

BME's

**INSIDE: TRANSMITTER REMOTE CONTROL
NEW TECHNOLOGY BUYER'S GUIDE: AUDIO FOR VIDEO**

Television Engineering

AN ACT III PUBLICATION

\$3.00

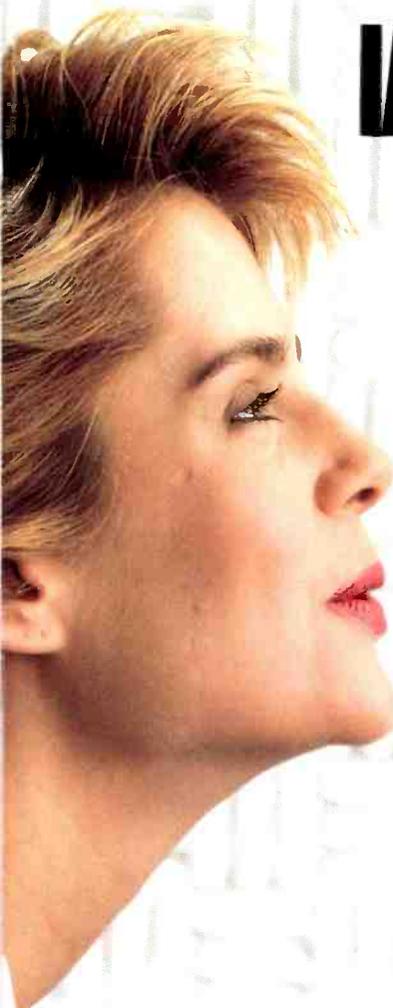
APRIL 1990

COMPONENT ANALOG DROPS IN

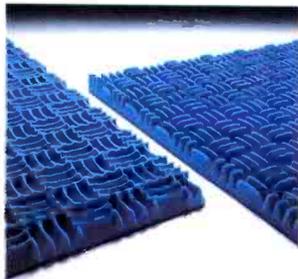
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INTO A
COMPOSITE
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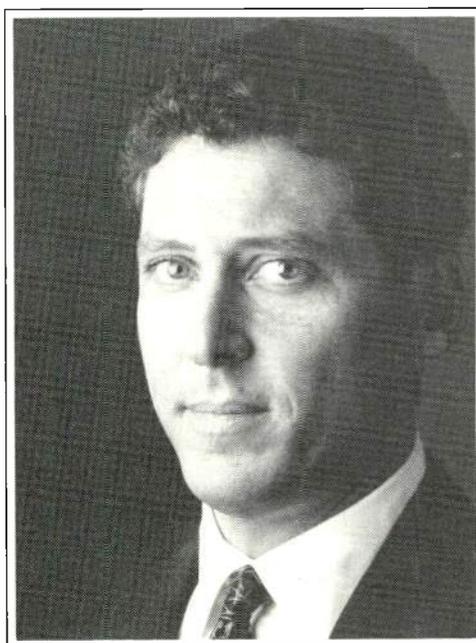


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When Viacom Networks had tough questions about Multi-Cassette Systems, Sony had the answers.

*Scott Davis, Senior Vice President
Viacom Network Operations*



When it comes to Multi-Cassette Systems, questions on efficiency, reliability and service are all pretty standard. But the answers are not. Because with each application there are variables. Like formats, capacities and software.

"It's a decision affecting every aspect of our operation. And it's a matter of doing what it takes to stay competitive in the years ahead.

For us, we knew the answer would be a Multi-Cassette System. Still there were many tough questions. Like how to implement a system that would satisfy our current needs, while working to fully

integrate many of our operations.

We looked very carefully at what was out there. The equipment, hardware, software, everything. We talked both to manufacturers and current system users.

Increasingly we found that choosing and installing a Multi-Cassette System involved more than just equipment selection. It meant establishing a long term relationship. One based on the confidence in knowing that should the need arise, the necessary engineering and service support would be close at hand.

It became clear that Sony had the hardware and software solutions we

needed to meet our challenges head on."

... Scott Davis

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For more information, contact your Sony Broadcast Sales Engineer. Or call 800-635-SONY. And have your questions ready.

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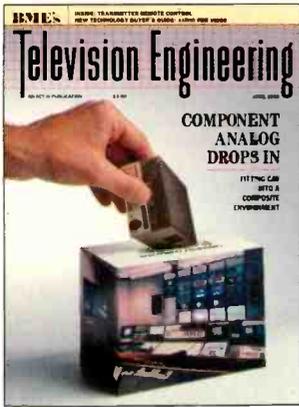
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The Number One Lens

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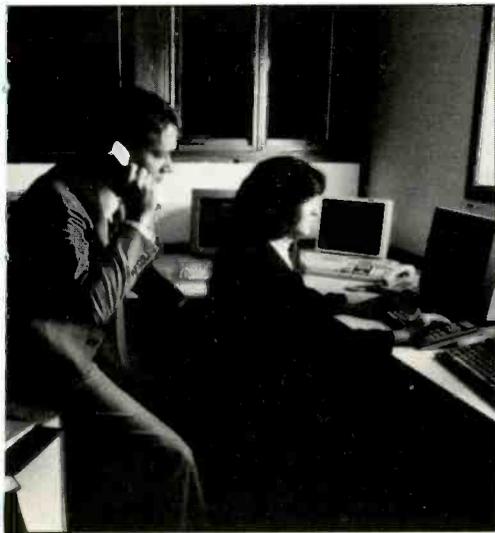
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On the Cover:
Photography by Gareth Hopson.



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44 Another Look at Component Analog Video

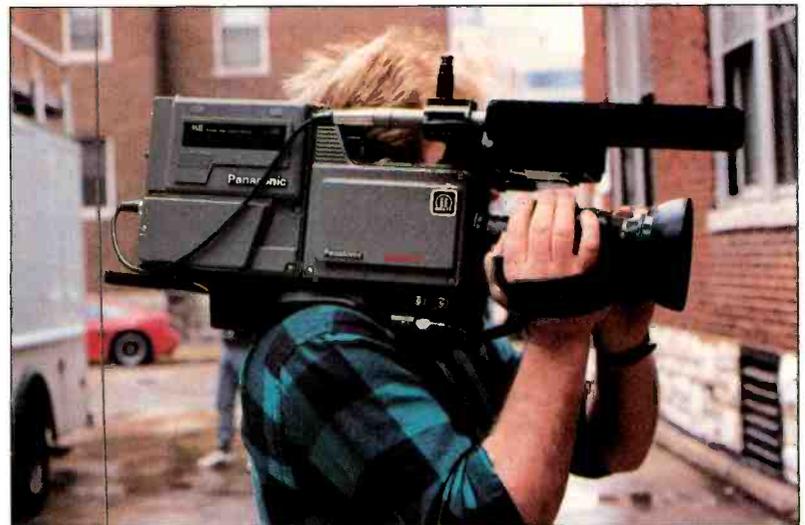
Is CAV the bridge to digital?

50 Remote Revolution

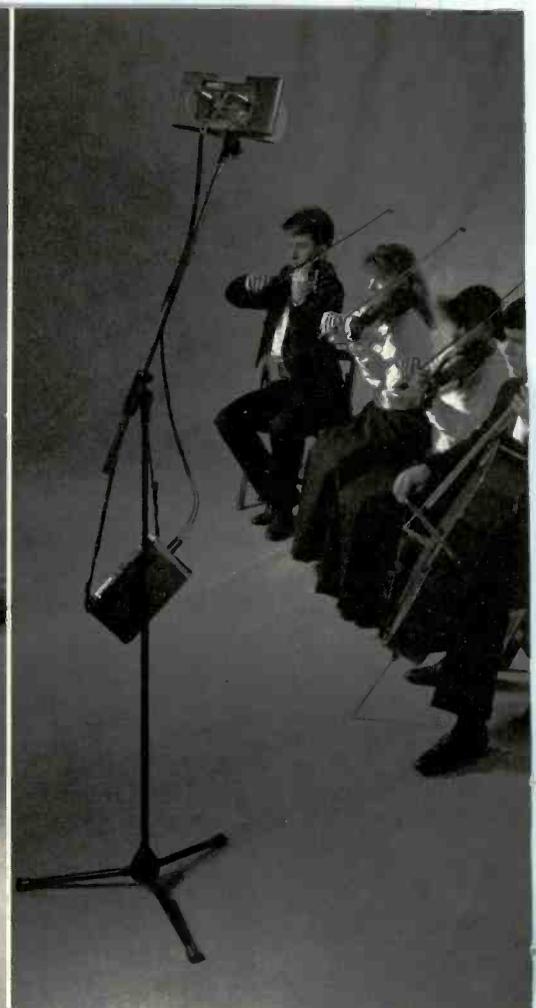
What used to be the work of the "transmitter guys" is now done remotely by master control. Advances in computer and satellite technology promise further changes in controlling station transmitters.

59 Soundproof Advice

Today's television studios have special soundproofing needs. Creating a quiet environment requires careful planning and construction, not quick-fix approaches.



44 Small-format camcorders led the way to Component Analog Video.



There's no faster, easier or better way to record incredible stereo.

When you compare Crown's new Stereo Ambient Sampling System™ (SASS™) and a DAT recorder with traditional recording methods you'll discover there's no faster or better way to record natural, beautifully imaged stereo.

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Also publishers of:

World Broadcast News
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BME's Television Engineering (ISSN 0005-3201) is published monthly by ACT III Publishing. BME's Television Engineering is circulated without charge to those responsible for television station and teleproduction facility operations and engineering, and to those responsible for specifying and authorizing the purchase of equipment used in television facilities in the U.S. and Canada. These facilities include VHF and UHF TV broadcast stations, cable TV systems, TV networks, corporate TV operations, audio and video recording studios, teleproduction and postproduction houses, consultants, etc. Subscription prices are \$36 one year, \$50 two years. Overseas: \$50 one year, \$75 two years. Air mail rates on request. Copyright 1990 by ACT III Publishing, New York City. Second class postage paid New York, NY, and additional mailing offices.

POSTMASTER: send address changes to BME's Television Engineering, P.O. Box 6056, Duluth, MN 55806.

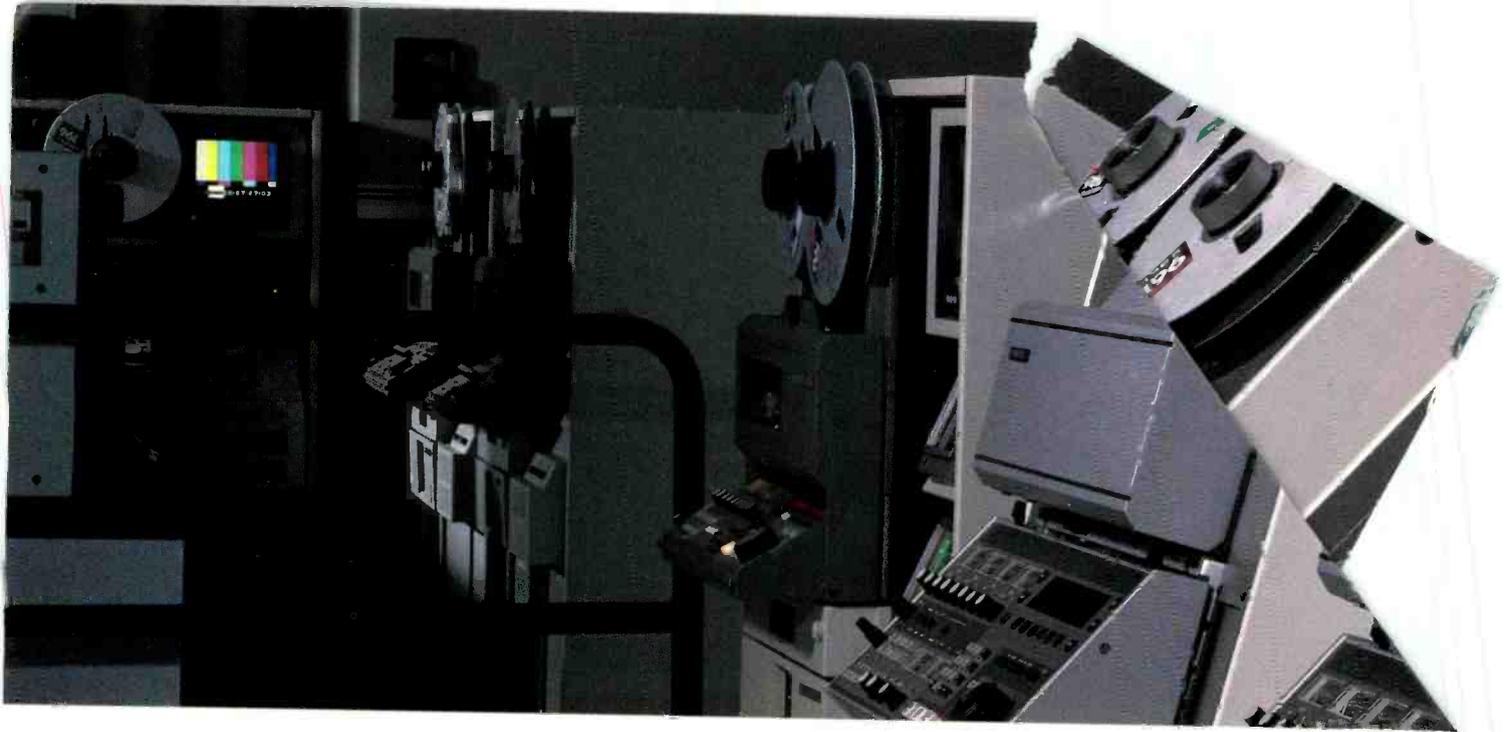
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A convincing argument for Type C from a company that invented D2.

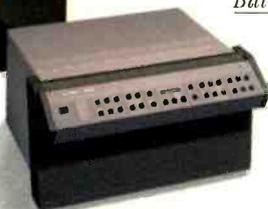
We didn't spend five years pioneering the world's first D2 composite digital recorder just to win technology awards—selling D2 machines is one of our top priorities.

But another and even more important priority for us is to make sure that the video professionals we serve have appropriate equipment for their jobs. And that they continue to look to Ampex



"... business more than tripled this year using Type C..."

Bill Stokes,
Bill Stokes Associates



*Ampex Zeus
Advanced
Video Processor*

straight story about that equipment and its

se in point is the question we recently
ral of our customers who purchased
we introduced D2.

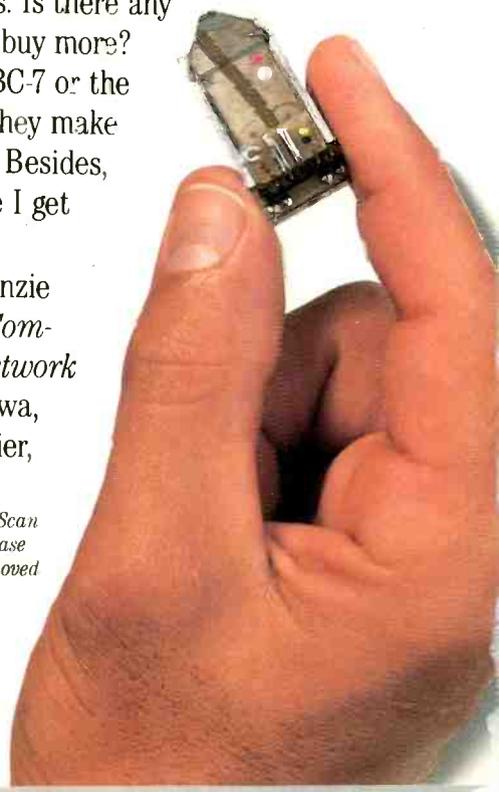
"With the introduction of D2, why did you purchase Type C?"

We think the answers we got may interest you if you're considering the purchase of *any* video machine.

Bill Stokes (*Bill Stokes Associates* in Dallas), came right to the point. "My business has more than tripled this year, and I'm using Ampex Type C machines. Is there any better reason to buy more? With the new TBC-7 or the Zeus processor they make perfect pictures. Besides, I like the service I get from Ampex."

Jerry McKinzie with *Cycle-Sat Communications Network* in Forest City, Iowa, (a satellite courier,

The VPR-80's Automatic Scan Tracking head and its erase head are both easily removed and replaced with only a screwdriver.





production, and post-production business), thinks it's important to be able to update easily as his business changes. "The hardware and software upgrades Ampex makes in their equipment allow me to keep my facility current, and to always give my customers the newest look. I like that, and my customers demand it."

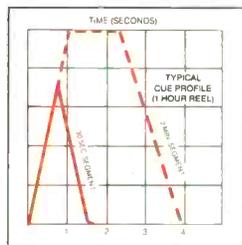
Darrell Anderson, whose company *Anderson Video* in Los Angeles, recently purchased several



"... Type C business is readily available..."

Darrell Anderson, *Anderson Video*

VPR-3s, pointed out that the Zeus port allows interface with D2. Darrell believes that, "Type C and D2 will co-exist successfully in a well-managed



The VPR-3's incomparable acceleration allows a 30 second segment to be re-cued and synchronously played in 2 seconds, using one hour reels.

facility. Type C business is readily available." We were gratified to hear that he, "bought the best Type C machine he could find."

Consider your purchase decision carefully. When the excitement of a new equipment introduction passes, and you've put the pros and cons down on paper, Type C may be exactly the right machine for your application. After all, it's still the world's broadcast interchange and distribution standard.

"... hardware and software upgrades keep my facility current..."

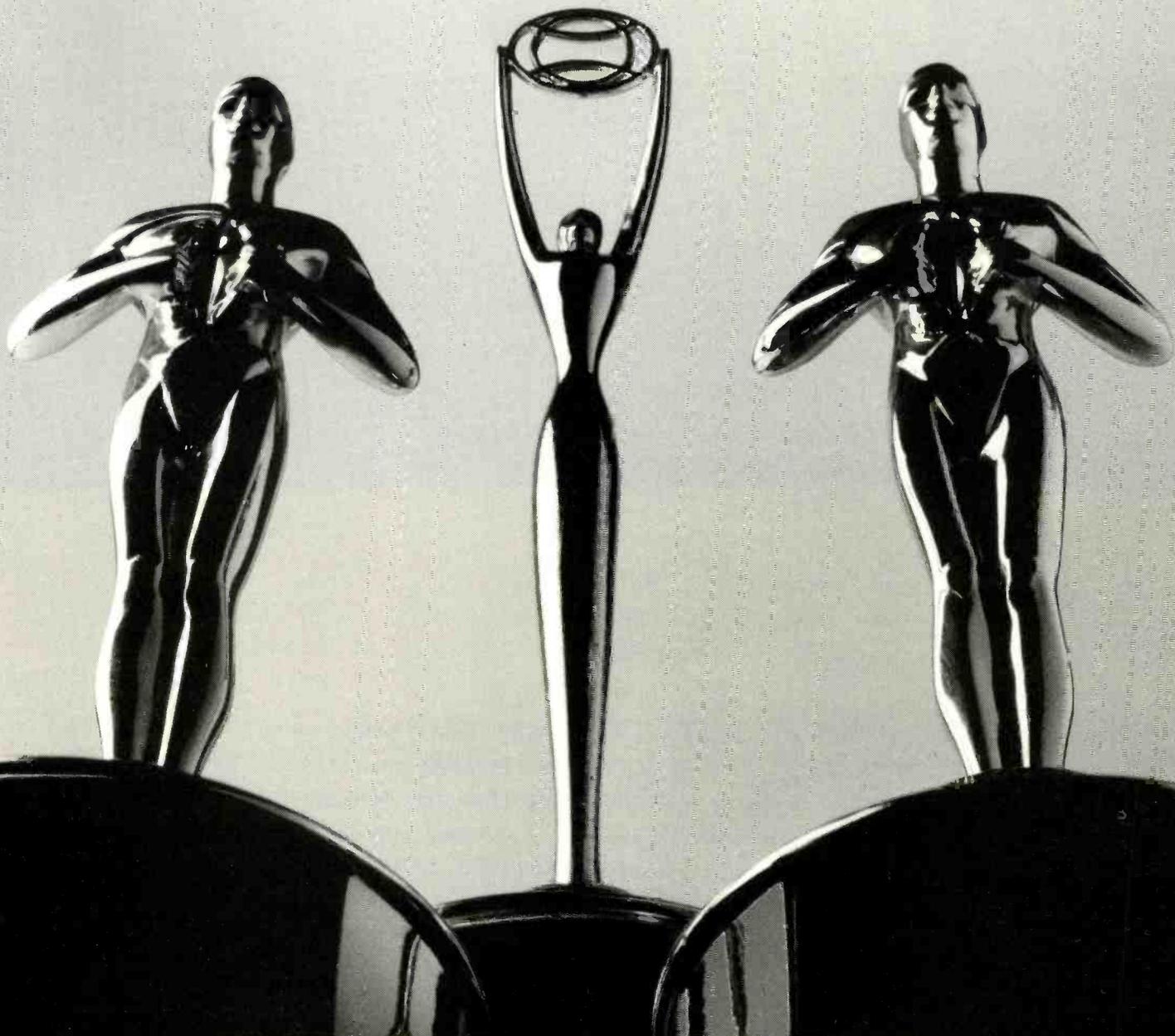
Jerry McKinzie,
Cycle-Sat Communications Network



And it is obviously the perfect choice for facilities that are moving up from 3/4-inch.

We'd like to be involved in your decision-making process, and we're as close as your telephone. Call Ampex at 1-800-25AMPEX for some real help with a difficult decision.

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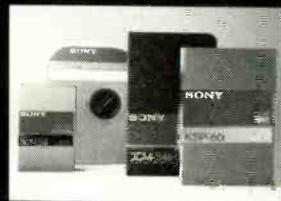
LEADERSHIP HAS ITS REWARDS.

Video leaders see the Sony difference not only in the quality of their pictures, but in their trophy cases.

Award-winning producers, editors, news teams and duplicators rely on Sony professional videotape to capture their best creations. They

see a virtually perfect balance of durability, reliability, audio-video performance and responsiveness in sales and service.

That's why Sony, the leader in professional videotape, is the choice of video leaders. Worldwide.

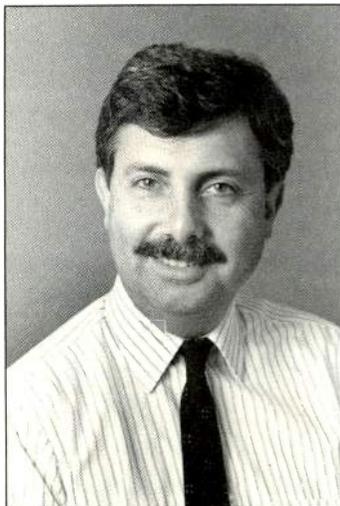


SONY
PROFESSIONAL VIDEOTAPE

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Station spending on equipment has stalled. When will the turnaround come, and how strong will it be?



Here's a startling fact. During 1990, the average TV station buying broadcast equipment will spend \$621,000. This is a mere one-percent increase over 1989, when the average station's equipment expenditures were \$613,000. This compares with a nine-percent increase (up from \$563,000) from 1988 to 1989.

Taking inflation into account, station spending on equipment this year is actually down. These findings are based on an exhaustive survey commissioned by *Television Engineering* and conducted by the independent TV research firm Frank N. Magid Associates, Inc. Data were collected via a random telephone survey of 245 affiliates and independents in the 150 largest markets. The results are projectable to the entire universe of stations in those markets with a five-percent margin of error. Details of the survey—including projected 1990 expenditures on 14 categories of broadcast equipment—will be published in next month's issue.

Why the stagnation? Conversations and interviews with station engineers and executives around the country confirm the already suspected: Revenues are down, viewership is becoming more fragmented, debt is up, and bottom-line managers are trying to hold the line throughout the industry. This has put a lid not only on hardware expenditures, but also on the purchasing of syndicated programming. Let's face it. TV broadcasting is in a slump.

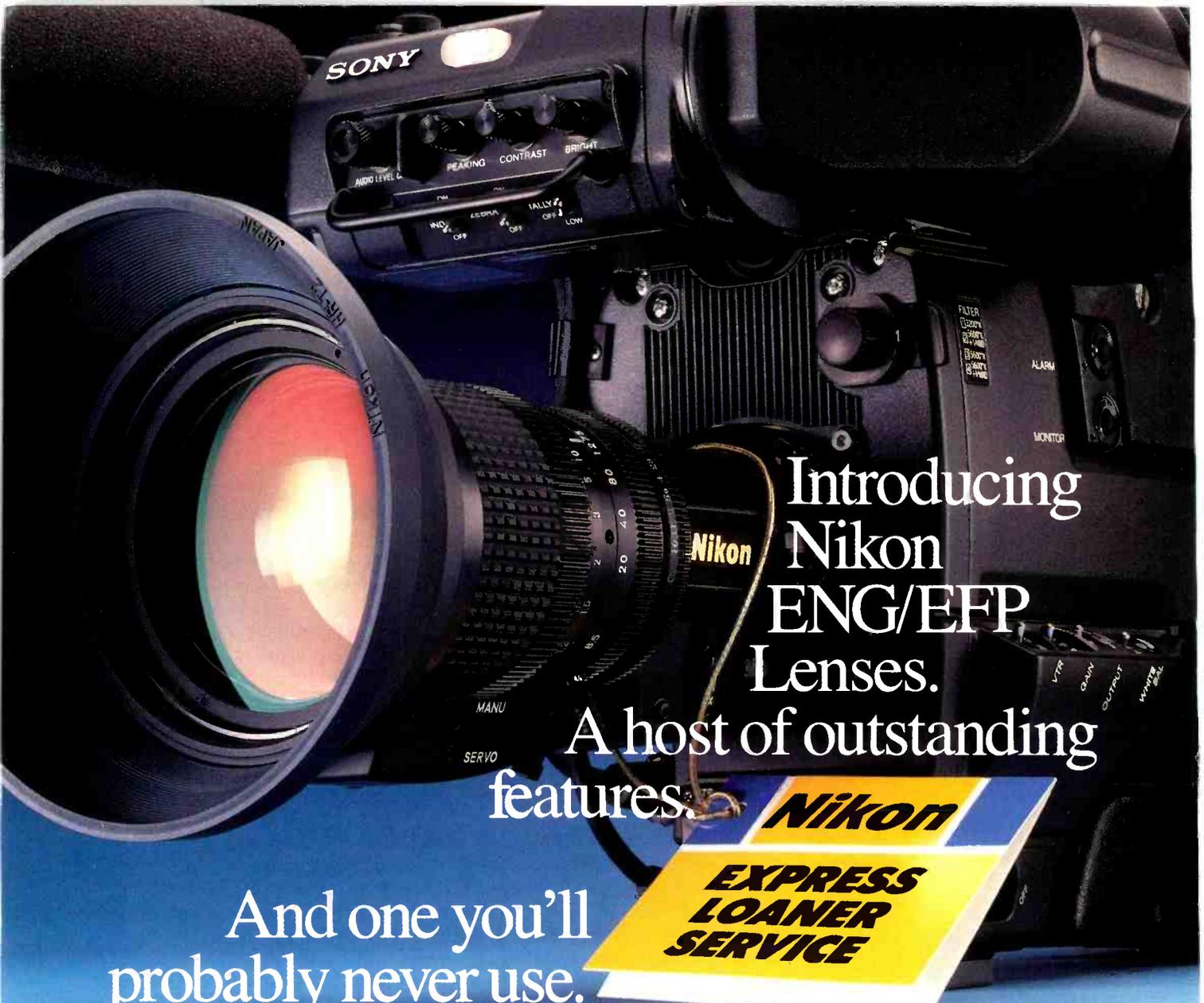
When will it end? Probably in a couple of years. Several factors will converge to turn things around. In 1992, the four-year cycle of Olympics and national election coverage will visit us again, boosting TV's ad revenues. At about the same time, much of the equipment purchased during the boom years of the mid-'80s will be amortized—not to mention wearing out—necessitating large-scale purchases for replacements.

These positive developments will coincide with major technical transformations that will further spur equipment buying. By then, a new recording format may well have broken through today's digital clutter—much the way Type C did in the '70s—eliminating the skittishness that inhibits buying during times of format wars. Also, when a high-def transmission standard is agreed upon, we may see the beginnings of a lengthy switchover among stations and networks to the new technology.

All this assumes TV broadcasters can hold their own among new competitors coveting slices of their market. If they do, happy days will come again. ■

A handwritten signature in blue ink that reads "Peter Caranicas". The signature is stylized and fluid, written in a cursive-like style.

Peter Caranicas
Editor in Chief



Introducing Nikon ENG/EFP Lenses.

A host of outstanding
features.

And one you'll
probably never use.

Selecting an ENG/EFP lens for your $\frac{2}{3}$ " CCD camera is a creative decision. It should be lightweight, responsive and zoom smooth as silk at any speed. Its design should utilize Extra-low Dispersion Glass to minimize chromatic aberration. It should include an anti-reflection coating for improved spectrum transmission ratio. And it should have an advanced design that improves corner resolution and produces a high, flat MTF curve. In short, it should be a Nikon.

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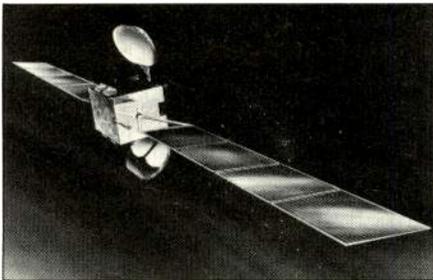
UPDATE

High Hopes: Sky Cable Aims for 1993 Launch . . . High-Tech TV Facility for Ogilvy & Mather . . . New Transmitter Technology On-Line . . . News Comes In All Sizes . . . Computer Program Supports Engineering Management

High Hopes: Sky Cable Aims for 1993 Launch

In late February, four major media and communications companies announced a joint billion-dollar direct broadcast satellite service scheduled to begin in 1993. Partnered in the venture are NBC, News Corporation, Cablevision Systems and Hughes Communications Inc.

The proposed DBS service, called Sky Cable, would offer up to 108 channels of programming via high-power KU-



band satellites. Home reception would utilize a small flat-panel receiving "dish" approximately one foot square. Sky Cable's backers say it

will provide convenient, low-cost access to a broad range of programming services.

At the press conference announcing Sky Cable, four executives—Cablevision Chairman/CEO Charles Dolan, Hughes Communications President Stephen Petrucci, News Corp. CEO Rupert Murdoch and NBC President Robert Wright—were long on concepts, but short on hard facts. Left hanging were questions on what program services would be delivered via Sky Cable, the level of participation of each company in the proposed operation, and the ultimate cost to the consumer. Nor was much light shed on the venture's corporate structure.

Also left unanswered were questions about financing. While the four partners agreed to contribute a total of \$300 million in equity (\$75 million apiece), the balance of the projected \$1 billion cost of the venture remains to be financed—which means that, in order to get off the ground, Sky Cable needs to raise \$700 million. (One major source of financing for the communications industry—Drexel, Burnham, Lambert—is no longer in business, after raising almost \$22 billion for broadcast-related companies. Many of the broadcasters involved in those deals, including Univision and SCI, have fallen on hard times, casting doubt on the value of investments in the industry.)

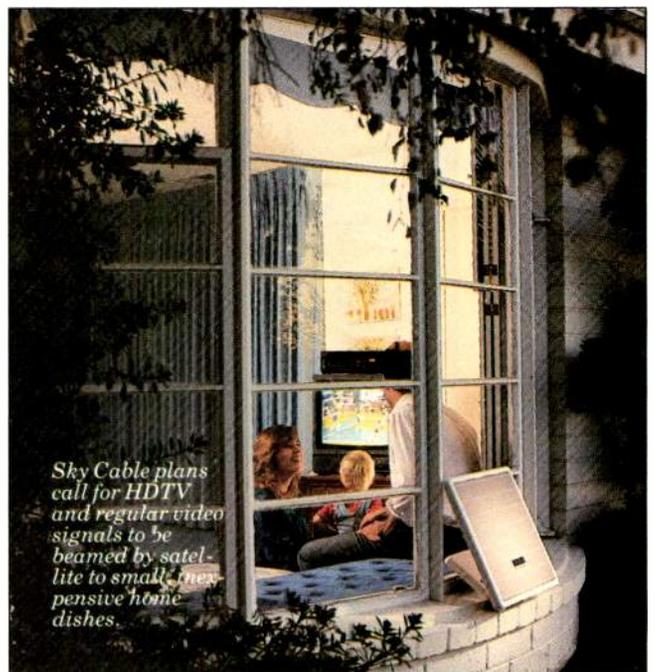
Each partner in the group brings a background of relat-

ed experience as well as a strong motive for participation.

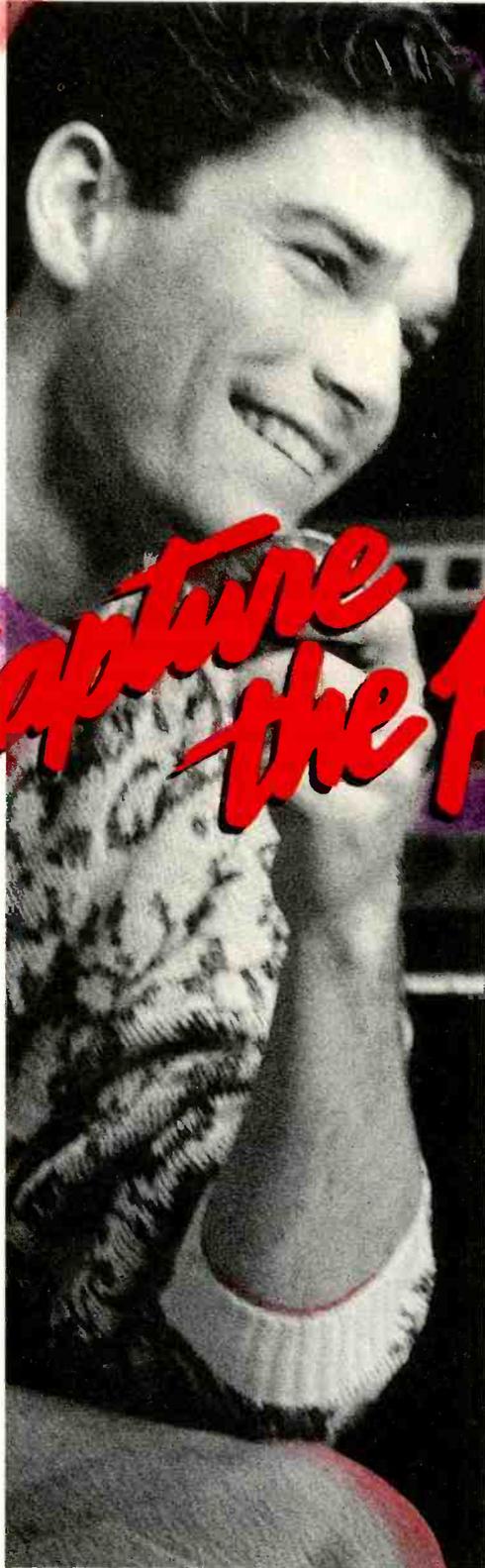
Hughes Communications is a major supplier of satellite transport, and plans to launch more than a dozen new satellites over the next few years. With much of the industry talking about land-based, fiberoptic transmission, Hughes has a strong interest in encouraging a viable DBS venture for which it provides satellites.

NBC's participation can be understood within context of its frustration in failing to obtain major cable clearances of CNBC, its cable network. By putting CNBC on a Sky Cable channel in addition to its regular cable distribution, NBC could bypass cable operators who have been less than anxious to carry the service. And such capability could be used as a bargaining chip in dealing with NBC Network affiliates. While protesting that there was no plan to carry the NBC network on Sky Cable, NBC's Wright sidestepped questions on the issue of NBC's participation in program services which compete with its own network affiliates.

Cablevision's programming service has had its own clearance problems with other MSOs, and while Dolan pitched Sky Cable as a supplement to wired cable systems, he also made a pointed reference to setting programmers



Sky Cable plans call for HDTV and regular video signals to be beamed by satellite to small, inexpensive home dishes.



Capture the power

1:45 Wednesday, having fun.
Your client cracks you up.
One hour into the session he
laughs, takes another bite of apple,
says... "this looks better than
the piece we did last week.
What's changed?"

You could tell him the only change
is your new Abekas A82 composite
digital switcher—its speed, digital
keyers, status monitor, digital
framestores, modular design—
and lots more.
But you don't.



A82 Composite Digital Switcher

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"free of the gatekeepers, regulations and local governments." Dolan's company faced regulatory problems in the New York City area over its dealings with sports programmer MSG Network. The implication is that with no governmental oversight, Sky Cable is free to program what it wants.

Clearances may also be an issue for News Corp., although in a slightly different context. The company is parent of the Fox network, which suffers from a lack of VHF affiliates. Most Fox stations are UHF, with a weaker position in their marketplace. An alternate delivery vehicle would help boost viewership, particularly in small markets and rural areas. When asked about programming, News Corp.'s Murdoch made an effort to distance the venture from the Fox network, stating flatly, "Fox is not involved in Sky Cable."

News Corp. is the only one of the four partners with DBS experience; it operates SKY TV in the United Kingdom—a venture that continues to lose money. Murdoch said that he expected it would take several years before SKY TV would be in the black.

Ultimately, the public will make its purchasing decision based on the perceived value of the program services offered. According to *Television Engineering's* sister publication, *Television Business International*, the SKY TV service costs approximately \$385 per year including rental of the receiver unit and dish. Programming is similar to what is found on a typical U.S. cable system.

While its technology is very interesting, Sky Cable's programming is what will drive sales. Stay tuned. ■

—William A. Owens

High-Tech TV Facility For Ogilvy & Mather

Construction of a major video facility for the sixth-largest ad agency in the world, Ogilvy & Mather, has been completed by Belleville, NJ-based East Coast Video Systems. The system, spread over 16 floors at O & M's World-wide Plaza offices in New York City, is used for production of test commercials and client presentations for the agency.

The facility includes four

Ogilvy and Mather edit room sports all the latest video "toys."

edit suites, a production studio with control room, two audio sweetening rooms, 23 conference rooms, two meeting rooms and a theater for client presentations.

Rich Basignano, president of East Coast Video Systems, described the O & M facility as "state-of-the-art, with big-league production capabilities."

The equipment list confirms that statement, with edit suites featuring GVG 200 switchers and GVG 151 editors, Abekas A53 DVEs, Dubner 10K character generators, Sony MPX-2000 series audio consoles, and Otari ATRs. The edit rooms are equipped with Sony BVU-950s, and may access a fleet of various-format VTRs based in a central machine room.

Ikegami HL-79 cameras are used in the studio, and the studio control room features a GVG 100 switcher, Abekas A53, Dubner 10K, Sony MXP-29, and BVU-950s. The audio rooms feature Yamaha 916 mixing consoles, Otari multitrack

ATRs, and a multitude of outboards, including Eventide Harmonizer. BVU-950s are used for audio playback.

From the central machine room, signals can be sent to conference rooms and offices throughout the building, via a three-channel, 160-drop RF system, or a 60-drop baseband system.

East Coast Video Systems is a 10-year-old engineering company with extensive experience in systems design and construction. ■

New Transmitter Technology On-Line

With the advances that have taken place in UHF transmitter technology, the Klystron vs. Klystrode debate continues to gain momentum. Transmitter manufacturers Comark and Harris each arrived at last month's NAB convention



with something new to brag about.

The news at Comark was the installation of the first 240 kw Klystron-equipped transmitter, at WDRB-TV, Louisville, KY. The Channel 41 transmitter went on the air on February 1, using one 60 kw aural and four 60 kw visual Klystrons to produce a five million watt ERP. According to Stu Kravitz, Comark's VP of domestic sales, the transmitter is "the first to use Klystron tubes to produce a 240 kw transmitter output power level."

The WDRB-TV transmitter is water-cooled, as are all Comark Klystron transmitters above 60 kw. The company showed an air-cooled 60 kw at NAB; Comark expects to have higher-powered air-cooled transmitters available within a year.

Proponents of Klystron technology point to power-consumption savings as the main benefit, with plant efficiency at 80 percent. The WDRB-TV 240-kw-output transmitter consumes only 300 kw.

Meanwhile, Harris Corporation makes the UM-series transmitters, which utilize the MSDC (Multi-Stage Depressed Collector) Klystron. The first Harris MSDC Klystron-equipped transmitter made its on-air debut at WNVT-TV, Falls Church, VA, February 4.

The MSDC Klystron applies today's engineering to a long-existing product. The tube uses much of the familiar wideband tube technology, including the same RF section and electron gun. The major ener-

gy-saving improvement over the old technology is in the collector stage of the MSDC Klystron.

"Someone with previous Klystron transmission experience would be very comfortable with the MSDC Klystron," says Greg Best of Harris's Broadcast Division. "Aside from a change in the way spent energy is collected, the operational characteristics are very much the same."

According to Best, the use of MSDC technology and the familiar operational characteristics make savings possible both in power consumption and operator training. In the example of the WNVT-TV transmitter, the 60 kw MSDC Klystron features almost twice the AC-to-RF efficiency as standard-pulsed external cavity tubes.

Both technologies offer benefits for station operators. But no clear winner has yet emerged. Many, like tube makers Varian and EEV, are hedging their bets, building both MSDC Klystrons and Klystrons, and letting their customers make the choice. ■

News Comes In All Sizes

A fire at a New Jersey auto dealership and some quick thinking by a local video crew resulted in an exclusive for pubcaster New Jersey Network.

On Monday, February 26, an early-morning fire at Maxon Pontiac, Union, NJ, was captured on 8 mm vid-

Computer Program Supports Engineering Management

Touted as the chief engineer's right arm, BCAM, a new computer program, has been introduced to provide support for the various engineering management functions. Created by experienced engineers and engineering managers at Computer Assisted Technologies, the software program is described as a user-friendly system for controlling the management of people and equipment.

A facility's equipment inventory is entered into the BCAM database. Trouble reports and repair requests can be tracked, and the program can generate a repair-history log on each piece of equipment. Repairs made and the person who made them are included in the repair history. This allows managers to project future parts requirements, or to determine manpower training needs.

The BCAM package also features a parts inventory system, which tracks parts in inventory, on order or back order; a "hints" system; a contact database and a manpower log for tracking work assignments. ■

eotape by Jerry Kampo and Rick Sullivan of Somerset, NJ-based K & S Video. The pair was traveling to a job site when they spotted the fire in progress. Using a Sony CCD-V220 Pro-8 camcorder, the team shot 12 minutes of fire footage, including several minutes prior to the arrival of local firefighters. After bumping the raw footage to Beta SP, the pair contacted the Newark bureau of state-owned public broadcaster New Jersey Network.

The fire gutted a building housing the used-car sales department, as well as several business offices. According to Joe Scibilia, operations manager for Maxon Pontiac, it was the quick work of local firefighters that saved the dealership's main building, located only 30 feet from

the fire site. All of that work was captured by Kampo and Sullivan on videotape.

While other television stations in the area featured tape of the clean-up, none had actual fire footage. According to NJN assignment editor John Russell, NJN "tends not to use outside tape, because of poor quality." But in the case of the K & S fire footage, Russell told us that the team provided "nice, stable shots, with clear pictures and broadcast quality." ■

Television Engineering welcomes your comments and opinions. Write to us c/o Editor, Television Engineering magazine, 401 Park Avenue South, New York, NY 10016. You may also fax us at (212) 696-4215.

BUSINESS BRIEFS

Equipment Sales

Club Theatre Network will use its newly-acquired **Media Productions** facility in Pompano Beach, FL, for transferring films to hi-def video with its **Rank Cintel MKIII HD telecine** . . . Citing lower initial cost and proven picture quality, **WICZ-TV**, Binghamton, NY, replaced its RCA primary transmitter with an **Acrodyne TRU/25KV tetraode transmitter** . . . **Boston Post-Production**, whose clients are high-tech firms and advertising agencies, purchased an **Ampex post-production package**, including an **AVC Century switcher**; **ADO 100 digital-effects system**; **ACE 200 editing system**; and upgrade encoder for the **AVA 3 video-art system** . . . **Washington International Teleport** is now providing transmission services to Sports News Network . . . **FOR.A Japan** will market, sell and service **7GV's D2500 D-2 digital video post-production switcher** under a new multi-year international OEM agreement . . . The first **UltraGraphix 240** from **Accu-Weather** was installed at **WHIO-TV** in Dayton, OH. Dave Freeman of WHIO-TV says the station's move from a LiveLine 3 to the UltraGraphix 240 constitutes a 'quantum leap' in picture quality." . . . **Henninger Video** of Arlington, VA has purchased an **A60 Digital Disk Recorder** from **Abekas Video Systems**. Henninger is using the A60 for graphics composition on the **DF/X Composium** . . . **WNYW** (Fox Television), New York City, is going with new **Sony BVM monitors** to establish consistency in its control rooms . . . Meanwhile, the **Sony PCM-3348 48-track DASH recorder** seems to be catching on with recording studios. **Digital Recorders** of Nashville and **Soundworks West** in Los Angeles are recent 3348 customers. Roger Nichols, three-time Grammy winner and chief recording engineer of Soundworks, was instrumental in choosing two 3348s. . . When Orlando-based **Video Marketing Services** expanded its duplication fa-

ilities, **JVC's BR-7030U tri-deck duplicator** was central to the company's efforts. Three hundred units have been installed at **Video Marketing Services**. ■

People On The Move

Videotek has appointed Robert M. van Zyl to the newly-created position of VP of operations; Kevin M. Miller to manager of engineering; and Wen Li to mechanical engineering manager . . . Jeffrey Nelson is now executive producer of **Square One TV**, a math series produced by **Children's Television Workshop** . . . Burton Richter has joined **Varian Associates'** Board of Directors . . . As

new VP for **JVC Professional Products Company**, Mike Yoshida will oversee sales/marketing and administration departments . . . Michael Arbutnot will manage marketing programs for **BTS** and Tom Hindle will cover key accounts in New York City for the international maker of systems and equipment for the professional TV industry . . . Gordon Tubbs is now **Canon's** regional sales manager for its Eastern region and Canada . . . **Digital F/X** has a new CEO: Rolando C. Esteverena . . . The new CEO at **Thomson Tubes Electronics** is Denis Ranque . . . Twelve years of broadcast production have finally gotten to **Mark Chiolis**, who is now a sales rep for **Midwest Communications** . . . **Ritchie Schaeffer** is new resident broadcast engineer for **Taurus Comm., DC**. ■

Company News

Recent major changes at **Broadcast Television Systems (BTS)** were made to help the company deal with increasing competition. "BTS is moving into what may be the most competitive decade in history," says Robert H. Wilkins, director of operations for BTS's Salt Lake City facility. Manufacturing and distribution operations are now centered in Salt Lake City and BTS is now adding more advanced manufacturing methods including "just-in-time," "cell manufacturing" and surface-mount technology. BTS will also lose about two percent of its employees worldwide . . . Archiving needs are a big target for **Honeywell's** Test Instruments Division, now that it has agreed to buy robotic systems from **Asaca/Shibasoku**. Honeywell will team its digital tape and control software with Asaca's library management system to create a three-terabyte random-access data storage system . . . **Canon USA's** Broadcast Equipment Division has moved its headquarters to Englewood Cliffs, NJ . . . **Rank Cintel**, completing its acquisition of Unimedia's business, has moved its U.S. headquarters to North Hollywood, CA . . . A greater commitment to the European market was the purpose behind the change in U.K. headquarters from Winchester to Basingstoke by **Grass Valley Group** and **Dubner Computer Systems**. Emily Dubner will move from U.S. headquarters to Basingstoke to oversee graphics system demonstrations and training . . . **New England Digital** is realigning its U.S. sales operations and has opened a new U.K. headquarters in West London . . . **Taurus Communications** has a new Nashville affiliate, **Link Up Communications**, which will provide satellite transmission of college basketball games for NBC . . . The Academy of Motion Picture Arts and Sciences awarded **SMPTE** with a commendation for establishing industry standards . . . **AudioTechniques** has formed a separate Broadcast Division and promises same-day service to broadcast clients in the New York tri-state area. ■



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ATV WATCH

HDTV: Technology in Search of an Audience?

By Eva J. Blinder

What constitutes high definition? Some people give simple, though variable, replies to this question. Others offer more complicated responses. And for some, there is no real answer yet.

Perhaps the real answer to this question should come from the potential customers of HDTV. Recently, the MIT Media Lab's Audience Research Group studied this question from a mass-audience point of view. While results of the study were unavailable at press time, the methods used give us one possible framework for answering the HDTV question.

It's already widely recognized that at small screen sizes, untrained viewers cannot perceive any difference between HDTV and NTSC signals. Early research at MIT bore this out.

"Our previous research on 1125-line HDTV showed that it was not so easy to get a mass audience to acknowledge the supposed improvements," explains Steve Schneider, a research assistant in the Audience Research Group. "We thought there were two reasons for this: the screens were not big enough and the resolution was not high enough."

Commercial success for HDTV may well depend on dramatic picture-quality improvement over NTSC. To try to find specs for the "dramatic" improvement, the MIT study tested audience reaction to various permutations of screen size and resolution.

"If we're going to get people to notice that HDTV is better than NTSC, how much better does it have to be?" Schneider asks. In the study, MIT researchers tried three different resolution levels and three different screen

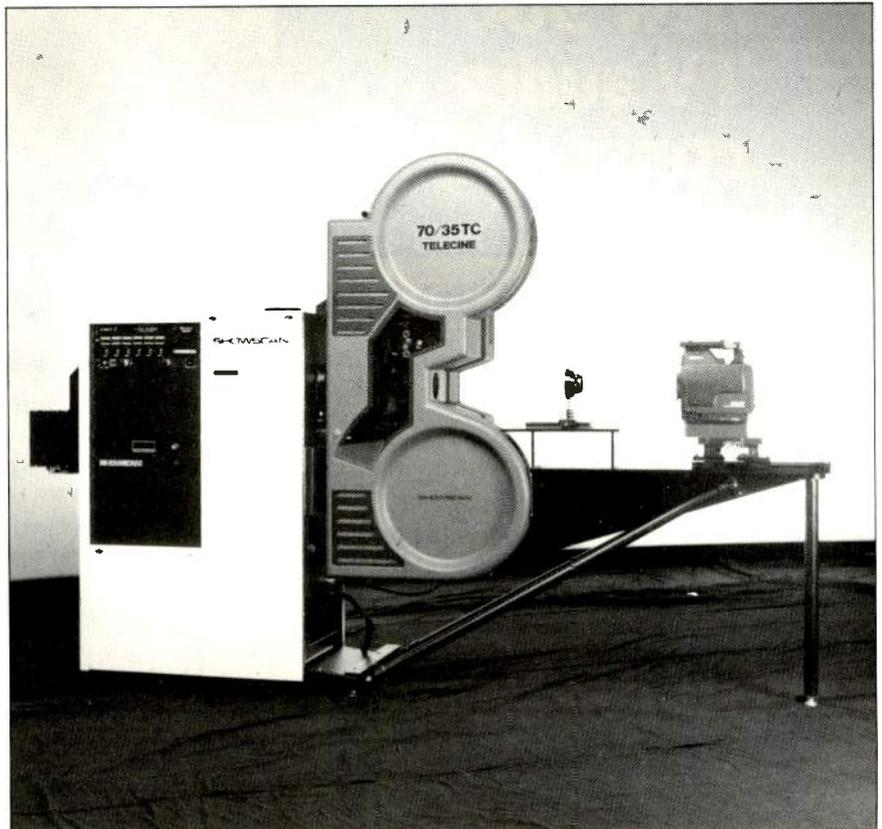
It's already widely recognized that at small screen sizes, untrained viewers cannot see a difference between HDTV and NTSC.

sizes "to see if we could get bumps in our curves."

A series of audiences that researchers say represented a broad demographic cross-section of viewers

watched from a simulated living room inside The Cube, the experimental media facility at The Media Lab. A 28-inch monitor displayed studio-quality NTSC and studio-quality 1125/60. A 45-inch monitor and an eight-by-10-foot rear-screen projector displayed NTSC, 1125/60 and Showscan, a very high-resolution film format.

Although Showscan is not a video technology, it serves as a basis for comparison in the MIT study, and Showscan promoters think it can make a positive contribution to the state of the HDTV art. Showscan is a film process that records images on 65mm film at 60 frames per second, explains David Nassif, Showscan's



Under development for Zenith is a Showscan telecine that will convert Showscan films to HDTV standards.



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ATV WATCH

vice president, business affairs. For projection, the images are recorded on 70mm film, with the additional 5mm being the magnetic soundtrack.

Nassif says that the 65mm film gives a better picture than 35mm, while the 60 fps recording speed serves to eliminate many of the motion artifacts, such as flicker, strobing

Though Showscan is not a video technology, its promoters think it can make a positive contribution to the state of the HDTV art.

and blur, that may occur with conventional filming.

"It turns out that the 60-frames-per-second feature is very compatible with the 60-field-per-second HDTV process for television," Nassif adds. In addition to its work with The Media Lab, Showscan is developing, at the behest of Zenith, an HDTV telecine designed to convert Showscan films to any of the proposed HDTV standards.

Showscan's Greg Thagard coordinated Showscan's participation in the MIT study and is project manager for the telecine venture. He says that the telecine has potential as a converter for HDTV test software since it could transfer a Showscan image into any of the HDTV scanning formats.

"We modified a Showscan-designed and -built projector so that it would operate like an old telecine and actually project the film into the camera," Thagard explains. He suggests that Showscan, with its ultra-high resolu-

tion, would be an excellent media for filming test material for the upcoming HDTV transmission tests. Using film-originated material, he adds, would eliminate the lag characteristics associated with camera pickup tubes.

Currently, the practical applications of Showscan are more limited. The company produces a device called the Dynamic Motion Simulator, a set of computer-controlled hydraulic seats designed to give a seatbelted audience a "thrill ride" as they watch action scenes filmed in Showscan. The company also produces a "specialty theater product" consisting of Showscan's special projector, sound projector, and a library of specially produced short films. As one long-term goal, the company hopes to get a major movie studio to produce a Showscan feature.

Meanwhile, viewers compared Showscan with NTSC and 1125/60 at MIT. Some viewers saw either NTSC or 1125/60 in all three screen sizes; others saw small-, medium- or large-sized versions of NTSC or 1125/60, or medium- or large-sized versions of Showscan. A final group compared small-sized NTSC, medium-sized

1125/60 and large-sized Showscan images. The viewers evaluated each picture by itself and then in direct comparison with the others. The researchers hope to find conclusive evidence that audiences can tell the difference among the different resolutions and screen sizes.

"If we can't get people to say that

Researchers hope to find conclusive evidence that audiences can tell the difference among the different resolutions.

wall-size Showscan is better than NTSC, then we've got to basically re-examine what we're doing" in HDTV development, Schneider said. Stay tuned to this column for test results. ■



HDTV equipment, such as this Ikegami EC-1125 camera, awaits the market.

AUDIO FOR VIDEO

Video Meets Digital Audio: A Night at the Opera

By Dan Daley

It would be redundant to present here yet another example of how audio for video has transformed itself from poor stepchild to princess in just a couple of years. Examples of this metamorphosis abound these days.

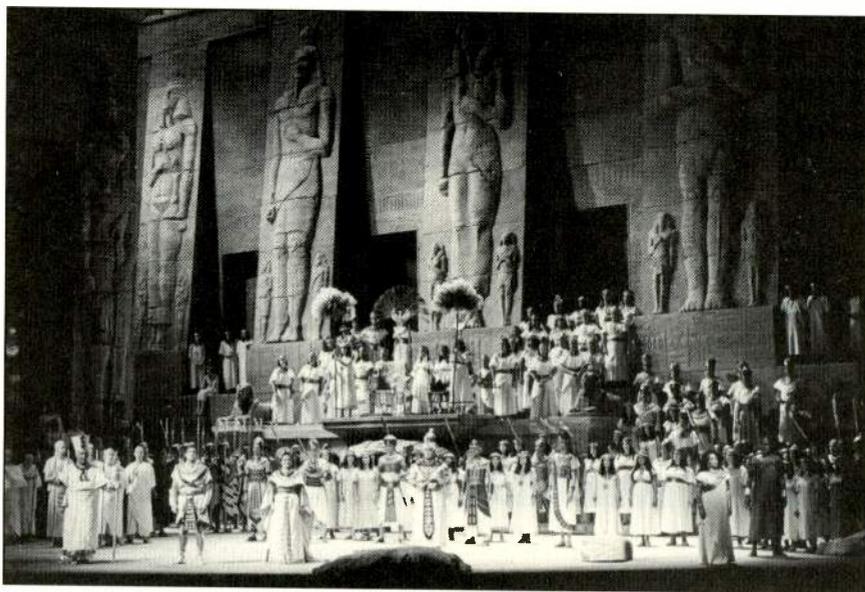
The reasons behind this transfiguration are the real story. How professional systems drive consumer products, which in turn drive the professional side even further (or drag it along, as the case may be)—these are the real meat of this phenomenon.

To find some reasons for the recent blossoming of audio for video, it helps to look backward every now and then. The future's bright, but the past is prologue if nothing else.

For several years now, New York City's Metropolitan Opera company (known locally as "the Met") has been using digital audio to record four or five of its broadcast performances each year. A Sony digital 3324 24-track deck is used to record both a multi-track recording of the company and a two-mix directly to the multi-track. This multi-track then goes over to Editel/New York for post-production under the supervision of Vin Gizzi, a partner in Benchmark Downtown Design, an acoustical design and consulting firm. Gizzi is an old hand at audio engineering, and he's been doing the Met broadcast posting since 1983, perhaps more as a labor of audio love than anything else.

These Met digital audio broadcasts demonstrate several of the changing aspects of audio for video.

For one thing, what was once a straight live broadcast with all the flaws of a live performance—the coughs, the libretto rustling, the occasional sound of a horned helmet falling off during the higher notes—has now matured into a slick television production.



The Metropolitan Opera Company has been broadcasting in digital since 1983.

Because digital audio offers increasingly sophisticated aural resolution, it fits better with the glossier imperatives of television production. Actual sounds remain intact longer in the broadcast chain through the sampling process of digital audio, and the generational loss that would have oc-

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it helps to look
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and then.*

curred even without a post-production stage is no longer a factor.

"The really big advantage to using digital on the audio tracks is that so much of the original quality is intact," Gizzi says. "By the time you've gotten to the point of mastering for the home video and CD-V [compact disc-video] versions of the recordings, you've saved three generations, and that's quite significant. Also, you sometimes have to make multiple copies for on-air promos or for after-mix changes; those copies no longer suffer from generational loss." Add to that the greater dynamic range and greater resolution of digital audio, and the total upgrade in quality is significant.

Gizzi's mention of CD-V brings us to another aspect of the changing world of audio for video: the increasing consumer demand for digital sound. The compact disc introduced the world to digital audio in the home, and as good as tape gets (and it's gotten very good in response to CDs), digital is the way of the future.

A Long Track Record in Audio for Video

Presently a partner in Benchmark Downtown Design, an acoustical design and consulting firm, Vin Gizzi has been in the audio-for-video neighborhood for quite some time. Gizzi studied at the Julliard School of Music and at New York University before entering the recording industry in 1969. From 1971 to 1981, he was the chief audio engineer at Teletronics International, where he mixed audio for hundreds of television programs and commercials. During this time, he co-designed, along with the legendary Bob Fine, the first sophisticated multi-format sound mixing facility in New York City.

In 1981, Gizzi established his own practice as an acoustical consultant and facilities designer to the commercial industry. Among his clients were RCA, CBS Television and Major League Baseball Productions. A member of AES and the Acoustical Society of America, Gizzi also designed the J.C. Penney teleconferencing facility.

—D.D.

Reflecting the consumer movement toward digital, the Met broadcast performances are also being produced for CD-V release here and in Europe. While CD-V is still a subformat in its infancy, it's interesting to note, as Gizzi does, that it was classical music that was the early anchor for audio compact discs. It was the older, more affluent consumer who could afford the new technology in the early compact-disc days, and the musical tastes of such customers ran more along the lines of Bach than Guns 'n' Roses. (That presents a nice ironic touch: Here again with opera, we have music written by some very, very dead guys in the vanguard of a technol-

Digital audio has gone far beyond its initial value as an archival medium for classical music.

ogy.)

Meanwhile, post-production has come a long way for digital since the early 1980s, when the Met used the old Sony F-1 format as a backup medium for its digital recording. Gizzi says that current post-production for the recordings is fairly minimal; the intermissions and other interruptions are excised during the digital editing stage, and some signal processing is added where the producers believe it's needed. But more often than not, the two-mix contained on the multi-track master reel is used as a final mix for the layback to video. Still the process can become complicated, using several digital multi-track and two-track audio decks (necessitated by the medium's editing requirements) and the three-quarter-inch video work copy, all synched with an Adams-Smith synchronizer.

One more facet to examine here is how the installed base of digital technology in both audio and

audio-for-video facilities is driving down the costs of using the technology. This situation didn't exist just a few years ago. Even though, as Gizzi points out, much of television's audio programming doesn't really benefit from extended frequency ranges, and despite the fact that it will take time before many well-equipped home-television receivers are on-line, quality can go in before the name goes on because it's become so affordable.

While digital audio's initial perceived benefit to the classical-music domain was as an archival medium, it's certainly gone far beyond that, in retrospect, limited goal. Music in general, and classical music in particular, has served as point man for a whole generation of digital audio technologies. And now with MTV's extended digital broadcasting capabilities on-line (which we'll discuss in detail next month), Vixen and Verdi are poised to stand on even ground, at least in the broadcast audio realm. ■

Dan Daley is a New York City-based freelance writer specializing in audio technology.



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PROFESSIONAL AUDIO

NEW TECHNOLOGY BUYER'S GUIDE:

AUDIO

A directory of audio-for-video products from a variety of manufacturers, cross-referenced by product category.

In this issue, *Television Engineering* launches its New Technology Buyer's Guides, a new and ongoing series of directories targeted to specific product areas. This month, we present a guide to audio-for-video products, based on questionnaires completed by manufacturers, who were asked to focus on products introduced in the past 18 months.

Some 130 companies are listed alphabetically with addresses, phone numbers and products (including model numbers when available). Following that listing is a cross-reference by product, with company names listed under each of 24 product categories.

While traditional technology still dominates the field, digital equipment is on the rise, as is the incorporation of computers and software. With the audio-for-video world changing rapidly, these listings are designed as a service for users searching for the latest and best in audio-for-video equipment. In future issues, we'll present New Technology Buyer's Guides for such product areas as video, automation, graphics and so forth. Stay tuned. —*John King*



Accurate Sound
3515 Edison Way
Menlo Park, CA 94025
415 365-2843

AS-100-2 Professional Studio Master Recorder 2-track ATR; AS-100-4 Professional Studio Master Recorder 4-8 track ATR; MCS-500 cassette recorder/logger; Model 1053 micro-cassette recorder/logger.

AKAI Professional
1316 E. Lancaster
Ft. Worth, TX 76102
817 336-5114

A-DAM System, digital multi-

track ATR; Model GX-912 cassette deck; Model ATR 12-track cassette recorder, DD1000 optical disk recorder.

AKG Acoustics
1525 Alvarado St.
San Leandro, CA 94577
415 351-3500

140X Type II noise-reduction system; K 270-S headphone; 400 transmission limiter.

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800 262-4671

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Aphex Systems
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N. Hollywood, CA 91605
818 765-2212

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503 627-0832
800 231-7350

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ATH 609, 610 and 611 headphones; ATM 25, AT877, and ATW1031/1032 microphones.

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4561 E. Florence Ave.
Fresno, CA 93725
209 442-1048

Monitor speakers.

Auratone Corp.

Box 698
Coronado, CA 92118
619 297-2820
SCEQV, SCTV, SMCV,
SMCEQU, T6V, RT6V, PS25 and
P650 monitor speakers.

Avcom of Virginia

500 Southlake Blvd.
Richmond, VA 23236
804 794-2500
PSA-65A Portable Spectrum
Analyzer.

B

B&B Systems

28111 N. Ave. Stanford
Valencia, CA 91355
805 257-4853
800 345-1056

IM-1HR Half-Rack
Imagescope.

Benchmark Media Systems

3817 Brewerton Rd.
N. Syracuse, NY 13212
315 452-0400
1-800 662-4675

Model RGC-100 8 Channel Remote Gain Control - System 1000; Model HPA-1 Headphone Amplifier; Model DA-101 power amp with remote gain control, Models SPM-2, SPM-3 VU & PPM meter systems; RPM-1 VU add-on card for monitors; Model VU-1 Arue VU monitor; Model ALM-110 (SYS 1000) 10 channel loss of audio alarm; Models MIA-4, MIA-4X4, MIA-4X4t mic pre-systems; System 1000 models DA-101, DA-102, MDA-101, MDA-102 DA's; System 1000 model MCM-102 two-input router/mode controller; IFB system 1000 models BMX-100 and MX-424 mix minus; System 1000 models 1-UP and BP-96 ultra patch panels; The Interface System/16-channel modular (IRU) line amp; IFA series interface amplifiers, jack-mounted interface amplifiers.

Beyer Dynamic

5-05 Burns Av.
Hicksville, NY 11801
516 935-8000
DT770 Pro, DT990 Pro, HM560,
DT158, DT159 and DT329
headphones; M58, MCE86,
SHM420, SHM422 and SHM20
microphones.

Bogen Communications

50 Spring St.; Box 575
Ramsey, NJ 07446
201 934-8500
ML-1 Electret Condenser Lavali-
er, MHH Dynamic Handheld,
MBS-1000 Dynamic Desktop
and MGN-19 Dynamic Goose-
neck microphones; DPA-80
and DPA-160 power amps;
WMA-80 and WMA-160 ampli-
fiers; TAM-B, ZPM-3 and ZPM-
9 telephone interfacing equip-
ment; FG-10 monitor speakers.

Broadcast Audio Corp.

11306 Sunco Dr.
Rancho Cordova, CA 95742
916 635-1048

Series Six three-meter stereo-
line and mono-mixer broadcast
console; amplifiers,
preamplifiers.

Broadcast Supply West

7012 27th St. W.
Tacoma, WA 98466
800 426-8434

Radix HE-20 headphone ampli-
fier/equalizer.

Bruel & Kjaer

185 Forest St.
Marlborough, MA 01752-3093
508 481-7000

Type 4011 and 4012 cardioid
microphone.

Bryston Vermont Ltd.

979 Franklin Ln.
Maple Glen, PA 19002
800 673-7899

Noise-reduction systems; re-
verb, special efx systems.

BTS/Broadcast Television Systems

2300 S. 2300 W.
Salt Lake City, UT 84119
801 972-8000
BAA-350 and BAA-351 DAs;
TAS-3000 routing switcher;
BSB-3000 patchbox for VTRs;
BAC-3000 digital encoder/
decoder.

C

Cetec Ivie

1366 W. Center
Orem, UT 84057
801 224-1800

PC-40 computer-controlled 1/3-
octave RTA with RT 60
capability T&M system.

Cipher Digital

Box 170
Frederick, MD 21701
301 695-0200
800 331-9066

Model CDI-8415 ATR synchro-
nizer system; Model CDI-5000
electronic editor; TimeCode
readers/generators.

CRL/Circuit Research Labs

2522 W. Geneva Dr.
Tempe, AZ 85282
602 438-0888
800 535-7648

TVS 3001 tri-band audio gain
controller; TVS 3003 MTS gen-
erator/limiter; BAP 2000 FM TV
mono audio processor.

Clear-Com Systems

945 Camelia St.
Berkeley, CA 94710
415 527-6666

Model 1021 amplified monitor
speaker; IFB systems; Matrix
Plus digital intercom; telephone
interfacing equipment; wireless
intercoms.

Comrex Corp.

65 Nonset Path
Acton, MA 01720
508 263-1800
800 237-1776

Field-portable mixers; cue sys-
tems; amplifiers, preamplifiers;
IFB systems; Models 3XP/3XR,
2XP/2X2 telephone interfacing
frequency extenders.

Conifer Corp.

Box 1025
Burlington, IA 52601
319 752-3607
800 843-5419

Broadband block downcon-
verters and antennas for the re-
ceive site of a wireless cable
(MMDS) and ITFS system.

Crown International

1718 W. Mishawaka Rd.
Elkhart, IN 46517
219 294-8000
SASS stereo mic.

D

Datatek Corp.

1121 Bristol Rd.
Mountainside, NJ 07092
201 654-8100
800 882-9100

Models D-850, D-851 and
D-852 mono & stereo DA's;
Model D250 20x10 stereo
switcher.

Delta Electronics

5730 Gen. Washington Dr.;
Box 11268
Alexandria, VA 22312
703 354-3350

Model SNG-1 stereo noise

generator; SM-1 splatter monitor; phase meters; T&M; compressor/expander.

Di-Tech

48 Jefryn Blvd.
Deer Park, NY 11729
516 667-6300
800 595-1012
200 Series DAs; routing switchers.

Digital Audio Research

6363 Sunset Blvd.
Hollywood, CA 90028
213 466-9151
Soundstation II, with VPP 16 channel, optical/disk, wordfit.

Dolby Laboratories

100 Potrero Ave.
San Francisco, CA 94103-4813
415 558-0200
Model 363 two-channel SR unit; MT series 24-channel switchable SR/A-type N/R system; Model 500 digital bit-rate coding system.

Dorrough Electronics

5221 Collier Pl.
Woodland Hills, CA 91364
818 999-1132
Compressors/expanders.

Dynair Electronics

5275 Market St.
San Diego, CA 92114
619 263-7711
Models AD-5370B and AD-5370A DAs; DYNA MITE audio and/or video routing switchers.

E

E-Mu Systems

1600 Green Hills Rd.
Scotts Valley, CA 95066
408 438-1921
Emulator Three digital workstation.

Edcor

1948 E. Pomona
Santa Ana, CA 90804
714 648-0292
Headphone amplifiers; amplifiers, preamplifiers; telephone interfacing equipment.

Electro-Voice

600 Cecil St.
Buchanan, MI 49107
616 695-6831
Microphones, accessories; power amps.

ESE

142 Sierra St.
El Segundo, CA 90245
213 322-2136
Clocks and timers.

Eventide

1 Alsan Way
Little Ferry, NJ 07643
201 641-1200
BD1000 audio/video broadcast obscenity delay; H3000SE ultra-harmonizer pitch change and efx; H3000B ultra-harmonizer pitch change and efx for broadcast; HS322 sampler board for all models of the H3000 ultra-harmonizer.

F

Farrtronic

45 Campbell Av.
Kitchener, ON
N2H 4X8, Canada
519 741-1010
800 265-2713
Headphones; monitor speakers; studio monitors; VU monitor displays; level indicators; amplifiers; preamplifiers; DAs; MA4 SDA System; IFB Systems; intercoms; patch panels; telephone interfacing equipment.

Fidelipac

Box 808
Moorestown, NJ 08057
609 235-3900
800 HOT TAPE
Audiotape, carts; cart decks; heads, accessories for cart machines; eraser/splice detector, bulk erasers.

FM Systems

3877 S. Main St.
Santa Ana, CA 92707
714 979-3355
800 235-6960
ALM671, ALM672, ALM673 Audio Level Masters; AVM Audio Volume Meter; AMM Audio Modulation Meter; CSPM-1 (cable stereo performance meter for BTSC Stereo); ADA662, ADA664 DAs.

Focusrite Audio Engineering

Unit 2, Bourne End Business Centre
Cores End Rd.
Bourne End, Bucks
SL8 5AS, England
0628-819456
ISA 130 and ISA 131 compressors/expanders; ISA 115 equalizer; FSC 1 post-production console.

For-A Corp. of America

320 Nevada St.
Newton, MA 02160
617 244-3223
Automated post-production consoles.

Fostex

15431 Blackburn Ave.
Norwalk, CA 90650
213 921-1112
Two-track, four-eight-track, digital two-track, 16-track, and MIDI-equipped VTRs; cassette decks; DAT decks; ATR synchronizer systems; post-production consoles; electronic audio editors; headphones; microphones, accessories; studio monitors; amplifiers, preamplifiers; automation software; MIDI remote for Macintosh and Atari personal computers.

G

Gotham Audio Corp.

1790 Broadway
New York, NY 10019-1412
212 765-3410
Gotham CDR-90 compact disc system; Audio and Design PRODAT DAT deck; Model SPL SX-2 processor; Series KM1000 & RSM190 microphones.

Graham-Patten Systems

Box 1960
Grass Valley, CA 95945
916 273-8412
Videotape editing mixers; digital mixer for editing; digital systems for STLs.

The Grass Valley Group

Box 1114
Grass Valley, CA 95945
916 478-3000
800 825-5127
ABER optic audio/video/data systems; post-production consoles.

H

Hedco

Box 1985
Grass Valley, CA 95945
916 273-9524
HD-16X series of routing switchers.

Karl Heitz, Inc.

34-11 62 St.
Woodside, NY 11377
718 565-0004
Microphone fishpoles.

HM Electronics

6675 Mesa Ridge Rd.
San Diego, CA 92121
619 535-6060
Systems 50, 55, 515 and 525 wireless mics; RP753 four-channel matrix power station; RW760 universal interface; system 8110 wireless intercom with four-wire interface.

Hybrid Arts

8522 National Blvd.
Culver City, CA 90232
213 841-0340
ADAP-2 digital recording/editing system; SMPTE Track II and FM Melody Maker music sequencing software.

Hybrid Cases

1121-20 Lincoln Ave.
Holbrook, NY 11714
516 563-1181
Reusable shipping cases, flight cases, soft bags for all equipment.

I

Image Video Limited

705 Progress Ave.; Unit 46
Scarborough, ON
M1H 2X1, Canada
416 438-3940
VU monitor displays, amplifiers, preamplifiers; audio DAs; audio routing switchers; automation systems; analog delay systems; ATR synchronizer systems; audio digital workstations; electronic editors.

AUDIO BUYER'S GUIDE

Industrial Research Products

321 Bond St.
Elk Grove Village, IL 60007
708 439-3600
800 255-6993

Compressors/expanders; DJ-4132, DJ-4133, DJ-4134, DJ-4135 and DJ-4136 digital delay systems; mic mixers; line mixers; equalizers; AGC; cross-overs; notch filters; distribution amps; line drivers; remote controls.

Inovonics

ITI/Weather Network
1305 Fair Av.
Santa Cruz, CA 95060
408 458-0552

Models 370, 390 and 397 replacement and upgrade Analog Recorder Electronics for mag-film and audiotape machines; compressors/expander/limiters for production and on-air; Model TVU on-screen level display keyer with VU and PPM switchable display.

Jasoni Electronics

2900 E. Charleston Bldg.; #197
Las Vegas, NV 89104
702 384-0081

TAS-1000 tape analyzer system.

J

JBL Professional

8500 Balboa Blvd.
Northridge, CA 91307
818 893-8411

Control 1 Plus personal monitor loudspeaker system; models SR6615, SR6630 and SR6650 power amplifiers.

Jensen Transformers

10735 Burbank Blvd.
N. Hollywood, CA 91601
213 876-0059

Power amps; mic input, line input, line output and special types of transformers; Twin Servo 990 Mic Preamp; Comtran circuit analysis and optimization software for Hewlett-Packard and IBM-PC computers.

J.N.S. Electronics

P.O. Box 32550
San Jose, CA 95152
408 729-3838

Model 8602 stereo limiter; Model 8408 stereo equalizer; Model 8512 synthesizer; Model

8714 microphone/line amplifier; Model 8711 and 8711-2 monitor/amplifier; model 8705 stereo/mono DAs; Model 8830 stereo switcher; Series 8300 mono & stereo switchers; Series 9000 routing switchers.

K

Kaitronics Corp.

890 Cowan Rd.
Burlingame, CA 94010
415 697-9102

Model AM-8000W field-portable mixer.

Kay Elemetrics Corp.

12 Maple Ave.
Pine Brook, NJ 07058
201 227-2000

800 Series of in-line step attenuators, including models 837, 839, 1/839 and 860.

L

Leader Instruments

380 Oser Ave.
Hauppauge, NY 11788
516 231-6900
800 645-5140

LJM-1851 CD Jitter Meter.

Lectrosonics

581 Laser Rd. N.E.
Rio Rancho, NM 87124
505 892-4501

Microphones, accessories; Maximouse portable field amp/monitor.

Lester Audio Laboratories

1111 W. Mockingbird
Suite 1342
Dallas, TX 75247
214 637-9311

Model DASxx64 digital transmission system.

Logitek

3320 Bering Dr.
Houston, TX 77057
713 782-4592
800 231-5870

MAS-SCL stereo compressor/limiter; TR2 broadcast console; field-portable mixers; power amps; BRIGHT-VU LED peak/average meters; DAs; routing switchers; automated crossfader.

N

Nady Systems

6701 Bay St.
Emeryville, CA 94608
415 652-2411

501 VR wireless mic for ENG and EFP applications.

Neotek Corp.

1154 W. Belmont Av.
Chicago, IL 60657
312 929-6699

Neotek film elite dubbing post-production console.

Neutrik USA

195-53 Lehigh Ave.
Lakewood, NJ 08701-4527
609 327-3113

TT402A, Audiograph 3300 and AI T&M equipment; 3382 balanced measurement microphone; Audiograph 3332 phase meter.

Neve Inc.

Berkshire Industrial Park
Bethel, CT 06801
203 744-6230

Mitsubishi X-86HS (high-sampling) ATR, digital two-track; Mitsubishi X-880 32-channel digital recorder; Neve PRISM series of rack-mount signal-processing systems; Neve Flying Faders automation system; Neve 66 series of radio and television broadcast consoles; Neve VRP post-production console.

New England Digital

49 N. Main St.
White River Junction, VT 05001
802 295-5800

PostPro SD digital workstation.

O

Opamp Labs

1033 N. Sycamore Ave.
Los Angeles, CA 90038
213 934-3566

Model A-24/2ML Audio Press Feed; Models A-4/2ML and A-6/ML DAs; routing switchers.

Orban, Div of AKG Acoustics

1525 Alvarado St.
San Leandro, CA 94577
415 351-3500

4000A transmission limiter; 290 RX signal restoration and enhancement processor; compressors/expanders; noise reduction systems; reverb, special ef; synthesizers; microphone processor.

Orion Research

4650 W. 160 St.
Cleveland, OH 44135
216 267-7700
800 822-8346

Newsmaker-II broadcast console; SoundStar-16 post-production console; DMS-16 PPM/VU metering system; MM-16 mix-minus system; PPS-16 programmable pre-select matrix routing system.

Otari Corp.

378 Vintage Park Dr.
Foster City, CA 94004
415 341-5900

Models MTR-15, MX-5050, BIII, MKIV2 two-track ATRs; models MK-IV-4 and MD-IV-8 four-eight-track ATRs; 16-track and 16+/-track ATRs; digital multi-track ATRs; cart decks; automation system consoles; Series 34 and 54 broadcast consoles; Series 34 and 54 post-production consoles; audio-for-video time codes; heads, accessories.

P

Pacific Recorders & Engineering

2070 Las Palmas Dr.
Carlsbad, CA 92007
619 438-3911

Cart decks; STX Stereo Television audio mixing; broadcast and post-production consoles; DAs; patch panels; telephone interfacing equipment.

Panasonic Pro Audio/Ramsa

6550 Katella Ave.
Cypress, CA 90630
714 373-7277

SV-255 and SV-3500 DAT decks; WZ-9375 digital delay systems; WS-A500/WS-A550 monitor speakers.

PC Musicmaker

1221 W. Campbell Rd.; #125
Richardson, TX 75080
214 238-9944
800 456-6434

HRS-3000 Home Recording Studio—includes HRS-3000 Studio Box (MIDI interface) and "Maestro" sequencing software (64-track).

Penny & Giles

2716 Ocean Park Blvd.; #1005
Santa Monica, CA 90405
213 452-4995

Motorized and digital variant faders and attenuators.

Precision Monolithics

1500 Space Park Dr.
Santa Clara, CA 95054-3434
408 727-9222

Integrated circuits: SSM-2141 differential amplifier; SSM-2402/SSM-2412 dual audio analog switches; SSM-2131 operational amplifier; SSM-2139 operational amplifier; SSM-2220 PNP transistor; SSM-2210 NPN transistor pair.

Q**QSC Audio Products**

1926 Placentia Ave.
Costa Mesa, CA 92627
714 645-2540
800 854-4079

QSC MX 700 and 1100 amplifiers.

Quad Eight Electronics

27771 Avenue Hopkins
Valencia, CA 91355
805 295-1324

EQ-712 graphic equalizer; Compumix PC console automation system; Screenstar and Virtuoso post-production consoles; Filmstar film rerecording console.

R**Radix**

7012 27th St. W.
Tacoma, WA 98466
206 565-4546

HE-20 headphone amplifier/equalizer.

Ramko Research

3501 #4 Sunrise Blvd.
Rancho Cordova, CA 95670
916 635-3600

Power amps, models XL20, XL40, XL2 (two-40 watts, mono & stereo); infrared light-controlled faders; XLSCMZ R amplifiers; models XL8S/8M, X285/16M & XL2080 DAs; RS1616 switcher, router, amplifier; models XLMM1A, XLMM1B, XLMM2 interfacing/matching units; XL series consoles.

ROH/Portland Instruments

921 W. 223 St.
Torrance, CA 90502
213 533-1498
800 262-4671

Model 192 RD three-channel monitor panel; DAs; intercoms.

RTS Systems

1100 W. Chestnut St.
Burbank, CA 91506
818 566-6700

400 series and 2500 series amplifiers; 4000 series IFB system; TW, series 17 and 800 series intercoms; Model 1927 tone generator.

Russco Electronics Mfg.

5690 E. Shields Ave.
Fresno, CA 93727
209 291-5591

Models MA-225, MA-325 and MM-260Ax power amps; models 2418, 4428 and 2816 DAs; T-321 mixer and T-212 studio interface telephone interfacing equipment; MLD-22 mic preamp; IMD-24 two-way, hi-to-low impedance matcher; CD-100 hi-to-low impedance adapter for compact disc players; Cue Master, Studio Pro and Mark V turntables; 505 mono and 505-S stereo broadcast consoles; T-321 three-channel remote mixer.

S**Saki Magnetics**

26600 Agoura Rd.
Calabasas, CA 91302
818 880-4054

Saki BVH-2000 ferrite head for Sony BVH series.

Sandmaster USA Inc.

900-A Hampshire Rd.
Westlake Village, CA 91361
805 494-4545

Syncro ATR synchronizer systems; Syncram digital workstations; Soundmaster electronic editors.

Seck

8500 Balboa Blvd.
Northridge, CA 91329
818 893-8411

Post-production consoles.

Selco Products Co.

7580 Stage Rd.
Buena Park, CA 90621
213 921-0681

Level indicators; Control collet knobs.

Sennheiser Electronic Corp.

6 Vista Dr.; Box 987
Old Lyme, CT 06371
203 434-9190

Models HD25 and HD450 studio headphones; Models MKH 20, 30, 50, 70 & 48U3 microphones; Microport computer display for 27 channels of RF.

Sescom

2100 Ward Dr.
Henderson, NV 89015
702 565-3400
800 634-3457

Analog delay systems; field-portable mixers; power amps; amplifiers, preamplifiers; DAs; patch panels.

Shure Brothers

222 Hartrey Av.
Evanston, IL 60202-3696
708 866-2553

Phono cartridges; Beta 57 and Beta 58 supercardioid dynamic microphones; L2/SM58, L2 Beta 58 and L2/SM96 wireless handheld mics; L3 non-diversity receiver; L4 Marcad diversity receiver; VP88 stereo condenser mic; DAs; telephone interfacing equipment; compressors/expanders.

Skaggs Telecommunications Service

5290 South Main St.
Murray, UT 84107
801 261-4400

Broadcast and post-production consoles; digital workstations.

Solid State Logic

Begbroke, Oxford
OX5 1RU, England
842300

ScreenSound digital workstation; apt-X 100 digital compression system.

Sony Magnetic Products Co.

1 Sony Dr.
Park Ridge, NJ 07656-8038
201 930-6080

DAT tape, digital open reel, digital u-matic.

Soundcraft

8500 Balboa Blvd.
Northridge, CA 91329
818 893-4351
800 852-5776

Console automation systems; broadcast and post-production consoles.

Sprague Magnetics

15720 Stagg St.
Van Nuys, CA 91406
818 994-6602
800 553-8712

AMC Nortronics Norton EMC/Geneva heads.

Stanton Magnetics

101 Sunnyside Blvd.
Plainview, NY 11803
516 349-0235

Magnetic cartridges for turntables, replacement styli, record-care products; models ST-3, ST-5, ST-10, ST surround 45M/MC microphones; 310B Turntable preamp/equalizer.

Stewart Electronics

11460 Sunrise Gold Circle
Rancho Cordova, CA 95742
916 635-3011

Phantom Power Supplier model PM1, PM2, PM4, PM6 microphones; MP-2 microphone preamp; Model PA-50B, PA-100B PA-50, PA-400B power amps; MP-2 mic preamp; Model HDA-4 headphone distribution amp.

AUDIO BUYER'S GUIDE

Studer Revox America

1425 Elm Hill Pike
Nashville, TN 37210
615 254-5651

A807-TC-VUK two-track ATR; A827-24 16-track VTR; D820-48 digital multitrack VTR; A729 CD Controller; Dyaxis digital recording and editing system; electronic audio editors; A779 compact mixing console; A723 speaker.

Studio Technologies

5520 W. Touhy Av.
Skokie, IL 60077
708 676-9177

Generation II Stereo Simulator; Mic-PreEminence two-channel microphone preamplifier; IFB systems.

Swintek Enterprises

965 Schulman Ave.
Santa Clara, CA 95050
408 727-4889

Mark 200D/LT-QDC cue system; Mark 1L-SM58 and Mark QDC-50A microphones; Mark 200D intercom; Mark 200D/RJ telephone interfacing system.

Symetrix

4211 24 Ave. W.
Seattle, WA 98199
206 282-2555

SX206 multi-dynamics processor; 511A single-ended noise reduction system; 111 adaptive hybrid telephone interface; DPR100 digital processing recorder; SX204 four-channel headphone amp; SX205 precision audiometer; SX202 dual microphone pre-amp.

T

Tannoy North America

300 Gage Av., Unit 1
Kitchener, ON
N2M 2C8, Canada
519 745-1158

Monitor speakers.

Tascam

7733 Telegraph Rd.
Montebello, CA 90640
213 726-0303

DA-30 AES/EBU digital I/O DAT; DA-800 24-channel digital recorder; M-700 40 I/O, automation-ready, in-line mixing console; M-3500 input console (24- and 32-track configu-

rations); MTS 1000 MIDlizer multi-synchronizer/controller; MSR 24 one-inch 24-track analog recorder/reproducer; MSR-16 1/2-inch 16-track analog recorder/reproducer; TSR-8 1/2-inch synchronizable eight-track recorder/reproducer; 644 and 688 MIDlStudios synchronizable four- and eight-track 1/8-inch tape format recorders with built-in mixers for integrating digital and analog recording; 238 Syncaset synchronizable eight-channel 1/8-inch tape format multitrack recorder.

Technical Projects

Box 1449
Barrington, IL 60011
708 381-5350
800 562-5872

DMH2000 high-fidelity headphones; PS-1A, BP-2S, LS-3, HS-1 and BP-2B intercoms.

Tectan

1900 Bates Ave.; Box 271872
Concord, CA 94527
415 798-2222

Transmission equipment for satellite and microwave; Model 450 dual-channel FM subcarrier system.

Telex Communications

9600 Aldrich Av. S.
Minneapolis, MN 55420
612 887-5550

Radiocom wireless intercom system.

Telnox

55 Montpelier Blvd.
Montreal, QU
H4N 2G3, Canada
514 744-1785

L-O telephone interfacing equipment.

Telos Systems

1729 Superior Ave.
Cleveland, OH 44114
216 241-7225

Telos LINK telephone-to-intercom interface; Telos One digital telephone interface;

Tentel Corp.

4475 Golden Foothill Pkwy.
El Dorado Hills, CA 95630
916 939-4005

Test equipment; tentelometer tape tension gauge.

TFT

3090 Oakmead Village Dr.
Santa Clara, CA 95052-8088
408 727-7272

Test & measurement equipment.

Trompeter

31186 La Baya
Westlake Village, CA 91359
818 707-2020

Coax and triax cable.

U

Uher of America

7067 Vineland Av.
N. Hollywood, CA 91605
818 764-1120

Two-track reel-to-reel ATRs, four-eight track reel-to-reel ATRs; cassette decks.

UREI

8500 Balboa Blvd.
Northridge, CA 91307
818 893-8411

Power amps; studio monitors; amplifiers, preamplifiers.

USCO Audio Engineer Inc.

2623 Canyon Dr.
Hollywood, CA 90068
213 465-4370

DTM-3 three-way near field reference; MSM-Z music scoring monitors.

V

Valley International

Box 40306; 2817 Erica Pl.
Nashville, TN 37204
615 383-4737

Compressors/expanders; digital delay systems; DDP (digital dynamics processor), DCE (digital compressor/expander); amplifiers, preamplifiers.

Vega

600 Cecil St.
Buchanan, MI 49107
616 695-6831

Models SP-30, R-42A wireless microphone systems.

W

WaveFrame Corp.

2511 55 St.
Boulder, CO 80301
303 447-1572

CyberFrame digital post-production workstation.

Wheatstone Corp.

6720 VIP Pkwy.
Syracuse, NY 13211
315 455-7740

Compressors/expanders; models A50 and A-32EX on-air consoles; post-production consoles; DAs; routing switchers.

Y

Yamaha Corporation of America

Professional Audio Division
6600 Orangethorpe Ave.
Buena Park, CA 90622
714 522-9011

MT3X and MT100II multi-track cassette recorders; DDL3 digital delay line; SPX1000, SPX900, REV5 and FX500 multi-effect processors; SY77 digital synthesizer; PM1200 and MR series of live SR mixing consoles; PM1800 and PM2800M series of stage monitor consoles; DMR8 digital mixing recorder (eight-track expandable to 24-track); DRU8 expander modules (eight-track recorders) for the DMR8; RH5M headphones; MS101 and MS202 powered monitor speakers; P2350 and P2700 audio power amps; NS10MC studio monitor.

PRODUCT GUIDE

Amplifiers, preamplifiers

Benchmark Media Systems
BGW Systems
Bogen Communications
Comrex
Edecor
Electro-Voice
Farrtronics
Fostex
Image Video
JBL Professional
Jensen Transformers
J.N.S. Electronics
Laird Telemedia
Logitek
QSC Audio Products
Ramko Research
RTS Systems
Sescom
Stewart Electronics
Uher of America
UREI
Valley International

ATRs

Accurate Sound
AKAI Professional
Alpha Audio
Fostex
Neve
Otari
Studer Revox America
Tascam
Uher of America

Attenuators

Kay Elemetrics
Penny & Giles

Broadcast consoles

AMS Industries
ATI/Audio Technologies
Auditronics
Autogram
Neve
Logitek
Orion Research
Otari
Pacific Recorders &
Engineering
Quad Eight Electronics
Ramko Research
Russco Electronics
Skaggs Telecommunica-
tions Service
Soundcraft
Wheatstone
Yamaha Pro Audio Div.

Computers, software, music libraries

Amek/TAC US Operations
Associated Production
Music
Fostex
GML
Hybrid Arts
Jensen Transformers
PC Musicmaker

Digital workstations

AKG Digital Products
Alpha Audio
E-Mu Systems
Image Video
New England Digital
Sandmaster USA
Skaggs Telecommunica-
tions Service

Solid State Logic
Studer Revox America
Symetrix
WaveFrame

Distribution Amps

Aphex Systems
Auditronics
Benchmark Media Systems
BGW Systems
BTS/Broadcast Television
Systems
Datatek
Di-Tech
Dynair Electronics
Farrtronics
FM Systems
Image Video
J.N.S. Electronics
Logitek
Opamp Labs
Pacific Recorders &
Engineering
Ramko Research
ROH/Portland Instruments
Russco Electronics
Sescom
Shure Brothers
Wheatstone

Heads, accessories

Fidelipac
Northern Magnetics
Otari
Sprague Magnetics
Saki Magnetics

Headphones

AKG Acoustics
Audio-Technica U.S.

Beyer Dynamic
Farrtronics
Fostex
Sennheiser-Electronic
Shure Brothers
Symetrix
Technical Projects
Yamaha Pro Audio Div.

IFB systems

Clear-Com Systems
Comrex
Farrtronics
Orion Research
RTS Systems
Studio Technologies

Intercoms

Bogen Communications
Clear-Com Systems
Farrtronics
HM Electronics
ROH/Portland Instruments
Swintek Enterprises
Technical Projects
Telex Communications

Microphones, accessories

Audio-Technica U.S.
Beyer Dynamic
Bogen
Bruel & Kjaer
Crown International
Electro-Voice
Fostex
Gotham Audio
Karl Heitz, Inc.
HM Electronics

AUDIO BUYER'S GUIDE

J.N.S. Electronics
Lectrosonics
Nady
Neutrik USA
Orban
Russco Electronics
Sennheiser Electronic
Shure Brothers
Stanton Magnetics
Stewart Electronics
Studio Technologies
Swintek Enterprises
Symetrix
Vega

Miscellaneous recording/playback equipment

Accurate Sound
AKAI Professional
Aphex Systems
Fostex
Gotham Audio
Hybrid Arts

Otari
Pacific Recorders & Engineering
Panasonic/Ramsa
Sony Magnetic Products
Stanton Magnetics
Stewart Electronics
Tascam
Uher of America

Monitors

Farrtronics
Lectrosonics
RTS Systems
Sennheiser Electronic
Symetrix
UREI
Yamaha Pro Audio Div.

Monitoring equipment

Apogee Electronics
Benchmark Media Systems
FM Systems
Jensen Transformers
Neutrik USA
Radix
ROH/Portland Instruments
Russco Electronics
Swintek Enterprises
USCO Audio Engineer

Monitor speakers

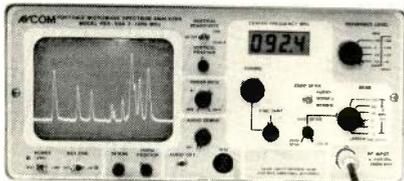
Anchor Audio
Auratone
Bogen Communications
Clear-Com Systems
Farrtronics
Panasonic/Ramsa
Studer Revox America
Tannoy North America
Yamaha Pro Audio Div.

Post-production consoles

AMS Industries
Autogram
Focusrite Audio Engineering
For-A Corp. of America
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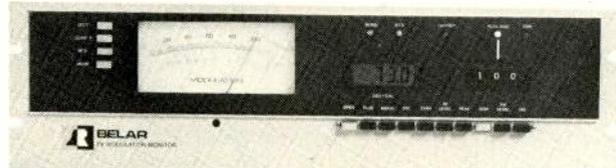
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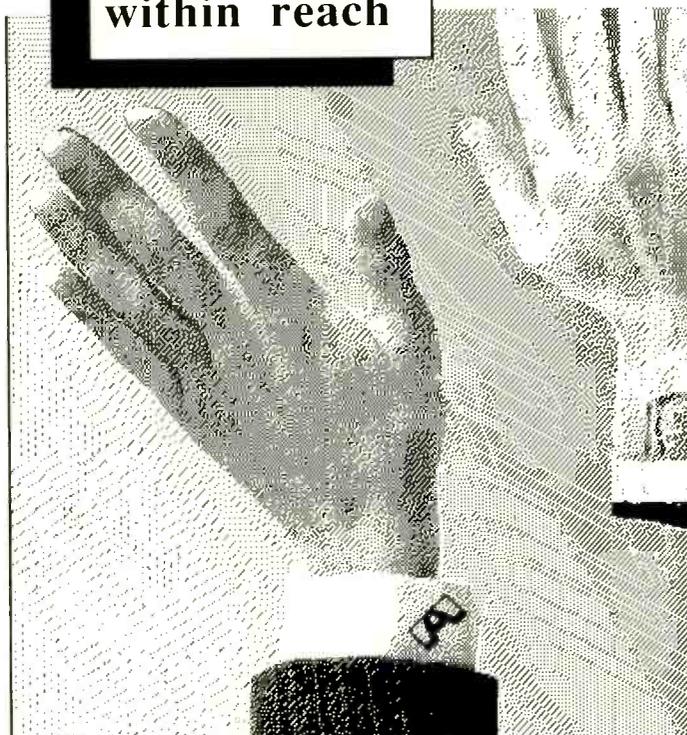
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ANOTHER LOOK AT COMPONENT ANALOG

VIDEO

BY BOB PAULSON AND WILLIAM A. OWENS

Is CAV the bridge to digital? Component Analog Video may play a role as a mid-step to the digital studio.

Until the advent of videotape recording, the "first-generation" NTSC studio or camera output was the only generation that existed. These signals were passed through the various video switchers, and out via the transmitter to the airwaves, where they deteriorated during the "real time" propagation all the way to our humble television receivers.

The advent of videotape recording devices, and the later development of electronic editing equipment, brought to the viewers for the first time video that was not first-generation. The tape-copying process was accompanied by the problem of signal degradation, as successive generations of the original signals made more visible the artifacts of the less-than-perfect NTSC process. Over the years, many attempts have been made to eliminate the quality loss attributed

to video editing. Each solution has its own proponents—and also to its own problems.

Digital video recording equipment almost completely eliminates generational loss. Recently, we viewed on a split screen a Sony first-generation tape and a 40th-generation dub side-by-side. There was only a very slight difference.

But not everybody is ready to make the heavy financial commitment needed for a completely digital production and transmission environment. The cost is hard to justify because the pristine quality of a digital environment would be lost in the conversion to, and the transmission of, the decades-old NTSC broadcast standard signal.

With the broadcast-signal delivery system less than perfect, many broadcasters are waiting on digital purchases until transmission and reception products catch up with the production technology. Yet the need remains for higher-quality "master" material, for those production jobs where multiple generations are nec-

essary. For that marketplace, half-inch component video recording was created.

Well, sort of.

It is logical that manufacturers respond to marketplace demands. If the market is screaming for purple and orange smooth-sided widgets, somebody will make them, and make a ton of money selling them. In the case of videotape, long before "digital" machines were a reality, broadcasters were screaming for a lightweight, portable camera/VCR package for news production. Accustomed to lightweight film cameras like the Cinema Products CP-16, news cameraman balked at using the heavy portable cameras and 3/4-inch videotape recorders of the day. In addition, where once a station could deploy a film cameraman by himself, the heavy portables required a cameraman, a tape operator and a lighting man. Not very cost effective.

LESS IS MORE

Matsushita was the first manufacturer to respond to the market demand

for a lightweight camera/VCR, producing MI-format camcorders under the RCA Hawkeye and Panasonic brands. In order to create a physically smaller package, the MI format used a half-inch videotape in cassettes similar to the home-type VHS shell. The signal was recorded as Y/I/Q components, to provide a higher-quality picture for later editing.

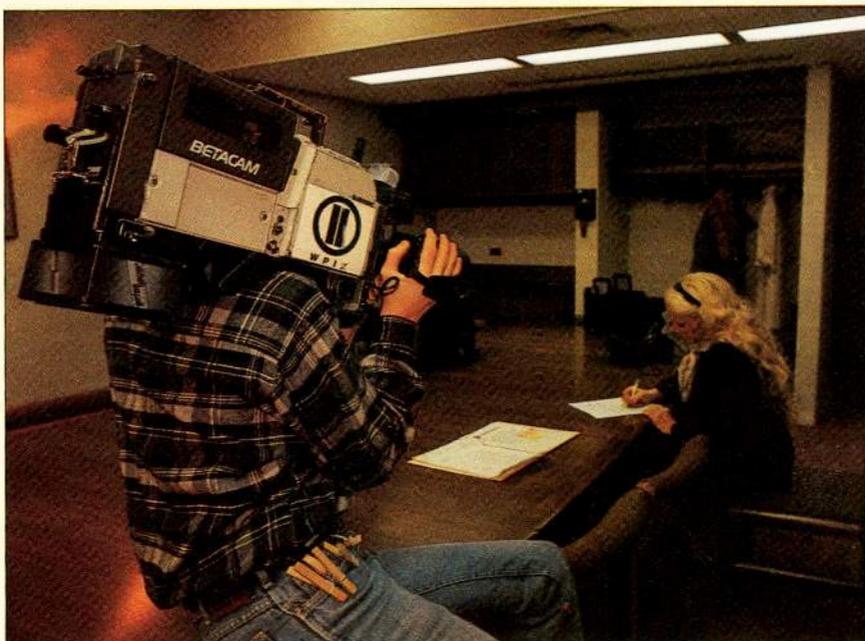
Sony took a slightly different route with its camcorder package, recording in the Sony-created Betacam format, a half-inch system which recorded the Y, R-Y, and B-Y color-difference components. Eventually, Panasonic joined Sony in the color-difference camp, with a reformulated recording system dubbed MII.

While the acceptance of half-inch color-difference formats is a given, the implementation of color-difference processing—or CAV (component analog video), as it has become known—throughout the television plant has not been universal. The question of Beta vs. MII is not the issue. The issue is what is being done with the CAV signal once it departs from the videotape machine.

Broadcasters and production houses live, for the most part, in a composite analog world. While CAV decks may be used as source machines, the composite video signal, in most cases, is the one that feeds air. And while the signal might be sent to the production (or edit room) switcher in CAV form, it will most likely exit as a composite signal. This is simply because the users have not seen a need to re-invent the wheel, to change their systems entirely to accommodate a tiny CAV island.

The same approach can be seen in regard to digital processing. Digital devices, such as VCRs or effects units, are being “dropped” into the signal path as islands, where a direct benefit can be seen. Manufacturers have come to understand that situation, and they produce both CAV and digital output products, along with the “black magic boxes” needed to interface them into existing video systems.

One place where this type of think-



Sony Betacam CAV cameras are widely used as field acquisition devices.

ing is evident is PBS affiliate WLVT-TV, in Bethlehem, PA. The station derives much of its financial support from its sale of production services. According to Assistant Director of Engineering Barry Wittchen, the station purchased Beta SP camcorders to improve the quality of field tapes.

Acquisition is via Betacam-format tape; these are bumped to D-2 masters in the edit process. Wittchen explains: “We haven’t spent any money on our edit suites to upgrade them to component. There isn’t any advantage for us in all-component editing. We now master on D-2, but distribute our programming on one-inch type C or on 3/4-inch SP.” Commenting that “The Sony D-2 portable VCR buys quality, but is a step backward in portability,” Wittchen says D-2 could become his future production standard, “if a D-2 camcorder was available.”

BUILDING BLOCKS

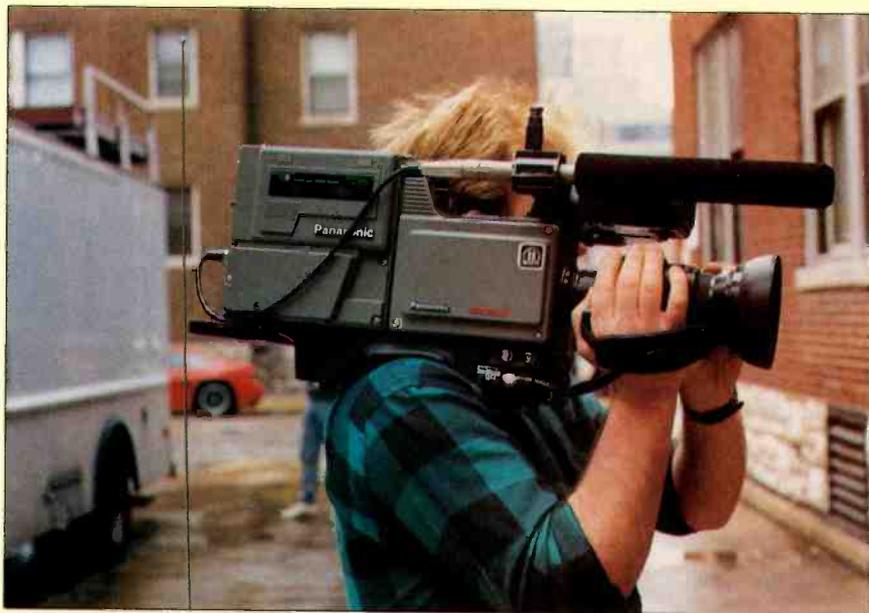
Another station with a building-block approach is KPLR-TV in St. Louis, MO. The station operates 15 MII decks and a Panasonic M.A.R.C. automation system alongside both one-inch type C and 3/4-inch equipment. KPLR’s VP of Operations Jim Wright

says his station “chose MII over Beta because of its metal-particle tape technology” and uses it “for most news and field production, and all satellite feeds.”

The folks who brought you “format wars” may very well be planning to stage “price wars,” with cost-efficient on the minds of both Panasonic and Sony. Will Sony follow Panasonic’s lower prices?

Wright says, “We’d like to go all-component, if there was some creative justification. Right now, we do most of our editing in two one-inch suites, in which all video is routed in composite.

COMPONENT ANALOG VIDEO



Camcorder systems were first to operate in the CAV domain.

We go down in type C generations as required to create edited masters. And nobody complains about quality." Wright was quite impressed with the Panasonic AQ-20 digital camera, particularly its "picture quality, low light sensitivity, low noise, and stability."

Columbus, OH-based Vanguard Productions was the first production house to order MII-format equipment, back in 1987. Owner Jerry Beck says his brother, whom Jerry describes as the engineer of the family, led the move to MII "because of the quality advantage over 3/4-inch, and the portability advantage over the one-inch machines we had been using." Beck reports that his machines have had the benefit of every available update, and says that the machines "do anything and everything we expect of them. Downtime has been minimal—MII is an everyday shoot-it-and-play-it system."

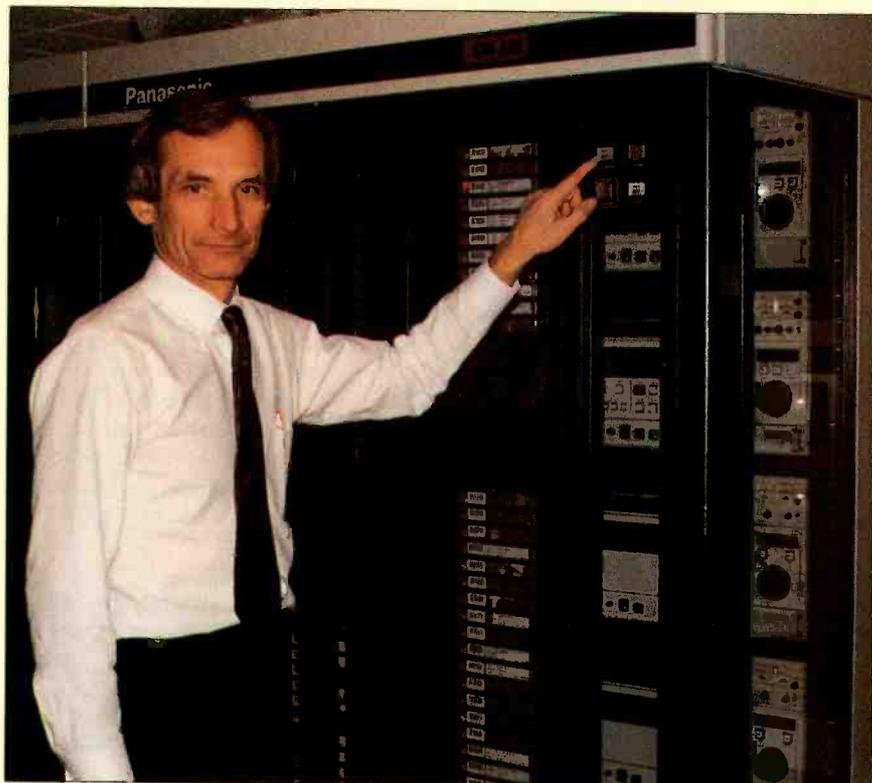
Vanguard's MII machines feed composite to a GVG switcher for A/B roll editing, with cuts-only editing done in component analog. Beck re-

ports that in his 25 years in the production business, he has found that good equipment and good planning is essential for high-quality images. He told us that except for complex layer-

ing, "there should never be a need to go past four generations."

The concept of component "islands" in a sea of composite is a way of life for Video Works, a New York City-based teleproduction facility. Video Works owner and television director Elliott Tuckerman says Beta SP is his choice for field shooting, and "very often for studio shooting." Tuckerman reports that many of his post-production clients shoot in Beta SP. Despite the preference for Beta, all of Video Works' edit rooms are composite-based. He says, "[Beta SP] is the key format in our interformat suite, which contains two Beta SPs, two BVU-820s [3/4-inch], and three BVH-2000 one-inch type C machines."

The selection of composite for the production media was based on the needs of Tuckerman's customers. "Clients come in here with a mixture of formats—graphics on one-inch, archival and new footage on 3/4-inch, as well as half-inch Beta," he says. Tuckerman also pointed out that there's no technical justification for



KPLR's VP of Operations Jim Wright with his Panasonic M.A.R.C. cart system.

bumping material downwards or sideways because the edit suite might only process component.

As for the manufacturers, NAB '90 again showed their component product and marketing enthusiasm. Through their eyes, the polyglot editing suites of the world are a major sales opportunity. The folks who brought you "format wars" may very well be planning to stage "price wars," with "cost-efficient" on the minds of both Panasonic and Sony. Panasonic, in fact, planned to intro a "budget" line of MII machines, promising prices in line with the original 3/4-inch decks. Can "Beta Lite" be very far behind? In keeping with the concept of component islands, much activity went on in the area of stand-alone acquisition.

Ampex did its part to expand on the versatility of component systems, debuting the CVR-400 one-piece camcorder. Kevin Dauphinee, marketing manager of Ampex's small-format systems, says, "The CVR-400 has a

The question of Beta vs. MII is not the issue. The issue is what is being done with the CAV signal once it departs from the videotape machine.

most useful parallel-feed capability both to the internal deck and to the outside world. Either a component or composite signal, along with audio, can be fed to an external recorder or video switcher. That's important in shooting events where both a live switched feed and iso'd tapes are required, or in covering a news event where camera pooling is necessary."

Not to be outdone, Sony introduced its own BVW-400, a single-piece camcorder using the same frame interline chips as found in its BVP-370 studio

On the Horizon: D-X

Since last summer, "D-X" has been rumored around the industry to be the coming third digital recording format. Now it's official. In December 1989, Japan's NHK broadcasting network announced and designated as "D-X" its specification for a new half-inch videocassette digital composite recording standard. According to some sources, NHK plans to purchase several thousand portable and editing decks against this specification in the 1991-1993 time frame.

How does the so-called D-X format relate to the so-called D-3 half-inch composite digital format previously shown in prototype in the U.S. by Panasonic? When D-3 prototype systems were first introduced, there was a vague implication that their rack-mount decks and videotape cassettes would be form- and fit-compatible with MII. This is not true of the proposed D-X cassettes and decks.

Some speculate that NHK made this unilateral specification move to end forever the Matsushita/Sony struggle for world exclusive standardization on their half-inch component analog formats. Whatever the reason, the Japanese broadcaster's decision will cause turmoil in the U.S. marketplace.

Matsushita will embrace the D-X format as the logical conclusion of its D-3 half-inch composite digital system development, and indeed, such a case can be made. That position, however, isn't necessarily popular with the company's U.S. sales force at Panasonic, some of whose members have been counting on an MII-identical cassette to help push half-inch digital sales. One source at Panasonic bemoans what he feels may be the loss of a marketing advantage over Beta SP in the war for sales of cassette-based automation systems.

Sony, too, has reason to be unhappy about the appearance of another proposed future format. For one thing, D-X acceptance in the world marketplace will directly impact future Beta SP product family sales potential, which aggregated some 50,000 units in its first three years of existence. For another, D-X will compete directly with the D-2 19-mm cassette format for sales of both portable and rack-mount equipment and automation systems. One Sony executive says that "the world marketplace isn't ready for another format and, in any event, one format can't serve all the needs of all the market segments." Sony reportedly was invited to participate in the development of the D-X format, but opted not to.

Ampex executives also talked about D-X, but not for attribution. Their marketing and manufacturing energies and budgets are committed to Beta SP and D-2. They want to enjoy the fruits of building on that first-three-year worldwide sales base, and to sell into the latent demand for all-CAV postproduction systems. "Another format in the composite digital environment, which hasn't begun to mature in either the broadcasting or video production marketplaces, is too much and too soon," one executive said. "Until recent-past Beta SP/D-2 investments have been amortized, there isn't any money in the marketplace to commit to a major format change."

Objections notwithstanding, D-X may well become the "spoiler" format of the early 1990s, bloodying both CAV and D-2 in the marketplace. Even before its official introduction, the format has made progress. Articles abroad have reported that the BBC has seen the format and is seriously considering adopting it. What's more, NHK has agreed with the planning officials of the 1992 Olympics TV coverage to have D-X established as the standard for recording and distribution at the Barcelona Games.

By the way, NBC will broadcast those games in the U.S.

—B.P.

COMPONENT ANALOG VIDEO



The AmpeX CVR-400 Betacam SP features a 700-line resolution FIT CCD sensor.

camera. Creative functions are aided by the addition of a safe-area generator for the viewfinder. The unit also sports separate component and composite outputs.

BTS brought its new one-piece camcorder, the LDK-391, to the show. While the recorder technology is licensed from Sony, the camera side of the unit is pure BTS, incorporating

the new FT-5 frame transfer chip, promising greater than 700-line resolution. According to product marketing manager Greg Pine, "Our FT-5 technology has no lag, no burn-in, and no comet-tailing at any light level. Images feature high resolution with extremely low aliasing." Pine pointed out that similar features are found in the LDK series studio cameras as well.

COMPONENT ISLANDS

All of these are acquisition devices: component islands in a composite world. As noted before, one can make a direct comparison between the component/composite relationship, and that of digital/analog. Component is better than composite; digital is better than analog. There's no question about that. The slow implementation of improved technology—whether

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component or digital—is directly related to the low perceived value of the improvement over that which has been long-utilized.

Those on the broadcast-station level are moving quite slowly because no matter how good the acquisition format, no matter how good the editing format, and no matter how good the playback format, it's still going on the air as regular, artifact-heavy, 525-line NTSC.

In the production houses, where graphics requires both improved mas-

There's no technical justification for bumping material downwards or sideways because the edit suite might only process component.

ter quality and the retention of that quality for many generations, things must move faster. This is where the implementation of both component and digital technology will find its short-term niche. Short term because looming on the horizon is, of course, HDTV. There is no question that it is on its way. The question is how soon.

In the meantime, stations and producers must plan ahead, and that planning will require the introduction of the best possible available formats for whatever lifespan there is until HDTV arrives.

The key then, is to provide a "bridge technology," one that may be implemented now, and provide the ability to adjust and adapt in the future. Component analog video is that technology, providing the pathway to higher-quality recording and playback, while laying the groundwork for the new technologies to come. The CAV products we've seen at NAB are just the beginning. ■

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REMOTE

REVOL

What used to be the work of the "transmitter guys" is now done remotely by master control. Advances in computer and satellite technology promise further changes in controlling station transmitters.

Television transmitters are probably the best possible example of voodoo engineering. You feed a little signal in, and you pump a couple of million watts out the other end.

These mysterious monsters used to require the kind of constant care and feeding that make a crew of servants mandatory. These were the "transmitter guys." They hardly ever saw the light of day. They did things with chewing gum and imagination—and maybe a few power tools—that are better left unspoken. But they kept us on the air.

Back then, being a transmitter guy was 10 percent operating adjustments, 10 percent preventative maintenance, 70 percent drinking coffee and sitting around waiting for something to go down, and 10 percent fixing it when it did, usually at the same time as fielding frantic calls from the station manager asking when you would be able to go back on the air. But times change, and advances in technology and economics have brought changes in who does the job, and when.

In the "good old days," you needed a live body with a First-Class License

to run the transmitter. And chances were that the guy running master control also had a first-class ticket. Remote control has allowed stations to combine the master control and transmitter operator positions, thus saving significant dollars.

One person who recalls the changes brought about by advances in technology is Ernest E. Rety, the now-retired chief engineer of WDHO-TV, Toledo, OH. Rety clearly remembers the days before remote control. "The instability of the first-generation transmitters required constant attention by knowledgeable operators," he says. "Drifting of frequency and power were major problems, and since modulation varied with tube life, constant tweaking was necessary."

"The instability of the first-generation transmitters required constant attention by knowledgeable operators."—Ernest E. Rety, retired chief engineer, WDHO-TV, Toledo, OH

Remote control brought changes to WDHO. "Before remote control, we operated with three full-time transmitter men and one part-timer," Rety explains. "With remote control in place, one full-timer remained on the overnight shift for transmitter and studio maintenance, and the part-timer was assigned to studio operations. The two other positions were eliminated."

Of course, the first-class ticket has gone the way of the dodo bird, and today's transmitters are considerably more reliable. They no longer demand the constant personal attention they once required. Computerized remote controls, combined with the new station economics have created two new types of transmitter people: operators and maintainers.

Today you have stations in both small and major markets running with only one operator on duty at any given time. Automation is one reason, of course, but more important is the availability of reliable equipment to control the station's transmitter from the studio location.

The person actually logged on in charge of the transmitter at any given time is usually the master control "operator," using a remote-control device to keep the transmitter within FCC specs. The person who handles the care and feeding of the beast is usually a "maintainer," one who keeps an eye on computer-generated transmitter logs to monitor performance, and takes care of the real nuts and bolts of keeping the rig air-worthy. More than likely, the "maintainer" has other duties, splitting his hours between transmitter and studio maintenance. And in many small

UTILIZATION

markets, the “maintainer” is the chief engineer as well. To management’s thinking, this type of manpower utilization is more efficient, and therefore less costly, than having an experienced technician tied down to what is basically a “firewatch.”

The result of this shift to all-around facility maintainers instead of dedicated transmitter people is a lowering of a station’s manpower cost per on-air hour. And without question, it is a direct result of advances made in the remote-control devices most of us use today.

LONG DISTANCE

The use of transmitter remote controls is not limited to those wishing to save a few dollars. In many transmitter locations, it is impractical to use on-site manpower. The physical distance between a station and its transmitter can be a factor in the decision. And an isolated location, on a mountaintop, for example, may push the scale in favor of remote control.

WHYY-TV is an educational station licensed to Wilmington, DE. The station’s studio facility is located in Philadelphia, with the broadcast transmitter located in the antenna farm used by most Philadelphia broadcasters. From there, the station covers the northern portion of Delaware, as well as the Philadelphia market. To provide program service for the southern portion of the state, WHYY-TV also operates WDPB-TV, located in Seaford, DE, over 110 miles

to the south of its Philadelphia studio.

For its two transmitter sites, WHYY utilizes two different remote-control systems. According to Bill Weber, chief engineer for the stations, the main WHYY Harris transmitter is controlled by a Moseley remote, via dedicated telephone line. Weber explains, “We selected hard wire for two reasons, the first being the ability to control the transmitter in the event of a microwave failure, and the second, the ability to switch microwave circuits without an interruption of control.”

Until about a year ago, Weber had the same type of dedicated-line control for WDPB. “It was an expensive way to handle control,” he notes. Today, he uses a Gentner dial-up system to keep tabs on WDPB. “The system dials our master control every two

By William A. Owens

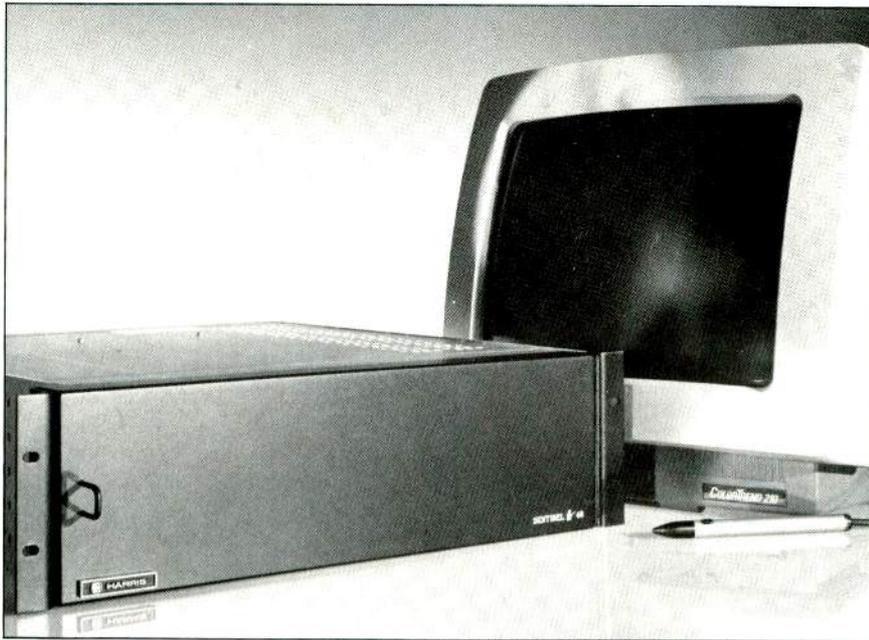
hours to log transmitter readings, and of course, it instantly reports any alarm condition,” he explains. “Our operators turn the station’s Acrodyne transmitter on and off using the Gentner, and it has worked well for us.” A local contract engineer is employed for routine maintenance, and a local security company provides visual monitoring of the Seaford station to eliminate the need to transport an off-air monitor signal back to Philadelphia.

A slightly different problem was faced by KBCI-TV in Boise, ID. While the station is only 14 miles away from its transmitter site, chief engineer Larry Smith reports that distance is not the main problem: “We have snow



Engineers at the National Supervisory Network’s command center remotely control stations throughout the country.

REMOTE REVOLUTION



Harris Sentinel 48 Remote-Control Unit features a color touchscreen video display.

here a good part of the year, and it sometimes could take us five to six hours to get to the transmitter site," Smith points out. The site, at the top of a 7050-foot mountain, is shared by several area broadcasters. Smith uses a Moseley remote to control his transmitter and ENG receiver, but has one more backup in place. "The local broadcasters share the cost of keeping a man on the mountain at all times," Smith says. "For the popped breaker or the quick repair, having a man there is an extra bit of protection that is worth the expense."

WATER EVERYWHERE

When one thinks of isolation, New York City may not immediately come to mind. But for local broadcasters, their transmitter sites are just as isolated, although in a different context. Four of the local stations maintain studios in New Jersey, WWOR-TV, WHSE-TV, WXTV and WNJU-TV.

A few years ago, WNJU-TV suffered a burst water pipe at its Empire State Building transmitter location. The station's master control room was at that time located in Newark, NJ,

and the transmitter was operated via remote control. The pipe burst at approximately 4:15 p.m. on a weekday. Because of heavy rush-hour traffic in northern New Jersey and midtown

"The system dials our master control every two hours to log transmitter readings, and it has worked well for us."—Bill Weber, chief engineer, WHYY-TV, Philadelphia, PA

Manhattan, the maintenance crew spent almost two hours traveling the 13 miles to the transmitter, and the station was off the air for almost 24 hours due to damage caused while the maintenance crew was in transit — losing 24 hours of revenue.

This is the potential downside of remote control. But for most stations, the benefits of remote control are worth the risk.

CUSTOM SYSTEMS

Remote transmitter control in the '90s will be computer-based and responsive to the requirements of individual stations. Remote-control devices are available as base models, of course, with limited functions. But today, most manufacturers expect their customers to customize the base models to their specific applications, and most offer extensive lists of optional devices and plug-ins designed to make their units task-specific for a wide range of functions.

According to Martin Horspool, applications engineer for the Harris Broadcast Division, his company's Sentinel Series remote-control system is "designed for expansion, with a base system starting with 16 channels of status, control and analog, plug-expandable up to 96 channels of status and control, 64 analog." The system provides for time-based control of up to 50 functions, including turning the transmitter itself on or off, with a sequential function allowing time for transmitter warm-up.

Another system designed for tomorrow is the Gentner Electronics VRC-2000. Garry Crowder, national sales manager, describes the VRC-2000 as "providing 16 status, 16 metering and 32 command channels." The system can be used with a dedicated data link, or through touch-tone telephone service. According to Crowder, "the unit will respond to an alarm condition by dialing out to a predetermined list of telephone numbers. These could be the studio control room, the chief engineer's home or even a cellular telephone." The person receiving the call could take command of the transmitter via the telephone keypad, and make the proper corrections in response to the alarm.

Moseley Associates Inc. offers two computer-based remote-control devices. National sales manager David Chancey explains, "The MRC-1620 is a low-cost system, allowing control via a standard PC." Communication with the transmitter unit is via telephone line modem, or dedicated circuit, such as a microwave STL. For

those needing a larger system, the MRC-2 is capable of controlling up to 99 sites, with 256 channels of metering, status and command. The MRC-2 is also computer-based and uses Moseley's Master Control software. One interesting feature is that display screens may be created by the user for his specific requirements.

Potomac Instruments Inc. VP of marketing, David Harry, describes his company's RC16+ remote control as a "microprocessor-based system which uses a factory-programmed PROM." According to Harry, "the PROM allows you to install the unit, and be up and running without the time-consuming set-up programming normally associated with a remote controller." Potomac also offers a PC-based system, the 1500PC, with units for both studio and transmitter sites, and software that permits control from any MS/DOS-equipped PC, while protecting against unautho-

**"Before remote control, we operated with three full-time transmitter men and one part-timer . . . with remote control in place, two positions were eliminated."
—Ernest E. Rety,
WDHO-TV, Toledo, OH**

ized use via embedded system coding. This will keep out the computer hackers.

For those stations seeking a plain and simple solution to the problem of remote control, TFT Inc. makes its model 8610. It is described by Jesse Maxenchs, marketing director, as "definitely a low-tech box, for a small-market application." Using a building-block approach, the unit is ex-

pandable up to a maximum of 70 command and telemetry functions. According to Maxenchs, it is "not a complicated computer product, but a simple box designed to be understood by even the most low-tech operators."

ULTIMATE CONTROL

There is no question that remote control is a firmly entrenched fact of broadcast life. Bottom-line-conscious management sees the benefit of lower manpower costs. Chief engineers see

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REMOTE REVOLUTION

a way of deploying manpower where and when needed. Today's equipment is without a doubt more stable, and needs less attention, than the last generation.

But that's today. Where are we going tomorrow? Perhaps tomorrow is already here.

Those looking for the "ultimate" form of remote control need only look towards the sky. Using Ku-Band VSAT (very small aperture terminal) satellite equipment, National Supervisory Network, based in Avon, CO, recently went "on-line." The company provides a unique service. It remotely monitors and controls the transmitter operations of several radio and television stations across the country.

According to President Bill Sepmeier, the company "provides a service through technology, furnishing stations with a qualified operator on

"Finding qualified engineers is difficult; finding [them] within a station's budget is more difficult."—Bill Sepmeier, president, National Supervisory Network

duty 24 hours a day at a cost considerably lower than an on-site operator." NSN engineers have been able to adapt their technology to run automated television stations as well.

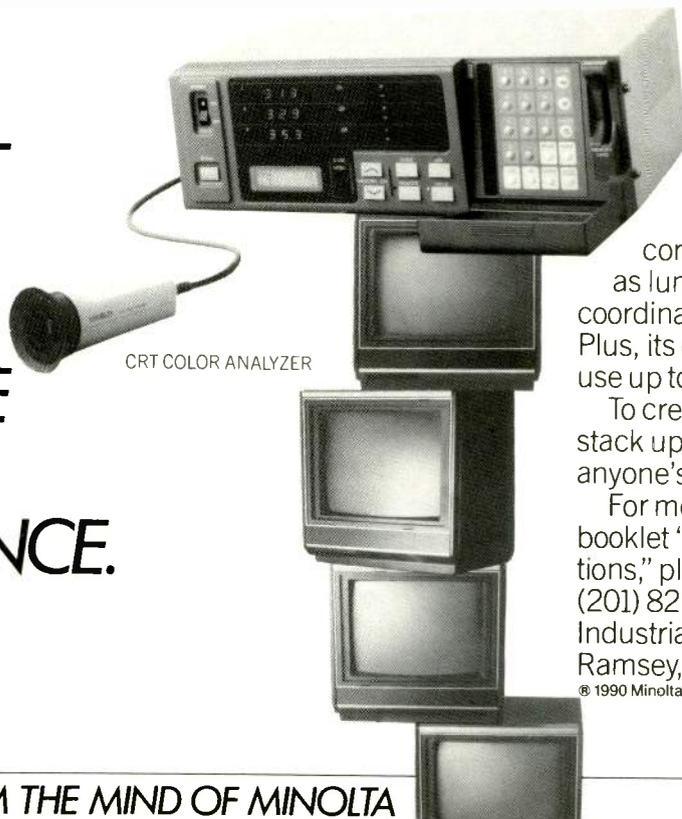
For many television broadcasters, particularly those in small markets, the NSN package of hardware and services may be the remote control

system of tomorrow. In Sepmeier's opinion, "finding qualified engineers is difficult; finding qualified engineers within a station's budget is more difficult." He believes that many are by-passing broadcast careers due to long, often unpredictable hours involved. And with talented engineers moving to other, less stressful careers, NSN's service may be right on target for the future.

One other possibility for the future of remote control was posed by Ernest Rety. He suggested that "manufacturers provide diagnostic communications links that would permit station operators to send transmitter-performance data directly to the manufacturers for evaluation. This would allow stations to spot and repair problems before they affected on-air performance." Perhaps some manufacturer out there is listening. ■

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SOUNDPROOF

BY SKIP PIZZI



ADVICE

Today's television studios have special soundproofing needs. Creating a quiet environment requires careful planning and construction, not quick-fix approaches.

Control of ambient noise is a basic requirement of recording and broadcast studios. All of them need three types of soundproofing: isolation from exterior environmental noise; reduction of intra-studio sound leakage; and minimizing HVAC (heating, ventilation and air conditioning) noise. Television studios in particular present special challenges, making their need for noise control more critical.

There are several reasons for this. A major one is that audio pickup in television usually involves the placement of microphones at some significant distance from the sound source. The typical use of a shotgun microphone out of the camera's view, or a lavalier microphone on the talent's lapel, means that the sound pressure level (SPL) of the desired sound will be attenuated from what a closely placed microphone would receive from that same sound source. The inverse-square law applies here: SPL will be reduced by 6 dB for every doubling of the distance from the source. So while a person speaking in a radio or voiceover studio might have a microphone placed two inches away or less, the same announcer in an on-camera television scene will have a mic placement of eight to 12 inches or more.

That television placement is two or two and a half doublings of the radio

placement's distance, meaning that for the same acoustical signal-to-noise ratio (assuming the announcer speaks at the same volume in both instances), the television studio must be 12 to 15 dB quieter. (By the same reasoning, TV studios must be necessarily *deader* than audio or radio facilities, to avoid the pickup of excessive reflections or reverberation by the relatively distant mic placements used—but this is the subject of a different discussion.)

Next consider the high heat loads generated by television equipment in studios, primarily lighting. This mandates high-volume, fast-exchanging HVAC systems. The more air an HVAC system has to move per unit of time, the more noise it makes, other things held equal. So quiet *and* adequate HVAC is a difficult yet critical element of any TV studio. Having to shut down the blowers during record-

ing or broadcast is not a viable solution, since this is when the most heat is being generated. Operating under these conditions puts great stress on both the human and electronic elements of the production.

Finally, remember that much of the audio recorded in these facilities is subjected to large amounts of compression during later stages of production, and/or during broadcast. Even with today's more sophisticated gated devices, this audio processing



Studio control room of Pyramid Productions, Dallas, TX.

SOUNDPROOF ADVICE

*Production studio of KPLX/KLIF,
Dallas, TX.*

typically causes an increase in perceived background noise levels. The quieter a signal is before such compression, the quieter it will be afterwards.

MEASURES OF HUMAN HEARING

In any discussion of this kind, it is important to understand how studios are measured for acoustical noise. A family of curves called "noise criteria" has been developed for this purpose. These curves follow the so-called "Fletcher-Munson equal loudness contours," which are generally agreed upon to be measures of the human hearing sense's frequency response at varying intensities of sound. The "40 phon" Fletcher-Munson curve (defining the SPL required across the audible spectrum for all frequencies to exhibit equal loudness to a 1 kHz tone at 40 dB-SPL) is the basis for what is known as "A-weighted" measurement, making it an ideal weighting for low-level noise measurements. The unit dBA is used to indicate dB-SPL with A-weighting.

Determination of a room's noise criterion is accomplished by measuring the ambient noise there at all audible frequencies, then plotting the observed noise maxima across the spectrum. The lowest Fletcher-Munson curve that *all* points on the measured noise plot fall *under* is said to be the noise criterion (NC) for that room. (Because the Fletcher-Munson curves are stated in 10 dB steps, NC curves also add interpolated contours at the intermediate 5 dB steps.) So a studio quoted as "NC 20" means that no noise in the room exceeds the perceived loudness of a 1 kHz tone at 20 dB-SPL.

This is in fact the typical specification for a good, quiet studio. Facilities quieter than NC 20 are exceptionally silent. Radio studios can function acceptably at NC 25 or NC 30. TV studios, for the reasons mentioned above, should adhere to the NC 20 standard



whenever possible. Foley stages or other locations where very quiet sounds are likely to be recorded (and at some distance from a microphone) might try for NC 15.

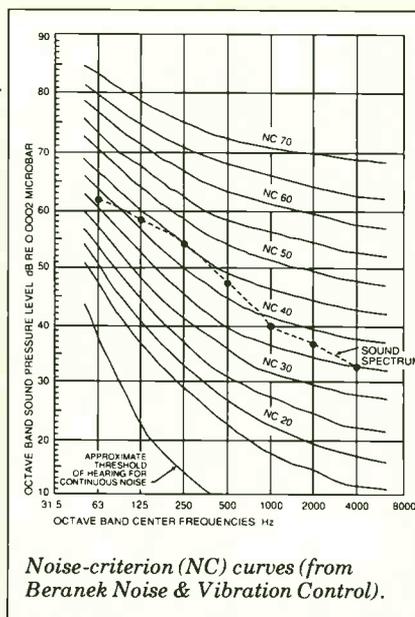
How one achieves such quietude is of course the subject of many volumes and years of research and development. For starters, low-frequency noise is the most insidious and difficult to protect against. Luckily, we are relatively insensitive to such

noise at low levels. Nevertheless, it can be quite a challenge to the designer, especially in urban areas, with their subways and truck traffic.

TOOLS OF BATTLE

Typical tools of battle here include the use of floating floors and massive masonry construction. Floating floors involve the use of twin concrete pads, one above the other, with the upper physically separated from the lower by rubber isolators. In some cases, existing concrete floors may be adapted, but best results are usually obtained with construction from scratch. It is also important that the floating floor not be compromised laterally, so rubber or cork isolation should be provided along the edges of the inner pad.

Exterior walls should be of masonry construction, and interior isolation is typically achieved between rooms with double or triple-layer drywall construction. Ceilings in television studios are often higher than those of many sound studios, chiefly due to the presence of the electrical grid. Often, this means that the studio ceiling is the building's roof, thus requiring substantial isolation from exterior sounds, especially in urban areas or near airports and military bases. Massive masonry is more difficult to



*Noise-criterion (NC) curves (from
Beranek Noise & Vibration Control).*

employ in ceiling construction, so multilayered drywall or its equivalent is often used.

Load-bearing requirements of the structure are an issue here, and worth considering when designing new facilities or inspecting existing structures for adaptation. If the studio ceiling is *not* the structure's roof, the nature of the room(s) above will in part determine the isolation required. Generally, treating the studio ceiling in a similar manner to the studio walls in terms of isolation works well.

Another important feature of studio soundproofing is the decoupling of structural features. Walls should be isolated from each other, and from floors and ceilings. Further, walls should not "short" across two adjacent floating floors, such as a studio and control room pair. Nor should wiring troughs tie two otherwise isolated slabs together. Finally, all joints should be properly sealed.

Windows between rooms are a frequent source of sound leakage. Worst-case scenarios involve studios serving more than one control room, since in these, leakage may involve audio from a different program. (Leakage from the same program is not much of a problem until it causes resonance or feedback.) Windows should be dual-pane, the thicker the panes the better, but with each pane of a different thickness. The spacing between the panes should be made as large as possible, and the interior surface of the interstitial space should be treated with sound-absorbent material. Window areas should be no larger than absolutely necessary for proper sight lines. The common practice of tilting studio windows can actually reduce the transmission loss through the window since it reduces the average spacing between panes, compared to keeping the panes straight in the same frame.

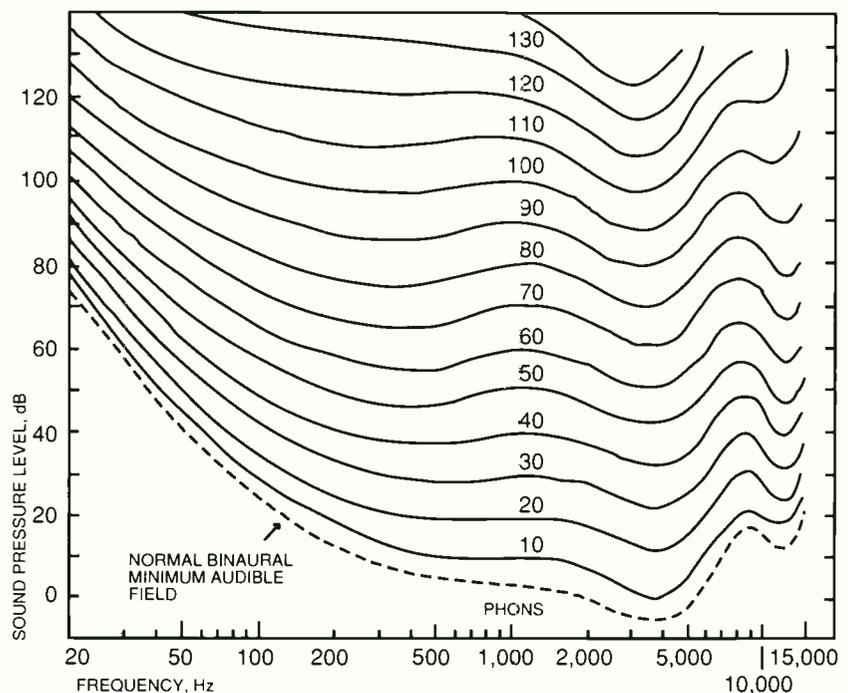
HVAC systems create noise through air blowing, through compressor and motor noise transmission, and through sound leakage from one room to another through ducts. Air-blowing noise is reduced by using

The Fletcher-Munson Curves

Human hearing is not "flat" within the 20 Hz/20 kHz spectrum, but rolls off significantly as it approaches each extreme. More importantly, though, the steepness of these rolloffs varies with the intensity of the sound being heard at the moment. The louder the sound, the flatter our hearing's response; the softer the sound, the steeper our hearing rolls off. In other words, a low-frequency sound at 50 dB-SPL sounds much quieter than a mid-range sound at the same SPL, but the same low frequency sound at 100 dB-SPL will sound much closer to the loudness of the mid-range sound at that same higher level.

The Fletcher-Munson curves detail this variable response. Using 1 kHz as a reference, there is a curve for each 10 dB step of SPL at that frequency, from 1 kHz at 10 dB-SPL (10 dB above the limit of human audibility) to 1 kHz at 130 dB-SPL (the approximate threshold of pain). Each curve shows the actual SPL required at other frequencies to create the impression in a human listener of equivalent loudness to the 1 kHz tone.

Employing the unit "phon," the curves are named by the 1 kHz SPL that they intersect. For example, the 20-phon curve defines the SPL at any point in the audible spectrum that is required to match the apparent loudness of a 1 kHz tone at 20 dB-SPL in a normal human listener. That curve, along with its fellow low-level curves, is highly U-shaped, reflecting the great increases in SPL required to overcome the hearing sense's natural insensitivity to frequency extremes at lower volumes; the higher-level curves are more dish-shaped, as a result of the flatter response of hearing under louder conditions. —S.P.



A set of equal-loudness contours. Note the maximum sensitivity around 4 kHz.

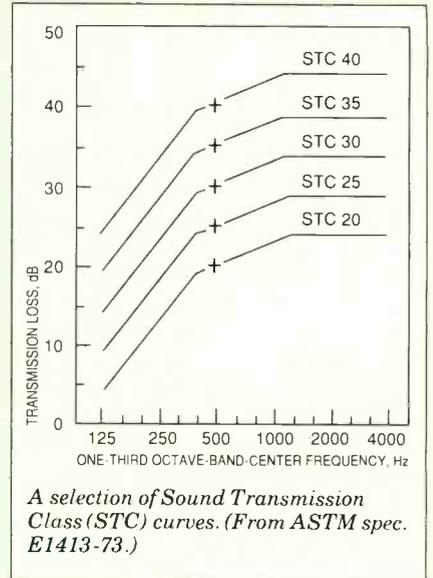
SOUNDPROOF ADVICE

ducts with large cross-sectional area, allowing sufficient air volume to be moved in and out of rooms without requiring that air to move at high velocities, and capping those ducts with quiet registers. Compressors and motors should all be mounted on spring-isolated platforms, but piping, conduits and ductwork to and from these units should also be isolated by use of rubber sections. Support framing should be carefully constructed so it does not defeat this isolation by bridging. Smart duct planning, using mostly "home-run" design, will minimize the room-to-room leakage through ductwork. Interiors of ducts should be acoustically damped with sound-absorbent liner, and sharp turns in ducts should be equipped with diffusers or "silencers" to reduce noisy turbulence.

Finally, don't neglect doors. These

necessary intrusions to an otherwise airtight enclosure can be quite devastating to the overall result, even though everything else may be done impeccably. Good sound-isolating doors are usually expensive, but worth it. They also wear with time faster than any other part of a room's isolation scheme, and again, the higher price typically pays off here, too.

The STC (sound transmission class) rating shows how effective the door—or any other construction unit such as prefab windows, drywall, and so forth—is at stopping sound from reradiating or leaking through it. The STC method is also based on an equal-loudness-contour approach, but it only considers 125 to 4000 Hz, and the rating number is the 500 Hz value of attenuation. All commonly used building materials are rated; an acoustical consultant can provide a



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structural doorstep to those types of doors that employ bottom drop-seals, since the use of force-fit wedge door-stops can quickly damage these. Vestibules or "sound-locks" between the studio and other rooms are, of course, essential design features. A studio door should never open directly into another room or hallway. In this way, a studio door never works alone (except for sounds occurring inside the sound-lock).

BETTER DEAD THAN HEARD

Consider also the treatment of other areas adjacent to the studio where unwanted sound may be generated, such as corridors, restrooms, lounges, canteens and offices. Keeping these areas "dead" by the application of sound-absorbent surface treatments (effective to as low a frequency as possible, preferably around 500 Hz) and carpeting will reduce the level of sound generated in those nearby areas before it gets to the outer sound-lock door, thus enhancing the isolation that the doors can provide.

And door seals are not the only things that wear out in a studio. Plenty of other temporal and environmental variables will cause changes in a studio's sound-isolating performance, from foundations settling to HVAC fan belts or bearings wearing. Seasonal changes are especially problematic in HVAC systems. It behooves the studio owner to make annual checks of the noise floor in his or her facilities to see if the NC rating has changed.

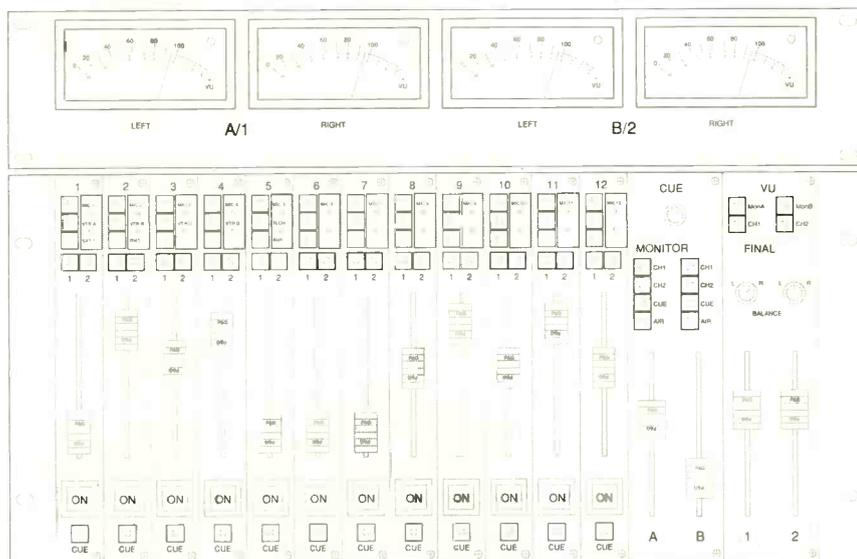
If improvements are required, or new/renovated facilities are envisioned, avail yourself of the talents of a qualified acoustical consultant or studio designer. The results will justify the effort and expense. On construction projects, the choice of contractors is equally important. Finding one with studio experience is a plus. Even better would be finding a project manager who understands the intricacies and attention to detail required in studio construction. The appointment of such an individual to oversee operation of all crews on a full-time

basis will pay rich dividends in terms of fulfilling projected specifications and reducing rebuilds.

As television sound enters the stereo and digital audio milieu, appropriately quiet rooms are the baseline

and foundation of high-quality audio chains. Equipment can be upgraded on a piecemeal basis as time goes on, but lower studio noise floors are not something that can be bought off the shelf at the broadcast supply house. ■

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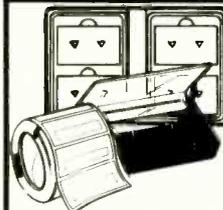
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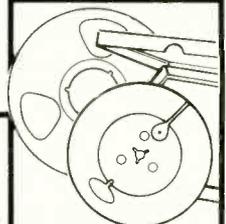
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Reader Service #200

MICROSEARCH Electronic Color Splitter

An input device for Amiga personal computers, the Splitter is used in conjunction with the Digi-View or Perfect Vision digitizer; it allows users to digitize color images from any stable composite or S-VHS video source. Video cameras, camcorders, laser disc players, video-still cameras, digital VCRs and time-base correctors with freeze capability are all potential input sources, without need for a video capture board. The unit takes any composite or S-VHS video signal and separates the signal into red, green and blue components needed to digitize in full color. Suggested retail price: \$150.

Reader Service #201



BTS LDK 391 Camcorder

Launched at NAB '90, the LDK 391 uses FT-5 image sensors with over 700 TV lines resolution. This one-piece camcorder integrates a Betacam SP VTR. Geared toward ENG applications, the LDK 391 features eight white-balance memories for a wide range of lighting conditions, and it also offers a range of shutter speeds. A 1½-inch viewfinder displays camera set-up and diagnostic messages, and can replay the recorded signal. The VTR has a built-in time-code generator/reader, as well as a built-in loudspeaker for audio monitoring.

Reader Service #202

FOR-A AFV-500 Audio-for-Video Mixer

This automated audio system with self-contained memory provides "key-frame" programming of audio set-ups. It works with ESAM II protocol, any GPI signal, an IBM PC or clone, or can function as a stand-alone. In addition, the unit works directly with FOR-A video production switchers (component and NTSC), as well as those from other manufacturers. List price: under \$8000.

Reader Service #203

WHEELIT GR-3 Folding Video Production Cart

Is a lightweight cart that holds up to 130 lbs.

Features a pre-mounted telescoping column with fluid heads that supports a 10-lb. camera, adjusts 43 to 82 inches in height, and has a full pan and tilt. In addition, the unit can be folded to a compact size of 41 x 21 x 10 inches for car storage.

Reader Service #204

QUANTA CE 25 Edit Controller

A two-VTR cuts-only edit controller, the CE 25 can be expanded to control eight VTRs, and offers a disk-loadable system that can create a Grass Valley or CMX-compatible EDL. It features a built-in 5¼-inch floppy drive, CMX RT-11 disk-compatibility for both 3½- and eight-inch formats, audio/video split edits and help menus. List price: \$5000.

Reader Service #205



QUANTA



ODETICS

ODETICS SCS800 Sequencing Cart System

A VTR sequencer with six VTRs and a personal computer, the SCS800 includes a display that tells the operator into which VTR to load each cart in order to maintain the scheduled sequence. Other features include a record/dub, a monitor, and program switchers. The system's database can store information for up to 65,000 carts, and Odetics Multi-cut software is available for use with the SCS800. The unit is compatible with the Odetics External VTR Controller and can interface with the Odetics Cart Work Station.

Reader Service #206

FLUKE PM 3355 and PM 3375 DSO Oscilloscopes

These analog/digital storage scopes offer real-time sampling speeds of up to 250 μ s/s, analog and digital bandwidths of up to 100 MHz, and added microprocessor-calculated measurements. Both feature cursors and full autoset. List price is \$5390 for the PM 3375 and \$4500 for the PM 3355.

Reader Service #207

TIME LOGIC TLC Controller

The TLC editing and synchronization system controls one or two Rank Cintel telecines, and four RS-422 serial-control VTRs or ATRS in any combination of recorders or players. It also drives a Grass Valley Group Model 100 switcher to automate crosspoint selection and edit transition effects. Individual scenes can be replaced by using insert edits.

Reader Service #208

**CENTRAL DYNAMICS STAGE*1
E-NTSC Digital Encoding
System**

This 4:2:2 encoder features 100 percent digital processing, proprietary FIR (finite impulse response) filters to screen out artifacts, analog antialiasing and reconstruction filters, and both 12- and 16-bit internal processing. Its modular design accommodates D-1 to NTSC, D-1 to D-2, and CAV to D-2 configurations. Options include genlock, CAV inputs, an AUX channel, ES-BUS interface and D-2 outputs.

Reader Service #209

**AVITEL Digital Video
Distribution Amplifier**

This full 10-bit digital DA with re-clocked outputs has a dip switch on the inside front panel to allow users to assign the dual-output modules to any of the input modules. The DA frame allows up to three input and three dual-output modules. Optional input cable equalization (up to 500 feet) and remote-control output module-assignment selector are also available.

Reader Service #210

**SUPERIOR ELECTRIC UPSY
Series Stabiline UPS**

Series models include ratings in 400 VA; 800 VA; 1250 VA; 120 V; 60Hz; and 220/240V, 50Hz. Units operate at very high frequency and use MOSFET semiconductor components that allow for small size, light weight, quiet operation and high efficiency.

Reader Service #211

TECHNI-TOOL Demagnetizer

This hand-held demagnetizer serves as a deguasser for video screens and computer monitors. Its correlative magnetic flux generation is 6.3 V with consumption at 3.3 A. It weighs one pound and measures 1.25 x 1.25 x 8 inches.

Reader Service #212



TELEPAK T-CAM Camera Carrying Cases

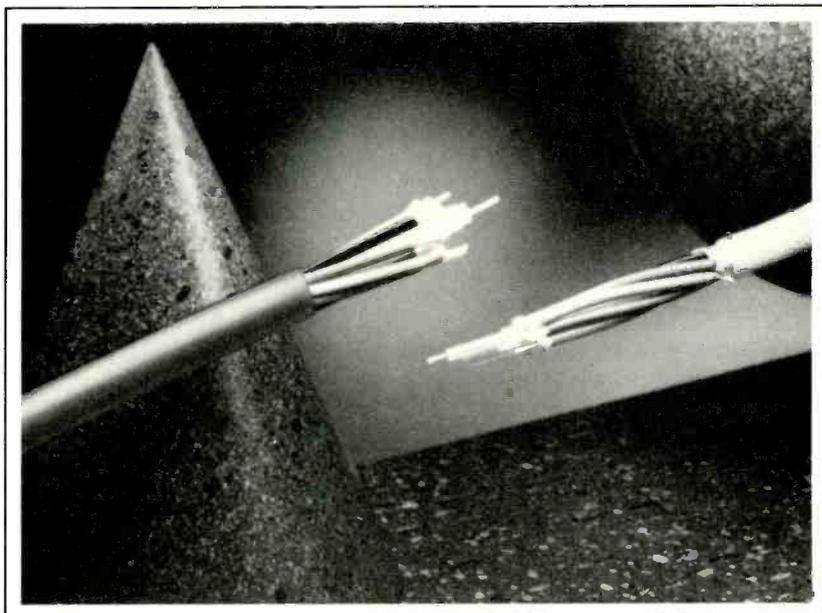
Telepak now offers two new carrying cases: the Small Universal and the Large Universal. The Small Universal is designed for professional production cameras and camcorders; the Large Universal is for Betacam cameras. Made of nylon, both units provide custom fit, high-density foam padding, and plastic inserts for durability. The cases also have interior pockets for tapes, microphones, tripods, plates and other accessories.

Reader Service #213

BELDEN Fiberoptic Breakout Cables

Available in one-, two-, four-, six-, eight-, 10- and 12-fiber breakout constructions, this line of riser-listed and plenum-listed cables is made for connector-intensive indoor applications. The cables meet the requirements of NEC article 770-6(C) and are UL-listed type OFNP for use without conduit in air plenums. Features include a tight buffer construction, and fire-resistant fluorocopolymer inner and outer jackets. Each fiber unit is individually pre-jacketed and ready for termination. Suggested price starts at \$2/ft.

Reader Service #214



BELDEN

INTELVIDEO Video Flasher

A video control system, Video Flasher lets users shoot photos and slides off NTSC or personal computer video monitors. It displays a pre-selected number (one-eight) of video fields on a monitor when the camera shutter is triggered. In effect, it synchronizes camera shutter to monitor display. Video Flasher permits photographing a single field or frame of a moving sequence. It handles NTSC or NTSC-compatible color or black and white signals, as well as TTL-level PC video (CGA and EGA). The unit comes with connectors for NTSC and nine-pin D connectors for PC video. List price: \$349.

Reader Service #215

SAKI MAGNETICS BVH-2000 Ferrite Audio Head

This one-inch ferrite head is designed to work with Sony BVH Series recording units. It is made with hot-pressed, glass-bonded ferrite, and has an all-ferrite head with a ceramic face. List-priced at \$895.

Reader Service #216

TEKSKIL INDUSTRIES 909C Camera Prompter Software

Software that permits downloading of information from Macintosh computers is now available for the Tekskil 909C computerized camera prompter, which is already MS-DOS compatible. The software upgrade kit is priced at \$139.

Reader Service #217

MICRO COMMUNICATIONS Series 44110 UHF Filters

The 44110 series is designed for use in super-high-powered TV installations. The "reactive-type" filters feature 1.05 VSWR at the fundamentals, second harmonic rejection of 35 db, and third harmonic rejection of 30 db. The Series 44110 units also allow the user to perform field-adjustable tuning.

Reader Service #218

RESEARCH TECHNOLOGY D-11 Dropout Analyzer

Provides accurate dropout detection and high-flexibility analysis. The unit tests videotapes for dropout prior to recording, editing and duplicating.

Features include a hard-copy printer that provides total dropouts (two counters); "bad" interval of tapes; elapsed evaluation time; date and tape ID numbers; and user-programmable set criteria. The D-11 measures 19 inches W × five inches H × 17 inches D and is rack-mountable. Models are available for PAL and NTSC.

Reader Service #219

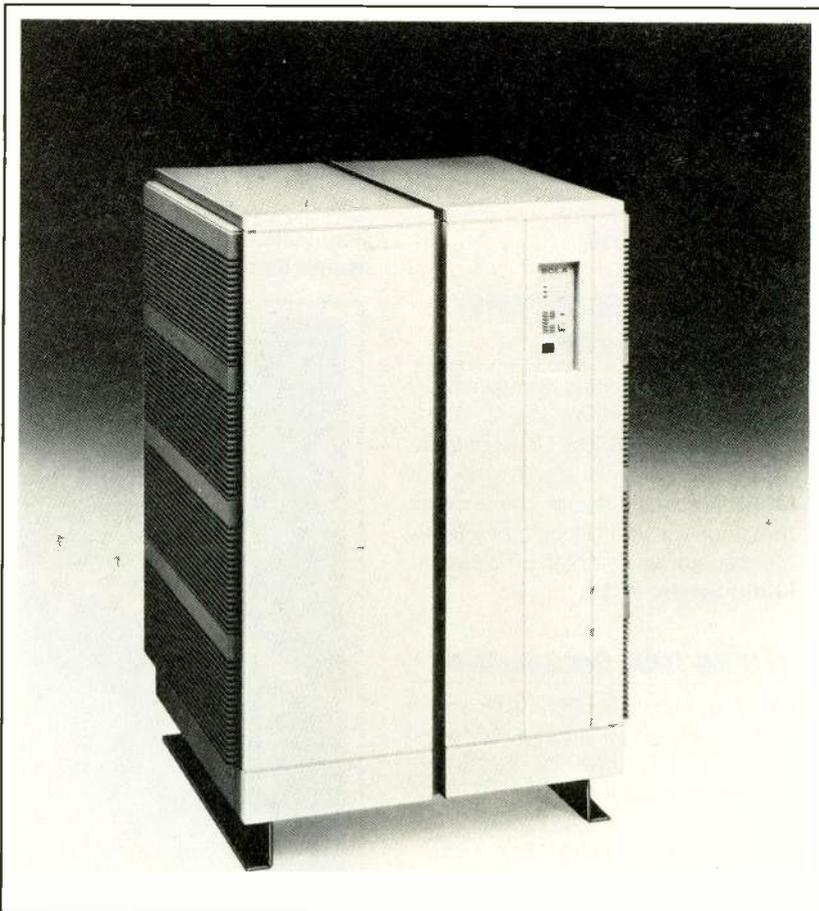
SOLA Power Conditioner Series and "Sidekick" UPS Series

Sola, a unit of General Signal, now offers a new three-phase CPC power conditioner series and a new series of microprocessor-based uninterruptible power system (UPS) units.

Available in 10, 15, 25 and 30 kVA models, each CPC unit acts as a buffer between an unbalanced load and the power source. These products feature load-imbalance correction, full electrical line-to-load isolation, and protected bypass. Prices range from \$9160 to \$12,440.

The "Sidekick" UPS units are designed to protect against overvoltage, blackouts, surges and electrical noise. Suited for use with personal computers and telecommunications equipment, this series includes output capacities of 180, 360, 450 and 520 VA.

Reader Service #220



SOLA



SONY

SONY EVO-9500 Video Hi-8 Recorder/Player

This single-deck configuration unit provides a wide variety of production/distribution applications, including in-house duplication, studio playback and satellite downloading.

The unit features an eight mm time-code generator/reader, two channels of PCM audio, an optional wireless or wired remote control, playback and record via an external AC timer, 400 TV lines of horizontal resolution, signal-to-noise ratio of 45dB, and Y/C (S-video) in and out connectors. The unit weighs 14.3 lbs and measures 13" W x 4.25" H x 14.3" D.

Reader Service #221

**ARIES ELECTRONICS
SB-200 Electronic DIP
Components Kit**

Kit includes test sockets, flexible jumper cables, capacitor sockets, programmable headers, DIP switches, LED sockets, box connectors and elevator sockets. Priced at \$150.

Reader Service #222

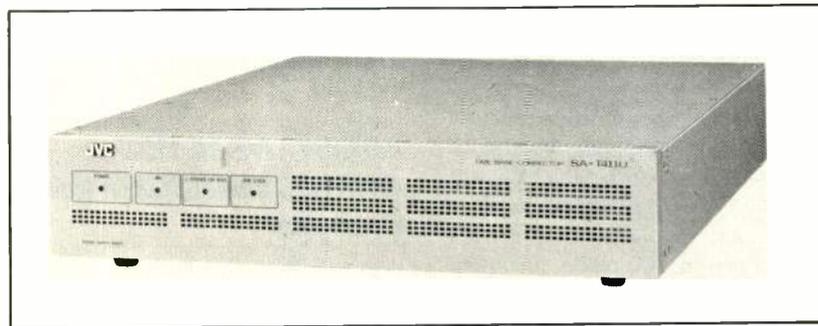
**RGB SPECTRUM
RGB/Videolink and RGB/View**

The RGB/Videolink video scan converter transforms computer graphics from a workstation or PC to television (NTSC or PAL) video for videotaping, video projection or video transmission. It offers real-time operation, line and pixel averaging, antialiasing and 24-bit color. One model works with workstations that have a 45-80 kHz scan rate; a second model works

JVC SA-T411U Time-Base Corrector/Noise Reducer

The SA-T411U utilizes component signal-processing circuits and a noise reduction system to enhance video performance. It converts input analog signals to 4:1:1-format digital video component signals. Includes a frame memory for correcting time-base errors over two fields, drop-out compensation, Y-signal digital delay line for adjusting Y/C delay in 74-ns steps, switchable AGC, and a black-stretch circuit. Suggested list price is \$6950.

Reader Service #225



JVC

with IBM PCs or Mac IIs.

The RGB/View video windowing system displays a real-time video window on any hi-res computer screen.

NTSC or PAL composite video or RGB

**ALCOA FUJIKURA FSM-20R12
Optical Fiber Fusion Splicer**

Automatically aligns and fuses up to 12 optical fibers in either a bundled or ribbon cable. The high-speed, multi-channel splicer is ideal for on-site fused connections of large numbers of single-mode or multi-mode fibers in residential subdivisions and commercial subscriber loops.

Includes a built-in 3.5-inch TV monitor. In addition, the unit weighs 19.8 lbs. and measures 8.3 inches W x 8.3 inches H x 7.9 inches D.

Reader Service #223

**SOUND-TECH ST-77
Projection Wallcovering**

Is a unique, vinyl-backed, laser-cut, commercial wallcovering with a projection surface that's measured at 1.5 f-stops brighter than a matte-white screen.

Features a surface with no off-axis loss of brightness. The ST-77 is washable and is sold in linear yards.

Reader Service #224

component signals can be input from a camera, VTR or video disc. The system is frame-buffer and computer-independent.

Reader Service #226

PANASONIC TBC-200 Plus Y/C Time-Base Corrector

Is designed for use in video production applications, including post-production in editing suites, A/B roll systems, as well as time-base correction and chroma-delay correction for broadcast and cable television stations in on-air applications.

This unit has the ability to transcode NTSC and Y/C 3.58 (S-VHS) or Y/R-Y, B-Y. Features a 16-line correction window, horizontal and vertical Y/C delay adjustments, frame-editing capability. Suggested price of \$4950.

Reader Service #227

C-COR ELECTRONICS FH Series Eight-Port Finned Lid Housing

This housing incorporates 242 square inches of additional heat-sinking area to increase heat-dissipation capabilities for high-performance amplifiers. The unit is compatible with C-COR's 500 Series RF Modules and ancillary products, such as the dual-output PHD Bridger Amplifier, Failsafe Control Module, and Status Monitoring Transponder.

Reader Service #228

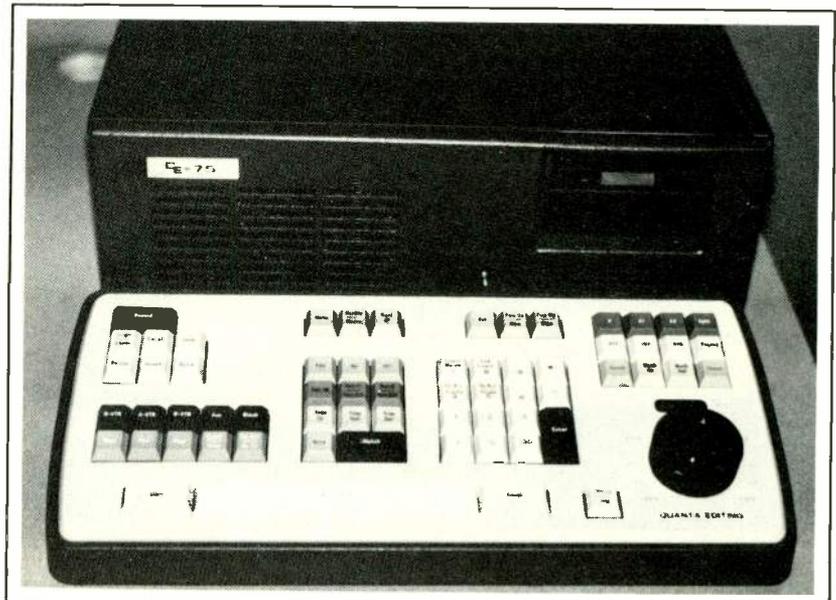
PRECISION MONOLITHICS SSM-2139 Audio Dual- Operational Amplifier

The SSM-2139 chip has been internally compensated for gains of three and above. This monolithic bipolar op amp offers voltage noise performance of 3.2 nV/Hz, gain bandwidth of 30 MHz, gain of 1700 V/mV, and slew of 11 V/V. The circuit draws four mA of total supply current for both amps. Price in 100-piece quantities is \$1.85.

Reader Service #229

DIGITAL DYNAMICS Cue List Software

This new software is for Digital Dynamics' ProDisk-464 expandable



QUANTA

QUANTA CE75 Edit Controller

Quanta's CE 75, an A/B roll edit controller, handles three VTRs and can be expanded to control eight VTRs. Included with the CE 75 are a video switcher, a built-in 3.5-inch disk drive, CMX RT-11 disk compatibility in both the 3.5- and eight-inch formats, a preview switcher and four optional programmable GPIs.

List price: \$7500.

Reader Service #230

four- to 64-track line of digital audio recording and editing systems. Cue List lets users cue recordings, as well as edit and manipulate edit-decision lists (EDLs). Through Cue List, Pro-Disk-464 users can put a series of cues into an EDL; later, the EDL may be edited, with cues rearranged, repositioned and re-edited as needed.

Reader Service #231

INTERACTIVE MOTION CONTROL Model 3025h Hand Controller

Is used with the Model 3025 remote-control head.

Features a four-line by 20-character backlit LCD display, keyboards with 32 keys (including numeric keypad), and a single encoded knob for jogging. The 3025H allows users to position, jog and halt through the system. The unit plugs into the 3025H

via a serial RS232C cable.

Reader Service #232

ANRITSU MS710 Series of Microwave Spectrum Analyzers

Models in the MS710 series operate at frequencies from 10 kHz to 140 GHz. The MS710 analyzers measure signal levels from -115 dBm to +30 dBm, and will operate from 10 kHz to 140 GHz with external mixers. Optional features include coax-to-waveguide adapters, cords and connectors, a high-powered attenuator, tracking generators, a printer, a pre-amplifier and a portable test rack. Price range is \$22,140 to \$25,000.

Reader Service #233

FOR-A ENC-200 Color Encoder

Encodes analog RGB or Y/PR/PB signals into composite video signals.

Uses comb-filter technology to maintain the high quality of component signal processing while ensuring minimum reduction in vertical resolution. Produces a clean signal to at least 60 MHz (500 lines). Features black stretch and enhancement functions, an internal full-field color-bar generator and a built-in genlock system.

Reader Service #234

INNOVISION Motion-Control Tables

Three tables designed for use with InnoVision lenses.

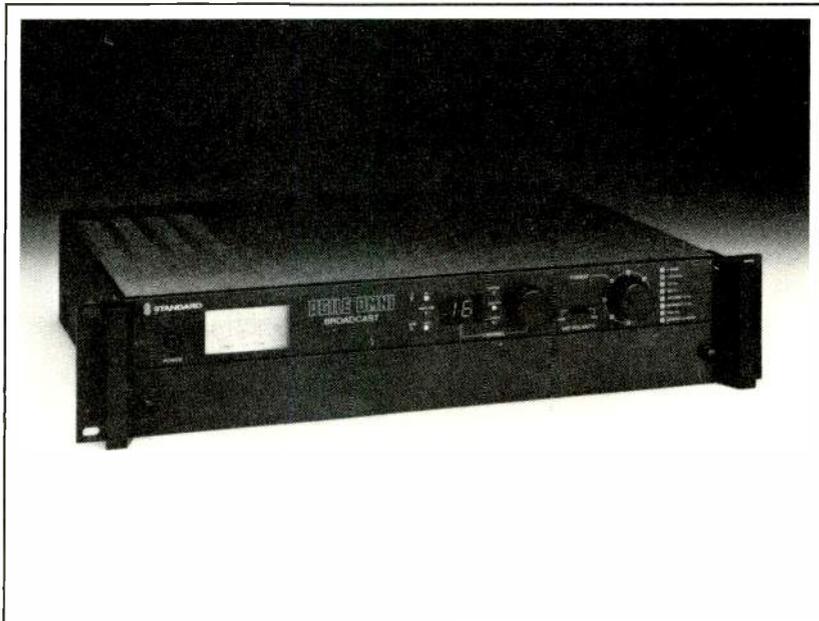
Powered by microstepping drives, the tables move in X-axis and Y-axis, or rotate. Position and velocity can be controlled with a joystick or computer controller. Each 24-inch table can be "stacked" to accommodate dual-axis motion control. Their other features include adjustable maximum speed and ramp time, variable speed control and a camera-mounting plate.

Reader Service #235

AMS EDL Translator Software for AudioFile

AMS has introduced software to enable CMX- and Sony-format edit-decision lists to be prepared and transferred to AudioFile via an IBM-compatible PC. The software allows the transfer of EDL in- and out-times to AudioFile and creates program record events from the EDL. A CMX-format EDL editor is included. Since the software is not part of the AudioFile package, the upgrade is available for a nominal charge, according to the company.

Reader Service #236



STANDARD

STANDARD COMMUNICATIONS Agile Omni Broadcast Receiver

The Agile Omni Broadcast C-band/Ku-band multi-format satellite receiver features automatic tuning, so that the operator chooses just the transponder number and satellite format. PLL RF center and audio subcarrier tuning are featured, and the unit has front-panel indicators of satellite format and channel number. There are also indicators for upper/center/lower transponder, antenna polarity, audio subcarrier frequency and six IF bandwidths.

Reader Service #237

ENTERTAINMENT TECHNOLOGY Access Pro Lighting Console

An expanded version of Access, this lighting console controls up to 256

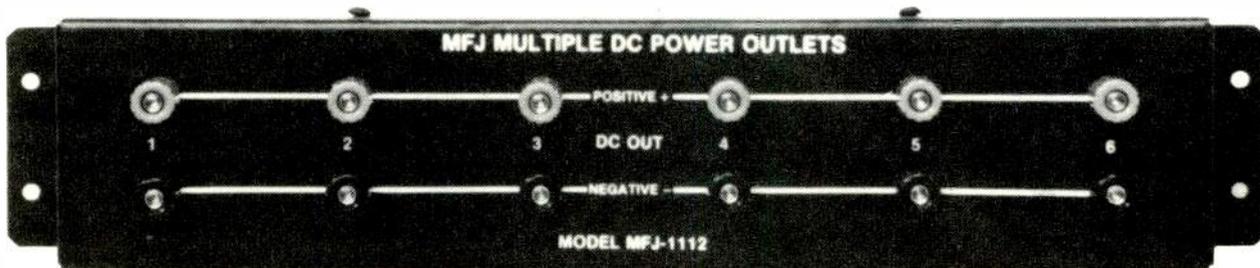
dimmers (depending on output format) patched to 96 control channels, and stores 228 full-sized memories—a capacity that can be extended via the Cue Card library storage. Features include 24 overlapping pile-on Scenemasters with flash buttons, and four banks of memory that can be accessed by instant paging. The unit measures 19 by 10¼ by 3½ inches and weighs seven lbs. List price: \$3995.

Reader Service #238

MFJ ENTERPRISES MFJ-1112 Multiple DC Powered Outlet

Connects directly to users' 12 VDC power supply. RF bypassing keeps RF out of the power supply from the DC line outlet. The black aluminum cabinet measures 13½ × 2¾ × 2½ inches.

Reader Service #239

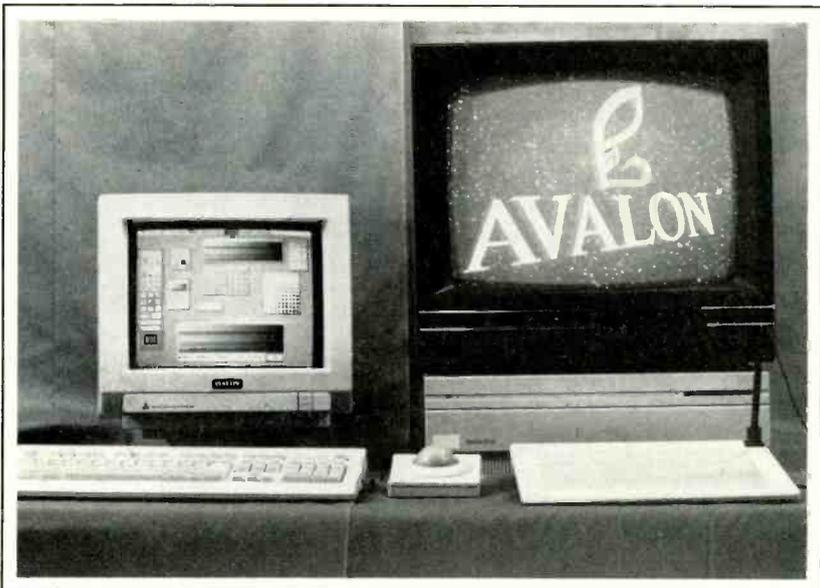


MFJ

BLUE FEATHER Avalon Animation System

Blue Feather has unveiled the Avalon, a 3D animation system based on an Apple Macintosh interface. The unit creates 3D and cell animations, animations and storyboards. Features include a built-in frame controller and a character generator that gives animated titling effects. External video can be captured for use in animations, and computer-generated backgrounds can be created. The system also includes a paint system with 16.7 million colors, unlimited brushes, and 32-bit color video output.

Reader Service #240



BLUE FEATHER

MOTIONWORKS Motionworker Automation and Synchronization Systems Interface

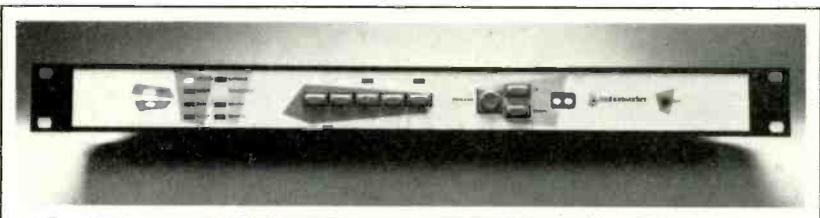
Brings machine control to console automation systems by letting engineers operate many studio functions from the console automation computer.

Enables integration of console automation systems, tape machine synchronizers and MIDI systems. Features a virtual machine system to

allow control of automation systems from external time code or MIDI time-code source. Can communicate with many control protocols including MIDI, Audio Kinetics ESBUS, Lynx VSI, Adam Smith 2600 and ZETA 3, SSL

'G' and 'E' series, AMEK Mozart and APC console automation systems, and GML's Series 200 automation environment.

Reader Service #241



MOTIONWORKS

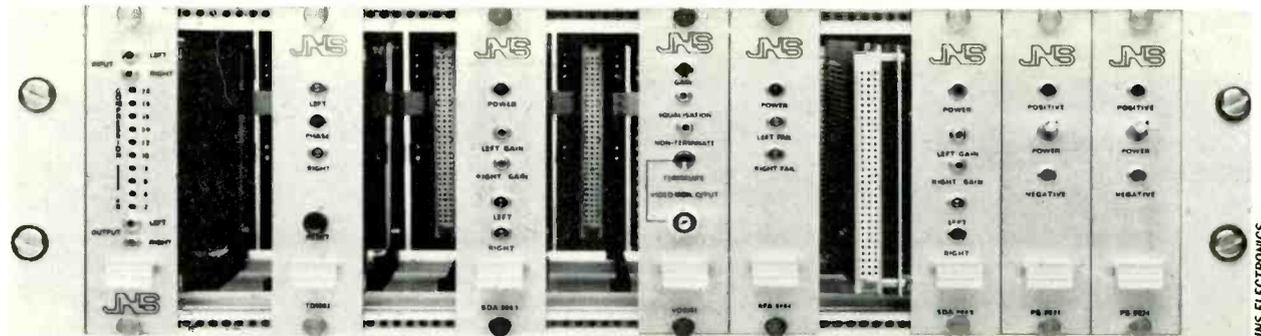
JNS ELECTRONICS 8000 Series Modular System

Designed to ease the installation process, the 8000 Series Modular System (the Frame) from JNS Electronics

provides a variety of modules that amplify, switch, match and perform other functions for audio and video. Modules are available for mono or stereo audio distribution, audio mon-

itor amplifiers, video distribution, audio failure sensing, program change-over and stereo presence/validity measurement.

Reader Service #242



JNS ELECTRONICS

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CLASSIFIED

CHIEF ENGINEER, WBBH-TV, FORT MYERS, FLORIDA! Due to promotion of former Chief, this top-notch NBC affiliate has an immediate opening for **CHIEF ENGINEER**. Must have extensive record troubleshooting and maintaining high power UHF transmitters. Needs to be an expert re **BETA, BETA SP, 1", ENG, SNG, STUDIO CAMERAS AND STUDIO TERMINAL EQUIPMENT**. "Hands-On" type of Chief required. Rapidly growing 96th market. Send resume to Steve Pontius, VP/GM, WBBH-TV, 3719 Central Ave., Fort Myers, Florida 33901. **WBBH-TV IS AN EQUAL OPPORTUNITY EMPLOYER.**

TV Maintenance Engineer KPLR-TV

St. Louis Cardinal baseball station. 3-5 years broadcast TV experience. Strong background in VHF-TV transmitters, broadcast microwave and satellite communication equipment. Experience with RCA FH line transmitters preferred. Applicant should also be experienced in VTR's and various studio equipment. Some moving expenses covered. Call Rod Wisdom (314) 454-6310 or send resume to: KPLR-TV, Rod Wisdom, 4935 Lindell Blvd., St. Louis, MO 63108. EOE.

Looking for self-motivated **VIDEO ENGINEER**. Must have a strong background in live TV audio, some field engineering, and basic maintenance skills. Minimum of 2 years experience necessary. Send resume to: Northwest Teleproductions Chicago, 142 East Ontario. Chicago, IL 60611, Attn: Engineering.

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When considering purchasing state-of-the-art equipment, people turn to SONY. Enjoying the number one position in the electronics industry has not relaxed our aggressiveness towards sales and marketing nor our deep dedication towards customer service.

SONY products are #1 not only for their quality but for the customer support that stands behind the name. Currently, SONY Communications Products Company has several positions available nationwide for dedicated service professionals as Customer Service Engineers or Field Service Engineers.

We seek those rare individuals who can combine technical expertise with good communication skills and a dedication to customer service attitudes. The ideal candidate will have experience in the repair, maintenance and servicing of Professional Video, Professional Audio or Broadcast Products equipment. An appropriate technical education (a BSEE or AAS) or equivalent experience is also preferred.

We offer you the challenge of working for an industry leader and the opportunity to develop your technical skills on state-of-the-art equipment. SONY offers a competitive salary, comprehensive benefits package and for some positions, a company car. If interested please send your resume, salary history and requirements and geographic preferences/restrictions to: DEPT CS, HUMAN RESOURCES, SONY COMMUNICATIONS PRODUCTS COMPANY, 1600 QUEEN ANNE ROAD, TEANECK, NEW JERSEY 07666. We are proud to be an EEO/AA employer M/F/H/V. Also, we maintain a drug free workplace and perform pre-employment substance abuse testing.

SONY

Rethinking Remote Control

By Joseph Fedele

To the chief financial officer of a broadcast station, the phrase "transmitter remote control" promises a chance to slash budgets and cut down the technical staff—the answer to many an accountant's dream. But to many chief engineers, "transmitter remote control" is generally synonymous with slitting one's own throat.

I personally detest the thought of operating by remote. While remote operation is fine for controlling ENG repeater sites or rooftop cameras, remote control of a transmitter is very risky because if the remote system quits, the money machine is off. Most transmitter sites are also centers of communication, with complex systems for ENG, SNG, microwave and two-way communications. In such cases, everything is riding on the remote system.

Despite all of these technical drawbacks, the choice of going remote is often left to the financial officer, while the job of making it work is left to the chief engineer.

If a station decides to rely on a transmitter remote system, some thought must go into its design. Besides the three basic components of a control point, a remote point and a data link, every remote system also has an infinite number of ways to put you off the air.

Engineers spend countless hours designing backup systems for every conceivable calamity, and broadcasters spend big bucks on all kinds of equipment. Yet stations with transmitter remote control often operate without a backup remote system. This is true not only in smaller markets, but even in New York City, the largest market in the country.

Transmitter remote control is not a new technology. Most broadcast facilities have remote capabilities, ranging in complexity from

only a few controls to hundreds.

The old system of remote control meant a remote point (at the transmitter site) that branched out to one or more control points. Intricate and extensive controls, status and telemetry were all funneled into one remote unit. Data was transmitted to and from the control points by microwave or telco lines—smart designers called for both microwave and telco to be used to provide for diversity. Even so, however, if the unit at the transmitter failed, all means of control was lost.

In the '70s, remote systems became both digitized and vastly improved through new technology. Then computers took hold in the '80s; software designers joined forces with remote-control manufacturers to construct nodal systems. The nodal system has several microprocessors acting independently to control various groups of functions. Each microprocessor is housed in its own distinct unit, runs on its own software and can be accessed independently through modem, microwave or private line.

A chief advantage of the nodal system is that one node can control the main transmitter and a completely independent node can control the backup transmitter. So if the main transmitter node is down, the backup node can keep you on the air. Engineers are beginning to design these systems using over-the-counter circuit boards

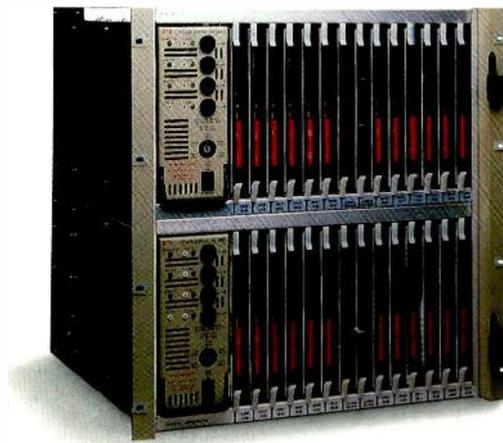
from a variety of manufacturers, eliminating reliance on a specific manufacturer.

Regardless of how your station operates, you can never take your remote system for granted. Backup systems are a must. If you are designing a new system from scratch, don't try to save a few dollars by skimping on transmitter remote control. Being on the air is all that matters. ■



Fedele is manager of technical operations and chief engineer for WCBS-TV in New York.

This switcher handles standard bandwidth like it's going out of style.



TVS/TAS-3000 Distribution Switcher

The new TVS/TAS-3000 video/audio distribution switcher from BTS handles standard bandwidth switching in stride. But the fact is, standard bandwidth may not be the standard much longer. And that's why the TVS/TAS-3000 is not your standard switcher.

With the advent of wide bandwidth video, you'll need a switcher that can handle the new higher bandwidth signals. The 3000 will. It provides a video bandwidth of more than 50 MHz, measured with a full-amplitude sine wave or video signal. Which makes it upwardly compatible with HDTV or computer graphics—no matter what the standard.

The TVS/TAS-3000 also delivers the cleanest signal and expands to accommodate any matrix size to meet your specific needs.

And if high bandwidth capacity isn't a require-

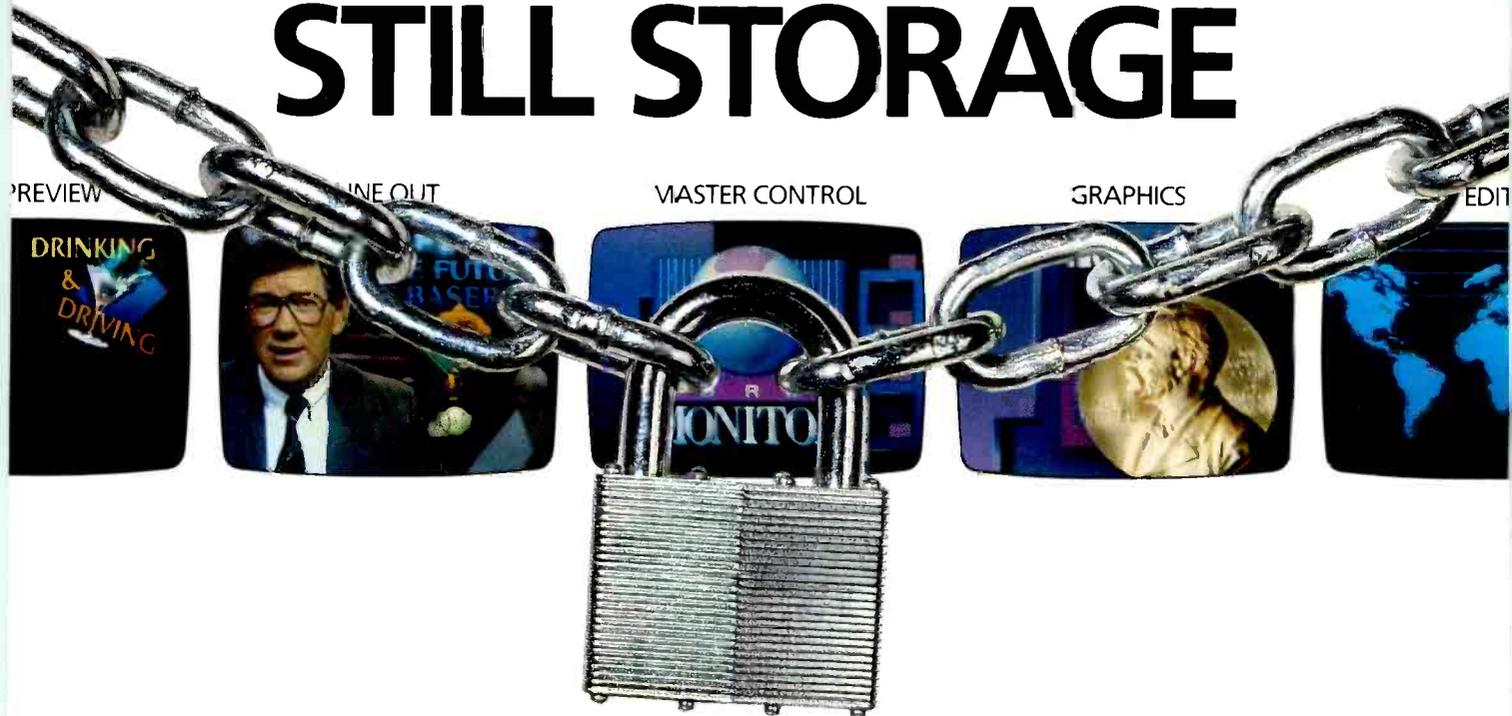
ment, BTS still has you covered with our best-selling switcher, the TVS/TAS-2000. The 2000 represents the same advanced technology and quality as the 3000 in a standard bandwidth switcher. BTS also offers a full-range of control panels and distribution amplifiers for a complete system designed, tested and guaranteed by one supplier.

All BTS switchers undergo 100% computerized factory testing and are protected with a 5-year warranty. In the unlikely event you do have a problem, simply return the board for a free replacement.

Dependable, performing switchers from BTS. Anything else is substandard. Call for information and technical specifications today: **1-800-562-1136**.

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what's ahead.

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