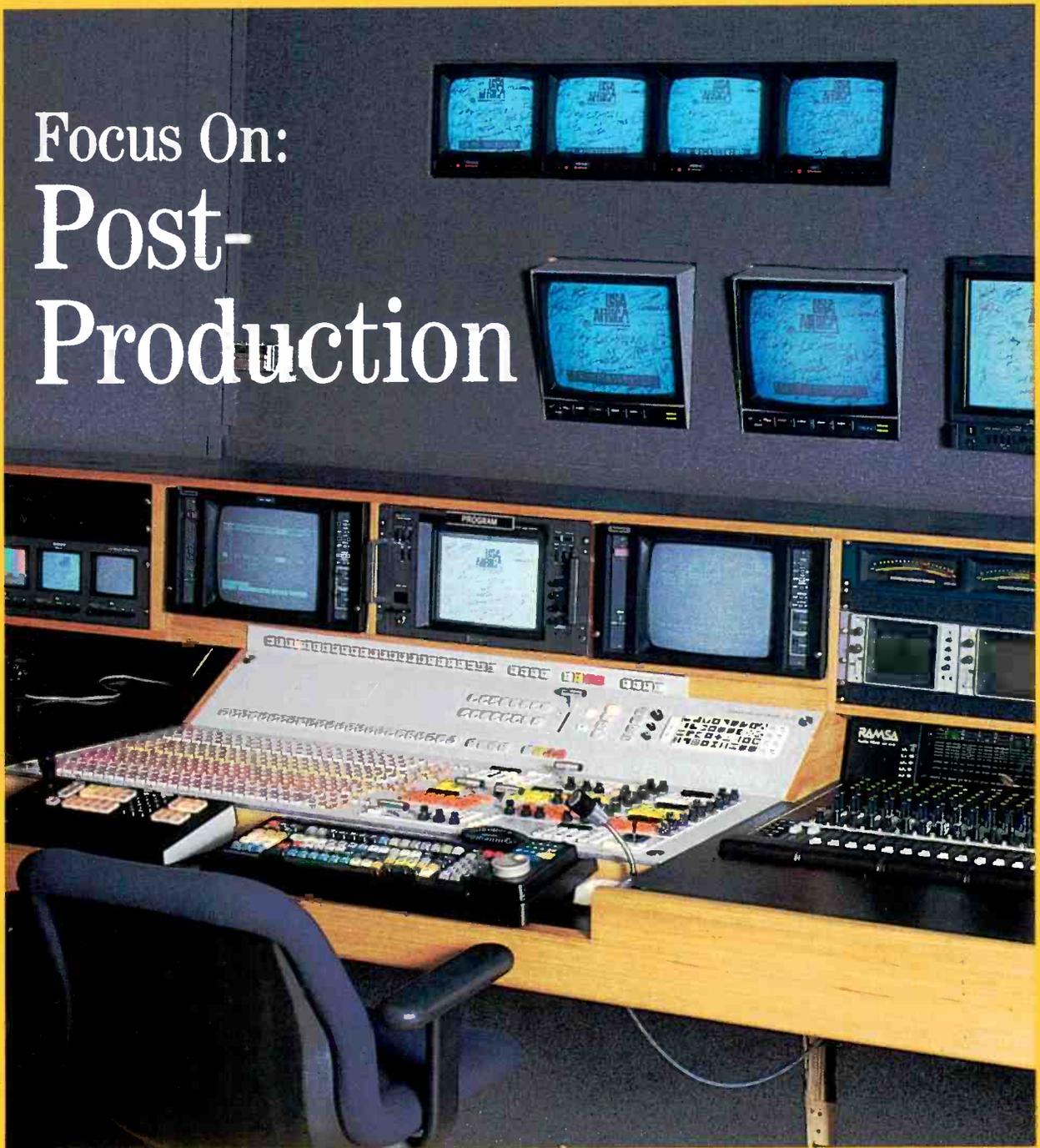


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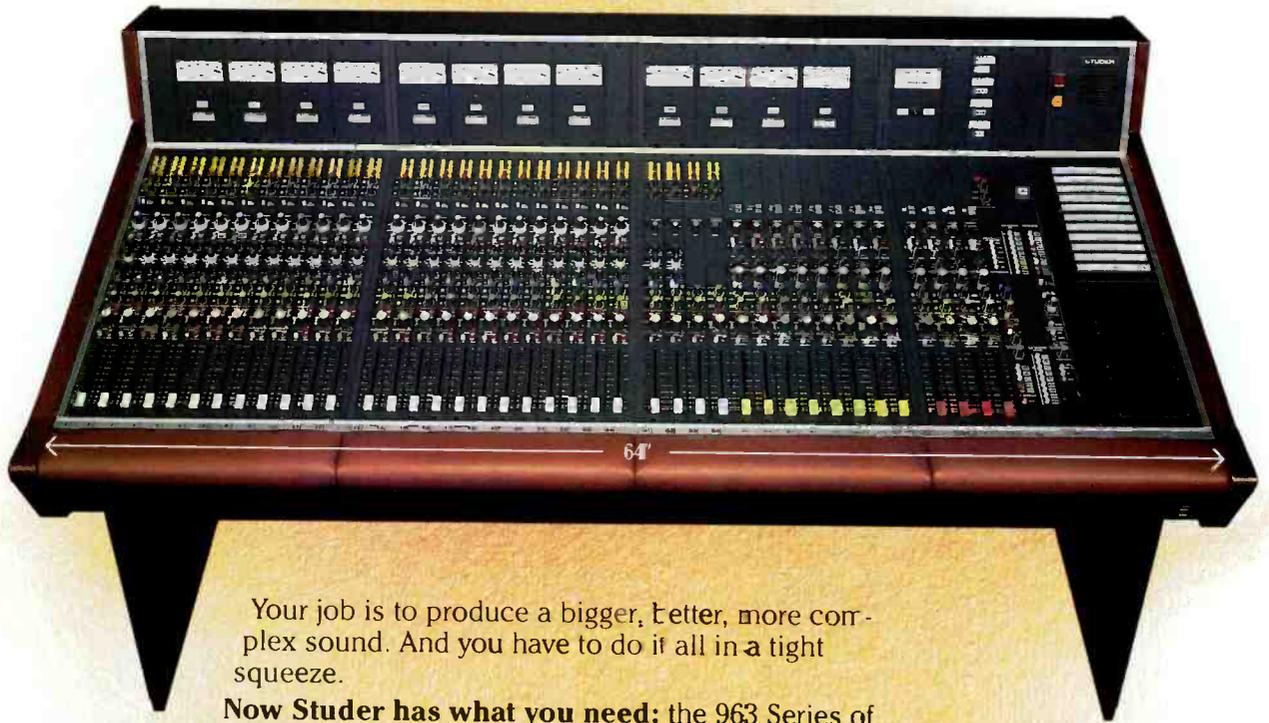


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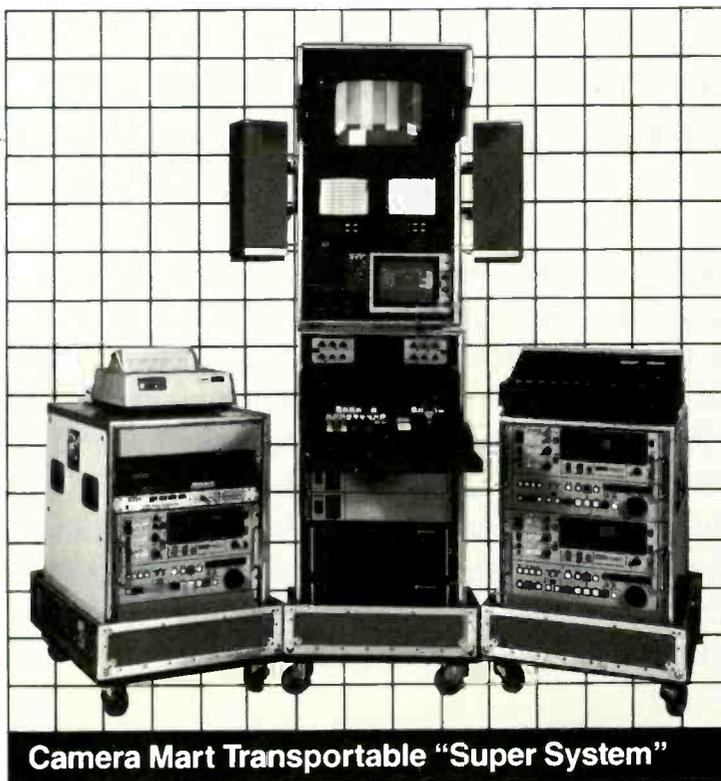
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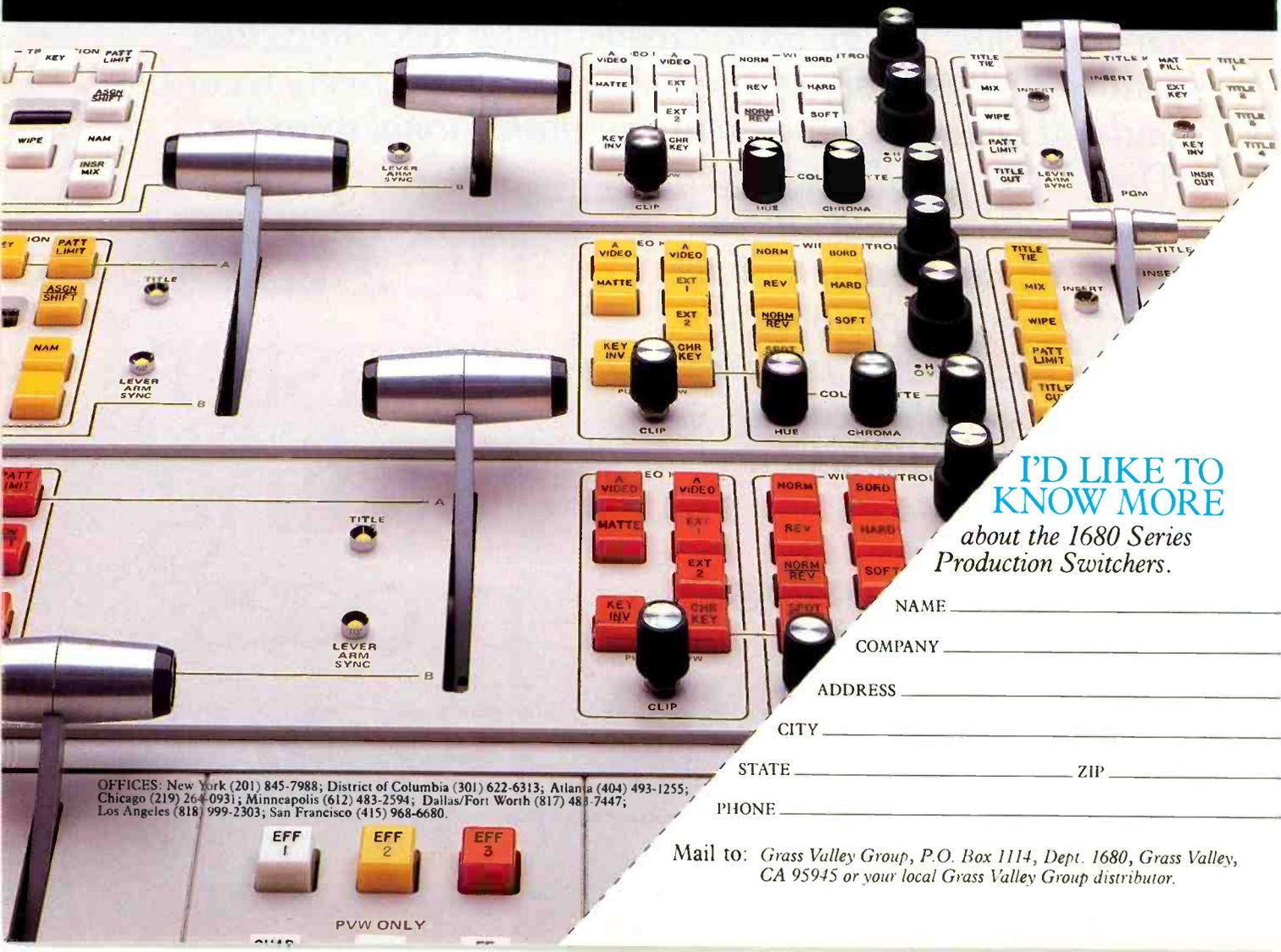
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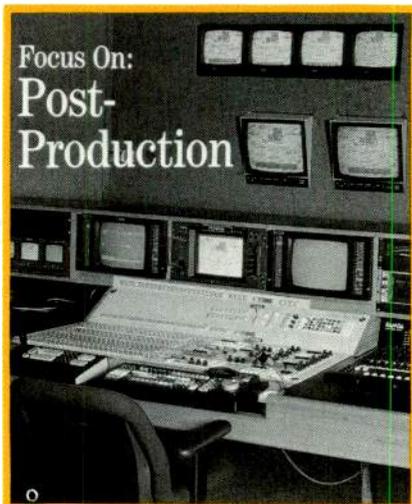
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## An "A" for FCC

***"Living a paradoxical existence can be very difficult: a regulating agency in hot pursuit of deregulation."***

In the hallowed pages of editorial columns past, in this and in other publications, the tradition of strict editorial scrutiny clinging to a long literary heritage has been upheld. That is to say, the critical function of our literary endeavors has been just that, critical. We, like others before us, have adhered to this tradition, always bearing in mind that the point of criticism was to be constructive. Of course, no one is perfect. Still, the objective point of view requires, to paraphrase the noted literary critic Hugh Kenner, that we turn a colder eye on the matter at hand in order to shed whatever prejudices may exist.

I will now do one of my favorite things: fly in the face of tradition. And I will do this in support of the FCC, no less. Specifically, the praise comes in regard to the mediation process set up by the FCC regarding the broadcast licenses of RKO General, to be headed by mass media chief James McKinney.

Living a paradoxical existence can be very difficult: a regulating agency in hot pursuit of deregulation. This, of course, makes for mistakes and opens the Commission up to criticism from almost every angle. But, in this difficult circumstance, the FCC has taken a step to rectify an absurd situation. The litigation surrounding some of the RKO licenses goes back 21 years (if you think about it, there are currently some influential broadcast executives who were barely out of diapers when the litigation started). Also, in view of the number of people involved (70 applicants for 13 licenses), an official involvement was definitely in order.

We hope the attempt to get all parties together to settle the problem in an equitable and financially appealing manner will be a success. We commend the FCC and McKinney for overseeing the project. With eyes wide open, we give the FCC an "A" on this one. Until next time.



*Tim Wetmore*  
Editor

# Mobile Satellite News Systems

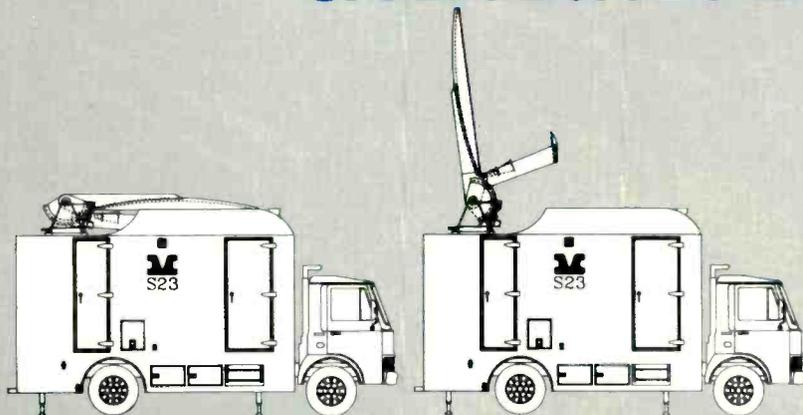


## - The Second Generation

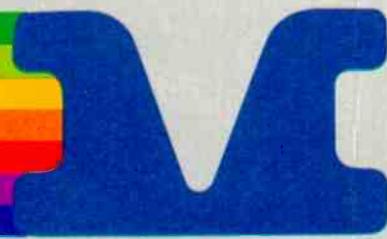
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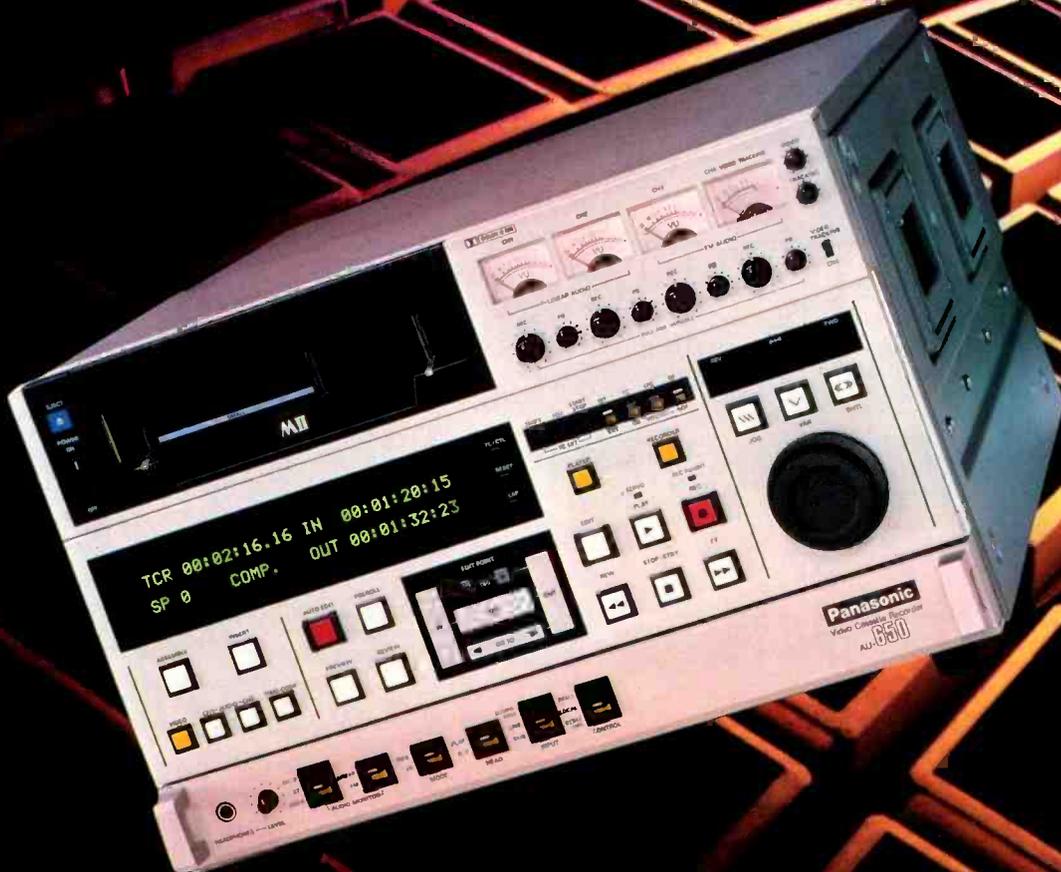
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## CBS Tech Center Closing Spells Uncertainty for FMX

Among all the questions raised by the closing of the CBS Technology Center, concern runs highest for the future of new technologies, especially FMX.

The noise reduction system intended to increase FM's stereo coverage area (see "FMX," September, *BM/E*, p.47) was jointly developed by the Tech Center and the NAB, with a patent held jointly by CBS's Emil Torick and by Tom Keller of the NAB's Science and Technology department.

FMX was just getting off the ground when CBS decided to close the Tech Center and sell the Stamford, CN, facility to help the parent network's ailing financial situation.

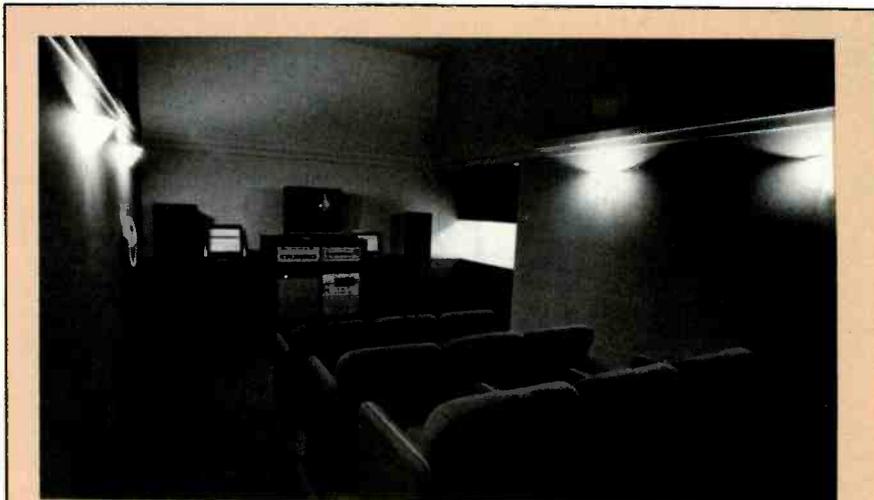
This presumably puts most of those working at the center, including Torick, out of a job, although a CBS spokesman said some 20 of the 54 scientists and engineers would be asked to stay on and transfer to other divisions of CBS, such as the Broadcast Division. But he could not say how the closing would effect the development of FMX.

Four companies had voiced their intentions to manufacture FMX generators. Two of them, Aphex and Inovonics, designed FM generators with FMX as an option, and they have said they will go forth with an FMX product.

"We're still committed to the project," said Inovonics' James Woods, "we've been conducting air tests, and we're aiming for limited product availability by the end of November." The company had answered some of the outstanding questions about the system, such as the shape of the reentrant compression characteristic, to their own satisfaction.

Woods added, "We plan to go ahead no matter what happens to the FMX project at CBS or the NAB."

Two other companies, however, have put their FMX plans on hold and are waiting to see whether someone else, presumably the NAB, will proceed with the project.



A plush, private screening room equipped with videotape and videodisc players is but a small part of the state-of-the-art upgrade recently completed at Detroit's General Television Network. The post-production facility recently acquired an Abekas A62 Digital Disk recorder and da Vinci unified color correction system, which have been linked to a Bosch routing switcher.

GTN spent \$2.5 million on the expansion and, in the process, doubled its space to 37,000 square feet. There are many luxury "extras" in the renovated facility, including this theater with seating for nine, which has a monitor linked to every video signal generated in GTN's studios and edit suites, and which boasts a quadrophonic sound system.

Circuit Research Labs, which helped develop the prototype FMX generator, had been waiting for some additional performance specs before proceeding with a design for a generator. Engineering manager Stan Salek said the company wants to make sure features that are included in the design fill broadcasters needs.

"We've pushed the 'hold' button; we have a design that meets the initial goals, but these were changing rapidly," Salek said, "we'll wait and see what happens."

Orban Associates was also waiting for more information, both on the specs and on research and suggestions about the potential for multipath problems.

"We'll wait and see what effect the closing has," said Howard Mullinack, "no decision on FMX has been made either way."

Torick reported that up until its closing, the Tech Center had been collecting data on FMX's potential for multipath problems, which, in spite of the delay, will probably be outlined in a paper next spring. Torick speculated that the project could proceed under NAB auspices,

perhaps with the same CBS staff people and in a location near the Technology Center facility.

Tom Keller, NAB senior VP, Science and Technology, agreed that that's a possibility. He said the NAB's executive committee has decided to continue with FMX, but would have to wait until the closing was completed to see how this could be accomplished. Espousing FMX puts the NAB in the position of supporting a standard, even though it is currently the only standard proposed for FM noise reduction. Keller conceded that it would be "an unusual position," but he maintained that "our lawyers aren't worried about it."

One other concern is the financial and other resources the NAB would have to commit to the system's development and to getting broadcaster acceptance. Keller suggested that an outside group, either one set up by the NAB or one independently interested in FMX, might be the solution to monetary questions and concerns about propriety. But he feels it's important to maintain the CBS Technology Center staff that has

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been involved with the project.

"We're not going to let those people get away from us," Keller said.

However the NAB decides to proceed, it's a crucial time for the FMX project. Recent concerns about the multipath problem, the question of the availability of FMX receivers, and some negative publicity had clouded the picture for FMX even before the closing was announced. Torick pointed

out that at Hartford's WPKT, where FMX has been tested for over a year, when the station publicized its testing of FMX it received negative feedback, but when it didn't mention FMX there were no calls. Getting more test data and answering broadcasters concerns about the system is something that cannot be delayed too long if FMX is to gain acceptance among stations.

In addition to the uncertainty

over the future of FMX, the closing of the Tech Center is unfortunate from other standpoints. Keller pointed out that it means the loss of a lab that is set up to explore new broadcast technologies. He said there had been plans to establish an experimental, low-power radio transmitting station at the Technology Center to obtain test data in a more realistic environment, but those plans are now also on hold until a new facility can be found.

And, in spite of CBS's assertion that it is not "walking away from technology by closing the facility," both Torick and Keller maintain that "it's a sad day for our industry." The CBS Technology Center had existed for more than half a century and had played an instrumental role in the development of new technological frontiers. The Tech Center saw early work on color TV, helped bring about the first audio cassette, and first long-playing record, as well as the first photos from the surface of the moon. It was at the Center that recent work had been done on land mobile UHF, 80-90, and MTS, including all of MTS's compander evaluation.

### FCC Petitioned on AM Stereo

Will the FCC reconsider its action on AM stereo? That's the question posed by a petition submitted to the Commission by Texar, Inc., a Pittsburgh processing manufacturer.

The petition for rulemaking in essence asks the FCC to do what it failed to do four years ago in what has come to be known as "the marketplace decision" on AM stereo. Texar wants the Commission to choose between the two remaining standards: Motorola's C-Quam and the Kahn system, and hopes that the petition will spur similar requests from others. Texar's president, Glen Clark, and senior design engineer, David Van Allen, believe that the more broadcasters get behind the request for a ruling, the more likely it is that the FCC will make a decision.

But the problem has always been that the selection of one standard over the other by the Com-

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mission could mean litigation and appeals by the one not chosen. In addition, the process of rulemaking itself would be time consuming and might keep AM broadcasters from making a decision on a system for many years to come.

It seems unlikely that the Commission would begin the standards selection process (which originally took five years) all over again, not only because of the time

factor, but because of the difficulties in evaluating the systems that surfaced the first time around.

But there are some other pending matters that, along with Texar's petition, might bring about some action on AM stereo. For one thing, Leonard Kahn is still waiting to hear the full commission's decision on his splatter filing. The Commission's engineering staff said that they could find no splatter problems after

tests of the C-Quam system in answer to a filing by Kahn that contended that C-Quam AM stereo stations cause splatter. Kahn has appealed to the Commissioners themselves.

The second recent development on AM stereo is the NTIA's intention to do a study to see if an AM stereo standard already exists (see "NAB Hosts Upbeat Radio Show," p.65, this issue).

It's likely that the FCC will await the NTIA study before taking any additional action on AM stereo, if they indeed intend to do any more than they've already done.

**New Tape for Olympics**

One side benefit of elaborate media extravaganzas such as the Olympic games is the development of new broadcast technologies to bring those games the widest possible audience. The first area to reap the benefits of the upcoming '88 games may be audio and video tape.

3M has been named as the exclusive supplier of video and audio cassettes, video and audio tape, and computer disks and data cartridges for the 1988 Olympics.

In order to meet this obligation, 3M intends to be ready with a metal particle tape product for Panasonic's M-II format. NBC will be carrying the summer games from Korea, and the network has committed itself to full M-II conversion by 1988.

In addition, 3M is about ready to release an optical laser disc product, also in preparation for its commitment to the Olympics. The company had been showing prototypes at recent trade shows.

**RKO Sale of Stations Starts**

The long, arduous process of selling off its 13 broadcast properties has begun for RKO General.

Some 72 applications have been made for the properties, which include WOR-TV, which moved from New York to New Jersey in an original effort by the parent company to avoid having to give up its broadcast ownership.

FCC mass media bureau chief

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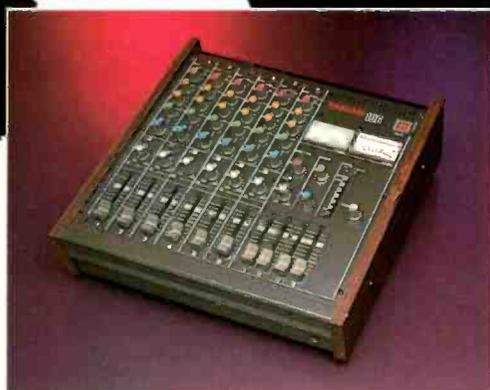
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James McKinney was appointed by the Commission as mediator in the RKO case and held the first in a series of meetings in which there were some 39 interested parties. Another half dozen parties are also said to be interested in the stations.

There had been speculation that Gencorp, the parent company itself, would try to maintain ownership of its stations, but that now seems unlikely since it would tie

up in court a case that has already dragged on for years.

Among the markets effected by the sell-off of the RKO stations, both radio and TV, are New York, Boston, Chicago, Los Angeles, San Francisco, Memphis, Fort Lauderdale, FL, and Bethesda, MD.

Parties competing for the licenses have until the end of January, 1987, to settle, but McKinney is looking toward settlements by as early as the end of December.

**Rock for Charity on CD**

The promotional concept of radio stations producing an album for charity has taken on a new twist. In the future, it won't be unusual to find the same stations producing a CD benefit "album" for the same reasons.

One pioneer in this effort is Dover, NJ-based WDHA-FM, a rock station that has, in the past, produced four vinyl benefit albums, with proceeds going to Dover General Hospital.

This year, WDHA produced its benefit album on compact disc. *N.J. Rock 5* is being billed by the station as "the world's first 'home-grown' CD," and it features 65 minutes of music by New Jersey bands, some of them already signed to major recording labels and some of them undiscovered.

Analog tapes were obtained from the bands, and a digital master was made at Frankford-Wayne studios in New York using a Sony 1610. The master was then sent to LaserVideo in California, where it was put through Waring-fds (full dimensional sound) digital processing.

According to WDHA GM Bob Linder, the processing helped clean up the noise from the original analog tapes and gave the finished product a "bright" sound. A thousand copies of the CD were pressed, and the quantity was intentionally limited by the station so the music collection could become a collector's item and because of an agreement with the major recording labels with which some of the artists record.

Listeners who want to buy the album but who don't have a CD player can order a special audio cassette.

The station currently plays about half of its music from CD and has a reputation among CD fans for two programs: "Laser Lunch" and "Digital Dinner."

In addition, Linder said the station is eager to begin testing the FMX system, because of its commitment to high-quality audio, its use of digital, and because WDHA is located in an area where there are multipath considerations, which need more investigation in the development of FMX.

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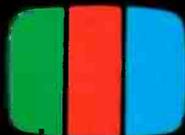
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# Seeking Synergy in the Edit Suite

By Eva J. Blinder

*Despite the expanding utilization of serial interfaces and digital intelligence, ultimate control remains beyond the reach of postproduction.*



An editing suite at Post Perfect in New York. According to Dean Winkler, VP computer graphics and optical services, more integration between graphics and editing devices can be achieved by demands from the post-production community.

Imagine, if you will, the central nervous system of some vast and complex organism. Nothing happens without its knowledge; all the limbs and organs respond instantly and fully to its commands. Constantly monitoring all activity, from the largest to the most minute, it ensures a complete synergy among its parts.

Now imagine that same synergy transplanted to a modern postproduction suite. The editing system computer, functioning as the central nervous system of the facility, exercises ultimate authority over all its components: videotape recorders of all formats, audio decks, video and audio switchers, digital effects devices, graphics and ani-

mation systems, and any other desired peripheral.

All are controlled directly through serial interfaces. The human operator never needs to leave the well-designed, flexible editing console, which affords full access to all functions on all machines.

This is the editing system of the future—or is it? While attractive

## Serial Interfaces

to many creative editors, the degree of control implied by the "central nervous system" analogy has drawbacks to match its advantages. And it remains far from implementation, despite progress by SMPTE and manufacturers. As one executive at a major editing manufacturer put it, "It's beginning to pull together, but it's not as easy or as elegant as any of us would like to see."

The fly in the serial interface ointment, by and large, is the array of incompatible and proprietary command protocols. Even with full standardization of the EBus—the RS-422 serial interface SMPTE has worked so hard to formulate—the differing protocols make direct communication awkward at best.

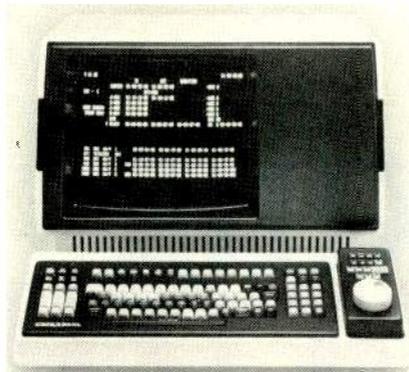
Agreement on protocols would solve only one part of the problem, however. An editor powerful enough to control fully a sophisticated production switcher and digital special effects unit would need an edit decision list large and flexible enough to include full information about the moves and effects being programmed. Current EDLs are far too limited in the number and kind of decisions they can handle to make such far-reaching control practical.

### Getting serial

Steve Smith, product line marketing manager, editing and systems integration, for Ampex Corp., is a member of the committee working on the EBus. He recalls that around 1980 serial control began to replace the parallel interfaces common until that time. These interfaces are at once simpler and more powerful because, instead of a single wire for each command parameter, a computer "word" is transmitted that contains the interface information.

"We have left the realm of wire-to-wire interfaces," Smith asserts. In addition, SMPTE's work has standardized serial control via RS-422, at a communication rate of 38.4 kilobaud.

"I know of no major manufacturer that uses communications hardware that is different from



An example of editing systems dictating effects and switcher protocols, CMX's 336XL editing system provides control of a peripheral Abekas A62 disk recorder via a serial port.

that," Smith adds. "Everyone is on RS-422, 38.4 kilobaud. But the problem is, when the word is sent down the wire, is the language spoken by the two [interconnecting] devices the same? This is the glitch. It's as if we have the United Nations now, but the translators haven't been hired yet."

One end user who'd like to see more integration is Dean Winkler, who recently left Teletronics with partner Pat Howley to build Post Perfect, a new post and effects house in New York City. Winkler, who is vice president, computer graphics and optical services, for Post Perfect, says, "I don't really see that much communication happening yet [among peripheral devices and editing systems]. Most ADOs or other digital effects boxes are still being triggered with GPIs [general purpose interfaces]." The SMPTE protocol is helping, he feels, but complete integration is not just around the corner.

"What's needed is economic motivation," he asserts. "The post-production community has to say we want better integration. But it may not happen for a while, simply because GPIs work."

Although no one questions the ability of the general purpose interface to perform its straightforward task of triggering a contact closure, postproduction profes-

sionals like Winkler look ahead to more comprehensive control. Conflicting protocols are one factor interfering with the realization of this goal.

### De facto standards?

Some de facto protocol standards appear to be emerging, however. For example, manufacturers of serial interface VTRs generally are following either the Sony or the Ampex protocols. In switchers, versions of the Grass Valley protocol are fairly standard. Nevertheless, each manufacturer must adapt these protocols to address the needs of its own machines, and variations from the "standards" can be expected to continue.

"The good news is that the number of [protocol] languages is getting smaller, but languages are not the right languages," Steve Smith complains. The laborious SMPTE standardization process, in part, is aimed at fine-tuning these conflicting languages to meet the needs of the broader industry. Because each manufacturer's language is so specific, a protocol that becomes a de facto standard may not give other manufacturers the leeway to make the most out of their machines.

Smith comments, "In the case of VTRs, if you implement a feature or capability that hasn't been part of the standardized spec, you have to have the ability to write protocol that allows that feature to be controlled." A good example of this is the Zeus TBC for the VPR-3 VTR.

"We had never thought of controlling TBC functions through a VTR before," Smith states. "Now, the Zeus can have chroma level control, freezes, and other capabilities through the user-defined part of protocol."

With properly designed protocols, it is probably quite feasible to have an editing system console controlling a switcher or an effects device. But some manufacturers argue that such complete control is not always an advantage.

"What we're looking at is really trying to figure out what is the most convenient operator inter-

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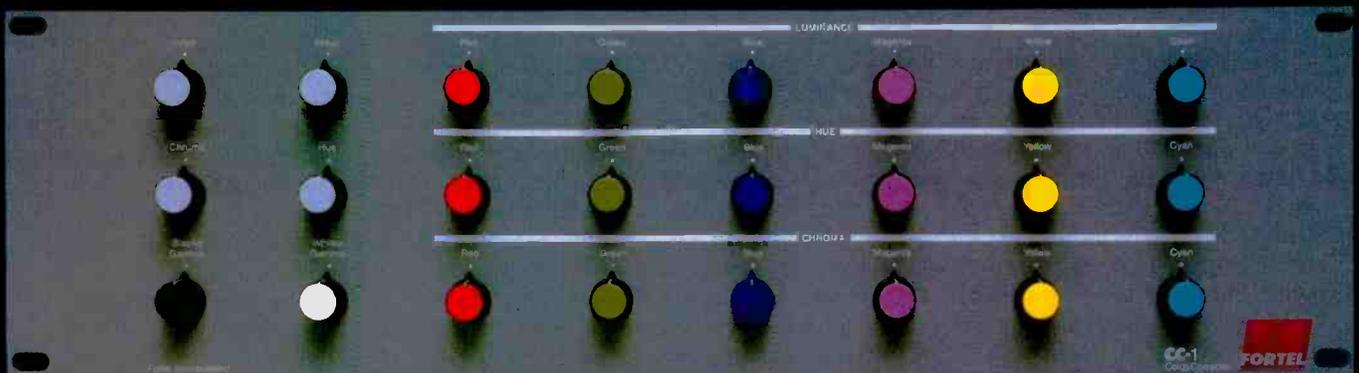
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face," explains Rome Chelsi, product marketing manager, editing systems, for Grass Valley Group.

"There are a couple of philosophical arguments," Chelsi continues. "At what point does the edit controller depart from control of that peripheral device? You can almost run an entire edit session without touching the switcher, but when you go to some complex devices such as the Kaleidoscope, there has to be a point of departure. You can send out a relay closure, but we feel it really should go beyond that.

"Our philosophy is to say, How is the edit system best utilized in the editing environment?" he adds. While the user would no doubt want to have the some control over an effects box such as the Kaleidoscope, that may not be the most efficient way to do effects. Should the device be "transparent" to the operator, like a VTR, or handled as an effects register?

"We probably will allow operators to do it both ways so we don't restrict them in any way," Chelsi notes, adding that GVG plans to make the Kaleidoscope protocol available to other editing manufacturers.

### Ideal interfaces

Manufacturers of switchers and digital effects work hard to make their user interfaces as logical and efficient as possible, however. While the editing system console may function smoothly for certain basic tasks, it may not be appropriate for setting up complex events.

Even when the entire system has been supplied by a single manufacturer, user interface issues may limit the amount or kind of control possible. Smith notes that ADO effects cannot be created on the ACE control panel despite the high degree of serial communications between the two devices.

"The ADO control panel is set up for effects," he states. "You build effects on effects devices. Once the effect is stored in the ADO, then it's the controller's job to synchronize it and call it up and place it in the edit list." The operator can trim an effect at the con-

troller keyboard or modify its duration but cannot make changes in motion. In addition, the ACE allows switcher effects to be previewed in the same manner as digital effects.



Convergence's ECS-205 editing system. According to company spokesman Greg Schreiner, Convergence's products will begin using the SMPTE EDL standard as list output, but full adoption would require "rework of our whole product."

"We can access the switcher's memory from the editor, but we don't want to turn an editor into a switcher," Smith comments. "Once an effect is built and the edit is done, however, we feel that it's very important to be able to preview the edit without rolling the machines." Essentially, ACE previews a switcher effect simulating a wipe of the specified duration between the in point of one source machine and the out point of the other.

Nevertheless, Ampex offers other editing system manufacturers the opportunity to design any kind of interfaces they like for its AVC switchers and other devices. Smith notes, "Manufacturers put different capabilities on the serial port. The AVC is much more oriented toward control of the whole control panel. Our protocol allows access to almost every button or control through the serial port."

According to Greg Schreiner, product specialist for Convergence Corp., the increasing demand for full access to special effects from the edit controller reflects the increasing ubiquity of digital effects.

"One thing that makes this a bit of a problem is that a lot of the special effects systems are just now beginning to show their identity

in the edit suite," Schreiner says. Previously, many users have preferred setting up effects manually because they felt it gave them more creative range. "Now it's getting to be an everyday occurrence," he continues. "Users are expecting control from the edit controller. The best way would be some kind of standard control networking where you could tie together serial control devices so they could communicate at any time."

He continues, "You can set up switcher wipes, dissolves, keys, and have limited control over duration, reverses, soft edge borders, and many other capabilities. But it's the 15 or 20 percent that isn't controllable that always irritates the user—things like using the title keyer and downstream keyer in the same edit, or serially fully controlling an ADO."

While editing system manufacturers typically write serial interfaces around machine protocols supplied them by makers of switchers and digital effects, the reverse can also be true. CMX, for example, has supplied its own serial protocol to several manufacturers that have incorporated it in their machines. One of these, according to Christin Hardman, staff market researcher for CMX, is Abekas, whose A62 digital disk recorder is controllable directly by the CMX editor via the serial port.

"Because the A62 incorporates CMX software, the CMX user can plug it in and have direct control, just as if it were a VTR," Hardman says. CMX will give its protocols to any other manufacturer willing to sign a nondisclosure agreement and attend a seminar at CMX headquarters. Several companies, in addition to Abekas, have taken advantage of this, including Cox, Hitachi, and EchoLab, to name a few.

Where actual interface boxes are required, CMX is concentrating on serial, Hardman adds. "We are pretty much only doing serially controlled devices in-house," she explains. "Serial control is a lot less work for us and also gives us much better control because that's how the machines are de-

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signed to be controlled." She adds, "The amount of control has increased because the manufacturers of those devices have allowed more things to be reachable through serial protocol."

For example, CMX editors can control the broadcast variable motion facility of the Sony BVH-2000 in 256 discrete steps between zero and 30 frames per second, with the information going into the EDL for later auto assembly. In addition, field 1 or field 2 can be addressed through serial communications. Neither of these capabilities was possible with the BVH-1100.

"The more [information] the manufacturers put into their protocol that we can reach out and take—and that is going to get even better if the SMPTE standard is widely accepted—the better for us," Hardman concludes.

CMX has streamlined its serial interface hardware over the past year or two with the introduction of the Multi I<sup>2</sup>. "We used to have a whole box full of cards to control one device," Hardman recalls. "Now we have a box with up to four cards that controls four devices [one card per device]." The size of the interfaces was expected to shrink even more at SMPTE, where CMX planned to debut a "SuperKit" product for the I<sup>2</sup> that controls three devices per card, or up to 12 devices in one three-inch-high box.

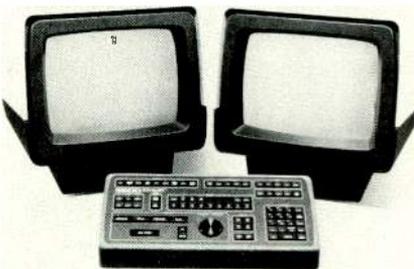
According to Hardman, the I<sup>2</sup> approach often provides faster control than direct serial interfaces, at least when the device being controlled doesn't have its own microprocessor.

"We've noticed that [direct control] can actually slow down the whole system," she comments, "because the CPU is doing edit list manipulation and other editing tasks, plus all the machine control for up to 16 devices at once.... A faster processor might be able to keep up with this, but it still puts more burden on the central system." A distributed processing system, such as the I<sup>2</sup>, with a Z-80-based, customized interface for each device, also has advantages in its ability to mix and

match equipment from different manufacturers.

### It's in the list

The most sophisticated and far-ranging control won't reach its potential unless it can make its way into the edit decision list. The current industry standard—essentially, the CMX format—is limited in its capacity for describing complex effects and



EECO's EMME system provides two options for recording slow motion speeds.

stores its information on outmoded eight-inch floppy disks. Increased control will dictate both an expanded edit list and some form of high-density storage. It also will have to face up to recent changes in the industry, such as the demand for four-channel audio.

"Putting all this information into the edit decision list turns out to be the only way to achieve the customers' real desire, which is to have one disk for the entire edit suite to return to," asserts Tom Phillips, product manager for Sony Corp.'s editing systems. "Now, the user has to load a disk into the special effects unit, the E-MEM unit, the editing system, and maybe one or two other devices." An integrated EDL would make the most of serial control by allowing interfaced devices to pass down to the editor everything the editing system is capable of controlling.

Just such an integrated EDL has been proposed recently by the working group on editing procedures of SMPTE's Video Recording and Reproduction Technology Committee. The September 1986 issue of the SMPTE Journal carried a report and call for comments on RP 146, which specifies a lan-

guage for interchanging edit list data between editing systems. According to Robert Lund, president of Robert Lund Associates and chairman of the working group, the recommended practice follows the CMX format fairly closely, "partly because the users on the committee wanted something they were used to, and also because the programmers who work for the manufacturers wanted to minimize changes to their edit list software."

The new format goes beyond CMX in a number of aspects, however. For example, it handles up to 99 channels of audio; the user can specify a range of channels to be addressed, specify a mix and give a dB value for any given track.

"There's no equalization [in the list], but for every area we attacked the basics," Lund says. Basic wipes and keys can be specified, as can variable motion, as long as speed and acceleration are constant.

"The list is meant to cover all the different situations of editing," Lund explains. He adds, "We are beginning to try to make a language for a second list format that will more closely parallel the work of the Digital Control Committee," the SMPTE group working on serial interface protocols. He differentiates the two lists by saying that the second language will be oriented more toward describing the processes involved in an edit, whereas the first describes the product.

This second list, which is still in an early stage of development, will be more suited to handling the very complex instructions involved in special effects work, Lund says.

"We want to be able to deal with things like [the Quantel] Harry and all the latest equipment that's determining the look of video these days," Lund adds. EDL 2 will not make EDL 1 obsolete, however; Lund expects it will always be usable for basic content cutting of features, spots, and other material. In fact, the two lists will be complementary.

"We will probably modify EDL 1 at some point in the future so you

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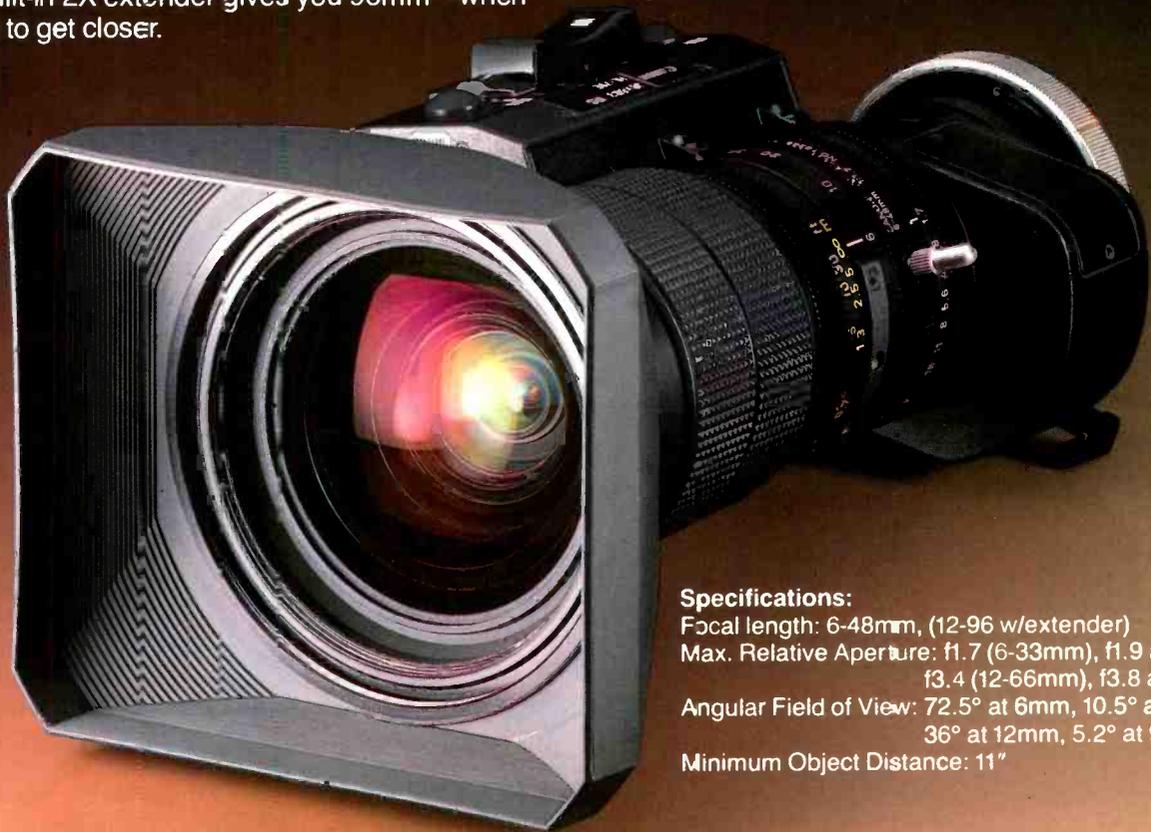
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## Serial Interfaces

can insert an event that calls in a file of data that is in the second format," Lund predicts. Such an "include" statement could be used for repetitive events.

While the final form of EDL 1 is yet to be determined, its impact will probably be felt very soon. "It's in a form now where manufacturers can take it and start modifying their software," Lund points out. As would be expected,

Lund himself plans to include it in his own editing systems (he designs custom systems and hopes to introduce a standard product line in the near future).

How soon other manufacturers will jump on the bandwagon is unclear.

### Awaiting decisions

"We are studying the SMPTE [EDL] proposal, but we haven't

made any decision as to what will or won't happen in that area," says GVG's Chelsi. "In adopting anything new you've got to consider your installed market base. If you make a radical departure, you have to accommodate the users that are out there." Among the recommendations GVG expects to incorporate in the near future is multichannel audio, spurred by the advent of enhanced half-inch recorders and digital video. Other enhancements will also be considered.

"If it was easy to make a cutoff point and say, 'Former users, you've got to accept this,' it would be very easy," Chelsi explains. "Technologically almost anything can be done, but from a business standpoint there are other things that have to be considered."

Greg Schreiner of Convergence says, "There's a definite need and demand for an expanded edit decision list. Unfortunately, this recommended practice has taken such a great long time; basically we've been hearing about it for the past couple of years. We have allocated a provision for using a SMPTE standard EDL as far as outputting a list, but to actually go ahead and adopt this standard as our standard, that really wouldn't be applicable at this time because we'd have to rework our whole product."

Schreiner feels that the SMPTE proposal is necessary, however, especially for dealing with switcher effects memory banks, SMPTE-standard proposed wipe codes, and "everything that has to deal with a sophisticated three- or four-layer effect."

He notes that the Convergence EDL currently accommodates three audio channels and that the company is considering a fourth. "Obviously technology is catching up on us all," he quips.

One area that few editing systems manufacturers have put into the EDL is slow motion. According to Eloy Chairez, product specialist at EECO, the EMME editing system has two options for recording slow motion speeds for such VTRs as the VPR-3 and the BVH-2000.

The operator either can key in



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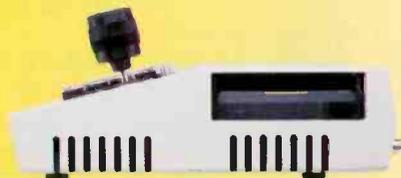
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## Serial Interfaces

the actual frame numbers and rate of speed or can set the sequence up visually and have the EMME computer calculate the speed. This information goes into the edit decision list to trigger slow motion operation.

"We've been operating on the de facto CMX standard, which does not let you program a lot into the edit list," Chairez comments, "although we do some things in the

edit list that are not CMX compatible, such as slow mo." At press time, the company had not had time to review the new SMPTE list in detail.

According to Hardman, CMX "will certainly conform" to the SMPTE standard EDL once it is approved. Work is underway on expanding the number of audio channels that can be dealt with in the edit decision list to more than

four. At this time, the contents of E-MEM and Master E-MEM on Grass Valley switchers can be put into the CMX EDL.

"Our charter as a manufacturer of on-line videotape editing systems," Hardman asserts, "is that we should be able to listen to and talk to postproduction devices and put that information in some sort of storage so people can spend their time being creative and not having to recreate things they've already done.

"The editing system should be a repository of information, but it shouldn't necessarily be the human interface for everything. I'm not sure an ASCII keyboard is the correct way to control all devices. On the other hand, you can listen to what the switcher is doing and store it so it can be recalled. We're heading toward being able to control and listen to all these devices, but not necessarily direct control through our keyboard."

Sony is another manufacturer looking at multichannel audio—a necessity if it is to control the audio on its own digital VTR. Phillips, however, notes that adding two more audio channels to the EDL could create difficulties.

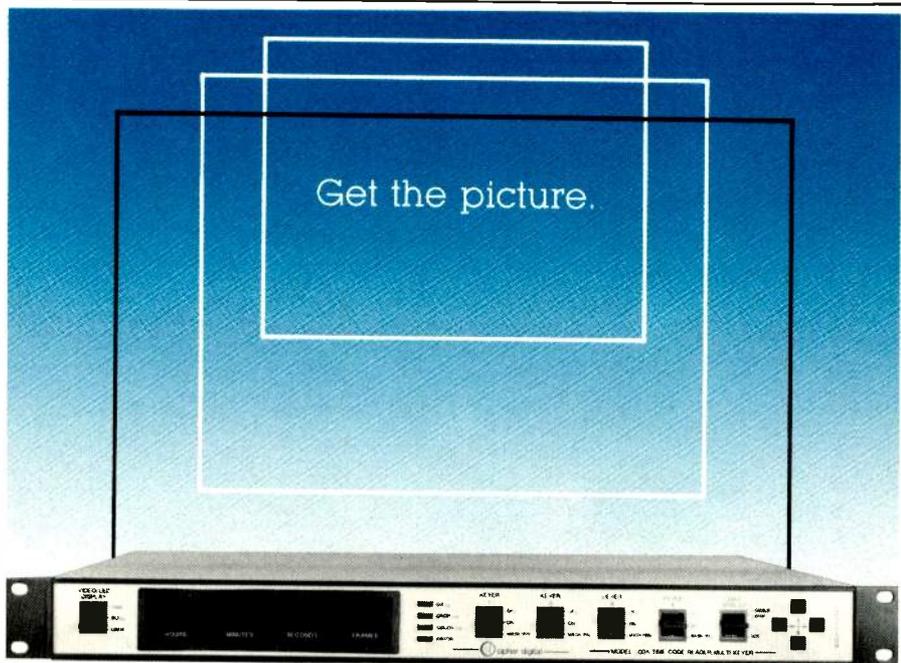
"There would be an incompatibility problem immediately because the EDLs floating around now only use Audio 1 and Audio 2," he asserts. "No one would be compatible. Technically it can be done, but administratively it's a real problem."

### Storage problems

One of the biggest obstacles facing an expanded EDL is memory capacity. In an age of personal computers with multi-megabyte memories, most edit decision lists accommodate only 500 to 1000 events. Specifying complex switcher effects can eat up those lines very quickly.

So far, no new standard has emerged to take the place of the CMX eight-inch disk with its limited storage. Proposals abound, however, and awareness is high that the storage issue must be addressed.

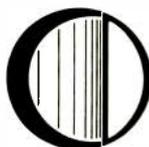
"A major problem with the EDL is that you have to have something



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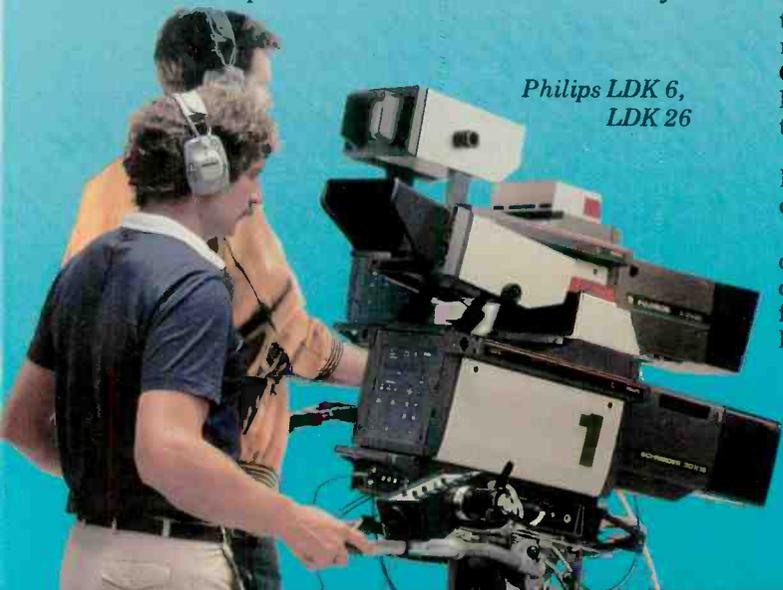
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### Serial Interfaces

besides the eight-inch disk," asserts Smith. "The medium we have standardized is becoming a dinosaur." Cheaper and more powerful 5.25-inch or 3.5-inch floppy disk drives, or a four- or five-Megabyte battery-backed RAM, could be excellent replacements, he suggests.

"All these things are good ideas, but people have to agree," he insists. "The medium isn't really important, it's getting a standard."

Phillips notes that computer memory sizes are increasing as prices drop, a good omen for postproduction.

"Editing systems historically have had very little memory capability compared to PCs," he says. The PC itself could provide a partial solution for this problem, serving as an outboard storage computer for EDL information.

Comprehensive Video Supply has already taken this approach with its Edit Lister software package for PCs, and Sony offers an off-

line Edit List Organizer program that runs on MS-DOS and CP/M systems. The latter can be plugged directly into BVE-5000, 900, or 800 editors so that information can be downloaded from the editor and manipulated off-line.

This approach "works well in some areas but not in others, such as an on-line situation when immediate changes are desired," Phillips adds.

Convergence also offers a PC-based approach to EDL management. "Floppies are becoming obsolete just like the paper tape punch did," Schreiner observes. The increasing number of personal computers in postproduction environments presents an excellent opportunity for editing to get in step.

"I think the industry as a whole is going toward some kind of format compatibility, including the disk format and how the data is stored on disk," he adds. The Convergence PC storage system uses

floppy disks at present, but the company is looking into hard drives, spurred by user requests.

Serial control, multichannel audio, a standardized, powerful EDL—all these things have one foot in the editing suite door. When they will make it all the way in is still anyone's guess. The reservoir of technology already in the field, with its plethora of edit list and interconnection schemes, will prevent any new standard from sweeping the industry.

But the demands of users will ensure that if standardization can't sweep in, it will creep in—not as fast as desired, perhaps, but as fast as practical. Demanding, sophisticated postproduction requires a system that works together in the most powerful fashion possible. As Tom Phillips puts it, "I think all of us have got to start thinking systems and forget about the editor and the little box. It's like the engine of a car—without it, nothing runs." **BM/E**



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# Simple Editing Systems Inspire Creative Solutions

Owners of inexpensive, basic editing controllers may sigh with envy at the feature-packed systems that abound at every industry convention. For high-end editing, nothing can replace a powerful system with all the bells and whistles. But users of the big systems' more humble siblings don't have to settle for second-best in the quality of their programs. Whatever the equipment, the creativity and ingenuity of the human operator are the most important components of the post-production system.

A quick look around the world of video amply illustrates this assertion. Music videos, documentaries, experimental productions, and even animation are produced every day using the simplest editing systems—which are, after all, the mainstay of the industry.

## Editing animation

A demanding application like video animation requires an ex-

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*Even if your editing system lacks some of the bells and whistles, your program doesn't have to.*

---

By Eva J. Blinder

pensive editor, right? Not according to Pat Corbitt, president of Synthetic Imagery, a Princeton, NJ, post and animation house. For the past three years, Corbitt has used the EECO IVES editing system as a controller for his Dubner animation system. Corbett has just taken advantage of EECO's recent acquisition of Convergence Corp. to trade up to a Convergence 204 A/B roll editor. But he continues to praise the IVES for its simplicity and accuracy.

"We have used the IVES for a

good three years with a great deal of success in animation," Corbitt relates. "We use IVES for the hard stuff; very demanding kinds of things," he adds "You must have an exact match frame in animation—you can't tolerate machines that do not perform consistently."

Its accuracy is only one benefit Corbitt sees in IVES as an animation controller. "We operate three or four different keyboards as well as a variety of digitizing tablets and other devices," he says. "One more keyboard would probably make us go nonlinear. You can't go looking at a whole bunch of keys, you need a very analog kind of output from your hand." The straightforward IVES user interface eliminates much confusion in the animation room, according to Corbitt.

Until its recent replacement, the IVES controlled an animation suite consisting of the Dubner CBG-2 animation system and Sony V0-5850 U-matic recorders.



Synthetic Imagery's president, Pat Corbitt, uses the facility's EECO IVES editing system for a computer-generated animation project.

According to Corbitt, first-generation  $\frac{3}{4}$ -inch animations produced on this system have been bumped up to one-inch and aired with excellent quality.

"We've done everything from 3D animations, controlled by IVES in terms of editing, to cartoons," Corbitt asserts. His company, he claims, was among the first to use the CBG-2 for animation.

"We could do it because the IVES was hooked up to make all those little edits," he states. "People thought you could never do cartoon animation with the Dubner, which we always knew was nonsense because it has a very good painting system. The IVES really made that possible. The machine, just in the cartoon area, earned its value in a week, literally."

Between the Dubner, with its custom wipes, posterization, and dissolves, and the IVES, which fades to black, Corbitt was able to get by without even a switcher.

Another area where Corbitt found the IVES outstanding was audio. Synthetic Imagery runs a digital audio system consisting of two synthesizers—a Yamaha DX-7 and a Roland Super JX—controlled by an Amiga computer with music software. With

the IVES, the computer animation and digital sound could be linked together for a unified production.

"With the computer software for digital sound, we can modify the audio, add voices, and change elements in the music; with the Dubner, we can change elements visually, and, with the IVES, we can coordinate the two together in a real synchronized edit," Corbitt relates. "It's terrific and very cost-effective." It also saves his clients from "the trap of music libraries."

"People say, 'I'm so tired of music libraries, I wish I could afford custom music,' but most of them use it for 90 percent of their jobs even though they don't like it," Corbitt explains. "We have a lot of sound stored digitally on disk, so we can combine a lot of elements to make digital custom music at a price they'd normally pay for a library needle drop."

The new 204 A/B roll editor will allow Synthetic Imagery to add a new dimension to its animations—integration of live-action footage. Corbitt also looks forward to the 204's multiple machine control capabilities. Another probable addition will be off-line edit list management, most likely with the Comprehensive Edit Lister IBM PC software.

Corbitt plans to interface the PC directly with the 204 through the RS-232 port. That way, information can be fed in for autoassembly or an executed EDL can be pulled down to the PC for off-line modification.

"We've been very strong on computers," Corbitt adds. "Now that people who know about computers are beginning to shake hands with people who know about video, sleeping giants are awakening."

### The winning Edge

There's nothing so unusual about using a cuts-only editor for documentary work—except perhaps, winning two Emmys at it. Mark Baldwin, a California-based freelance editor, did just that with the help of an off-line CMX Edge controller while he was an editor and producer at PBS affiliate KOCE in Huntington Beach, CA.

Baldwin used The Edge to off-line three separate PBS series of 20 shows each; for two of those series he was also in charge of training all editors. The first show, *Faces of Culture*, a look at cultural anthropology, won a Los Angeles-area Emmy, as did the third series, called *Marketing*. The middle series was titled *The Photographic Vision*.

"Basically, we off-lined with The Edge and did list management as we went," Baldwin recalls. "We had to go through five or six cuts and do list management to prepare for assembly." The off-line process prepared each show for "B mode" on-line assembling.

"Doing that, we were able to assemble a half-hour show usually in less than a day," says Baldwin. "One really good editor did it in three and a half hours." And this for shows with three or four channels of audio and averaging about 350 edits per show.

This speedy editing was accomplished in a cuts-only system with a Sony VO-5800 source deck and VO-5850 record machine, plus a separate audio amplifier. Audio channel two was used for time code during the off-line sessions. Because the productions were multichannel, however, Baldwin and his staff got around the system's limitations by cutting the

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Boston Film/Video Foundation members using the foundation's Mini-Common-line editing suite.

additional audio tracks on a black encoded tape and making a second EDL disk for it.

According to Baldwin, many editors are still unfamiliar with the uses of list management.

"Most editors don't know from list management in off-line situations," he claims. "I've even been surprised by how many on-line editors are not at all familiar with list management. They're used to having somebody sitting over their shoulder telling them what to do. Because they end up with a finished product on one-inch in one pass, there's no need to keep a list."

The style of work required for the three series, therefore, required extensive training of editors. "Most of them were film editors, so they had to learn how to cut on tape rather than film as well as learning list management functions," Baldwin adds. The results, he says, were excellent.

"It worked out very well," he comments. "Some of them I feel outstripped me after a while."

One drawback of using The Edge, Baldwin notes, was that the system's menu screens occupy the full screen, so you can't see the whole list or scroll through it. This was more than balanced out, though, by the total compatibility of the finished EDL with the station's full CMX editing system, a boon for conforming.

"The Edge is exactly CMX compatible, so you can preprogram everything, including GPI triggers and dissolves," he says. "It was very flexible and extremely accu-

rate, especially in audio cutting."

### Video explosion

The video users who pass through the doors of the nonprofit Boston Film and Video Foundation run the gamut from amateurs to experienced independent producers. According to Raj Sharma, director of production services, the foundation keeps its JVC half-inch edit suite busy eight to 10 hours a day with its members' projects.

"We teach a number of workshops, at least 50 each semester," Sharma says. "There has been an explosion in interest in video in the past few years, and we get people from all walks of life, from beginners to experienced independent producers." The foundation's astonishingly low rates—a mere \$8 to \$12 an hour—make it an attractive alternative for independents seeking cuts-only on- or off-line editing. Some current independent projects include a documentary on a Berber marriage festival in Morocco and a memoir of women pilots in World War II.

Sharma has edited a number of personal projects for people who want titles and music added to their party footage or home movies. The system is also regularly used for small industrial productions, such as training and motivational tapes. He himself is at work on a personal piece about the conflicts between the ancient and modern in everyday life in India.

The cuts-only system, which

consists of a JVC RM-88U edit controller, 5300 playback deck, and 8600 record deck, plus a For-A character generator, six-channel TASCAM audio mixer with EQ, and a cassette deck, is capable of industrial VHS-to- $\frac{3}{4}$ -inch inter-format editing. A second JVC cuts-only system has  $\frac{3}{4}$ -inch decks and time code.

The foundation's pride, however, is its United Media Mini-Comm suite. One of its users is video artist Dan Hartnett, who is presently at work on a video installation for airports and other public places.

Hartnett, who has been working with video since 1978, calls the Mini-Comm "a great addition" to Boston Film and Video.

"It's inexpensive, yet it provides the same kind of flexibility that you can find in a higher-end house," he says. Its edit decision list and SMPTE time code not only result in more accurate edits, but also give Hartnett the option of making a window dub with visible time code for rough cuts.

"I have my own off-line system," he explains, "so I make the rough cut and build the EDL on that, then put the piece together at Boston Film and Video. That way, I know the numbers are going to be synchronous."

For Hartnett, working with the Mini-Comm has been his first experience in using an edit decision list. "For me, it's a new step in creative editing," he states. "If I decide to take a scene out, I can go back and just delete that number and have the machine do an auto-assemble edit. It takes a lot of the tediousness out of the process and leaves it open for creative ideas." He looks forward to the addition of a second source deck in the Mini-Comm suite for A/B roll work.

"For years many independents have only used straight cuts," Hartnett notes. "Now, with equipment like the Mini-Comm becoming accessible to people, it's suddenly opened up a whole new chapter in the visual vocabulary. All the work I'm designing for my own pieces now incorporates A/B-roll techniques."

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### Low-End Editing

for Hartnett, especially for his own projects, is keying.

"With my experimental work, I'm really interested in the possibility of putting things where they don't belong—putting doorways in the desert, creating surrealistic environments. I can do that with the key capability of the Mini-Comm." His installation project, for example, includes video of people who have made positive contributions to society keyed in over NASA space footage.

"Working with independents, the projects are exciting because all of them are heartfelt," asserts Hartnett. "The main motivation is to communicate something they feel strongly about." Flexible, inexpensive editing systems like the Mini-Comm, he says, are giving independents the chance to speak out creatively.

### High-end cutting

Cuts-only doesn't necessarily mean low-end. According to Gerry Pallor, executive director of Locus Communications, a nonprofit media arts center located in New York City, his JVC/Convergence 3/4-inch off-line suite is "not an edit-yourself system."

"We deal with a wide variety of noncommercial productions," he explains. "We try to offer full service; everything from script writing to the finished fine cut." For A/B effects, Locus goes out of house, but everything else is accomplished on its own system.

The edit controller itself is a 92, built by Convergence Corp. but packaged by JVC. "JVC has created a really excellent manual for the controller," Pallor notes. "For that reason alone it was worth buying from JVC." The suite also houses a JVC 5550 player and CR-8250 recorder, a Chyron VP-1 character generator, plus a Panasonic switcher genlocked to allow input from a color graphics camera for internal and external luminance keys. Locus also has a Mindset computer graphics system, although few clients make use of it. Special effects are not a high priority for Pallor's clientele.

"About the only effect I do with clients is freeze frames," he says.

"I can do dissolves and wipes, but not tape-to-tape. Those are the limitations of the system. But I have found that filmmakers are not as intimidated by that. They're not put off by the fact that you can't do dissolves, because filmmakers are not used to being able to just drop in a dissolve. They actually like straight cuts."

One current project is a promotional tape for a Manhattan church conducting a fundraising drive for its historic building. In addition to other promotional and educational pieces, Locus produces video resumes for artists and recently completed a major promotional and archival project for the Festival Latino of the New York Shakespeare Festival.

"We target productions in the \$5000 to \$15,000 range for our postproduction services," Pallor notes. He finds that low- to middle-budget projects like these are low on pressure and high on creativity.

"When I bought the system, I got a job for a jewelry company doing a tape of their entire line of wedding and engagement rings," Pallor recalls. "In the editing room, they just spent hours and hours sorting through slides. Fine, I'm getting paid top dollar, but I'd rather be editing than sitting around being bored."

The editing system itself "is probably, for my level of production, the best thing," He says. "It's a fast, accurate time code system, designed with the editor in mind. At this point to me it's transparent; after working with it for two and a half years it's just automatic. We've done fashion shows, industrials, we're just very busy with a wide variety of stuff. The system's held up terrifically. It's appropriate for everything from music videos to talking heads."

In fact, the only real limitation on any editing system is the vision of its users. Technical boundaries may prevent the use of certain techniques, but they have never imposed a ceiling on the ideas that make up a production—as any one who remembers the early days of film or video can attest. Now, as then, the key is creativity. **BM/E**

If you need assistance in designing or installing your interformat editing suite, the ACE Micro and other Ampex products are available from the following authorized Ampex video systems dealers:

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Please take a moment to fill out the form below so we can plan even better coverage of postproduction in the future.

1. Indicate your status on the following types of postproduction equipment. Please use the boxes to indicate how many of each type of equipment you have now or intend to buy:

	have now/ on order	intend to buy		
		within 3 mos.	within 6 mos.	within 12 mos.
Multisource video editors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A/B roll video editor/controllers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Two-machine editor/controllers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Time code synchronizers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SMPTE time code generators/readers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VITC reader/generators	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16/35 mm telecine projectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Solid-state telecines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35 mm slide projectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dedicated composite switcher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dedicated component switcher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Digital Effects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Time Base Correctors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Editing Control Software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Machine Interface	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Audio Recorders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Audio/Video Synchronizers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2a. In the coming year, what will be your top postproduction purchase priority?

\_\_\_\_\_

\_\_\_\_\_

2b. What would you like to see in future editing systems?

- Better Software  Improved Matching Interface
- Better Operator Interface  System Interchange Ability

3. About postproduction at your station:

Does your station have 1 or more editing systems dedicated to the news department?  Yes  no  If yes, how many? \_\_\_\_\_

Does your station have an editing system dedicated to non-news use?  yes  no

Is this system interfaced to a:  
 switcher  video effects system

4. About the stories on audio and video postproduction in this issue:

Did you find them informative?  yes  no

Did you read all of them?  yes  no

Did you pass the issue on to anyone else?  yes  no How many? (#) \_\_\_\_\_

7. About yourself: Do you work at a:

- TV station  Radio station  Production company
- TV network  Radio network  Postproduction facility  Other (specify) \_\_\_\_\_

Are you a:  
 Chief engineer  Engineer  General manager

Production manager  Operations manager  Other (specify) \_\_\_\_\_

Do you:  use the equipment?  make buying suggestions?  specify equipment?

make buying decisions?

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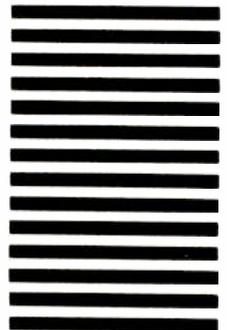
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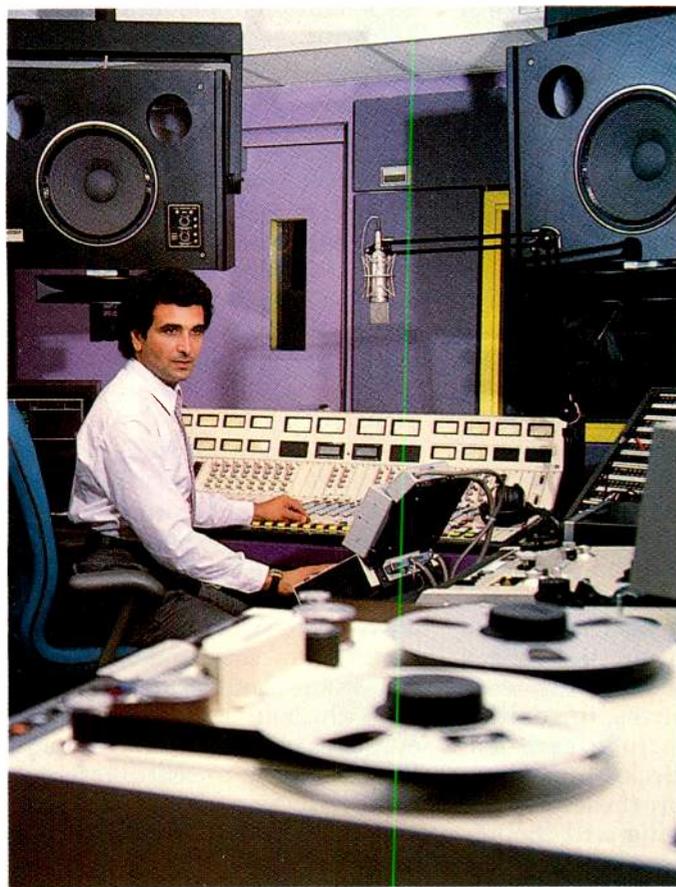
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Studio director Tony Louis Snetro coordinates bookings and does production in Studio 94, WLVE's eight-track studio.

# Setting Up the In-House Multitrack Studio

By Judith Gross

*More radio stations are building state-of-the-art eight-track studios to add prestige and profits.*

There was a time when radio production and high-end audio production were two separate entities. Radio did modest production for clients who bought time on the station, while ad agencies and the entire music industry turned to audio production houses for their needs. In video production, audio was all but ignored.

Now, as this month's AES show illustrates, the lines have blurred. Digital storage media, notably music synthesizers, are plentiful; the cost of quality audio equip-

ment has come down; boards are more versatile; and it is now more possible than ever for a radio station to achieve the quality of high-end audio production.

In addition, ad budgets are tighter, and advertisers and album producers can no longer spend excessive amounts of time and dollars on a single production. Finally, the video industry, spurred on by the advent of stereo sound and the popularity of the music video, has recently discovered audio. It's no wonder then, that radio stations, the original audio production people, have gone back to their roots by seeking out more outside production and building the facilities that can accommodate this increased need.

The trend today is multitrack—not the 32-, 24-, or even 16-track production common in the music industry, nor the two- or

four-track many stations have been working with for so long. More stations are opting for eight-track production, mostly because it affords the greatest flexibility and creativity for the most cost-efficient price.

Generally, the cost of multitrack consoles is more attractive these days, and console designers are building equipment with an eye toward the radio market. This has spawned hybrid boards, which combine on-air and production features, and smaller versions of the large boards that a full-service recording studio might purchase to record a hit album.

Another innovation that has helped stations bring production in-house is the MIDI interface and the vast range of synthesized music it controls. Big, elaborate, expensive musical productions using live musicians are not always nec-

## Multitrack Stations

essary any more, and it's now possible for a radio station to offer all the bells and whistles, and the most up-to-date audio features, of any outside production house.

Because they are buying quality equipment, stations have also been able to attract skilled producers and editors, people who might otherwise have built and opened their own studios. And, because more production equipment is being designed with radio station personnel in mind, stations are also finding it easier to train their own staff in the use of multitrack.

And finally, a radio station can offer all of its production services and expertise at a much lower cost than the typical production house because the overhead and initial expenses of setting up the studio are part of the station's overall budget. Or, according to James Rosenthal, production director at Houston's KKBQ-AM/FM, "We can do it for less and still provide the quality, because this isn't our bread and butter, it's our gravy."

### A range of options

The number of stations building a studio specifically for multitrack production and going after business separate from the station's own is on the rise. But no two stations take quite the same approach.

Multitrack rooms vary widely in size, volume of outside production, equipment choices, and in how aggressively they are marketed as a service separate from the radio station itself. There have to be some very impressive capabilities of the in-house multitrack studio, because, otherwise, clients that have been used to getting production free of charge when they buy a spot on the station might balk at the idea of paying extra dollars for production and talent fees in the eight-track room.

But actually, many stations are finding that the reverse of this is true. Outside clients come to the station for its multitrack capabilities and very often end up buying time on the station because they are impressed with what they see and hear.

Typically, in order to succeed, a

radio station needs to make a strong commitment, with dollars, time, and personnel, towards giving the multitrack room a separate identity. This is being done with varying degrees of success in different markets. In some stations, an entire marketing campaign is being built around the multitrack studio, and outside production takes priority. But other stations with the same intentions have found that their in-house work often expands to fill up the new studio, and promoting the multitrack room as a service in itself is fairly low on the list.

The typical multitrack equipment setup generally includes a stereo console that can accommodate eight or more tracks, with the basic processing needed for production built in: an eight-track ATR, and one or more two-track ATRs. Audio sources, in addition to live mics, include cart machines, cassette decks, turntables, and more and more these days, CD players. Processing will include compression, reverb, equalization, and some sort of effects; most stations seem to favor the Eventide 969 Harmonizer for the wide range of digital effects it produces.

Some stations will add a synthesizer and/or drum machine and possibly a computer system with MIDI interface if they are heavily involved with music synthesis.

Others are set up for live miking of musicians. In addition, many radio stations are starting to produce audio for video post-production; any station venturing forth into the increasing emphasis on this market will also be at least looking at SMPTE time code equipment.

With a few exceptions, digital multitrack recording, with the larger DASH or PD (Pro-digital) recorders made by Sony, Mitsubishi, and Otari, seem to hold little interest for stations involved in multitrack production; as do digital storage media (except for MIDI equipment). Most radio stations are watching the future of digital and are waiting until the costs come down before venturing forth into this area.

In addition to the recording, engineering, editing, and mixdown services a station provides to agencies, local clients, and aspiring bands, most stations with multitrack rooms rent the space to clients who want to bring in their own talent and producers. Usually one of the station's recording engineers sits in on those sessions. And if outside production makes use of in-house talent, extra talent fees are charged as well.

### Studio 94

When Miami's WLVE, or "Love 94," built a new facility last year, a multitrack room and separate sound booth were incorporated into the overall design. CE Roy Pressman says that, from the start, the idea was to set up the eight-track room as an independent production studio to attract outside business. The station hired a recording engineer/producer, Tony Louis Snetro, solely to coordinate outside production with no other station duties, and Studio 94 was born.

Snetro has his own production company, Anthony Louis Productions, and became Studio 94's first customer. Now he promotes the facility and his own services in one package deal, with a brochure and demo cassette that is sent to prospective clients.

"We had to establish a separate identity for the studio," Snetro explains, and that is the one key ingredient that seems to spell success or failure for a station's multitrack endeavors. Those who put the most resources and effort into keeping the studio separate from the rest of the day-to-day station business seem to reap the most profit from the multitrack studio.

In spite of the fact that most of what goes on in Studio 94 is separate from Love 94, Pressman equipped the multitrack room so "it could still be operated by our announcers, if need be, and not be overly complicated." The console is one designed specifically for a radio station's multitrack work, a Pacific Recorders ABX, and there's an Otari MX 70 eight-track and two Otari MTR 10 two-

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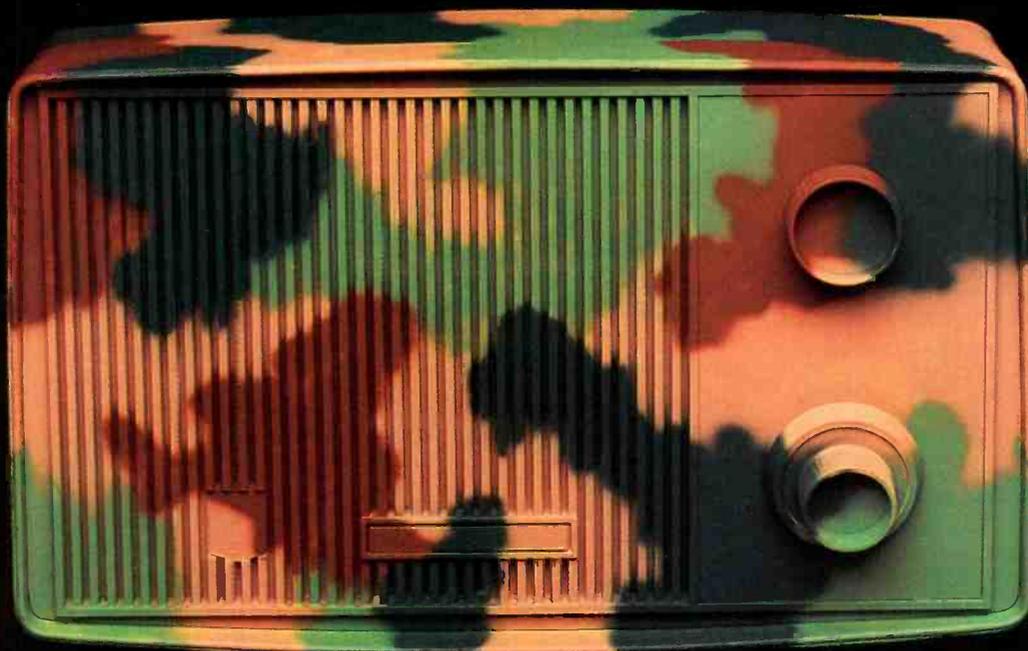
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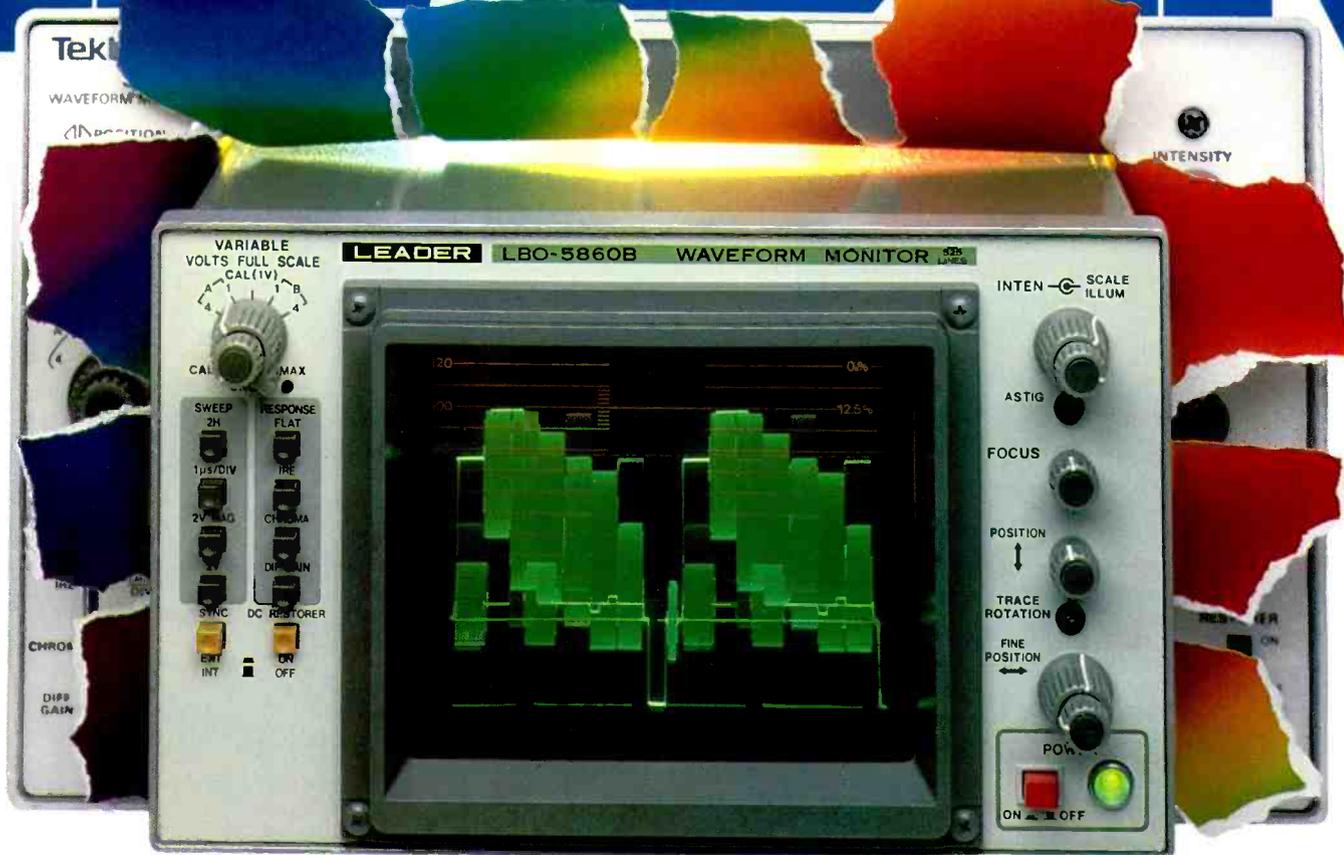
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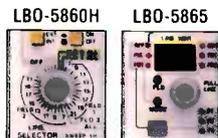
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tracks to mix down to. And, in addition to the Harmonizer, he added a Yamaha DX 1 synthesizer and a Linn drum machine for music production.

The separate sound booth is able to accommodate live music and is a big plus for attracting major musical production work. It can conceivably operate with any of the station's four studios, but it was designed to work specifically with the multitrack room.

Studio 94 is doing about 80 percent outside production and the rest in-house, according to Pressman. Snetro says that most of the work consists of radio commercials for agencies or directly for advertisers. So committed is WLVE to maintaining the studio as a separate entity, that the audio for a rival station's TV spot was even produced there.

The studio has also been used for music recording by performers, and, recently, there has been an increased demand for video post-production and sweetening; mostly audio for TV commercials. Studio 94 recently added a SMPTE time code reader and generator and is looking toward buying a synchronizer in order to "go after" more video clients, according to Snetro.

At Studio 94, in-house bookings generally yield to outside production work, Snetro says, but what he tries to do is schedule the station's own work during odd hours, to avoid a conflict.

Because the Miami market is, in Pressman's words, "heavily saturated" with production facilities, both he and Snetro are pleased with the success of Studio 94.

"For a brand-new studio we are doing figures that are unheard of," Snetro notes, "we're booking as much time as studios that have been around for years."

One probable reason for their success is the fact that Studio 94 can charge much lower rates for the same production, as little as half of what a production house might charge, according to Snetro.

The multitrack room is not yet fully profitable, having just opened this past April, but Pressman says it is meeting its current



Minnesota Public Radio's Studio M is large enough to hold a full musical ensemble; control booth is at the rear.

goals and is expected to be a money maker for the station. He says an added plus is the prestige WLVE reaps from maintaining a full-service audio facility, especially with potential advertisers.

"We can take care of all the client's audio needs, now, so he doesn't have to go to an agency," notes Pressman. "This gives us the opportunity to get closer to our clients, as well."

Both Pressman and Snetro point to station management's support and commitment to Studio 94 and advise that it is the make-or-break element in setting up an in-house studio.

"Stations can make money, but they really have to commit themselves to it," says Pressman, "with one person who is responsible for booking the studio. In some stations, the room is just sitting there, idle. And, a station really has to market its studio."

### "M" stands for music

An entirely different type of success, and a different range of production work, is found at Minnesota Public Radio's two new studios. Studio M is a 45- by 35- by 25-foot music studio that can accommodate a live orchestra. Studio P is a smaller room for production. Studio manager and recording engineer Tom Mudge

jokes that there should be a Studio R, to capitalize on the radio network's acronym, but there isn't—at least not yet.

MPR, which, among other programs, produces the successful *A Prairie Home Companion* program live from St. Paul's World Theater each week, enjoys a large amount of community and corporate support and was able to build the rooms to expand its production capabilities.

According to Mudge, Studio M was designed with high-end acoustic capabilities, mostly to meet the needs of music professionals wishing to record for albums, or these days, perhaps even compact discs. It can easily hold a thirty-piece orchestra.

"We've recorded everything from the St. Paul Chamber Orchestra to a Jon Hendricks and Company radio special that was recorded with a live studio audience," says Mudge. "It's the kind of room you don't have to wrestle with to get a clean, natural sound."

Mudge and his staff emphasize the people element in the recording business, seeing the need to focus on artists, producers, writers, and engineers, but they also understand the interaction between equipment and art, so the technology of the multitrack studios takes

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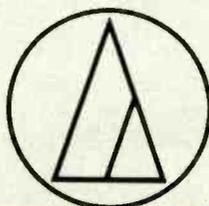
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center stage. It may also be the reason MPR is able to attract demanding music professionals.

The two studios are equipped in a way a typical radio station production room would never be. Studio M has a Neve V series 36-channel console, and Studio P has an MCI JH-636 automated console. The studios also offer 24-track recording on an Otari MTR-90-II or 32-track digital recording on a 3M digital mastering recorder. Additionally, there are four Otari MTR-10 two-tracks, an Otari MTR-12 with SMPTE track, and an MCI JH 110B four-track recorder.

Much of the equipment "floats"—that is, it can be moved into either Studio M or Studio P, according to Mudge, to provide the maximum versatility for both rooms. Processing includes several types of digital reverb and Dolby noise reduction systems, an added attraction to those concerned with a finished product fit for an audiophile's ears. MPR has also incorporated a Cipher Digital Softouch sync system to record digital audio for video or film.

As might be expected from the equipment choices, MPR attracts a large amount of musical production, either for radio programs or for other types of recordings. "It's a very acoustically oriented room, so much of what we do involves acoustic instruments," Mudge says.

Studio M has its own instruments, including a nine-foot grand piano, an electric piano, a twin-reverb guitar amp, a bass amp, drums and cymbals, and a synthesizer. Mudge says the split between music and commercial production is about fifty-fifty, but he notes that "the market has changed, and many commercial producers have their own facilities, and we can't compete with them in that area."

According to Mudge, most of Studio M's customers are clients "who need a room as large and as elaborate as ours"—which is something many commercial production houses can't offer.

MPR has rented Studio M out to other producers and has also pro-



A Neve console is the newest addition to MPR's multitrack recording setup.

duced programs for NPR, such as the *Star Wars* series the network aired awhile back. The remainder of Studio M's production work consists of programs, mostly musical, for MPR itself. However, Mudge says that outside work generally takes priority.

"If an outside paying client wants the room, they generally get it, unless an MPR show has been booked so far in advance, or it's a regularly slotted national show," says Mudge. He adds that conflicts in bookings have not presented too much of a problem so far.

In addition to Mudge, who acts both as a recording engineer and the studio coordinator, MPR has a staff of four other engineers, one of whom is also a producer, plus freelancers when needed. Mudge says that most work involves one or more recording engineers but that clients generally bring in their own producers. He observes a trend towards more independent productions, which could spell an increase in business for in-house multitrack studios, especially those offering lower rates than other production facilities.

Studio M is set up to handle digital recording and mastering and, according to Mudge, has also produced for CD recording. But he doesn't anticipate a large volume

or work in this area. "In order to do more of it, we would need our own Sony 1610 or 1630. In the past we rented one," Mudge says. "Digital is the future, and we're able to do it, but right now the market is more analog-oriented."

### From four to eight tracks

The multitrack production done at Houston's KKBQ-AM/FM station has a national listening audience. For one thing, the station produces *John Landers Hit Music U.S.A.* But the station has also become known for its wide range of song parodies and comedy bits used by other radio stations, most notably on "morning zoo" shows.

KKBQ had been working mostly with a four-track room, then decided to upgrade to eight tracks. The station is keeping its four-track studio, adding an eight-track studio, and also has a room for dubbing.

The four-track room has a modified Ward-Beck 14-channel board, and CE Dave Hammer has added an Otari MX 50-50 B four-track recorder. The eight-track room has a Wheatstone SP-5 board and an MX 70 Otari eight-track recorder. KKBQ also has several synthesizers, including two Casios and a drum machine, and an Eventide Harmonizer 969

## Audio Engineering & Production

### Multitrack Stations

for effects. Music plays an important role in the production of song parodies, so the station is also adding a computer system with a MIDI interface.

"MIDI is the future of one-man multitrack production," notes production director James Rosenthal. "With the costs coming down, even smaller stations can equal major market production."

Rosenthal says that the station is mainly interested in doing various kinds of music production, including the parodies, the national music show, and performers who want to record an album.

"We want to do music mastering, and that was our intention in buying the Wheatstone board; we didn't want a radio console," Rosenthal says.

The dubbing room is also set up to be used as a live recording studio for musicians. This fall, there are two albums slated for production. One is volume two of an album to raise money for charity that features comedy and parodies. KKBQ is involved in that album and is responsible for its release. The second is also an album of comedy and song parodies, but it's being done solely by the Rosenthal and the production staff and will not profit the station.

KKBQ has also produced audio for a local TV dance show and is keeping an eye on the video post-production market. "Video is an area we'd really like to move into," says Rosenthal.

The rest of the outside production done at KKBQ consists of commercials, both for agencies and local clients, although it's clear that the *Hit Music* show and the song parodies take center stage.

KKBQ tries to keep its outside production as separate from its in-house work as possible. The station's on-air talent do not operate any of the production equipment and serve as voiceover talent only. If their voices are used for outside work, they get paid a talent fee. In fact, Rosenthal says, when in-house production is done in one of the multitrack rooms, money from the station's budget is used to "pay" the costs of the production,



Production director James Rosenthal produces comedy bits and song parodies for nationwide airplay at KKBQ's Studio 93.

so the multitrack studios can become a separate profit center for the station.

Now that the multitrack rooms have proved their merit to the KKBQ, Rosenthal is looking toward adding a production library with digital music and effects on CD. He says that other additions to the room won't be in the form of major hardware but just "additional toys and effects."

The only other important ingredient, he believes, is a skilled production staff, although he concedes that the type of equipment being made for multitrack production today might allow engineers with little or no experience to learn multitrack skills in a short period of time. Whatever the case, he believes it's important for a station to have production people on staff.

"A lot of radio stations don't have a production director, and it causes their work to be inconsistent on air," says Rosenthal. "The bottom line, in doing multitrack, is to ask the question, 'Is it good, is it creative?' It is or it isn't, no matter how many tracks you use."

### Looking to expand

When WOW-AM/FM in Omaha built its studios, it was going to have an announcer's lounge. Then station management rethought

the plan and came up with the idea that a multitrack room could bring in some extra revenue. The result is Great Empire Productions, named after the station's parent company.

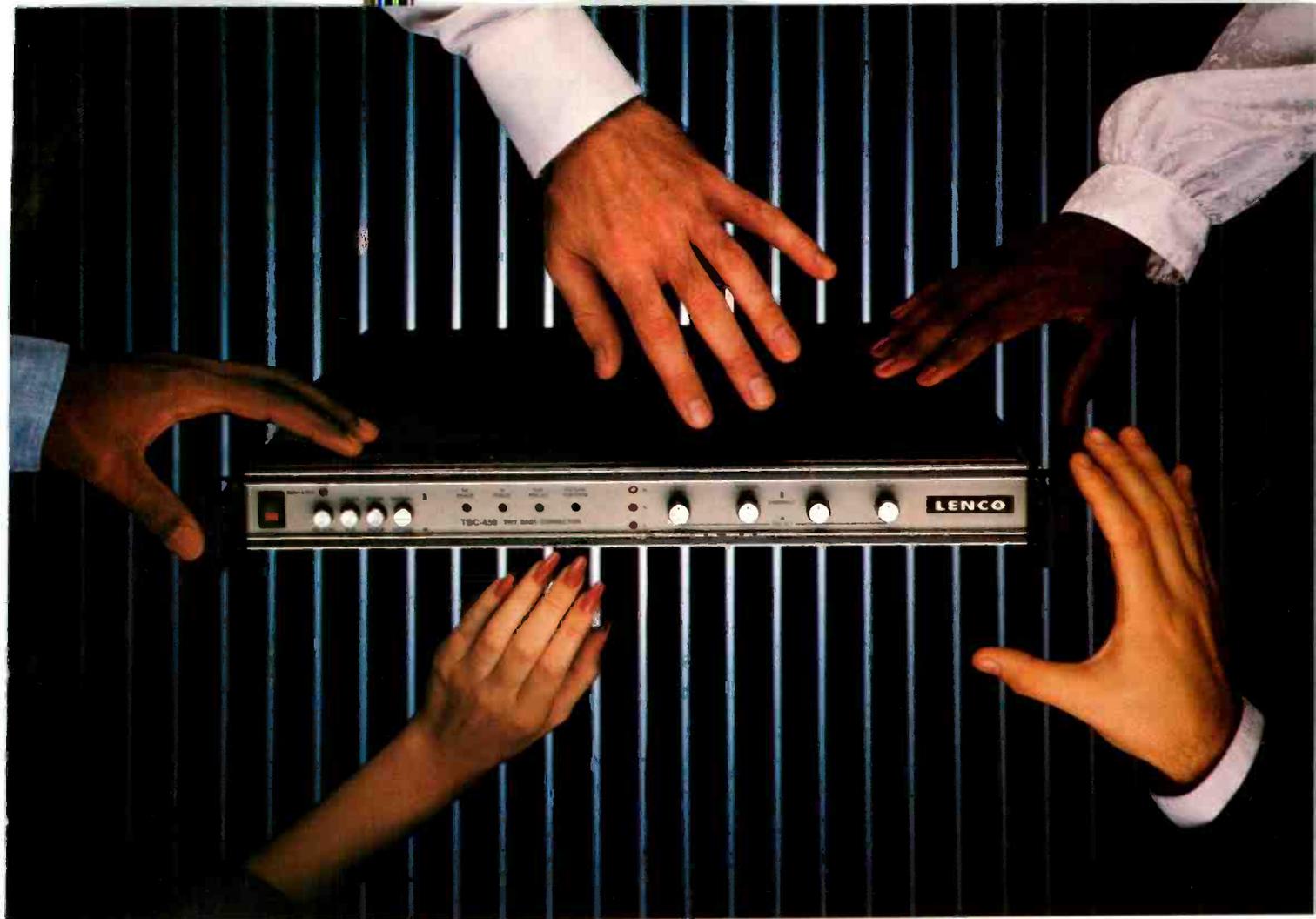
CE Paul Sjodin says the idea was to keep the eight-track studio separate and have it be "self-motivating," or existing in its own right.

WOW outfitted the studio with a combination of new and old equipment, including a Neotek console, an Otari eight-track recorder, a two-track Ampex ATR 800, and a mono Ampex 350 for voice programs only. Processing includes a reverb unit and the Eventide Harmonizer. The station also has a separate sound booth used mostly for voiceovers.

Sjodin says a key factor these days contributing to the ability to set up a viable multitrack facility within a station is the availability of equipment and the fact that costs have come down. For that reason, WOW was able to set up the multitrack room for production only.

"The board is a production, not on-air, board. It's too complex to be an air board, and we have no intentions of putting this room on the air," Sjodin says.

The studio is used for outside production "about half the time,"



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## Audio Engineering & Production

### Multitrack Stations

according to Sjodin, who feels it has yet to “realize its full potential.” One of the problems he cites is that there is not one person whose sole responsibility is the outside multitrack business. “We should have a full-time person dedicated just to the use of the studio,” Sjodin says.

Production director John David Dixon agrees that the room is not being used to its fullest potential. He does most of the production work, but has also been serving as program director for the station, which cuts into the time he can spend in production. Still, he says the room is busy every day, mostly for commercial work for agencies.

There are in-house clients as well, but Dixon says that sometimes, having gotten used to getting their commercials produced as a service when they buy advertising time, they are reluctant to assume the extra fees involved in use of the multitrack room. In addition to commercials, the studio

has also been used to produce a musical album and has sparked the interest of local performers. Instruments can be recorded live from the separate sound booth.

WOW also rents its studio out to producers, but an engineer is present at all sessions.

Dixon says that basically, the station markets its studio on the basis of its ability to charge less, produce with speed, and offer expertise. “We’re a lot cheaper and a lot faster than other production houses,” says Dixon. “They tend to take their time and get paid by the hour, but we don’t think like that. Plus our experience in radio is paramount.”

The station has produced literature to promote its multitrack capabilities, but Dixon says that “business is picking up just by word of mouth.”

Both Dixon and Sjodin would like to see a few improvements in the multitrack studio to help it become a full-service, successfully in-

dependent production facility. They both agree that the room is too small and should be expanded, especially to accommodate a client monitoring area; it would mean doubling the size of the studio.

The second improvement which both favor is the hiring of a production coordinator whose sole responsibility would be the booking, promoting, as well as the producing for the studio. But unfortunately, they don’t foresee such a step happening anytime soon.

### In-house overload

San Francisco’s K101 has a similar problem with getting its multitrack room to realize the potential for outside business. The multitrack set-up was part of a renovation of the station’s production rooms last year when two new studios, a two-track and an eight-track, were added with the idea of attracting outside business. But right from the start, K101’s in-house production seemed to ex-



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pand to fill up the added capabilities.

Now, so much in-house work is done in the multitrack room that not much time and attention can be devoted to outside work.

CE Randy Pugsley equipped the room with an Audiotronics 382 24-channel console and an Otari MX 70 eight track recorder, plus two MCI two-tracks. K101 relies heavily on vinyl as a music source, which gets carted for production work or airplay, so one of its three turntables is a Technics SP-15 with a high-performance Shure cartridge, and it has been optimized for recording from records to carts.

Production director Chris Montgomery, who also does an on-air shift, says the station does a limited amount of outside production, and devotes its facility more to in-house production of jingles, promos, and commercials, which take priority over the outside work. He says part of the problem is in the setup of the room itself.

"We aren't set up completely to attract outside work," he notes, "we don't have a separate control booth or sound booth."

The way the multitrack room is set up precludes music production and undertaking much post-production for video, according to Montgomery. But K101 does have some outside clients, which he tries to schedule during off hours.

These consist mostly of local clients and smaller agencies, many of whom bring in their own talent. Montgomery acts as a recording engineer, or, at times, he becomes the producer and perhaps the talent too. His approach to a particular production is flexible and varies with the needs of the client.

There is little active recruiting of outside work, but clients still come to K101 because they save money over fees charged by production houses. "They can come to us and get a comparable service for less," Montgomery says.

Both he and Pugsley would like

to see the multitrack room get more outside clients, and Montgomery says the amount of creative freedom he is allowed is something he'd like to take more advantage of by adding more outside work. But he feels there would need to be some changes in the room and the hiring of additional production personnel before that could happen.

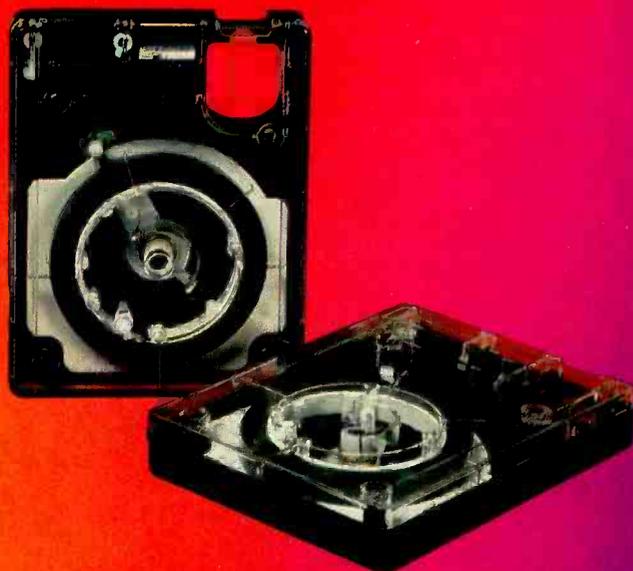
And, even if that doesn't happen anytime soon, at least the fact that the multitrack studio exists seems to be an advantage to K101 and to other stations with such facilities. In addition to boosting the station's prestige in the eyes of advertisers, it is expanding the station's perceptions of their own capabilities, and increasing their overall production values.

"There has been an increase in the awareness of multitrack among radio stations," Montgomery notes, "I think people are just starting to look at its potential."

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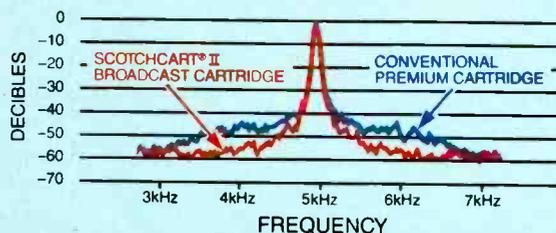
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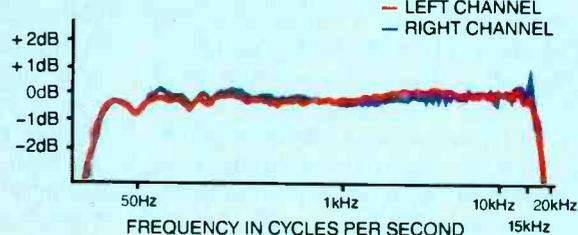
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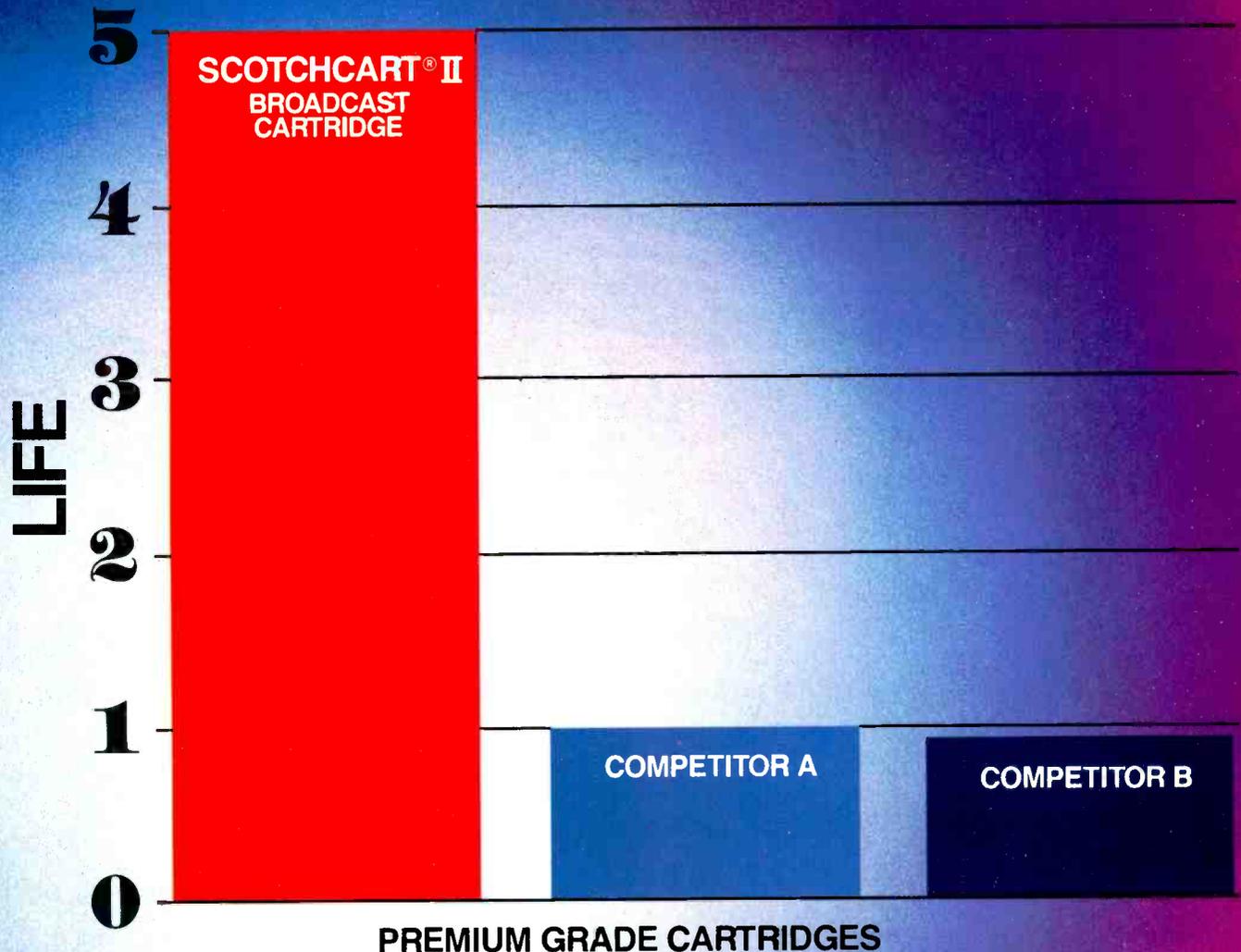
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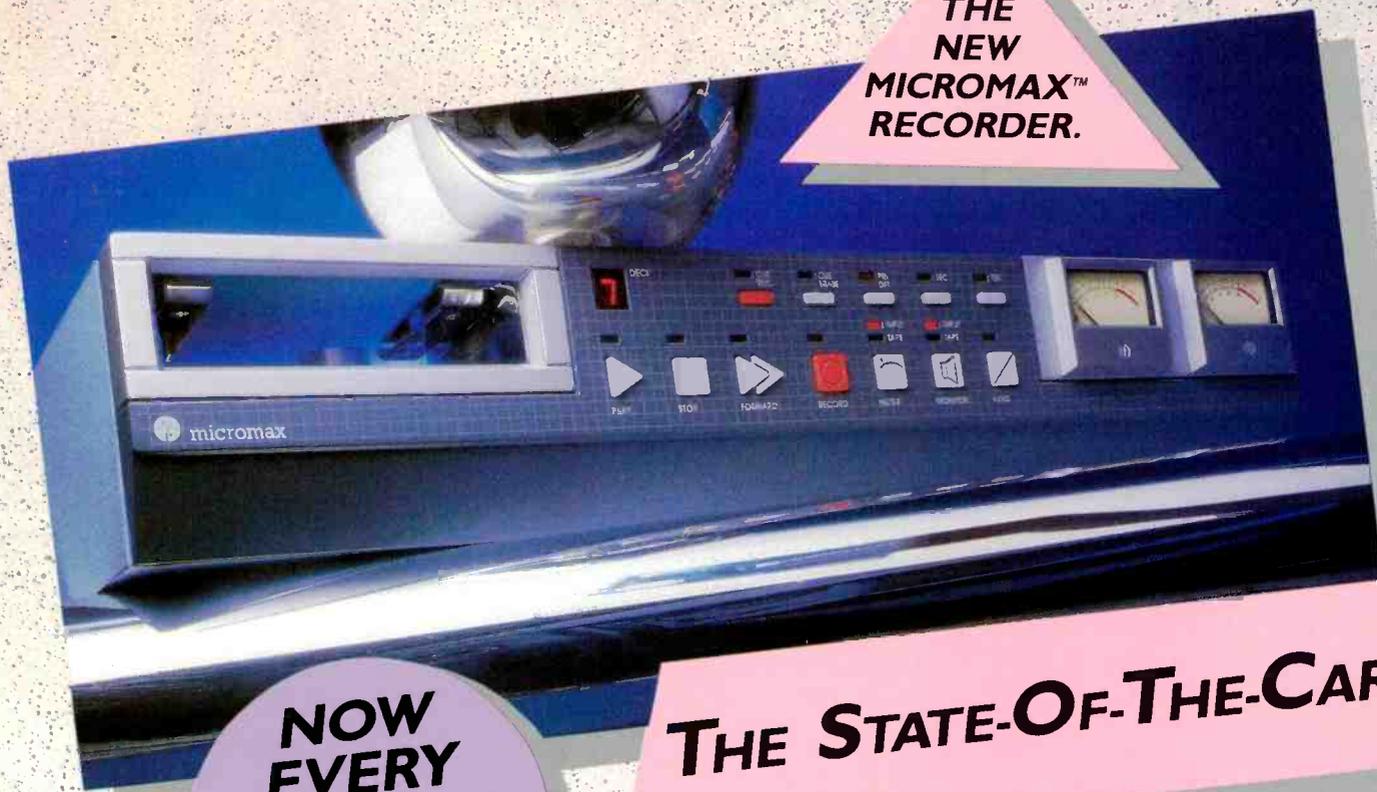
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Equipment exhibitors were pleased with booth traffic during Radio '86 in New Orleans

# NAB Hosts Upbeat Radio Show

*Hope for the future of AM dominated a convention that saw a greater emphasis on engineering and new technology.*

**By Judith Gross**

A record attendance, an upbeat feeling, and optimism for the future of radio set the tone for a successful Radio '86 show in New Orleans. The first show since the NRBA-NAB merger was more organized than in past years and drew more engineers among the 5500 broadcasters, exhibitors, and others to the three-day event. It was obvious that the additional organizational and other resources of the NAB were at least partly responsible for the good showing.

Companies exhibiting at the show, even equipment manufac-

turers and nonprogram-related booths, which have in the past been poor draws at a management/sales/program-oriented show, were happy with the traffic in the exhibit hall; there were 118 booths in all. And most of the sessions, including the 13 panel discussions devoted to new and current technology, drew large crowds as well.

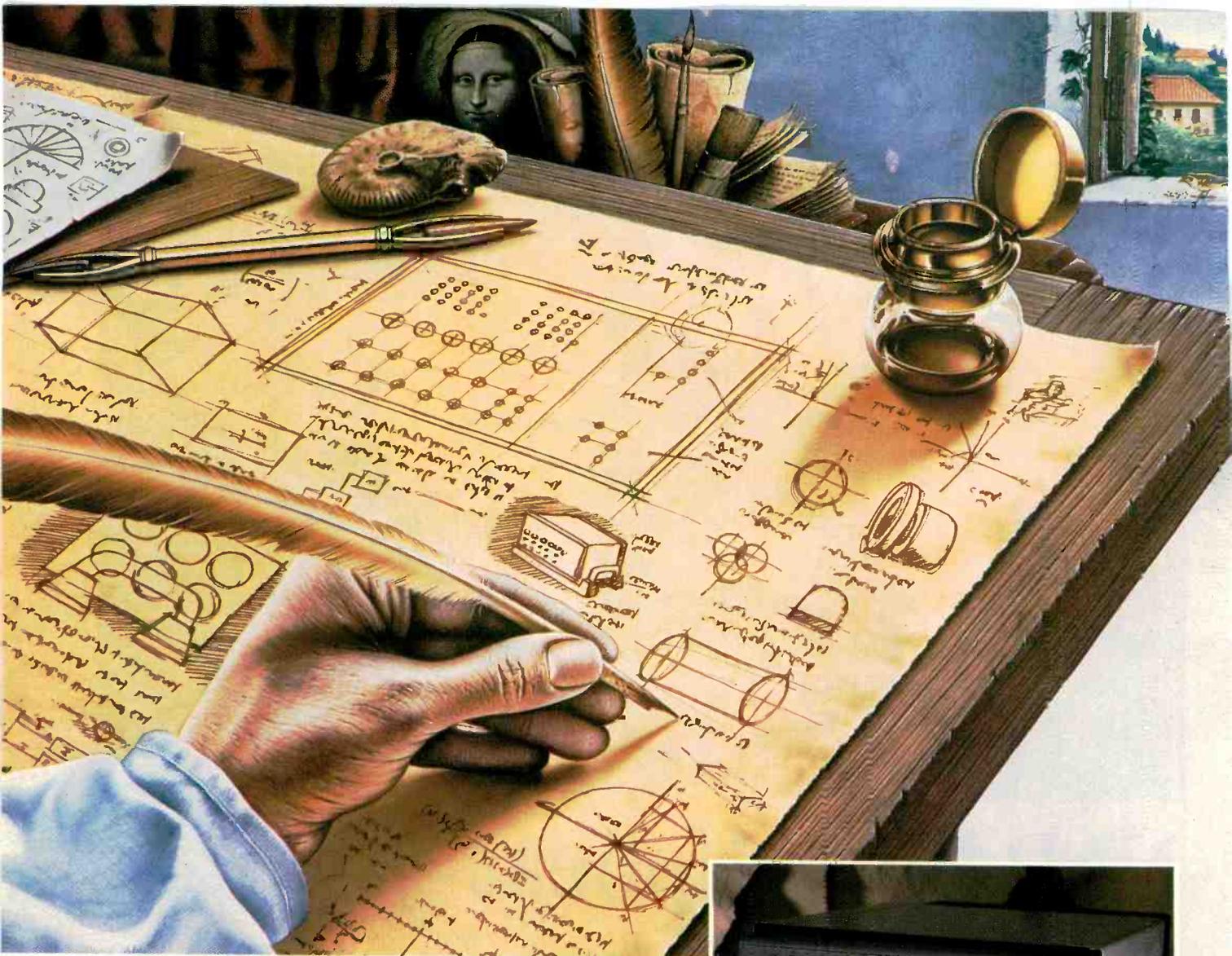
More than 80 engineers showed up for the first day-long seminar on RF radiation compliance. It was held the day before the show opened and featured discussion by FCC and EPA officials. Engineers

learned how to comply with new FCC regulations on exposure controls and how to deal with zoning laws.

## Hope for AM

Probably the single most significant occurrence at the convention was the adoption of a draft interim voluntary standard for AM preemphasis. After many months of work by a subgroup consisting of broadcasters and receiver manufacturers, the National Radio Systems Committee adopted a modified 75- $\mu$ sec. transmission preemphasis curve with complimentary receiver deemphasis.

It's a single-zero curve with break frequency at 2122 Hz, and, at high frequencies, there is a simple pole with break frequency of 8700 Hz. The voluntary standard also calls for stations to limit their bandwidth to 10 kHz, instead of the 15 kHz currently allowable under FCC occupied bandwidth rules. Finally, in recognition of the fact that the industry will change as the standard is implemented and as more radios with the complimentary deemphasis enter the marketplace, there is a



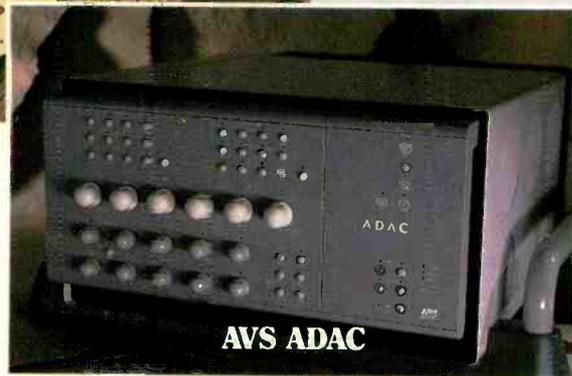
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five-year review provision built into the standard.

The NRSC approved the preemphasis standard without dissent, then presented it to broadcasters in a session on AM improvement. There was also a demonstration of how the preemphasis sounds on various receivers at the NAB's booth. Three manufacturers of processing—Orban, CRL, and Texar—have agreed to begin designing additions to their processing equipment that would implement the new standard. Bob Orban, who is a member of the NRSC subgroup, said he expected to have a module to his processing equipment several weeks after the convention and the necessary filter ready at the beginning of next year.

The radio manufacturers, for their part, have agreed to begin designing wideband AM receivers to the standard. Just how soon such radios would be available isn't certain, but the manufacturers have committed themselves to making and marketing them.

Bart Locanthi of Pioneer, another subgroup member, pointed out that there also needs to be some education of consumers to encourage them to purchase wideband AM receivers. Proponents of the new standard also stress that stations don't have to wait for the new radios to appear in order to begin using the new standard, since there are already wideband AM radios that will benefit stations if they implement it now.

But the main ingredient in getting widespread acceptance of the preemphasis standard is the willingness of broadcasters to go along, especially with the 10-kHz limitation, which may be difficult for many to swallow. NAB staff engineer Michael Rau said that the NAB will take an active role in educating stations about the benefits of the preemphasis standard. And a report on overmodulation that surfaced in the course of the subgroup's work on preemphasis may help convince them that the 10-kHz limit is necessary (see "Preemphasis Curve Submitted," *BM/E*, October 1986, p. 14).

Stations can get a copy of the



Ed Williams (left) of the NAB Science and Technology department demonstrates the NRSC's draft standard for voluntary preemphasis to convention attendees.

preemphasis standard from the NAB. Comments on the draft standard are being accepted until December 15, and it is expected to become a final standard on January 5. The voluntary nature of the standard is the critical element. For years broadcasters and receiver manufacturers have been blaming each other for the poor sound of AM. Now, for the first time, they have gotten together, pooled their efforts, and given each other the tools to bring about some improvement. Now it will be up to each to live up to that commitment, for the future of AM.

### NTIA takes on AM stereo

AM stereo is destined to be the controversy that won't die, but now the Commerce Department's National Telecommunications and Information Administration is getting into the fray.

Al Sikes, assistant secretary of commerce, and administrator of the NTIA, told broadcasters at the show's AM improvement panel that his agency will undertake a study of AM stereo to see if a de facto standard already exists in the marketplace. This will be an effort to resolve the standards war that still exists and has kept conversions to AM stereo at around 10 percent of the total marketplace. Four years ago the FCC decided to let the marketplace determine a standard, and now, Motorola's

C-Quam and Leonard Kahn's system remain to battle it out.

C-Quam stations, including those originally on the Harris system who switched their pilot to C-Quam, number over 300 in this country, while the Kahn system claims numbers in the eighties. In addition, several dozen manufacturers make C-Quam-only receivers, while there are only a handful of multisystem receivers. Kahn recently announced that Sanyo intends to market multisystem chips, but it will take some time before that translates into more multisystem receivers.

The NTIA intends to discover how many stations and how many receivers there are supporting each system, both in this country and worldwide. Sikes said the study would be completed by the end of this year, but exactly what kind of effect the results will have on the AM stereo marketplace is hard to determine.

Sikes said he would be reluctant to ask the FCC to pick one standard over the other. But perhaps clarification of the picture as it now exists, from an agency with the clout of the NTIA, would help broadcasters make up their minds or spur support for a movement to get the FCC to reconsider its original decision, as Texar Inc. is trying to do with a petition (See "FCC Petitioned on AM Stereo," p. 16, this issue).

Radio '86 Report

### Positive picture

AM stereo problems notwithstanding, the overall health of the radio industry was a positive theme in a talk by FCC mass media chief James McKinney at the AM improvement session. He told broadcasters that it was up to the them, and not the government, to save AM.

His talk touched on several aspects of AM improvement, includ-

ing RF lighting, problems faced by daytimers, and the duopoly rules. He said RF interference from lighting devices was a serious problem and one which the FCC has the power to remedy, but wondered just how far their actions should go in regulating devices that may interfere with the AM signal.

An investigation of new technologies at the show yielded

growing interest in digital. But the main focus is on CDs, and none of the digital memory store-and-play systems that hope to replace cart machines were visible at the show.

There were more production libraries available on CD, and some interest centered around the multiple disc changer, or CD jukebox, shown by Allied Broadcast Systems in a private suite. There was also software for CD player control. Ron Schiller Associates showed the CD Filer system, also in a private suite. It makes possible the control of CD players, including prefades, cross fades, and cueing, from a PC.

A new entry in this field goes beyond the control of CD players. Media Touch Systems had a booth with its Touchstone system on display. It uses a computer screen, or "light screen," which is controlled by touch to interface to various kinds of radio station equipment. The touch of a finger can call up actualities or commercials from cart or reel, or music from a CD player. It can also interface to networks, satellite feeds, station computers, transmitter control, telephones, and logging systems.

A switcher is needed to control most audio sources, but theoretically, the Touchstone system is designed to eventually eliminate the on-air console. Volume and fades are controlled through the touch of the screen as well: running a finger from one side to the other will change the level of the event being played. It's an entirely new way of operating for a radio station, but the system is already installed for testing at one station, and Media Touch was generating quite a bit of interest on the '86 show exhibit floor.

One other new technology that was demonstrated in a private suite is something that may appeal to stations with a large record library. Finial Technology has come up with a laser reader for vinyl records. It's called the Laser Turntable and has a laser beam that can read the grooves of records. Because it's laser, it seems to combine the best of both CDs

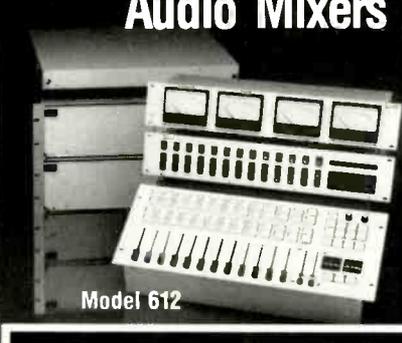
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and records. Warped records aren't a problem, since the beam is always the same distance from the record, and there is no skipping, no wear, no sound from the stylus pick-up, plus a laser can actually pick up more of the music information than a needle.

Since production of CDs is so slow, and because there are some records that will never be recorded on CD, the Laser Turntable should generate interest among stations. Finial will have a consumer model ready first, with a professional product, one which will include cueing capabilities, available by the fourth quarter of next year.

Two workshops that generated interest in new technology were those on FMX and Design for Tomorrow's Studio. The one on FMX introduced the recently developed system for reducing noise and increasing the stereo coverage area of FM stations (see "CBS Tech Center Closing Spells Uncertainty for FMX," p. 14, this is-

sue). The panel on studio design showed that radio stations are tending to pay more attention to high-end acoustic principles in designing new facilities.

### Existing trends

Two other areas of interest that were still strong forces at the radio show were satellite formats and station computers.

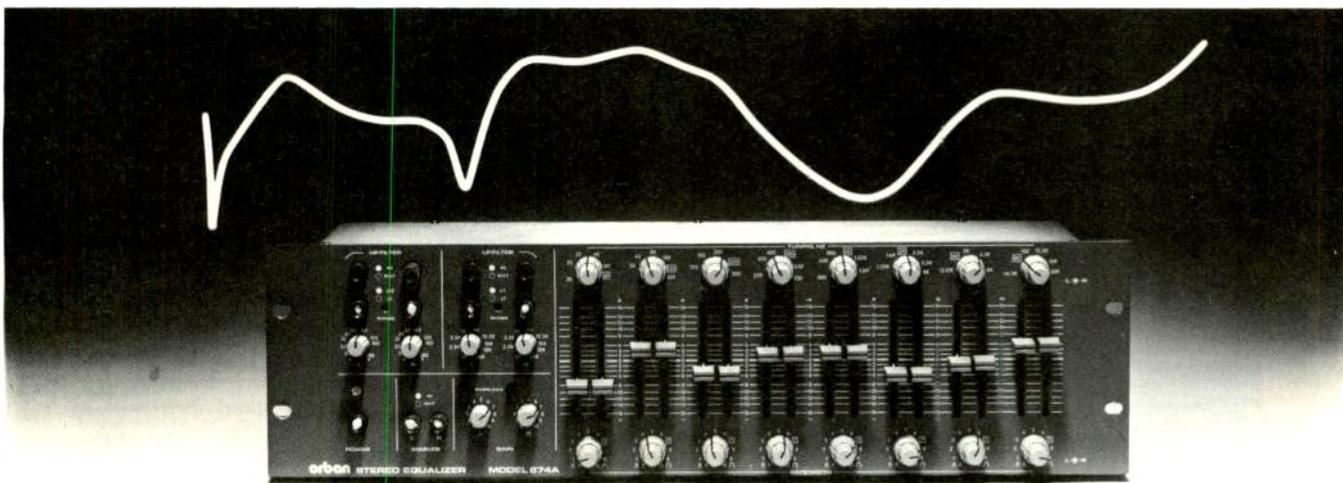
The recent trend toward programming via satellite continues, most likely because it allows stations to automate without sounding completely automated. Totally automated formats have all but died, as was obvious when a panel member at the session on New Studio Technology asked how many broadcasters have automated stations. Not one hand was raised. Most of the new satellite formats are designed as live-assist, allowing a station's own talent to introduce music and give weather and time.

Computers are more important

to stations than ever and in abundance at the show was more software to make a station's business operations run smoothly—everything from billing, to logging, to programming.

Equipment exhibits that caught the interest of attendees were those featuring consoles, mostly in the mid-size range, and cart and tape equipment. Three companies—ITC, Harrison, and Tennenplex—held equipment workshops aimed mostly at engineers, and the NAB followed with a reception for engineering attendees and exhibitors.

The increase in interest from engineers is a good sign for this show, which had hoped to draw more equipment exhibitors. Many potential exhibitors had felt that the convention had become too focused on sales and programming. If the '86 show is the beginning of a trend, the NAB may be able to lure more engineers and exhibitors to next year's show in Anaheim. **BM/E**



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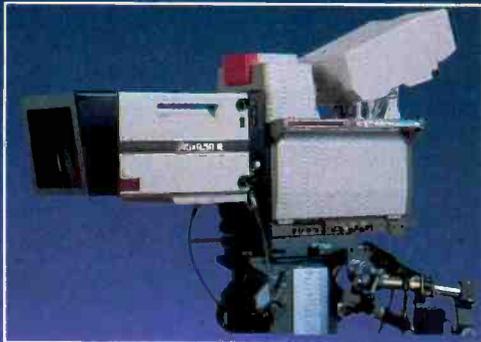
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# AES Show to Examine New Technologies

*Early every facet of digital recording will be explored at the annual gathering of audio engineers in Los Angeles this month.*

By Judith Gross

is not the only that will be high- at the Audio Engi- Society Convention, to take ce November 12 to 16 at the Los Angeles Convention Center. But technical papers and workshops will hold ample evidence that the infant technology has become the force to be reckoned with in almost every category of audio engineering.

There will be discussions on the digital studio, recording for CDs, RDAT, and digital synthesis of test signals in both the workshops and presentations of papers.

In addition to all subjects pertaining to digital, there will be several other areas of interest to engineers. Audio for video is always a hot topic, as is stereo TV. There will be technical papers on the new Dolby Spectral Recording process, and there's sure to be a great deal of interest in the latest innovations in MIDI control.

In addition to hands-on workshops and technical papers, convention attendees will be invited to tour video, sound reinforcement, film post-production, and music recording facilities in the Los Angeles area. And there will be some 190

equipment exhibitors participating.

The AES show has evolved over the past years to reflect changes in the audio industry itself. The lines between categories such as music recording, broadcasting, and post-production have blurred, and there is an overlap of both equipment and technique in all three. Also, an increased emphasis on audio quality in the video industry has been evident since the start of stereo TV. Finally, the emergence of digital has driven the entire audio industry in search of greater precision and toward a striving for perfection.

BM/E

## HANDS-ON WORKSHOPS

### Wednesday, November 12

9:00 a.m. to 12 noon

The All Digital Studio

2:00 to 5:00 p.m.

Wireless Microphones

Compact Disc Preparation

7:00 to 10:00 p.m.

Economics of Operating a Recording Studio

Ramifications of CD ROM and CDI

### Thursday, November 13

9:00 a.m. to 12 noon

The Business of Audio: FX+TX=RX?

Loudspeaker Cluster Design

2:00 to 5:00 p.m.

Production Intercom in the Entertainment Industry

Measurement and Instrumentation

7:00 to 10:00 p.m.

Microphones: Out of the Studio and into the Real World

Loudspeaker Measurements

### Friday, November 14

9:00 a.m. to 12 noon

Stereo TV Mixing

Tape Machine Maintenance

2:00 to 5:00 p.m.

Audio for Video

Computers in Audio

7:00 to 10:00 p.m.

Timecode: A Tutorial

Transformers in Audio

### Saturday, November 15

9:00 a.m. to 12 noon

Preservation and Restoration of Audio

MIDI and Beyond: Total Studio Control

2:00 to 5:00 p.m.

Film Sound: Dialog, Music, and Effects

Live Concert Sound

6:00 p.m.

AES Awards Banquet

### Sunday, November 16

9:00 a.m. to 12 noon

Education Workshop: Is There a Best Way to Teach Audio?

The Art and Science of Equalization

Basic System Design of Recording Studios

# TECHNICAL FACILITIES TOURS

## Wednesday, November 12

Video Facilities Tours  
Compact Video  
CBS TV Center  
Post Group

## Thursday, November 13

Sound Reinforcement Tours  
Orange County Performing Arts Center  
Crystal Cathedral

## Friday, November 14

Film Post-Production Tours  
Disney Productions  
Universal Studios  
Mix Magic

## Saturday, November 15

Media Center Tours  
KHS-FM  
Fred Jones Recording  
KTTV-Fox TV  
Music Recording Tours  
Capitol Records  
Lion Share  
Motown Records  
Sound Castle

# TECHNICAL PAPERS

## Wednesday, November 12

Perception  
Architectural Acoustics and Listening  
Conditions

## Thursday, November 13

Audio Recording and Signal Processing

## Friday, November 14

Audio Reproduction, Transducers, and Sound  
Reinforcement

## Saturday, November 15

Audio Measurements and Instrumentation

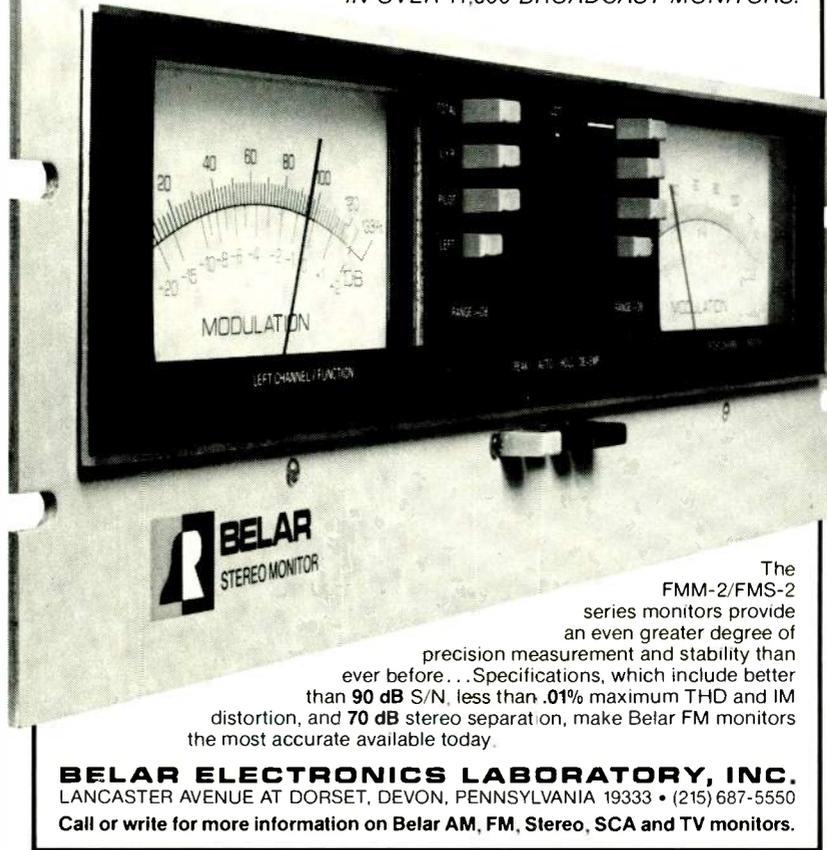
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Altec Lansing Corp.  
Amek Consoles  
American Multimedia Inc./  
Concept Design  
American Recorder  
Technologies Inc.  
Ampex Corp.  
Anchor Audio Inc.  
ANT Telecommunications Inc.  
Anvil Cases Inc.  
Apex Machine Co.  
A.P.G. Ingenieure  
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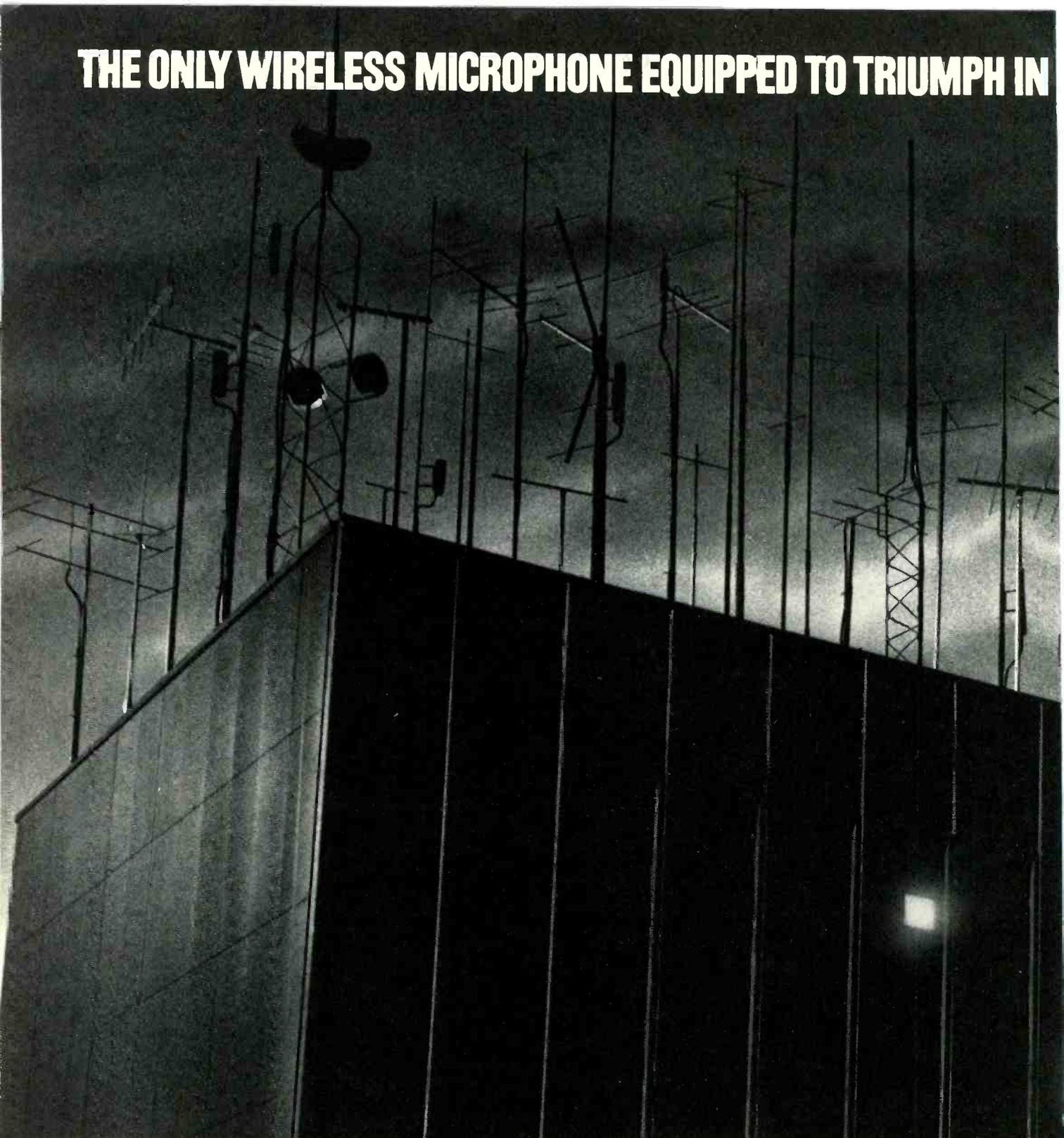
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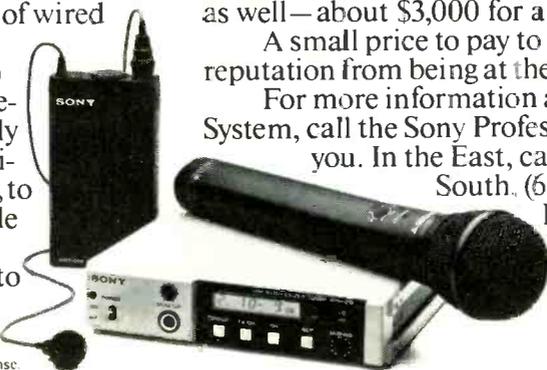
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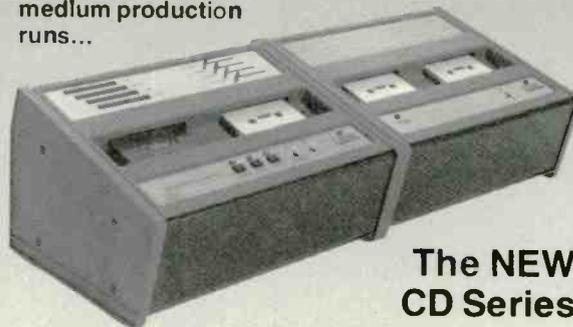
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United Video's new satellite communications system (SCS) for audio transmission is uplinked from the Chicago Teleport, in Monee, IL.

# Up With Radio

*Program audio for radio stations is beamed via satellite by a variety of methods, each of which has its own advantages and procedures for keeping the sound sound.*

By Brian McKernan

**L**ike manna from heaven, good things are descending from the sky for radio broadcasters everywhere. Program material distributed via satellite is nourishing the quality of thousands of radio stations, providing greater fidelity and choice of services at less cost than ever before possible. It's yet one more innovation contributing to radio's continuing vitality.

The components of satellite radio include affordable earth stations for the reception of these signals, satellites positioned 22,300 miles above the earth in geosynchronous orbit, and carefully managed and controlled uplinks. Efficient uplink trans-

mission ensures quality and reliability of satellite-distributed radio programming. There are several methods of transmission used in uplinking for radio.

"The evolution of satellite radio over the last decade has given us a number of different formats today," says Dennis Feely, senior vice president of operations and engineering at the IDB Communications Group, Ltd., in Culver City, CA. "It's hard to say which of them came first. Different methods were developed as technology changed." IDB, the largest independent distributor of audio programming by satellite in the United States, uses all three satellite radio techniques.

## Methods of transmission

The digital audio transmission service (DATS) is used by the radio networks of ABC, CBS, NBC, Mutual, and United Stations.

Developed by RCA, DATS codes analog sound signals with binary digital codes in a process known as pulse-code modulation (PCM). Time-division-multiplexing (TDM) is then used to combine 20 to 40 digitized audio channels in a time-shared, complex data stream. This single carrier is transmitted to saturate a transponder on Satcom I-R. Downlinked, the DATS signal is decoded back into analog sound, rendering virtually noise-free, high-fidelity audio.

Single channel per carrier, or



A portion of the communications console at RCA's Vernon Valley, NJ, earth station, where personnel monitor the uplink and downlink of DATS and SCPC radio transmissions.

SCPC, is another major satellite radio standard. In this method, each audio channel is its own radio frequency carrier. The number of channels one SCPC transponder can handle depends on the carrier power of each. SCPC transmission formats include wideband (200kHz per carrier) and narrowband (50kHz per carrier). Ideally, this enables a 36 MHz-wide transponder to receive and transmit as many as 40 to 100 wide- or narrow-band carriers simultaneously from different earth stations. National Public Radio (NPR) is an SCPC network.

The use of audio subcarriers on a video carrier is another method of beaming program material to radio broadcasters via satellite. The video carrier occupies roughly half of its total 8 MHz bandwidth; its accompanying audio subcarrier takes up additional room, usually at 6.2 and 6.8 MHz. In the spaces remaining, several additional audio subcarriers can be inserted to "hitch a ride" up to the satellite for distribution. Cable News Network Radio and Sheridan Broadcasting Network are two of the services using this method of transmission.

### Relative merits

Each of these transmission methods has its advantages and disadvantages. "The digital system has multichannel capacity, but, because it depends on time synchronization, only one uplink can feed the bird at any given time," says Don White, NPR satellite operations technician.

"Digital is reliable and repeatable," comments Joe Maguire, vice president of engineering at the United Stations Radio Network. "You know that if you put quality into it, you'll get quality out of it. Your frequency response won't change; you can get 90 dB out of it."

"Subcarrier receiving hardware is very inexpensive, thanks to the proliferation of home satellite-TV systems," IDB's Feely observes. In addition, a video uplink can use subcarrier technology as an economical way of also doing radio. "But that's a drawback, too," he says. "We prefer SCPC. It allows you to originate your signals from any location directly to the affiliates."

"SCPC gives you the flexibility of being able to change uplink sites on a given frequency at a mo-

ment's notice," says Greg Monti, NPR uplink system engineer. "NPR owns transponder 2D on Westar IV. SCPC allows us to sell transponder space to customers who are originating in different cities because each has his own frequency and can transmit directly to the satellite."

### Squeezing the sound

The quest for digital-quality sound with analog formats has led to the development of audio-processing technology for the purpose of noise reduction. These systems work by compressing the audio signal, which puts more energy density into the same amount of power to be transmitted to the satellite. In addition to concentrating the audio, these systems suppress the noise introduced by the process of transmission. On the receive end, the process is completed, and the audio is expanded back to its full, original dynamic range.

"SCPC space-segment costs would be prohibitive without noise reduction," states Monti. "The transmission distance from earth to the satellite causes a loss of almost 200 dB. Companding keeps average modulation of each carrier high to reduce apparent noise. It allows far less RF transmission power per channel and increases greatly the number of channels that can occupy a transponder. In addition it allows you to use smaller—and less expensive—dish antennas."

Subcarrier systems also benefit from companding, which increases the number of low-level narrowband subcarriers that can be inserted into the video carrier. "Ratios of companding vary," says Feely. "There's three main standards in use. Several companies make a 2:1 system, dbx Inc. manufactures a 3:1 system, and Wegener Communications has its Panda I and II formats."

Preemphasis is another noise-reduction technique that is often used in uplinking audio for radio. Long employed in commercial radio broadcasting, preemphasis involves amplifying high frequencies—which are more subject to



National Public Radio monitors 12 public radio channels from its main origination technical center, in Washington, D.C.

noise than low frequencies—before transmission, and doing the reverse on the receive end.

## Hardware

Regardless of the transmission system used—DATS, SCPC, or subcarrier—all uplinks for radio have four major components: the modulator, up-converter, high-power amplifier (HPA), and antenna. The DATS system, with its own modulation scheme, includes an analog-to-digital converter, time division multiplexer, and other components necessary to the digital process. The DATS up-converter is the same type that is used for SCPC. The DATS transmitter and antenna must be large enough to carry the amount of power that a video signal would put up; so those components are comparable to the ones that are used for subcarriers.

Subcarrier systems employ a modulator for each audio subcarrier. Audio is again modulated, as part of the video signal, in the exciter. SCPC's use of smaller bandwidth and lower power calls for smaller—and less expensive—hardware. And there are other differences among the components of these three methods of transmission. As with any electronic system, periodic maintenance keeps satellite radio uplinks—regardless of for-

mat—functioning at peak performance.

Although the technology of uplinking for radio is varied, the purpose is the same in each system: to deliver quality audio reliably. "You can use the same techniques, analog-wise, to test audio quality no matter what transmission mode you're using to uplink it," states Dave Gardner, manager of the network monitoring center at RCA American Communications, in Vernon Valley, NJ. "The difference comes in testing the means of transmission."

## Audio and RF

"The quality of the audio signal is only as good as the carrier on which it rides," says Al Freedman, operations supervisor at The Teleport, in Staten Island, NY. "In the case of radio, it's essential that you monitor the RF separately from the audio signal so that you can in fact be assured that the RF carrier will carry a clean audio signal."

Separation of audio and RF monitoring functions is a tendency of most larger teleports, where increased personnel means the ability to specialize. "When you're talking RF, you're talking transmission, and that requires a license," Gardner says, suggesting another reason why audio and RF

are often handled by separate personnel. RCA American Communications is the world's largest commercial earth station, and it uplinks—in DATS—the radio networks of ABC, NBC, CBS, and United Stations.

"These radio signals are digitized in a T1 format in their respective studios in New York and sent via redundant fiberoptic paths to lower Manhattan. Then the signal is transmitted from there to the Vernon Valley earth station on redundant microwave paths," explains Gardner. "The earth station is also totally redundant; for each unit on the air there's one on standby."

The ultimate test of any uplink, and the only way that you can ascertain that your signal is coming down to the rest of the world correctly, is, of course, the downlink. "We break the digital audio signal back into analog as any network affiliate would," Gardner says. "We use Hewlett-Packard and Tektronix analog audio spectrum analyzers to check the audio for such things as idle channel noise, amplitude versus frequency response, phase measurements, harmonic distortion, intermod distortion, and cross talk."

"Degradation of the analog specs may indicate a problem with the digital specs. If so, we test the digital bit-error rate (BER) with a

## Radio Uplinking

BER test set made by Hewlett-Packard. We use them to set up a pseudorandom digital test signal that is clocked from the transmit site to the receive site. We'll take test equipment into the studio and generate a digital T1 test signal. We then check this pseudorandom digitized signal here at Vernon Valley to see if it conforms to our BER standard of  $10^{-9}$ ," Gardner explains. The digital signal can also be tested on the downlink.

### RF analysis

For testing the RF carrier, the spectrum analyzer is the most important tool. "It doesn't matter whether you're dealing with digital or analog, SCPC or video," says Freedman, "the spectrum analyzer is the main tool for testing the RF carrier. Used on the downlink, it shows you if your carrier is clean and if your antenna is properly peaked. If the signal isn't clean coming off the satellite, the spec-

trum analyzer can do a comparison on the signal leaving the transmitter."

"The spectrum analyzer facilitates uplinking from transportables, which is more critical because you're at a different site each time," says Feely. "You have to coordinate your frequency with the local frequency coordinating organization. When the transportable is ready to transmit, they come up with a low-power carrier, and our master control will see it on an analyzer—just as they would with video—and use that information to peak the transportable's antenna and do the cross polarization procedure."

A spectrum analyzer is especially indispensable when an uplinking entity also owns a satellite (as in the case of RCA American Communications) or a transponder. NPR's Don White explains the procedures of that SCPC network: "We also manage—in addition

to owning—our transponder. We act as watchdogs, monitoring to see whether our commercial clients or the 20 NPR network uplinks are accessing it. We are able to measure the entire downlinked spectrum of our transponder with an RF spectrum analyzer. There are limits in powering allocated to each carrier, and the sum of those powers must not exceed the capability of the satellite itself, the electronics in the bird. We take RF measurements on the transponder three times a day."

Transponder management also includes keeping carriers from interfering with one another. A spectrum analyzer can measure the spacing between individual carriers, the amount of power that each carrier is operating at, and the amount of audio deviation applied to each carrier.

"The spectrum analyzer will even measure the frequency sta-

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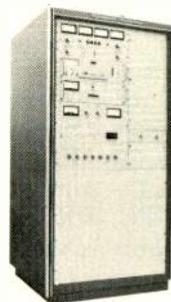
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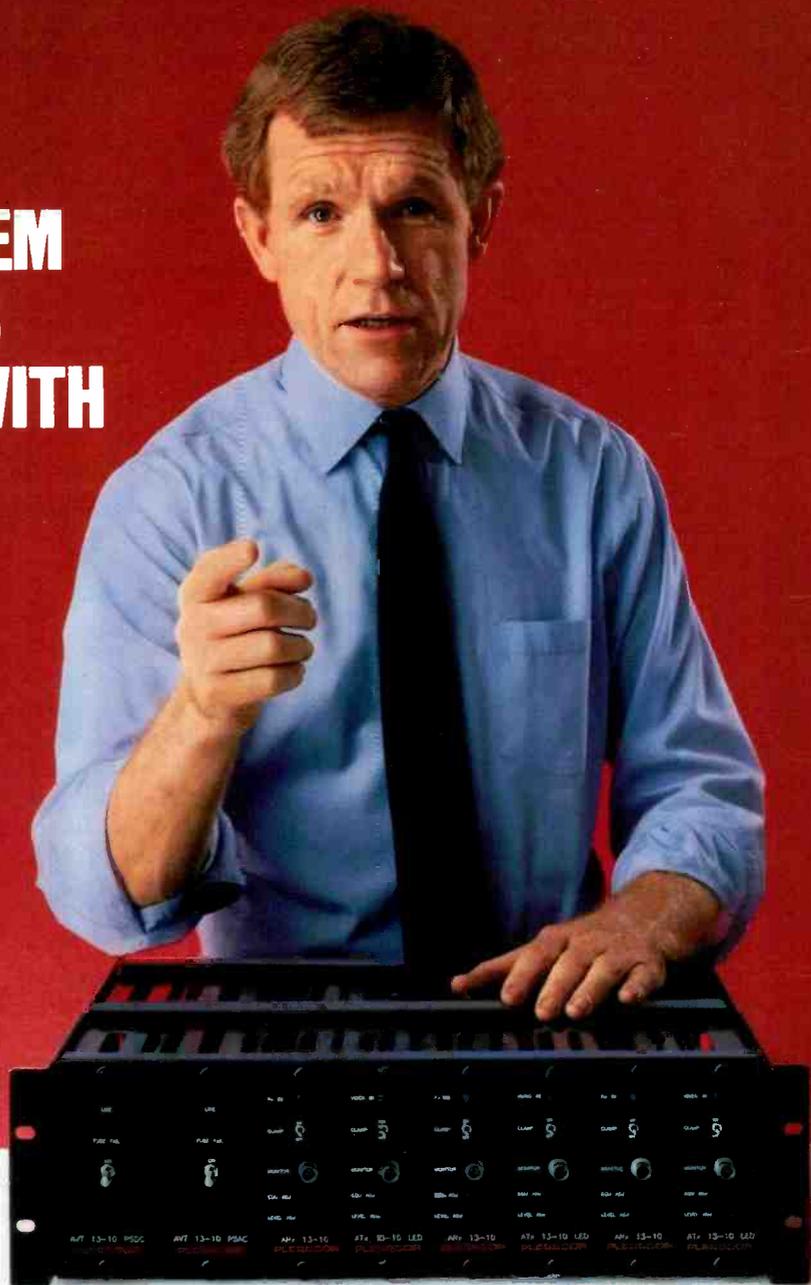
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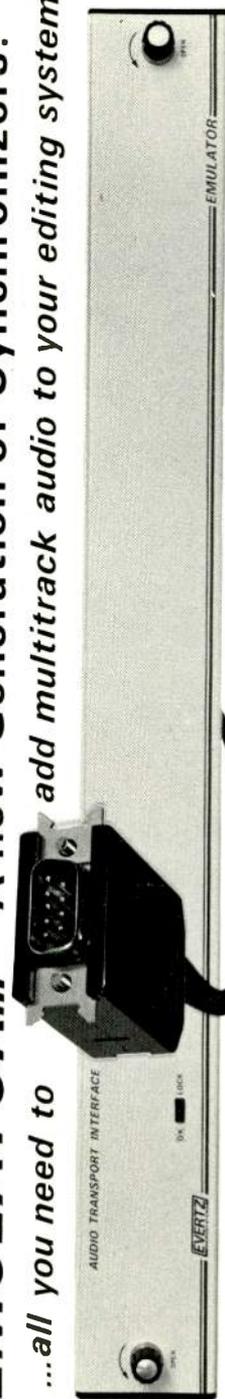
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## RF Engineering

### Radio Uplinking

bility of up-converters," White explains. "Sometimes when a modulator decides it's going to go flaky, it won't maintain the proper ratio between IF and C-band frequencies. Therefore, you'll see that particular carrier jittering or moving across the spectrum to some degree. If the problem is bad enough, that carrier will sweep over into another carrier's territory or perhaps sweep back and forth repeatedly, obliterating a couple of carriers. In very severe cases the whole transponder could be affected.

"In conjunction with the spectrum analyzer we have an X-Y plotter. If we see something out of spec or if we see interference from an unauthorized uplink, we can store the information on the display screen of the analyzer and plot it so that we have a hard copy representation of what the spectrum looked like at the time of that anomaly."

### Audio analysis

NPR's audio monitoring procedures illustrate one network's commitment to strict standards. "We are probably one of the more audio-quality conscious organizations doing satellite uplinking for radio," admits White. "And some of our customers insist on high standards. We monitor our audio consistently in several ways.

"For simple level measurements, we will use both VU and peak program meters (PPM)." First used in Europe, PPMs are similar to a VU meter, but with an altered scale and a white needle and a black face to distinguish them from VU meters.

"PPMs give you a more accurate representation of your use of the headroom—the dynamic capability—of your system. In other words, whether you are approaching the clip level of your transmission system. They don't measure the average signal level, as VUs do, but rather the signal peaks in the signal waveform. A PPM tells you how much peak content that program material has, and how close that peak content is to jeopardizing the headroom of your system, which can result in peak

distortion or clipping. That's the harsh, severe sound that occurs when you run out of the capacity of a particular piece of electronic equipment to reproduce the signal you're putting into it," White explains.

"Our main origination technical center (MOTC) also has a custom-built panel that features composite ladder PPMs. Unlike the mechanical PPMs, these are comprised of LEDs arranged in a vertical format. There are 12 columns of these ladder PPMs, each of which displays the modulation level of one of the 12 public radio channels, which are a portion of transponder 2D.

"The LEDs in these ladder PPMs are in green, orange, and red segments to indicate if the NPR channels are performing above or below our program operating level. Because we manage so many signals, the ladder PPMs are a good way to provide an instantaneous check on audio levels. They are accurate and compelling to watch and give the operator a lot of information in a small view angle."

Another important area of measurement is signal to noise. Common to all electronic transmission systems is what is known as the noise floor, which is optimally many degrees of dB below the operating level. Above this is the clipping limit, the point at which equipment will saturate. Headroom consists of the distance (in dB) between program operating level and the clipping level. The distance in dB between the noise floor and the clipping level is the dynamic range of the system.

"For signal to noise and other audio analysis, our main test equipment in the MOTC is the Tektronix TM 500 series unit," White explains. "It's a mainframe with plug-in components: a harmonic and IM distortion analyzer, an audio oscillator, a frequency counter, and a dual-trace oscilloscope.

"We perform signal-to-noise measurements with a sensitive audio volt meter, which is part of our distortion analyzer. The distortion analyzer has audio meas-

urement capabilities down to -70 dBm. We can measure both return level for downlink level and downlink distortion with one unit.

"The oscillator enables us to supply a downlink with a reference signal that has virtually no distortion in it so that we can see what kind of distortion products are caused by the uplink and downlink process. The counter measures the frequency of repetitive waveforms. The scope gives us a visual inspection of the waveform, lets us make phase measurements between stereo channels, and compare the trace of an original signal with the distortion products of that signal."

### Exam time

NPR's very low distortion oscillator is also used to test the network. White describes the procedure:

"Once a week, for half an hour, we will uplink a reference tone of 1 kHz at program operating level for our 300 affiliates to set levels. Then we send them some silence (which tells them where their noise floor is) and then 400 Hz for distortion measurement, and then we'll send them spot frequencies of 50 Hz to 15 kHz.

"This enables them to chart the frequency response of each of their individual demodulators, identify its S/N ratio, and calibrate its output level. To do this, affiliates use distortion analyzers with built-in audio voltmeters.

"At various times every month, each of our 20 regional uplinks in turn have the opportunity to go up on two of the public radio channels on Westar IV, transponder 2D, for an hour. This enables them to check the performance of their uplink and downlink simultaneously.

"Even if you have plenty of expensive and fancy test gear at your disposal," says White in summing up NPR's audio testing, "the best test instruments of all are the ones mounted on either side of your head. There's a good chance that an operator's ears will catch a problem before someone fiddling with test equipment will. For this reason, we have two pairs of small,



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## RF Engineering

### Radio Uplinking

one step further by United Video in a new service known as the satellite communications system (SCS). Al Stem explains:

"Having worked with subcarriers for several years, I saw that there was a way to mitigate its various problems. These include terrestrial interference, the necessity for large (expensive) reception antennas, and having to uplink from where the main video carrier is uplinked. We really didn't invent anything new, but what we did was optimize some existing technologies.

"SCS uses Wegener Communications' FM<sup>2</sup> technology for uplinking subcarriers without any video. On a video transponder, the video takes up about 90 percent of the energy, with the remainder left for the subcarriers. But with SCS we put 100 percent of the energy into the subcarriers, and without video, there's room for more of them. It's an FM frequency division multiplex system

(FM-FDM) system. Each channel is sent by way of an analog carrier, but each one of those carriers can be modulated any way the user wants to, FM or digital.

"SCS is a turnkey service providing clients with transponder space segment, an eight-foot antenna, and associated hardware to uplink—in Ku-band—from anywhere. United Video's Chicago Teleport downlinks the signal, uplinking it again in SCS. The systems' proprietary optimization of bandwidth eliminates terrestrial interference."

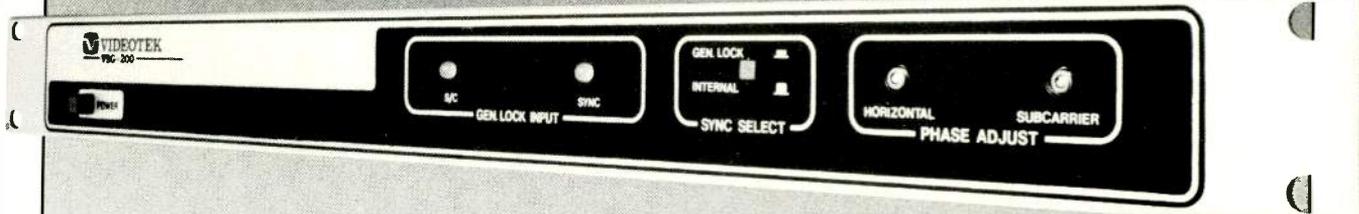
Satellite Music Network is one of several radio services to recently switch over to SCS. "It makes a ton of sense," says Dave Roycraft, director of technical operations at Multicom Telecommunications, in Alexandria, VA. "You can use less expensive components in your downlink, and they'll still yield good performance. With SCPC any phase noise in the receiver's local oscillator will degrade the re-

covered signal. Not so with SCS."

Regardless of the transmission method, satellite radio continues to grow as a cost-efficient means of point-to-multipoint distribution. Fifty-five services of program audio for broadcast radio are now delivered by satellite, with more every year. The increased demand for dish antennas has enabled manufacturers to lower prices by refining production methods. Some networks have even furnished affiliates with receiving equipment.

"The use of Ku-band for radio will grow because of the higher power afforded by such satellites as the 45 watt Satcom K-2," observes Marcia DeSonne, director of technology assessment for the NAB. "And radio stations have an added business opportunity in that they can also receive data and retransmit it on their FM or AM subcarriers for local distribution. There's a very robust and exciting future for satellite radio." BM/E

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The tracking, telemetry, and control center at RCA's Vernon Valley, NJ facility monitors the RCA Americom fleet of five C-band and two Ku-band satellites. It also sends commands to the craft to keep them in their assigned locations.

*Video that's for the birds is great for broadcasters, cable system operators, and corporations, saving them from the expense of terrestrial distribution.*

# Video Transmission via Satellite

By Brian McKernan

**B**ecause what goes up must also come down, transmitting video via satellite requires specific procedures to ensure a quality signal. Video for broadcast, cable, and other uses is beamed to and received from a multitude of transponders every day, and uplinking continues to be a booming business. But if the picture isn't good on the way up, there's not much a downlink can do about it. Not only that, but the potential audience for a problem transmission is enormous.

Redundancy is the major safeguard against transmission snafus, the rule being the more the better. This along with careful control, monitoring, and measurement of video and RF avoids signal degradation.

"There's basically three things that you have to do," states Mike Martin, senior technician at the Washington International Teleport, in McLean, VA. "Check the quality of the video and audio coming in to you, make sure that you're transmitting to the satel-

lite properly, and then check the signal on a downlink to see how it looks to the rest of the world."

## Getting the picture

In the case of National Gateway Telecom, in Carteret, NJ, video arrives from the major TV networks in nearby Manhattan on four duplexed microwave signals. The microwaves are transmitted from a 125-foot tower at National Gateway's technical control center (TCC) in New York, which is linked to ABC and CBS by fiberoptic cables. Periodic testing of both fiber and microwave identifies problems in the path, should they arise. Don Hoeger, director of engineering, explains:

"Once a year, the FCC requires that we check the microwave beam to see that deviations are set properly. For this we use a Hewlett-Packard [HP] 141 spec-

### Video Uplinking

trum analyzer for the video, the Marconi 2305 modulation meter for the audio, and HP and Boonton power meters."

National Gateway tests both their fiber and microwave path periodically for compliance with RS-250-B. Because the microwave link can transmit in either direction, a function generator and waveform monitor are stationed at both ends. "It's a lot easier than lugging them back and forth," Hoeger adds. "If the transmission in this direction is good, it can be looped back to show the quality of end-to-end transmission." In this way, the location of problems can be identified as being either inbound to the teleport or outbound to Manhattan. Signal generators and waveform monitors at the networks are used for end-to-end testing of fiber to the TCC.

"These tests confirm that 'yes, I am sending you quality pictures in both directions,'" Hoeger says. "Obviously your specifications on the microwave system have to fall within a certain number of IREs for whatever type of pattern or source generator function is being applied to the system. If you start with 100 IRE units, you'll want to read that at the other end."

### The crowded sky

Terrestrial RF interference is a problem for both microwave links and earth stations, particularly in major metropolitan areas. "The Olympics was perhaps the greatest challenge I ever worked on, it took a year of planning," comments Bob Wean, director of technical services at Wold Communications, in Los Angeles. "The LA area is crowded with frequencies that are not only commercial and common carrier, but also government and military. It's so hot with RF here that you could walk up on Mount Wilson, stick a pencil in the air, and the graphite of the pencil will literally draw an arc.

"The frequency coordination on the Olympics took a year of planning; a book could be written about it. Everyone worked very closely in the Southern California Frequency Coordinating



NBC's Skypath/New York master earth station, atop a Manhattan skyscraper. Each antenna transmits four video channels, in Ku-band.

Committee (SCFCC), a volunteer organization of all commercial and common carrier broadcasters in the area, which serves as a clearinghouse of information on what everyone is doing. The SCFCC holds monthly meetings and publishes a newsletter.

"If it wasn't for that coordination, it would have been chaos. But nobody stepped on anyone else, and we never missed a transmission."

### Off the air

Uplinking—and other telecommunications activities—benefit from the efforts of frequency coordination organizations everywhere, especially in areas of heavy RF. But being in a metropolitan area where commercial broadcast receive levels are strong can also be beneficial to a satellite uplink. National Gateway uplinks WPIX-TV 11 from New York for United Video for distribution to cable systems across America. The WPIX superstation is received by National Gateway over the air as a broadcast signal.

"We use a Yagi antenna, which is a high-gain, high-directional, high-front-to-back ratio antenna," explains Hoeger. "It's a multielement antenna that's cut—tuned—specifically for the station. Fortunately, we don't have interference from aircraft, but there is a large power grid in the area. For this reason, we peri-

odically conduct an RFI test using a color video monitor and a Tektronix model 1480 waveform monitor, which can display one sweep of the video—any line in the TV receive signal—for close inspection."

### On the beam

After the video has been delivered to the uplink site, the next step is transmission to a satellite. In the case of network television, the transmission of a large volume of program material and other feeds demands extensive control and coordination. Add to this the SNV transmission traffic of affiliates, and the picture gets even more complicated. The direction that network TV uplinking is headed may well be indicated by NBC's Skypath facility, which began operation several months ago at the network's New York headquarters.

Skypath is NBC's own earth station, transponder management facility, and control center for regional uplinks, affiliate TVROs, and SNVs. Skypath's master earth station—which frees the network from total dependence on common carriers—is located near NBC studios, atop a neighboring building in Rockefeller Center. The earth station is equipped with a pair of 8.1 meter Harris antennas and several accompanying structures that house a fully redundant complement of transmit-

ters, receivers, and related earth station hardware. Comsat General leases the system to NBC; the Harris Corporation's Satellite Communications division handles its maintenance.

NBC's master earth station transmits to three time zones; a second Skypath master earth station in Burbank, CA, feeds NBC's Pacific network. NBC's historic commitment to Ku-band satellite distribution includes eight regional earth stations, a fleet of six transportables, and a total of 40 affiliates that will own SNVs by the end of this year. The network also expects to have 50 Harris portable uplink package systems (PUPS) in service by 1987. Used to transform an affiliate's TVRO into an uplink—should the need arise—a PUPS is contained in two 125-pound transport cases. These attach to the TVRO antenna's kingpost to minimize waveguide loss. One case contains an exciter and a local control module to interface with Skypath's computers. The other houses the HPA and a 160-watt power supply.

NBC has six full-time transponders on Satcom K-2. The network's considerable satellite traffic, which includes program distribution, sports backhaul, news feeds, and Skycom—a service to affiliates enabling them to exchange news and sports programming among themselves—is coordinated by Skypath.

"Skypath gives the network more flexibility," comments Arthur Waardenburg, manager of Skypath control. "We can make more efficient use of our transponder time. Instead of having to schedule a block of time from a common carrier we can use as little or as much time as we need. We can, if we choose, get feeds out of a number of places in the space of 30 minutes. It also allows the network and its affiliates to react to breaking news at a moment's notice, or to respond to last-minute requests from affiliates for changes in sports coverage if league rules permit."

The heart of Skypath is a NASA-like control center illuminated by a bank of video monitors



The Vernon Valley network monitoring center checks all video programming on RCA spacecraft and can determine if signals are being transmitted on spec.

in its front wall. Two long, wood-trimmed consoles encase an array of waveform monitors, vectorscopes, and computer screens to monitor the status of all network satellite video traffic. For MTS there are VU and peak program meters for each channel, and stereo phase is displayed on the vectorscopes.

"As a part of the NBC operations and technical services department, Skypath's control room design reflects the needs and requirements of the operations group," comments Steve Paganuzzi, engineering manager for the NBC satellite network. The conceptual designer of the control center, Paganuzzi located the traffic and broadcast operations coordination departments on either side of the facility's sliding glass walls to centralize these related areas. In this way, communication and reaction time between departments is expedited.

Spectrum analysis of the status of the network's six video carriers on Satcom K-2 is dramatically displayed on a 46-inch RCA projection TV in the lower center of Skypath's monitor wall. The picture is relayed from a small CCD camera aimed at a spectrum analyzer in one of the structures at the master earth station.

Essential to Skypath's coordination of video feeds is its

Satellite Network Management System (SNMS), which consists of two separate computer systems, both of which are fully redundant. Both communicate with member stations via an SCPC relay on Satcom K-2. The first system, run by a General Automation computer, operates the network's complex pre-set switching routine. Affiliate TVROs and earth stations are turned on, off, or tuned to different transponders to receive sectional feeds, affiliate news exchanges, closed-circuit feeds, and news feeds.

The second half of SNMS is the Skypath maintenance controller, an Intel computer that troubleshoots each regional uplink and affiliate TVRO. Data is acquired by means of redundant Intel site controllers. NBC's TVROs have a one-watt uplink capability for transmission of this data. The status of each affiliate's earth station is logged into the main Intel computer at Skypath, and technical problems are identified. In this way, member stations are assisted in identifying earth station malfunctions, and appropriate switching to backup components is accomplished.

### Checking the transmission

Major network or small uplink, the best test of transmission is the

## Video Uplinking

downlink. "I look at my uplink testing more by the downlink side on a loop back," comments National Gateway's Don Hoeger. "On the uplink you can set your input levels, check your power and deviation, but the ultimate result is to observe the downlink side from the bird."

Verification of signal and power levels in the RF path from the exciter to the power amplifier is accomplished with a power meter, an important test device for satellite transmission. For setting video deviation of the carrier a spectrum analyzer is used, measuring the signal as it leaves the exciter. These tests are required only periodically; measurement of the downlinked signal is usually ongoing.

Skypath is one of many large facilities that use the Tektronix 1980 Answer automatic video measurement set for constant monitoring of its downlinks. "Answer does in under two minutes

what it takes a human two hours to do, and with no human error," observes Dave Gardner, manager of the network monitoring center at RCA American Communications, in Vernon Valley, NJ.

One of the largest commercial earth stations in the world, and the flagship earth station for the entire Satcom system, Vernon Valley is RCA's central location for interfacing with Satcom customers. Because of this, the facility requires constant and comprehensive status information on the system. For video, this information is provided by Answer machines at its South Mountain, CA, earth station, its New York TOC, and at Vernon Valley. A Racal-Vadic modem enables the Answer at Vernon Valley to interrogate its distant counterparts, resulting in fast and totally accurate monitoring.

"We depend on Answer because it is the system of preference of many of our full-time and occa-

sional clients, including Home Box Office and the major broadcast networks. Some of these customers we uplink, some uplink themselves, such as HBO. They use Answer to document problems, and our having Answer enables us to get the same numbers, in effect speak the same language that they do. It allows us to determine the location of these problems, whether they are on our end or theirs," Gardner says.

Vernon Valley's network monitoring center constantly oversees all video transmitted to RCA spacecraft, checking signal specifications. The center also acts as a watchdog, monitoring the transponders of eight different spacecraft.

RCA American Communications at Vernon Valley controls not only the use of its satellites, but their movement as well. A tracking, telemetry, and control (TT&C) department relays orders to the spacecraft to perform ma-

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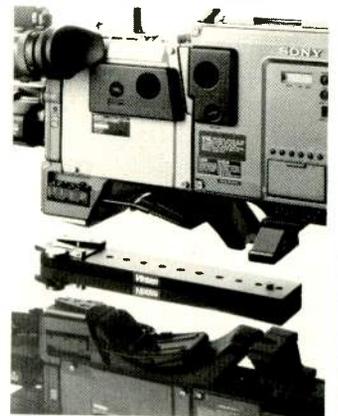
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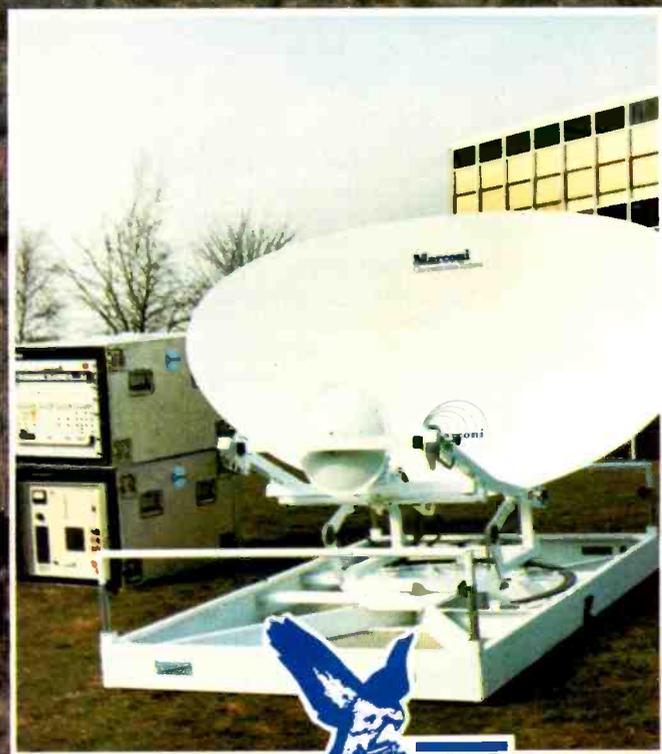
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### Video Uplinking

neuers to keep them in their box, an assigned location on the orbital arc. "Satellites move and drift," says Gardner, "TT&C performs normal station keeping on the birds to minimize earth station antenna adjustment. We have learned over the years the best ways to manage satellite fuel and batteries to maximize the life of the spacecraft."

Because satellites move within their boxes, and because careful antenna aiming is vital to uplinking, peaking the dish is often a necessity. This is especially true for uplink facilities that perform numerous occasional transmissions, accessing many satellites. Antenna control systems memorize satellite coordinates for automatic aiming,

but even then peaking may be necessary. "For downlinking the earth station controller's aiming is usually fine," remarks Jim Wright, of Koplak Communications Center, in St. Louis. "But for uplinking you have to peak the antenna so that it's aimed perfectly at the satellite."

Receiving a signal known to be transmitted from the satellite to be accessed can assist in peaking an antenna. Carrier to noise meters or power meters verify optimal tuning.

Prior to a feed, the proper satellite or transponder control center must be contacted for authorization.

The uplinking entity will then be instructed to commence transmission at low power. This avoids interference with other signals in case the nascent transmission's frequency or polarization is incorrect. "Sometimes your transmission is fine, other times it may take several minutes of tracking around to get it peaked up," says Wright, "or your polarity may be off, requiring rotation of the feed horn."

But once the transponder is fully saturated, uplinking is usually a trouble-free procedure, yielding better quality at lower cost than traditional terrestrial distribution schemes ever could.

### Testing

Generally speaking, the sophistication of earth station hardware ensures reliability. Constant monitoring and preventive maintenance avoids nasty surprises of component failure. When a malfunction is suspected in an uplink, the loop test translator is the principal tool for checking the entire transmission chain.

The translator performs the same frequency change on an exciter's output that a satellite would, without the expense.

The translator's RF connection can be inserted at several test points along the transmission chain, allowing for testing of one or all of its components: video exciter, cable between exciter and high power amplifier (HPA), HPA, and a portion of the

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waveguide. (A common test procedure is to terminate the signal in a dummy load along the waveguide.) Looped back into the receiver, the signal is evaluated with standard test equipment.

Reception limits can also be determined with a loop test translator. Attenuation added to a translator's return carrier determines the margin above threshold of the receiver, especially useful in simulating rain-fade conditions in Ku-band.

Rain and other environmental problems can also impair the performance of waveguides. One technique for troubleshooting waveguides is the use of a sweep generator at the input of the HPA, with spectrum analysis of the generated signal at the antenna.

### Power insurance

Basic to any facility that consumes large amounts of electricity to do its work is the need for a reliable power source. Although

earth station or teleport design may include extensive measures for the optimization of its transmission and reception capabilities, power line disturbances or outages experienced by a local utility could disrupt service—and profitability—at any time. Uninterruptible power supplies (UPS), long used in hospitals and the data processing industry, are an essential safeguard in satellite transmission.

"Without a UPS we're at the mercy of the local power company," states National Gateway's Hoeger. "Line noise is a common power company problem and if it's unchecked it will get on to everything else. Our UPS system eliminates such outside noise. We have a transfer switch that automatically changes us over to our Emerson 250 kW UPS power supply. It will correct for voltage and frequency fluctuations so that if the utility has a power switch problem in the field, we won't be

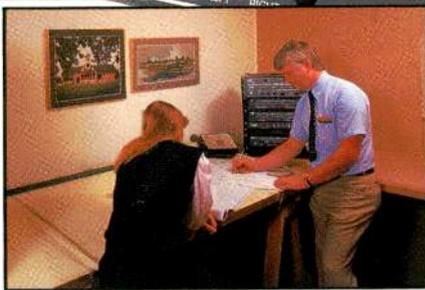
affected. We call it a hitless system, you don't see anything happen, and you would never know by looking at the transmission that switching had occurred."

UPS systems include large banks of batteries and—for prolonged outages—diesel generators, are an essential option.

Consistent electrical power is one of many contributing factors in effective video uplinking. Another factor is the power of truth in the ancient observation that the shortest distance between two points is a straight line. That fact has today created a new industry serving broadcasters, cable operators, corporations, and many other users of video. Transmission of video via satellite continues to grow, offering lower cost, greater flexibility, and the possibility of new video services. Whatever the future holds, the satellite video revolution will continue to be an important area to the broadcasting industry. **BM/E**



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# BUDGETING FOR POST- PRODUCTION

*Integrating almost any form of post-production capability into a modern television station can provide as many financial and budgetary hurdles as it does technical obstacles.*

By Tim Wetmore

**T**here are two sides to every story. In regard to providing a facility with editing and effects equipment, one side involves technical evaluation of system capabilities while the other side of the story is concerned with how to pay for those capabilities. Implicit in such evaluation, of course, is the determination of true need of the equipment, the reasons therein, and whether or not the station can afford it. This boils down to one word known to all: budgeting. It is important to examine how different budgeting approaches reconcile with the various technical solutions required of a broadcast, or any video, facility.

What all this means is that engineering and management need to take a look and see what they need to stay competitive and what is necessary to fulfill technical requirements.

Due to market competition and the currently popular polished look most stations use for their on-air image, a good deal of a station's equipment expense must go into the editing and effects department in order to stay in stride. Indeed, staying competitive and replacing old equipment are two of the most important criteria for purchasing such equipment. Thus it is that the modern broadcast environment requires a fairly high level of sophis-

tication in the post-production department. Whether the station has a completely outfitted post facility in-house or whether they have just a few dedicated edit rooms, station management must fit such capital expenditures into its overall equipment buying plan.

Developing that plan, setting up a purchase schedule, and fitting these elements into the overall financial structure of the station (or stations, in a group-owned context) are the essential building blocks of a stable operation. The finishing touches in the plan come during implementation, and that's where things get a little complicated.

## **Financial philosophy**

The one element that controls the way in which station management views equipment is the financial procedure, or philosophy, under which the company operates. This may seem obvious, but think about all the different ownership manifestations: network, group, and independently owned/operated. Obviously in a network situation, the layers of management through which the budget must pass are deeper and more numerous.

CBS maintains an ongoing five-year corporate capital expenditures plan. Charles Upton, director

# Broadcast Management

## Budgeting Post-Production

of technical operations at WBBM, a CBS-owned and operated station in Chicago, states, "After the station personnel arrive at a general purchase plan for all capital expenditures comes a budget proposal, which is presented. This must include all the reasons for buying the equipment, addressing both the technical and financial issues involved. Also a figure is set by the division and subsequently approved by Broadcast Group, which oversees all requests from within the group, which all must be based on need."

Since WBBM does not have a complete post-production facility nor does it operate a control center within the station, the requests for equipment are folded into the larger orders for other studio gear. Two edit studios are maintained at the station, one for studio functions and one for news; the equipment costs are allocated separately. This clearly demonstrates the way in which the hardware and budgeting are so closely interrelated: since the physical operation calls for doing effects and other enhancements during production or another phase of the operation, a smaller post-production capability is required and is reflected in the budget. Other stations may have fully outfitted post-production suites requiring budget adjustments.

### Budget structure

Also affecting the financial perspective on equipment purchases is budget structure as it relates to internal operations. Some stations have complete post-production facilities but use them mainly for purposes outside of news and general station needs. One such approach is demonstrated in Boise, ID, where KBCI maintains two umbrella units: direct and indirect revenue generating departments. The "retail production division" is a revenue generating device that makes commercials for outside clients as well as supporting internal work. The indirect unit, on the other hand, encompasses such departments as news, for which the profit figure cannot be easily identified. The budgets for capital equipment expenditure are closely scrutinized by management with the basic viewpoint that if it is a direct revenue generating device within the technical/financial structure of the station, it has a higher priority over other equipment.

Such a structure makes good business sense, but it is essential that important functions of the station not be neglected simply because profit cannot be directly attributed. Everyone, including Tim Bever at KBCI, would acknowledge that a good local news show is good for the community, is good for station ratings, and thus is good for the bottom line, though proving it with actual dollars might be difficult.

News at the Boise station does have its own equipment budget, which is broad and covers not only its dedicated editing gear but vehicles and all other hardware used in the department. KBCI

does involve itself with other group stations (owner is Eugene Television, Inc.) for exchange of ideas and to take advantage of whatever group buys may be possible when equipment needs at sister stations coincide.

### Group budget policy

Often, stations will be restricted in what they can do by whatever the group policy is. Some group managements require very detailed, itemized equipment lists for approval, others do not. Some budget by department, while other groups simply want a general capital expenditures figure.

WCMH in Columbus, OH, is an NBC affiliate owned by Outlet Communications. General manager Gary Robinson recently rebuilt the Columbus facility, and group management, he feels, set up the financial structure for doing so quite well. "Though the company restricts what types of purchases we can make," he states, "each station calls its own shots as long as we can justify the expense." Equipment buys are broken out not by department within the station, but by general categories that fit into an overall plan.

"We wanted to rebuild our station because the additive, patchwork approach didn't work—we knew we'd always be behind that way. To completely rebuild and to work out what we could spend, we talked to the other Outlet stations and even some others outside of the group for guidance. There is latitude locally, since headquarters wants us to be competitive and since we are responsible for our local results."

The strategic approach was to start with master control since it is the heart of the station. Engineering was involved immediately for help in identifying problems. Then the viewpoints of users and planners were mixed to come up with the decisions. This process was used throughout the redesign beyond the core consideration of master control. Obviously, equipment choices and engineering input affect how the budget gets manipulated along the way.

For example, while they were in the process of rebuilding, they added on to the structure to allow for a technical center. This was squeezed into the budget. In hardware, a new Quantel Paintbox was purchased, but, since its use is not limited to one department (i.e., post-production or news) it was difficult to assign the cost specifically.

Meanwhile, back at headquarters, Jerry Plemmons, vice president of engineering for Outlet, takes the broad view. Since the group owns four radio and four television stations, the most streamlined budgetary plan is to operate on a five-year cycle. Each station works on their own five-year plan, which fits into the overall corporate system. They just started a new cycle.

"As long as station revenues at least match the projections," claims Plemmons, "then they know how much money they are going to get. We require from all of our stations a list of the items they need

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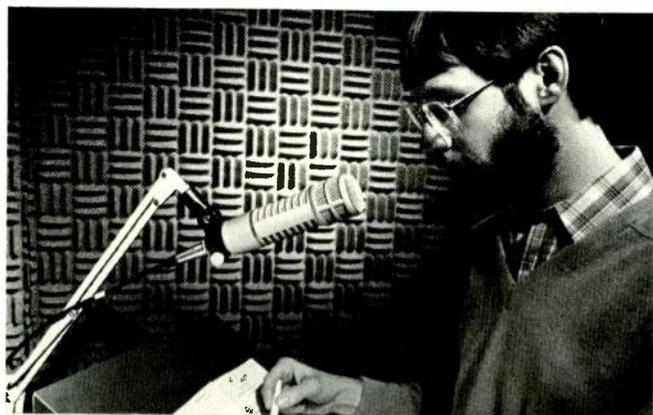
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Budgeting Post-Production

and the purpose for the request: whether its to replace old or broken equipment or whether its something completely new. If it's new, then there must be justification, such as to increase profitability of the station or stay on the air. There is also the matter of getting some piece of gear in order to stay competitive in their market. Then, all details of each equipment item, down to the features, need to be explained. Finally, the purchasing is done by the stations themselves once the budget figure is approved."

To enhance the value of such detailed and advance planning, Outlet has group purchasing deals with several major manufacturers. Of course, a local station can go outside the group purchase plan if the equipment doesn't fit into the local station needs. Cameras and graphics equipment, in addition to the wide variety of editing equipment available as well as many other high dollar items, may not be suitable for every station depending on their competition, the particular market, and the physical setup of the station (whether or not they have a complete post facility, for example).

The stations within the group are tied together in more ways than name alone. They all, officially at least, operate under one large capital expenditures budget, and it's possible that they may borrow from each other depending on the particular need. Technical advice is also exchanged. When Columbus was setting up its post-production facility, they consulted with some of the sister stations that had recently purchased editing equipment and which Robinson felt were similar in their needs. In this case, they ended up buying a CMX editor, not because of the price, but "because with something that important, features have as much priority as price, and that has to be considered when budgeting," explains Robinson.

Budgets need to have some room for change built in. It may seem contradictory since budgets by nature are a strict numbers game, but absolute rigidity when implementing the budget can backfire. In today's broadcasting world where things change so quickly, a station needs to be able to react, especially if they are located in a highly competitive market. At the Outlet stations, flexibility is built into the plan because of possible emergencies, and it is in these cases when the stations may borrow from one another.

One final consideration that may affect how the budgets are determined is depreciation. For this, the operation is separated into studio and other functions, and studio equipment (under which any post-production gear falls) is depreciated over seven years.

**Committee budgeting**

Operating on a five-year plan with yearly capital expenditures budgets, KARK in Little Rock, AR, sets its budgets and allots money for individual equipment purchases by committee.

Tom Bonner, executive vice president of the station, maintains that, "the committee approach was brought in two years ago when United Broadcasting Corp. (UBC) bought the station, and, in my 30-some years experience in broadcasting, I had never seen a system like this before."

The Little Rock NBC affiliate is the flagship for UBC, which also owns stations in Meridien and El Paso, TX. KARK, which has 115 employees, is run by four committees. Each committee oversees one aspect of the station: broadcast committee (which determines much of what goes on the air); capital assets (which determines when, how, and why money is spent); marketing (for sales and marketing); and personnel.

The members of the committee come from all departments and all levels of employees. In this way, education about the way the station's purchasing and budgeting works is disseminated to all departments. Fairly inexperienced workers at beginning levels are exposed to the experienced decisions made in the committee by veterans, creating loyalty, and knowledge to be used later if and when the employee gets promoted. It doesn't serve the station or the people involved to have someone in charge of a department if he is not familiar with the capital assets operation. The money available is known to those on the committee and being in-

involved with the process helps them learn to make decisions on their own.

The list changes as equipment is bought and/or reprioritized. On the same list will be, perhaps, an SNV, ENG cameras, distribution amps, a carpet, and a variety of other items. As each one is bought and as new items come on the list, the priorities may change. For this reason, the varied nature of

***"If it is a direct revenue generating device within the technical/financial structure of the station it has a higher priority over other equipment."***

the committee is very useful. Also, each department can feel it is close to the decision making process knowing it has a representative

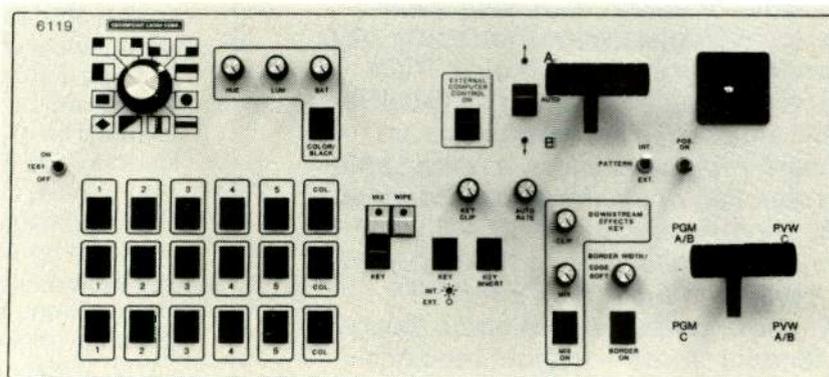
Before a decision is made, however, the department head requesting the product must come in and explain to the committee the reasons for the request. This may range from a simple explanation to a full blown presentation. When someone in production had a request, he produced a videotape complete with graphics to demonstrate the need. After they hear from the petitioner, either a consensus is reached or a full vote is called for. More

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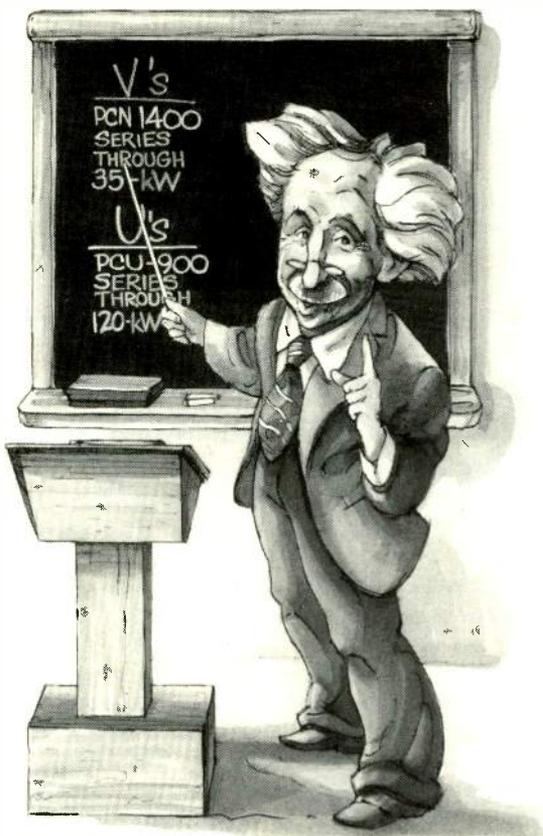
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## Broadcast Management

### Budgeting Post-Production

often than not, a consensus opinion carries the decision since reasons tend to be obvious in their advantage for the whole operation. The process is usually conducted on an annual basis unless a department head feels its necessary to call an emergency meeting.

### Future buys

Emergencies notwithstanding, the purpose of budgets is to keep control over money being spent, not only in amount but regarding how and where and for what it is spent. This is all geared toward streamlining the whole financial operation so there are as few surprises as possible as the station moves into the future. It also provides stability and flexibility if done properly, allowing the station to react to market demands in terms of what equipment it needs to buy to stay competitive and what is necessary for maintaining the operation.

A trend that is currently developing in both broadcasting and in the post-production facility world is editing package purchases. The road this trend is leading down seems to be one that will keep both the buyer and the seller happy. According to Robert Slutske, senior product manager, editing systems for Ampex, "The focus is now greater on complete editing packages because it seems to satisfy the three major considerations in a video operation: engineering, artistic, and ownership. All of these are involved in any money decisions, including budgeting."

The common thinking that a post-production house is vastly different from editing concerns at a broadcast facility are fading too, making the evaluation of the three basic categorical considerations more important. "The ownership perspective is: how do I meet my obligations after buying the equipment, and how do I get a return on my investment? The artistic or operational point of view is: does it work and help do things quickly, like train new people, or attract other people to the facility? The engineering perspective is: how do we keep it working properly."

The thread that runs through all these considerations is one of commonality; thus the integrated package or system approach to buying post equipment. If you only have to go one place it's easier to keep the maintenance level high and to keep things operating efficiently. Also, ease of training is evident in buying a package from one company. At Ampex, the customer can buy a complete room with editing, switchers, effects, etc. and have it all installed, tested, and explained to personnel in its Colorado Springs facility. Then the package is shipped to the customer's station and reinstalled and retested so there is complete familiarity with the system by the time actual operation begins.

"This packaging helps to eliminate hidden costs that tend to appear with systems containing individually picked boxes," claims Slutske. "It really shows up, because the maintenance people have to look at and study several different manuals and be

on the phone to several different companies, which ultimately shows up as increased cost factors. What you're really looking at is increased time." And more than anywhere else, in broadcasting time means money.

In addition, the experience or sophistication to put together an editing suite may not be in existence at the station. In these cases especially, the one-source system is attractive. There are, of course, considerations for buying different systems or parts of a system from different manufacturers. Points in favor of this strategy could be confidence in the manufacturer's products, features provided may be more desirable for a particular application, and a good track record.

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***"Training on an editor without a switcher or an effects device hooked up is only half-training since they will have to relearn when they add all these other components."***

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Obviously, major innovations have been made and many installations completed by the likes of CMX, Convergence, EECO, and many others who do not offer the breadth of product line to supply a complete room from tape recorders to switchers to editors. It seems their future is bright.

Nevertheless, another company offering a broad product line, Sony, shows indications of leaning more toward the marketing of packages. Tom Phillips, product manager for editing systems says, "More stations are interested in complete system deals than ever before. It's easier to go to one source, especially for the guys who don't have the money or the expertise to staff and maintain the equipment. Aftermarket support is the best reason for integrated systems purchases, and that support will save time and money."

Standardization and operating procedures are two other reasons for going with a package deal, especially if you are putting together a new facility or redoing an existing one; the package is efficient. It makes things all work together easier and makes for future ease of reconfiguration and updating. Finally, the training is better because you can train on the complete integrated system. Training on an editor without a switcher or an effects device hooked up is only half-training since they will have to relearn when they add all these other components.

Whether the integrated system approach is chosen, or whether the specialized companies are chosen as the source for post-production equipment, the essential budgetary considerations do not really change. Integrating the technical/operational questions with the financial picture remains the biggest challenge in formulating and maintaining the capital expenditures budget. **BM/E**

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## New H-P TV Test System

The HP 8770S arbitrary waveform synthesizer system is a new product from Hewlett-Packard that enables users to create and modify waveform test signals easily to test and predict television system performance under worst-case conditions.

Consisting of an HP870A synthesizer, 11776 waveform software, and a Hewlett-Packard Series 200 tech computer, the testing system outputs waveform samples at a 125-MHz rate, giving signal-generation bandwidths up to 50 MHz. A 12-bit, 128K word waveform sample memory accurately simulates television signals, and packets of waveform data can be stored in arbitrary order within the sample memory as well.

Other system features include external clock time base capability, deep memory and sequencing, 12-bit amplitude resolution, 560 MHz coverage, and an onboard waveform calculator.

*Circle 250 on Reader Service Card*



## Microtime Improves T-220

The T-220 FIT (format interchange time base corrector) from Microtime has been enhanced by the addition of several features. Now standard on the unit are input level AGC, for maintaining constant output levels; automatic mute, which switches the system output to black when there is no video present on the input; Vari-Trak operation, providing sync playback from  $-1x$  to  $+3x$  normal playspeed in dub mode; and selectable component modes, allowing output in Y, I, Q, and Y, R-Y, B-Y formats.

In addition, the T-220 features freeze with interpolation, dropout compensation, hysteresis buffer, simultaneous composite, component, and dub outputs, proc-amp controls, and modular construction.

*Circle 251 on Reader Service Card*

## Leitch Intros Test Generator

New from Leitch Video, the TTG-2500N NTSC transmission test generator provides 22 computer-generated video test-signal types designed specifically for FM transmission link applications such as satellite and microwave feeds. In addition, each

signal type is available at 10, 50, and 90 percent APL, for a total of 60 individual signals.

Three VITS packages are also included: FCC, CCIR (NTC-7), and CCIR plus VIR. EPROM-stored signals easily conform to changing industry standards and individual needs; conversion to analog occurs with 10-bit precision.

Other features of the test unit include H and V streaking signals, VITS insertion and deletion, internal RS170A genlock sync generator, stable TCXO, power-down memory, and an optional remote control panel.

*Circle 252 on Reader Service Card*

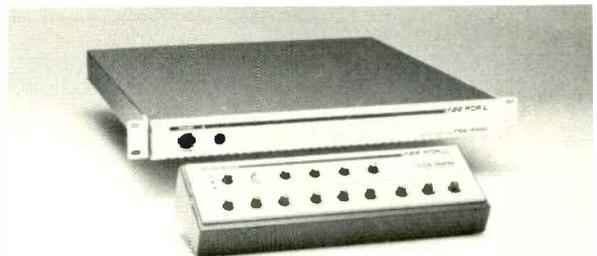


## VTA Creates da Vinci

VTA Technologies' "da Vinci" programmable color corrector boasts complete and comprehensive scene-by-scene interface capability with Rank telecine units.

The da Vinci features negative gain and PEC controls, Vari speed, repositioning moves, transport control, colorgrade, advanced signal processing, motion control, and list management functions. In addition to interfacing with Rank machines, the da Vinci can be coupled with Ampex ADO units, Ultimatte machines, Sony and Ampex VTRs, as well as VTA's own ADO composite/component video modification kit.

*Circle 253 on Reader Service Card*



## For-A Releases Component Color Corrector

The newest product in For-A's continuing series of equipment releases compatible with and based on its new CVM-500 component video mixer is the CCS-4400 component color corrector.

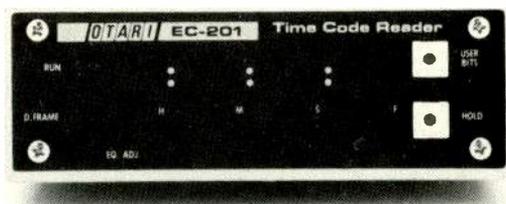
The CCS-4400, incorporating the capabilities of For-A's earlier composite correctors, offers more

## New Equipment

effective correction of black-and-white camera imbalance since the correction is applied directly to the component signal with no added signal distortion.

Other features of the CCS-4400 include Y, R-Y, B-Y input/output interfaces, RGB black and white level control, individual gamma correction for RGB, overall gamma correction, and remote (up to 1000 feet) operation.

**Circle 254 on Reader Service Card**



## Sierra Unveils CIK-1 Component Video Mixer

Now available from Sierra Video Systems is the CIK-1 component video mixer/keyer. Available in either RGB or Y, R-Y, B-Y formats, the unit features wideband linear closed-loop multipliers to either mix from one component video source to another or to key one component video source over another.

In addition, a GPI interface provides for external initiation of transitions, and a 300-foot range remote control panel offers flexible control of the compact one-rack-unit-high CIK-1.

The key source for the machine can be any combination of the foreground video luminance value, any selected color, any of the color components, or the luminance value of the external video. Key gain adjustment is available for use with computer paint systems.

**Circle 255 on Reader Service Card**

## Otari's New Time Code Reader

The EC-201, a new portable time code reader from Otari, is designed as an accessory for any audio or video tape recorder in field or studio operation. The unit features 1/20 to 60x play-speed reading, 40 hours of continuous battery-powered use, and reshaping circuitry on the loop output.

Other features include full hexadecimal user bits display, a -10 to +10 dBV input range, balanced XLR inputs/outputs, and an AC adaptor.

The 1.5- by 4.2- by 5-inch package comes with standard belt clips and batteries.

**Circle 256 on Reader Service Card**

## Ariste Cues up Playlist II

In 1982, Ariste Software began work on a computer program that could maintain the music libraries and generate playlists for radio stations, and Playlist II, a new software product from that company, is the result of that work.

The program can maintain custom libraries and generate tailored playlists according to user-selected music types, play patterns, and selection separations.

Playlist II, which runs on an IBM PC or compatible with two disk drives and 256K memory, also



## Two new Time Code Readers from skotel

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provides up to 26 categories, 16 day parts, 24 time patterns, 335 day patterns, six file attributes, play history for each title, flexible priority assignment, full control of rotation, and manual override.

List price is \$495, and a demo disk is available from the company for \$10.

**Circle 257 on Reader Service Card**

Modeled like a video switcher, with an all-digital control panel, the AMU provides full control and traditional styling in a minimum of space. Also, the console's unique digital control architecture provides a recall memory system and an electronic legend function as standard features. An optional plug-in serial interface for video editors is also offered.

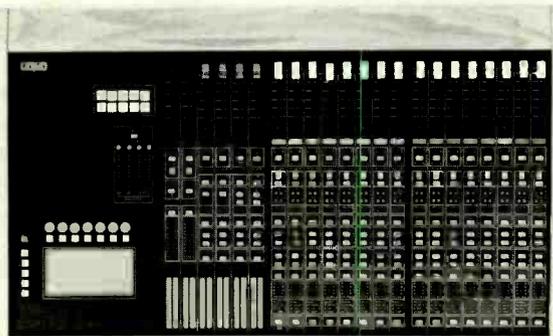
**Circle 258 on Reader Service Card**

## Tektronix Debuts Low-Cost Portable 2225 Scope

The new dual-channel 2225 Portable Oscilloscope from Tektronix not only breaks the \$1000 price barrier, it also offers a serious array of standard features—50 MHz bandwidth, alternate magnification, 500  $\mu$ volt sensitivity, peak-to-peak autotrigger mode, and high-/low-frequency trigger filtering—on a low-cost compact scope unit.

Alternative mag allows users to view both the normal and "zoomed" sweeps simultaneously. Selectable at either 5x, 10x, or 50x mag, the alternate magnification function gives the unit many of the benefits of a dual time base scope.

Targeted for field service, educational, and production testing applications, the 2225's TV trigger comes with selective triggering as a standard fea-



## Orion TV Audio Console

The new AMU series of 8-, 16-, 24-, and 32-input audio consoles has been released by Orion Research. Designed for broadcast, production, post, and remote applications, these consoles feature full input and output stereo processing.

# With our Automatic Remote Control System your transmitter – and your personnel – will operate with increased efficiency

Have you ever wondered if your night operator will remember . . . to switch patterns at sunrise? . . . to periodically check critical levels? . . . the correct transmitter restart sequence? You'll never have to worry if Potomac Instruments' RC16+ is on the job. Because it'll do all these tasks for you. Plus a lot more. Automatically.

With its microprocessor based control logic, the basic RC16+ provides 16 telemetry channels with automatic out-of-tolerance alarms and remote raise/lower controls;

plus 16 status channels. The automatic functions — pattern shift, transmitter restart, power control — are pre-programmed in accordance with station license requirements and controlled with an accurate master clock.

The RC16+ is also expandable. In 16 channel increments, up to a total of 64 channels. With the remote video display option your chief engineer can get a detailed readout of all measured parameters. It's updated every 30 seconds and connects to any standard telephone. The optional plug-in automatic logger provides a permanent record of all transmitter activity. Log intervals, sequence, and alarm flags are user-selectable.

And, best of all, the RC16+ is cost effective. No other unit on the market offers these features and capabilities at this low price.

Basic System . . . . .	\$4,995.00
Additional 16 Channels . . . . .	1,865.00
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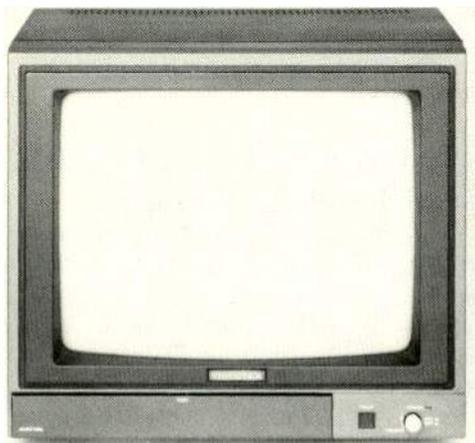
Circle 176 on Reader Service Card

## New Equipment

ture, making the unit well suited for a variety of television and video uses.

List price for the portable oscilloscope is \$995.

Circle 259 on Reader Service Card



### New Videotek Monitor

A new 13-inch color monitor, the AVM-13, has been announced by Videotek, Inc. Featuring an internal audio speaker and designed for a variety of applications, from line input monitoring to editing, the monitor sports a comprehensive array

of standard features.

The monitor includes A/B/VTR inputs, blue gun, pulse cross, underscan, internal/external sync, external demod input, keyed back porch clamping, and 8-pin VTR cabling.

Circle 260 on Reader Service Card

### Denecke Time Code Slates

Denecke, Inc.'s Dcode TS-1 time code slates feature high-intensity LED readouts for displaying time code, user bits, and drop frame status.

In addition, the slate utilizes a unique "clap" function: when the slate arm is in the open position, time code is displayed. When the slate is clapped shut, the time code display freezes for three frames.

Circle 261 on Reader Service Card

### Pro Bat Carries ProPouch

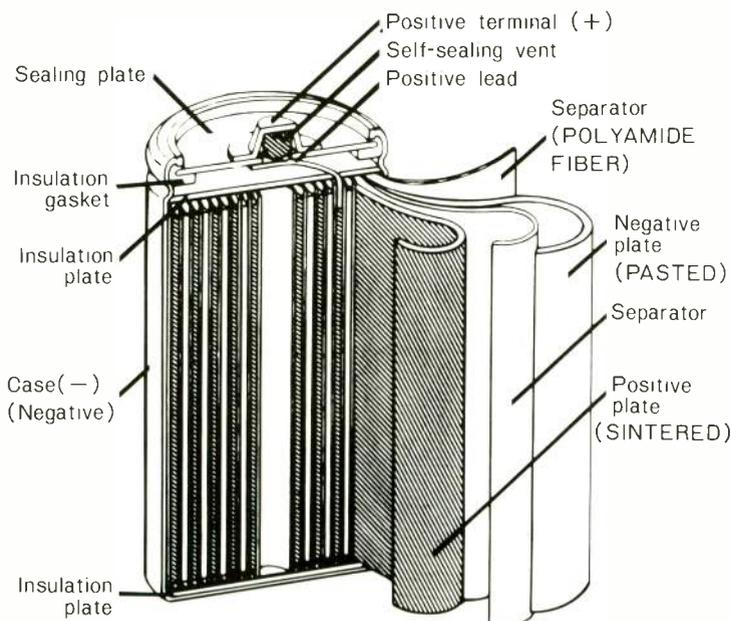
The ProPouch, a new lightweight battery system from Pro Battery Co., is designed specifically for ENG camera systems as an alternative to cumbersome battery belt setups used for remote lighting.

The weather-treated leather pouch holds one BP-90-type battery and is worn as a shoulder-slung unit. Optional clips allow for waist belt or camera deck mounting as well.

Circle 262 on Reader Service Card

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FOR SONY BP-90)

● QUICK CHARGER  
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● BATTERY DEMEMORIZED  
KD-120



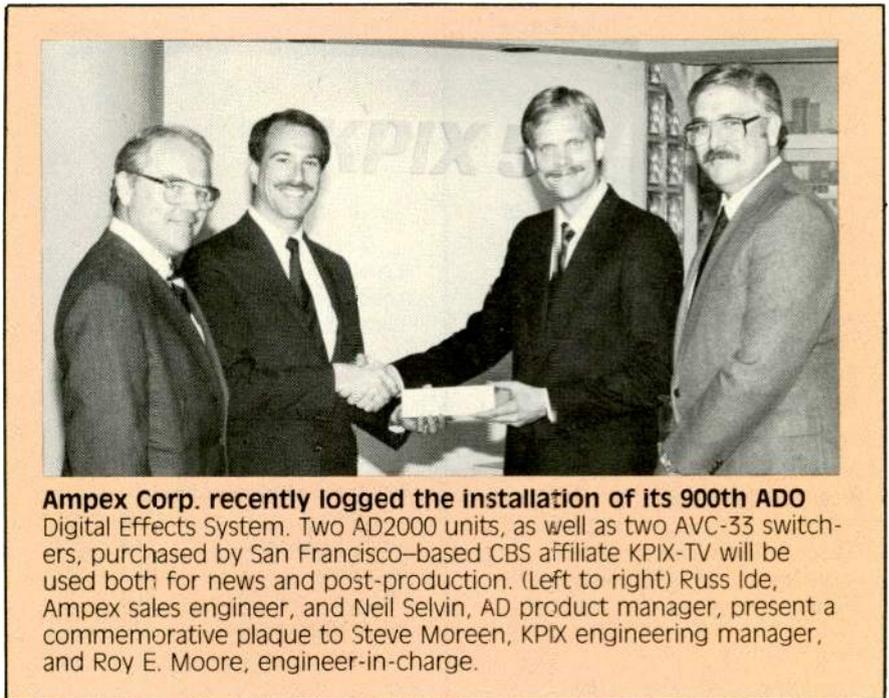
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Fiscal 1986 earnings reports are beginning to come in: **Harris Corp.** reports 1986 net income (year end, June 30) at \$59.6 million; \$1.48 per share. This compares with last year's net of \$80.3 million; \$2.00 per share. President John T. Hartley pointed to reduced sales and price pressures in the computer terminal and PBX markets for the substantial loss reported in Harris' Information Systems Sector. On the upside, Harris has just been awarded a \$2 million contract to provide NBC with voice and data satellite communications between its New York control center and affiliates' SNG field vehicles....A 21 percent increase in consolidated sales was reported by **Chyron Corp.** Up about \$6 million from fiscal 1985's \$29.4 million, the sales figures benefitted from "a strong uptrend in orders and shipments," according to chairman Alfred P. Leubert. However, Chyron's reported net income for fiscal 1986 was about \$2.3 million; down from last year's \$3.5 million....**Scientific-Atlanta, Inc.**, posted a net loss of \$9.2 million for the year, due to the effects of a \$18.9 million one-time charge against earnings. Operating earnings were down 30 cents per share (from 71 to 41 cents), but sales were up 7 percent over last year, totaling \$469 million. More recently, Scientific-Atlanta inked a \$2.2 million deal with Los Angeles-based radio networker **Westwood One** for the production of digital sat equipment for use by **Mutual Radio** affiliates.

**Music Business Institute**, an Atlanta-based music technology school, has purchased two **Harrison MR-4** 24-track recording consoles. The units will be installed in the institute's new studio complex and will be the focal point of audio production and recording courses. Nashville, TN-based Harrison adds this sale to recent deliveries of its AIR-7 console to facilities in the Peoples Republic of China, KPWR in Los Angeles, and three stations in St.



**Ampex Corp.** recently logged the installation of its 900th ADO Digital Effects System. Two AD2000 units, as well as two AVC-33 switchers, purchased by San Francisco-based CBS affiliate KPIX-TV will be used both for news and post-production. (Left to right) Russ Ide, Ampex sales engineer, and Neil Selvin, AD product manager, present a commemorative plaque to Steve Moreen, KPIX engineering manager, and Roy E. Moore, engineer-in-charge.

Louis, MO....A three-station group purchase of the **Thomson-CSF Broadcast, Inc.** Vidifont V graphics and animation system has been made by the **Harte Hanks Television Group**, San Antonio, TX. According to Harte Hanks VP Ray McMillan, familiarity with an older Vidifont at the group's Springfield, MO, affiliate led to the purchase decision.

**Intercontinental Televideo, Inc.**, has become the first production facility in the U.S. to install the new **Quantel Satin** all-digital standards converter.

Two new **Chyron Scribe** text generators have been added to Troy, MI's **Finishing House** post-production facility....A huge expansion project has been undertaken by **The Dub Center**, Owings Mills, MD. The facility now boasts four on-line one-inch Ampex and Sony units, nine RCA two-inch quad machines, as well as 70 Sony ¾-inch VTRs and about 200 Panasonic half-inch machines....Post house **Cal Image**, Rancho Cordova, CA, has recently added **Abekas A-52** digital effects and A-42 still store units to its full-service Edit-2 studio. A new **Dubner** 20k character generator will add 3D animation playback to the facility.

As we all know, Wally and

Theodore Cleaver are back with the new "Leave It to Beaver" show on Ted Turner's **WTBS** network, and **Editel/NY** is lending a hand. Editors Richie Jack and Bob Shott recently mixed, sweetened, and edited a 7½-minute promo for show producers **MCA**.

The **Studer/Philips** joint CD venture first announced at the 1986 NAB convention has been formally established with the recent signing of a research and development agreement between the two companies. The new firm formed by the contract, **Studer and Philips CD Systems AG**, will be based in Regensdorf, Switzerland, and the two parent companies will each assume a 50 percent share of the ownership and management of the new venture. Elsewhere at Studer, the company's New York offices have been relocated to 161 Avenue of the Americas, Suite 901....**CQI SportsTicker** and **WSI Corp.**, two satellite information networks, have joined forces to provide broadcasters with sports and weather data over the same sat system. Now, the Broadcast Sports Wire from SportsTicker and Astro-WX from WSI can be received on the same satellite system.

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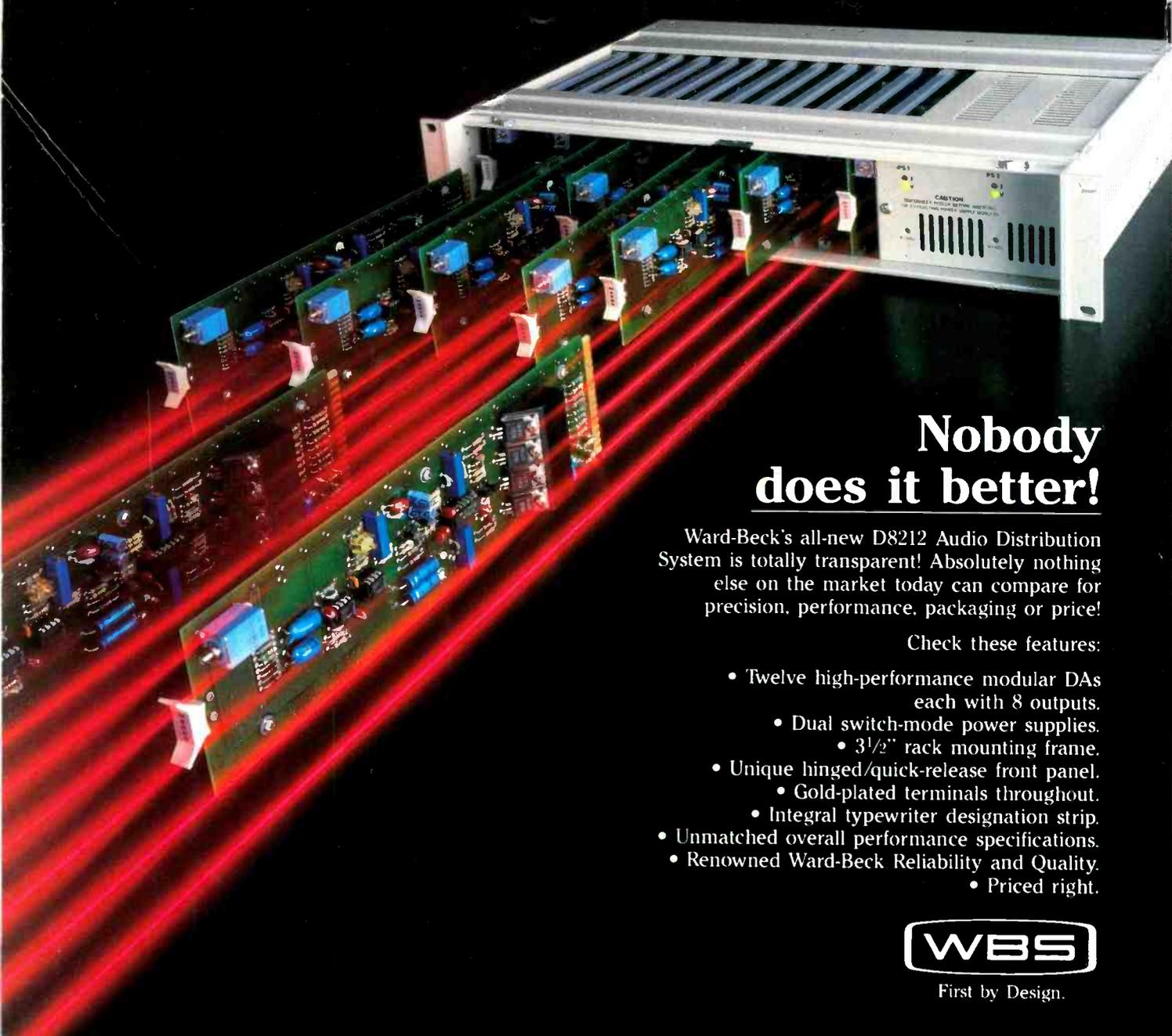


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