fast editor with serial control, the new system comes either with or without two optional plug-in switcher boards, the Sony BKE-611 or BKE-621. Supported by the full functions of the optional plug-in switchers, various types of editing with effects can be



performed without the use of an external special effects generator. Users can select one of ten wipe patterns for A/B roll edits. Dissolve effect transitions are also possible. Superimposing titles can be performed by connecting an external character generator. With the help of the built-in color background signal generator, various colors can be used for the superimposed titles. **Reader Service #201**

### **Bulk Tape Eraser From Garner**

**T**he Eliminator 4000 from Garner Industries is designed to erase the high, 1500 Oersted, coercivity metal particle tape used with the new MII, Betacam SP and D-2 formats. A degaussing force of 4000 Oersteds erases completely saturated 1500 Oersted metal particle tape to 75 dB. A conveyor belt transport system ensures ease of operation and a degaussing coil frequency virtually eliminates heating and vibration. **Reader Service #202**

### **JVC Unveils New RGB Camera**

**T**he TK-F7100U RGB frame-capture camera from JVC Professional Products Company is the first camera of its type designed exclusively to act as a high-resolution input device to a personal computer-based graphics system. Applications include electronic publishing, prepress and desktop, business graphic design, medical imaging, and textile fabric design. Resolution is about twice that of ordinary video cameras, but less than a flatbed scanner. The TK-F7100U can capture any type of object and when attached to a microscope provides crisp color images. **Reader Service #203**

### **Aphex Adds New Expander/Gate**

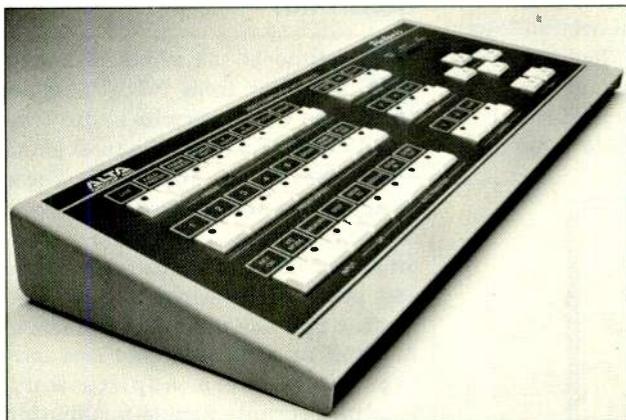
**A**phex Systems has begun production of the Model 612 expander/gate. Ten units were purchased by Ultra Sound for use by

by The Grateful Dead and Bob Dylan. The new expander/gate features an external gate trigger which can be used to enhance the sound of an instrument by muting the pickup mics until the instrument is actually played.

Reader Service #204

## New Digital Effects For ALTA Pictoris

**A**LTA Group has announced an enhanced ALTA Pictoris Video Compression System to be ready for delivery in October at a price of \$10,900. New effects added since its NAB convention preview include mo-



saic, vertical and horizontal inversion, posterization, negative video and dissolve. Other features include 5.5 MHz bandwidth yielding 450 lines of resolution, infinite compression, ease of operation, GPI, remote control, zoom in, zoom out, freeze, and a compact design ideal for use with live cameras and on remotes. With the ALTA Pictoris, compressed and/or cropped images can be positioned or moved anywhere within the live image area, then stored with or without borders.

Reader Service #205

## New Switcher From Crosspoint

**C**rosspoint Latch has announced a fully-computerized, two mix/effects systems switcher. Model

6129 can simultaneously produce up to five levels of video or keying to allow the operator to perform multiple levels of effects during one pass of the tape. Features include 32 wipe patterns, three internal colorizers, RGB chroma keyer, and five input GPI allowing ME1, ME2, DSK, fade to black, or sequences to be individually triggered. An optional second pattern generator allows the operator to select two wipes and position them individually. A second chroma keyer, either RGB or encoded, is also optional. The switcher can display four, or with an optional second downstream keyer, five levels of keys at once. The microprocessor controller permits storage of up to 800 events of switcher

configurations to produce smooth, frame accurate transitions. The 8-input version is available at \$10,995. The 16-input version will be available in December and will sell for \$17,995.

Reader Service #206

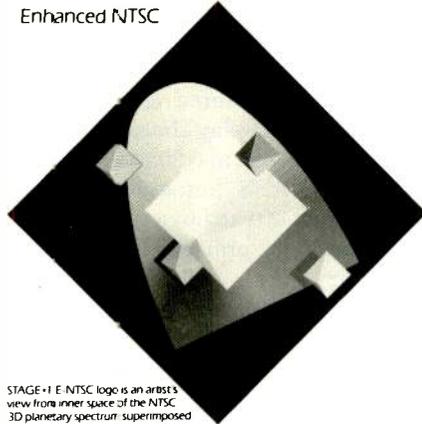
## Ampex Offers New Tapes

**A**mpex Corporation has announced the introduction of the 297 U-matic SP master broadcast grade videotape. Specially formulated for the higher energy requirements of the SP format, the new tape delivers significantly improved electrical and drop-out performance. Both the PAL and NTSC formats come in a distinctive red cassette shell to distinguish them from standard energy U-matic broadcast grade, 187, and master broadcast grade, 197, tapes which come in black shells. The new tape is designed for U-matic users upgrading to the SP recorders for improved picture and audio quality, and compatibility with existing program libraries.

Also new is Ampex 319 D2 metal particle digital videotape. This tape

# STAGE\*1 E-NTSC

Enhanced NTSC



STAGE\*1 E-NTSC logo is an artist's view from inner space of the NTSC 3D planetary spectrum superimposed on the NTSC chromaticity diagram (This logo is a trademark of Central Dynamics Limited)

## Bye, bye, NTSC. Hello E-NTSC.

Introducing STAGE\*1 E-NTSC encoders. They represent a new proprietary technology\* and the most advanced Digital Signal Processing and filtering techniques for eliminating NTSC artifacts.

**If you paid the price** for D1 high quality images... you can maintain that look when converting to NTSC.

Or...

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Or...

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and...

**If you want to preserve** the archival value of the material you create today... then...

STAGE\*1 E-NTSC encoders will give you the crisp, high-quality images you want today and need with tomorrow's higher definition TV systems. \*Patent Pending

**Are we claiming too much?**

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Using a powerful computer Real-time Video Simulation system (one of the few in the world) multi-dimensional diamond shaped FIR filters were developed. These unique designs shape the NTSC spectrum and separate chrominance and luminance. This completely eliminates cross-color and cross-luminance artifacts. These FIR filters are phase linear and will always respond correctly to any incoming signal combination or noise level.

**Adaptive comb filtering schemes cannot make these claims. And that's a fact.**

Get rid of all the artifacts... get the STAGE\*1 E-NTSC encoder facts.



Digital Encoder. STAGE\*1 E-NTSC is fully compatible with present NTSC and is plug compatible with D1, D2 and Analog Component Video.



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# EQUIPMENT

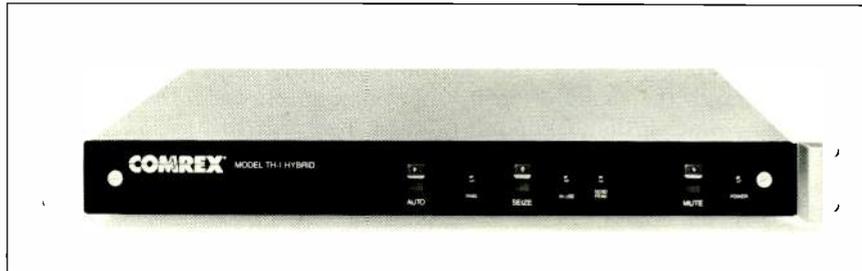
is available in three cassette sizes with maximum play times of 32 minutes, 90 minutes, and 208 minutes, respectively. ABS anti-static plastics reduce dust attraction and 1500 Oersted coercivity provides high-density recording.

Reader Service #207

## Clear-Com Debuts Speakers

The Models 1020 and 1020M Amplified Monitor Speakers are totally self-contained, two-channel audio monitoring systems requiring only a single unit of rack space. They feature full range, 100 Hz to 12 kHz, audio frequency response and employ both XL-3 type balanced line level inputs and RCA phono type unbalanced inputs. Model 1020M features LED bar-type input meters.

Reader Service #208



## Comrex Has New Telephone Interface

The new TH-1 telephone interface features precision wideband hybrid balance to maintain the full integrity of studio audio and careful filtering to give the best obtainable caller sound. The Comrex diverta-coupler affords easy connection to any telephone system and the hybrid balance tone oscillators and indicator provide fast uncomplicated setup.

Other features include manual or

auto answer, declipping, cart start and selectable ring count. All controls are remotable allowing operation from multiple locations and provision is made for computer control.

Reader Service #209

## NTSC Launches New Controller

Risetime is the name of a new controller from NTSC Productions which permits editor triggered "autotransitions" on most small video production switchers. These switchers are widely used by colleges, cable companies, and other non-broadcast users of multi-camera and edit systems. Risetime allows these users to upgrade their edit systems to A-B roll at a considerable cost savings. In camera applications, Risetime permits simple pushbutton remote-control over the "host" switcher.

Reader Service #210

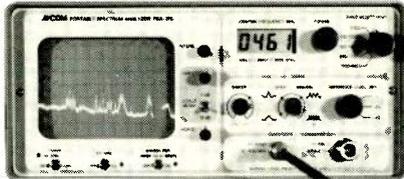
## New Microcart System From American Broadcast

American Broadcast Systems presents a new microcart VTR automation control system. Control of up to twenty-four transports is provided for automated spot and program playback. Features include stereo audio, two-second preroll, event rescue and fool-proof operation. The American microcart system makes it easy to build your own low-cost automation system. Control hardware, wiring harnesses, sync distribution and an audio/video program switcher are provided.

Reader Service #211

**★ NEW ★**

**AVCOM PSA-37D PORTABLE SPECTRUM ANALYZER**



AVCOM INTRODUCES THE NEW PSA-37D PORTABLE SPECTRUM ANALYZER WITH DIGITAL FREQUENCY READOUT. AVCOM'S NEW PSA-37D Portable Spectrum Analyzer has a 4 digit front panel frequency readout and is controlled by a rotary frequency adjustment control. Frequency ranges that the PSA-37D cover are 0 to 500 MHz, 500 to 1000 MHz, 950 to 1450 MHz, 1250 to 1750 MHz and 3.7 to 4.2 GHz. The PSA-37D Portable Spectrum Analyzer is lightweight, portable, battery operated, ideal for field test situations. A built-in DC block with a +18 VDC powers LNAs and BDCs with the flip of a switch. All other performance characteristics and features are the same as the PSA-35A which has become an industry standard for satellite communications work. \$2475



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## Audio Animation Debuts New Console

**A**udio Animation announces the Muse, a fully digital, fully automated console designed for CD mastering and digital tape preparation. The unit features a flexible, easy to use automation scheme which allows over 80 minutes of updating control functions at 100 times a second. EQ and dynamic control may be implemented in one of two ways, either by use of conventional pots or by plotting the desired EQ or DRC curve on a high resolution color monitor. **Reader Service #212**

## MFJ Announces Antenna Tuner

**M**FJ Enterprises, Inc. has a new 3 kW roller inductor differential-T antenna tuner that uses a single differential capacitor in place



of two variable capacitors. The new MFJ-986 covers 1.8 to 30 MHz continuously, including MARS and all the WARC bands. The differential capacitor makes tuning easy and fool-proof because minimum SWR can occur at only one setting. Roller induction allows a very low SWR. A lighted two-color peak and average reading cross-needle SWR/Wattmeter indicates forward and reflected power and SWR. Comes with one-year guarantee and sells for \$239.95. **Reader Service #213**

## Modulation Sciences Intros Remote Control Interface For Tektronix VM700

**T**he VMate-I extends the capabilities of the Tektronix VM700 Video Measurement Set by in-

terfacing it with other systems in the video facility. All of the VMate-I contact closure and remote control interface functions are programmed from the front panel of the VM700. Set-ups

are stored in non-volatile memory. The VM700 analyzes more than 40 video signal parameters. Alarms and cautions from the VM700 can be monitored by the VMate-I or converted to

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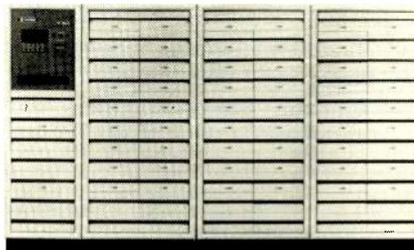
# EQUIPMENT

contact closures for automatic corrective action. In addition to video measurements in television broadcast, cable and production applications, the VM700/VMate-I combination is also ideal for use in automatic product testing and to provide positive pass/fail indications in a manufacturing environment. Delivery is scheduled for December.

Reader Service #214

## Harris Unveils Solid-State VHF Television Transmitter

**H**arris Corporation, Broadcast Division, has introduced the platinum series of solid-state VHF television transmitters in power levels from 1 to 60 kilowatts. Tubes are replaced by identical and interchangeable 1 kilowatt solid-state visual and aural power amplifier modules which operate in parallel. Each



module features a large silicon area, is protected by special heat sink, and exhibits an MTBF of over 280,000 hours. If a module should fail, it can be replaced while the transmitter continues to operate. Modules are designed for broadband operation and require no tuning. In addition, they are self-protected against VSWR, overvoltage, undervoltage, overtemperature and RF input overdrive. Multiple power supplies throughout the transmitter also operate in parallel. The cooling system provides separate fans for each power

amplifier and driver cabinet. Ducting within each cabinet ensures equal cooling for every module, even if one is removed for servicing. The new transmitters feature a combined visual and aural exciter which provides such features as frequency synthesis and digital power raise and lower controls. Also featured are a control cabinet which houses the exciter and offers room for an optional dual exciter, an aural PA cabinet, and one or more PA cabinets depending upon the power level of the transmitter.

Reader Service #215

## ART Offers High Definition Equalizers

**G**raphic equalizers from Applied Research & Technology, Inc. have a superior level of sonic quality based on newly developed high performance circuitry. Also featured are faders with a full 60 mm travel, switchable subsonic and ultrasonic filters, clip/signal metering, fail-safe hardware bypass in the event of power loss, balanced XLR, TRS and terminal block connectors. The 1/3 octave version has 31 bands from 20 Hz to 20 kHz, switchable scales, 7.5 dB and 15 dB, and a transformer balancing option. The 15 band version has 15 bands per channel with independent level controls. Although intended for high-end studio and professional applications, these equalizers are very price competitive. Available in January, 1989.

Reader Service #216

## Hotronic Offers New TBC/Frame Synchronizer

**M**odel AH91 is a dual channel video system used in A/B roll editing with special effects. Each of two independent channels has full proc-amp control and composite or Y/C 3.58 selectable input. The AH91 works with 1/2 inch VHS, S-VHS, and 3/4 inch U-matic VTRs with or without advance sync input, and with or without 3.58 sub-carrier feedback. Special effects include

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wipes, tile, posterization, mosaic, and negative. Transition effects can be controlled by the editor controller.

Reader Service #217

## Central Dynamics Announces Signal Processors

The STAGE\*1 E-NTSC line of video signal processors consists of digital encoders and decoders, and digital translators which convert from one videotape format to the other, ie. D1 to D2 and D2 to D1. Using new multi-dimensional digital signal processing and filtering technology, STAGE\*1 E-NTSC products process enhanced NTSC (E-NTSC) color images that are virtually indistinguishable from original RGB and component color signals. Two-dimensional filtering separates chromi-

nance from luminance to completely eliminate cross-color and cross-luminance artifacts. For facilities with large investments in conventional NTSC, E-NTSC provides an economical and smooth transition from analog to digital.

Reader Service #218



## Tascam Announces Digital Audio Tape Deck

The new DAT recorder/player uses zero distortion circuitry to maximize sonic performance. Granulation noise, the distortion in digital products which increases as the sound

levels decrease, is virtually eliminated by four Tascam ZD circuits that add and subtract digital dither. Each of the five main sections is shielded from electrical interference, external vibrations, and resonance by individual internal boxes. Critical wiring is mono-crystal coated cable. Glass epoxy printed circuit boards are used for the audio, servo, and control sections.

Reader Service #219

## New Broadcast Console From Harrison

Harrison Systems, Inc. has announced the introduction of a new on-air broadcast console, the AP-100 series. The new console has the features and price package specifically requested by a majority of radio station general managers and program directors.

Reader Service #220

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# BUSINESS BRIEFS

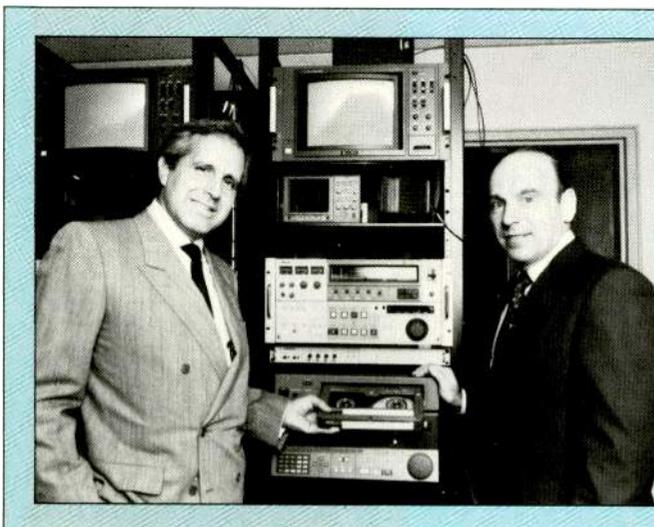
**N**ewly elected fellows of the **SMPTE**: David L. George, president and COO, Imagineering, Ltd.; J. Wayne Caluger, president, Caluger and Assoc.; Gustavo Dato, Jr., CE (ret.), American Broadcasting Co.; Richard R. Green, senior VP broadcast operations and engineering, PBS; Frank J. Haney, director of engineering facility, Cap Cities/ABC; Birney D. Dayton, VP engineering and GM, Telecom Systems Group of the Grass Valley Group; Arthur E. Florack, engineering coordinator, Eastman Kodak; Tomlinson Holman, corporate technical director, Lucasfilm, Ltd.; Richard A. Hathaway, director of engineering, Ampex Corp.; Murray Forrest, CEO, Colorfilm Pty Ltd.; Frederick Franzwa, technical project leader, Eastman Kodak; Nelson E. Meacham, senior project engineer, Walt Disney Imagineering; John P. Watney, principal engineer, Ampex Corp.; and John H. Streets, president, Merlin Engineering Works. Congratulations to all the new fellows.

A group of Brown University students has formed the National Association of College Broadcasters, with the help of a \$300,000 grant from **CBS**. The association plans to unite the estimated 300 student-run television and numerous radio stations on college campuses across the country. Short-term goals include setting a professional staff to assist member stations; formation of a programming distribution network; sponsorship of an annual conference; distribution of information concerning funding and career and internship opportunities; the publishing of a quarterly journal.

A significant equipment order was reported by **Dynatech Newstar** recently. The company has been awarded a contract to provide Newstar newsroom computer systems to all eight **Cap Cities/ABC** O & O stations. Installations began recently, with **KGO-TV**, San Francisco, being the first in the ABC TV Group to receive its system. The other installations will be finalized by early 1989...**Odetics** has announced orders for ten cart machines this fall: a record number of new orders for the quarter. Odetic units will be shipping

shortly to **KARE-TV**, Minneapolis, MN; **KDOB-TV**, Bakersfield, CA; **KGAN-TV**, Cedar Rapids, IA; **WGGB-TV**, Springfield, MA; **WGME-TV**, Portland, ME; **WGNX-TV**, Atlanta, GA; **WICS-TV**, Springfield, IL; **WMTV-TV**, Madison, WI; **WOWT-TV**, Omaha, NB; and **WWLP-TV**, Springfield, MA.

In the wake of a reported move by **IDB Communications** to beef up overseas expansion, the company has named Phil McInnes VP of international business development. Also, IDB has recently established a new IDB Systems division to specialize in systems integration, operation and maintenance...Edmund A. Williams has joined the staff of the **Advanced Television Test Center (ATTC)** as manager, transmission and propagation engineering...Don Roberts is **Tel-esis Productions'** new CE...Richard D. Conner has been elected CEO of **Cycle Sat, Inc.**...Gentner has added Bill Traue to its customer support team as engineer, and Jim Pino is Gentner's new director of R & D...Carillon Technology, parent company of **dbx**, has appointed Leslie B. Tyler VP for technology. ■



*An update on Sony's DVR-10 D-2-format digital videotape recorder: the company has logged the shipment of the 100th such unit since Sony made the VTR available last April. The latest owners of the D-2: Gannett-owned WXIA-TV, Atlanta, GA.*

*Sony has also reported its donation of a DVR-10 to the Museum of Broadcasting in New York to aid that foundation's TV archive preservation. Robert M. Batscha (left), president of the Museum of Broadcasting, and Paul Berger, manager VTR product management, Sony Communications Products Co., flank the unit that was part of a \$3.5 million equipment contribution to the museum.*

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## Let's Encourage Minority Engineers

By Ellis Terry, Jr.

**D**uring the recent third annual convention of the Society of Broadcast Engineers, I was disturbed to note the low level of minority participation in the event. This phenomenon, of course, is not confined to the SBE; I have observed it throughout my involvement in the broadcasting industry.

I have been a member of the SBE since 1982. No one approached me to join, it was my decision. I joined SBE first because I was an engineer and secondly because I thought this would be a good way to help increase minority involvement.

In the six years I have been an SBE member, however, I have yet to read an article in the national magazine concerning minorities in broadcast engineering. (When I use the word "minorities," I mean other than white males.) At the recent SBE annual convention, the topic of discrimination was addressed only briefly. There was some discussion of age discrimination but not a single word on sexual or racial discrimination.

During the panel discussion on Engineering Education for the Broadcast Engineer, several learning institutions that have programs geared toward broadcast engineering were mentioned, but not one was a black university. If the SBE is interested in increasing its membership by recruiting college engineering graduates, why not look to black educational institu-

tions as viable sources for new members?

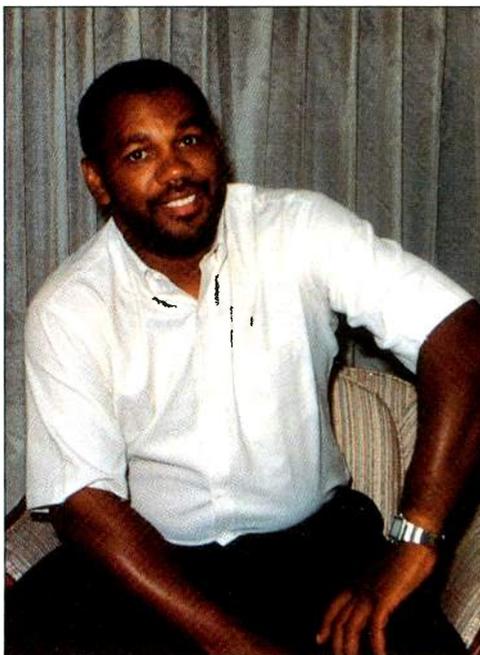
The SBE Daily News of Sunday, September 25, 1988 stated there were more than 600 preregistrants for this year's conference. I counted approximately eight blacks, two women, and four Hispanics. That figures out to be 2.3 percent minority participation at a national conference. This lack of minority participation year after year should be an embarrassment to the SBE. If more minorities preregistered than actually attended, why did this occur? And if the number that attended was all that preregistered, what is needed to attract an increase in minority participation?

The lack of minority participation is not something the SBE should be taking lightly in this day and age, especially with the overall number of broadcast engineers steadily decreasing.

Every time I attend an engineering conference or broadcast trade show, I am asked time and time again to recommend a qualified black engineer to meet a need to hire a minority. I understand that jobs for broadcast engineers are becoming scarce due to automation and budgetary cutbacks. I am not in favor of giving minorities preference in hiring simply because of a need to meet quotas.

I would like to see the SBE address the minority issue in a meaningful manner, such as establishing a minority recruitment program or any such vehicle to aid in increasing minority involvement in the SBE on a national level.

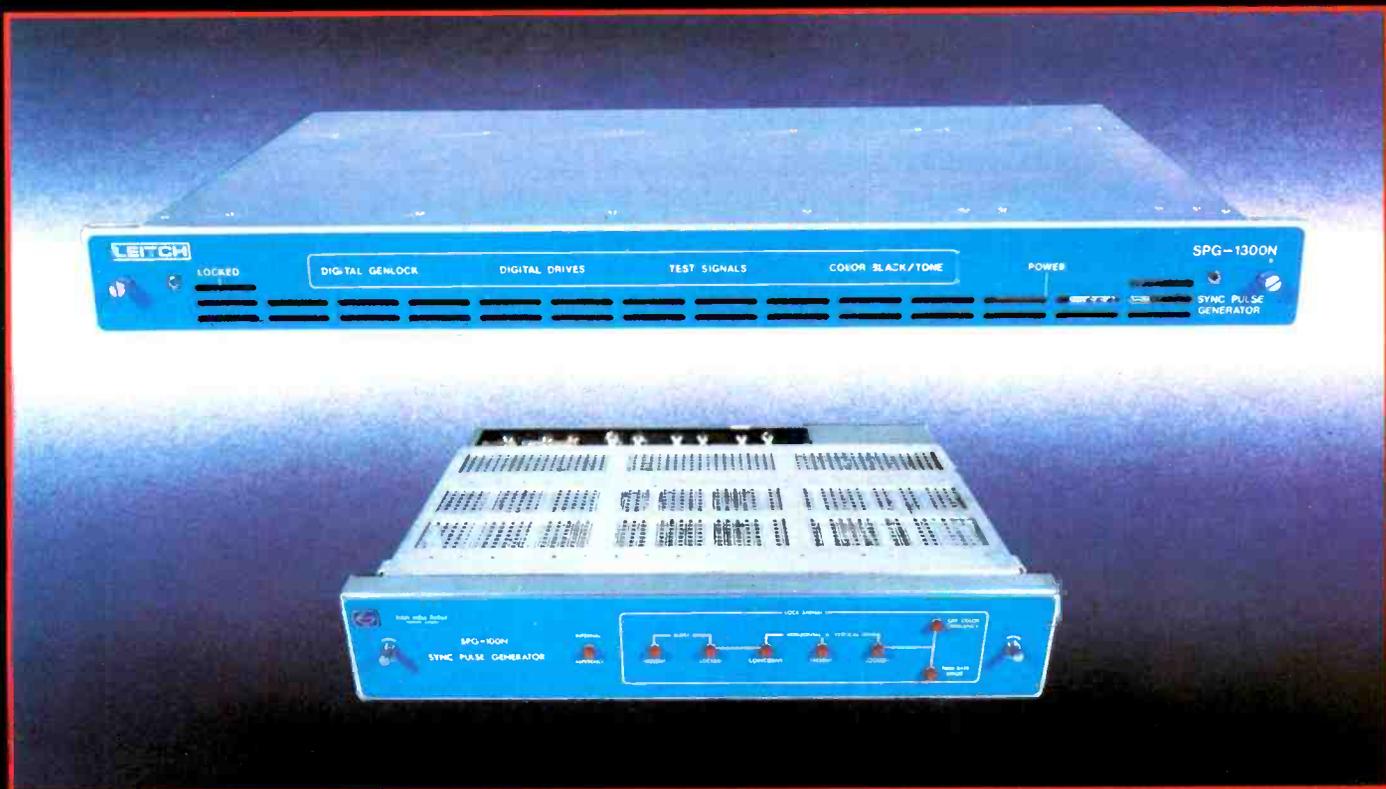
I am now in the early stages of compiling a minority broadcast engineers register or network. I call upon the SBE and other broadcast industry organizations and individuals to join me in this effort. ■



*Terry is assistant supervisor of maintenance for WETA-FM, Washington, DC. He is a member of SBE, AES, Washington Area Broadcast Executives, National Black Media Coalition, and IBEW Local 1200.*

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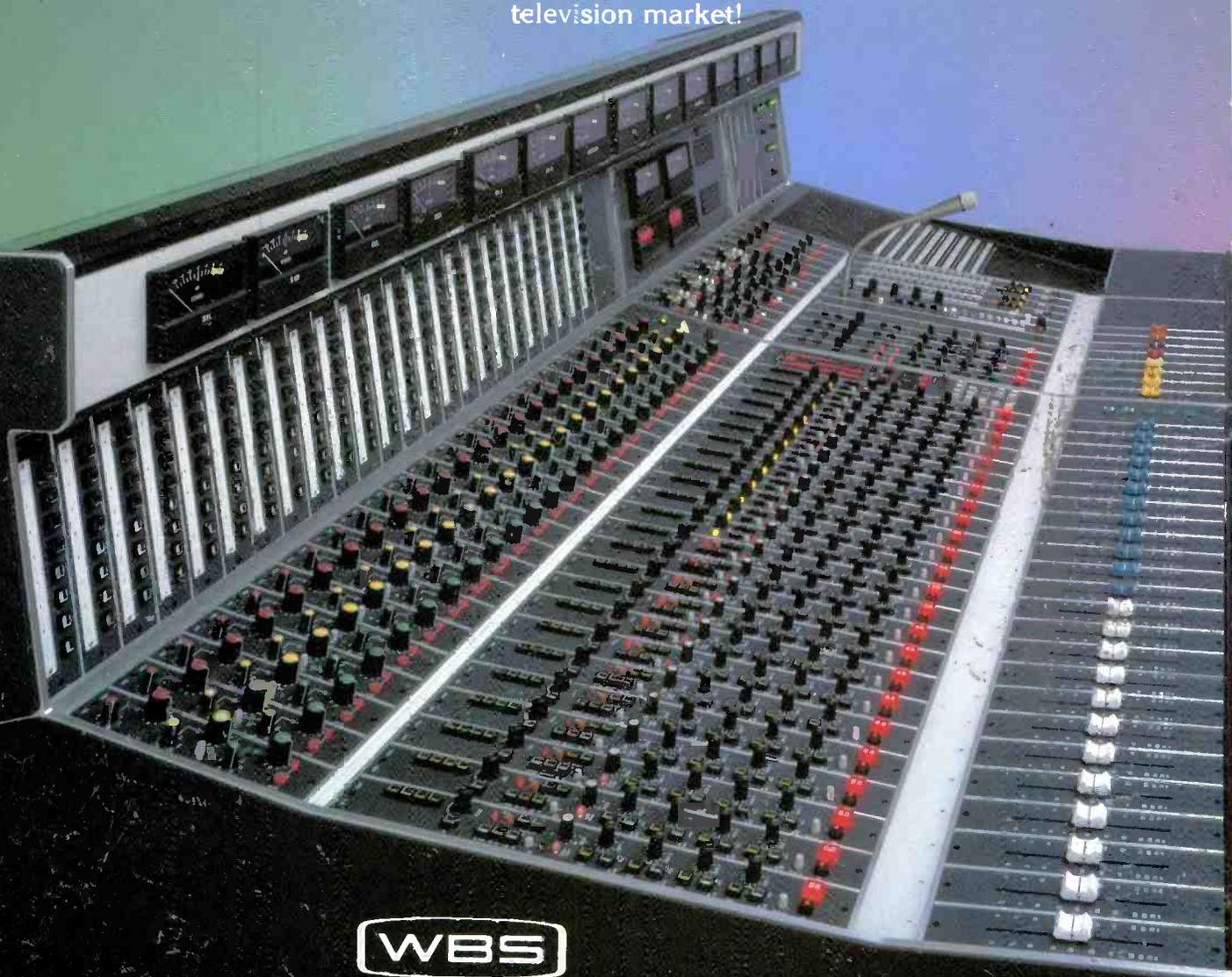
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