

# Television Engineering

AN ACT III PUBLICATION \$3.00

MAY 1990

her wishes to remain as private as possible after her death as she was in life, it was disclosed Tuesday.

4:USOT/Dave Lyon

USOT

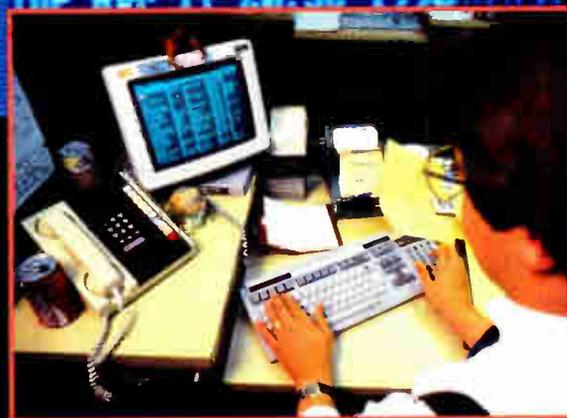
John Chapman, a spokesman for

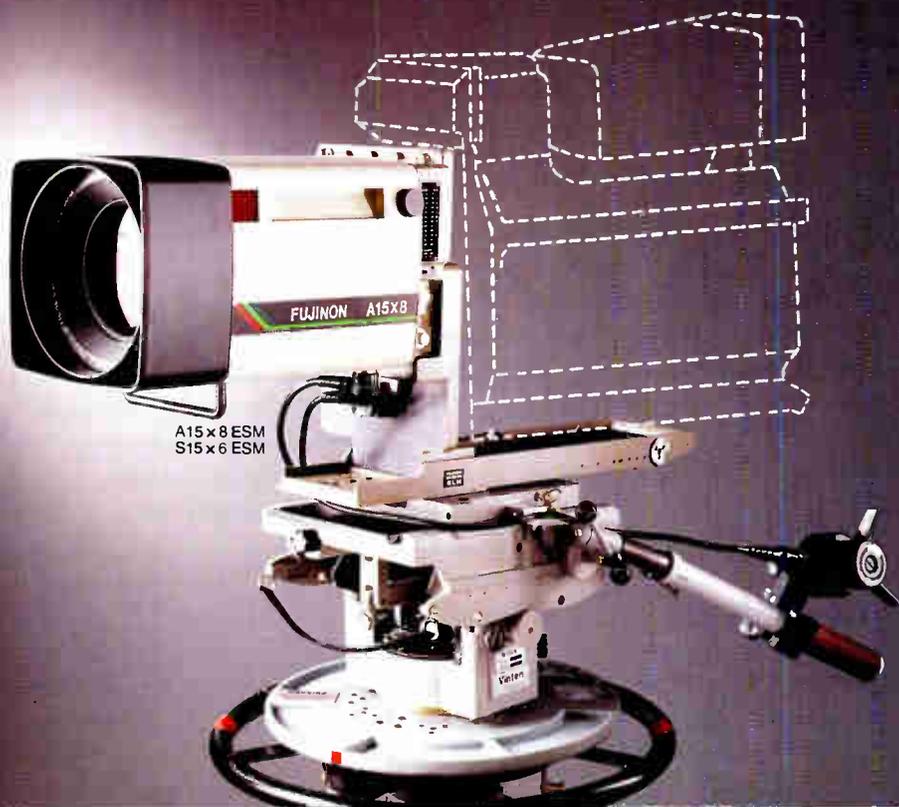
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ed:4ped 4-17 0753	3016	UPzxxs--sr	Tue Apr 17 20:58 1990	READY
kbdr 171959 0105	3015	UPzofql-or	Tue Apr 17 20:57 1990	READY
kbdl 171957 0103	3010	UPzofql-or	Tue Apr 17 20:57 1990	READY
kbos 171956 0093	3009	UPzofel-or	Tue Apr 17 20:57 1990	READY
no:4ped insert 4-1	3007	UPzxxev.ar	Tue Apr 17 20:57 1990	READY
azsa 0177	4277	UPzkwnlaur	Tue Apr 17 20:56 1990	READY
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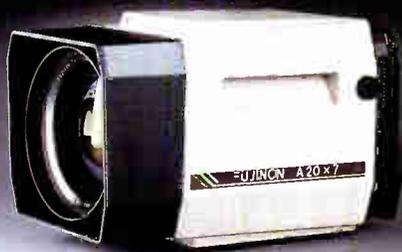




A15 x 8 ESM  
S15 x 6 ESM



A18 x 8 ESM  
S18 x 6 ESM



A20 x 7 ESM  
S20 x 5.4 ESM



A55 x 9.5 ESM  
S55 x 7.3 ESM



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S44 x 7.3 ESM



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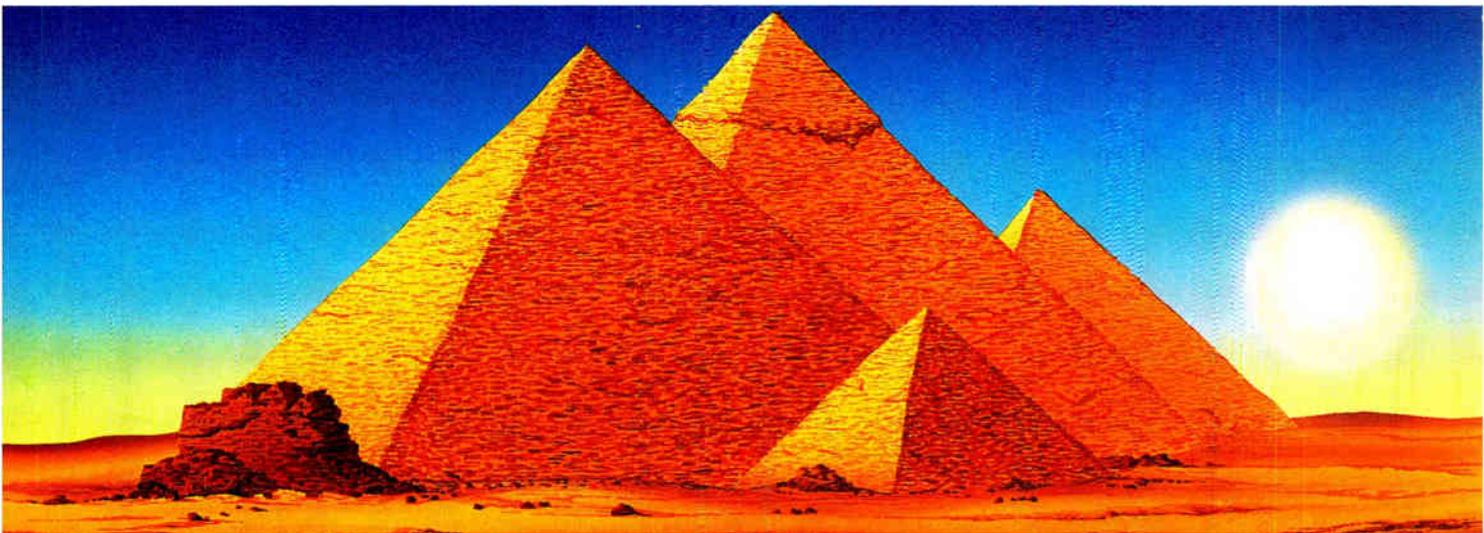
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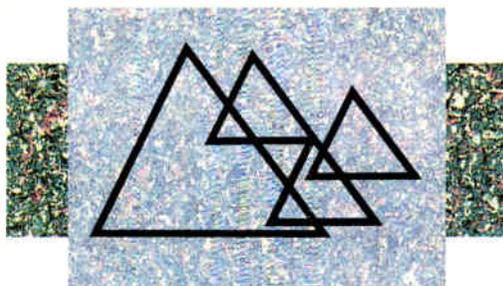
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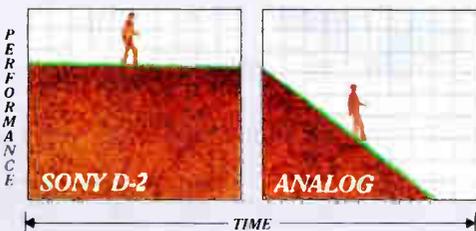
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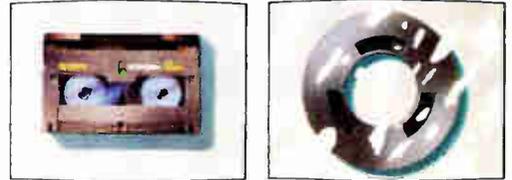
D-2 maintains consistently high performance.

important as video. And where machines operate without the need for constant adjustments.

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And it's all a matter of fact.

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D-2 effectively eliminates dropouts.

# To everyone with their video it's time to

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D-2's digital transparency is another



clear advantage.

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They're "clones." Digital replications indistinguishable from the original.

As for audio, D-2 VTR's have broadcast sound quality previously unheard of.

# who's satisfied tape recorders, face the facts.



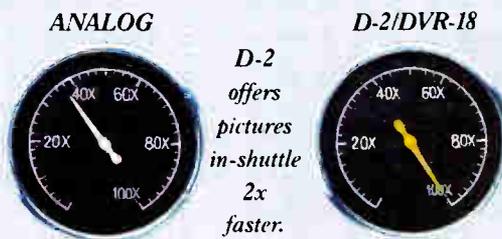
*D-2  
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Fact is, no other composite VTR performs as well as D-2. In both video and audio. You might think such a high per-

formance machine would be hard to work with. But in fact, D-2 is quite easy to use.

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*D-2  
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operate  
up to eight  
VTRs.*



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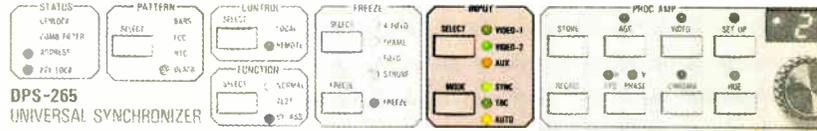
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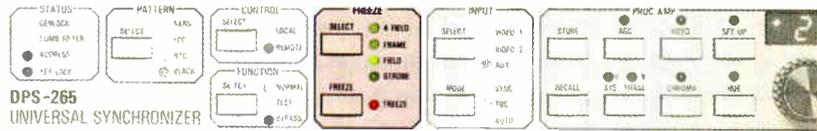
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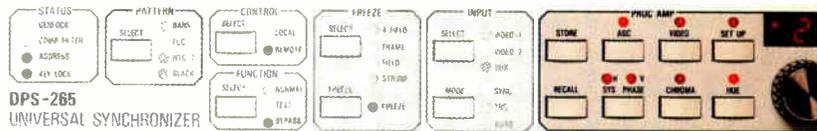
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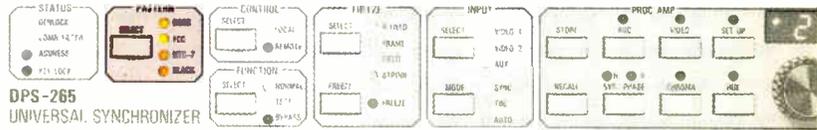
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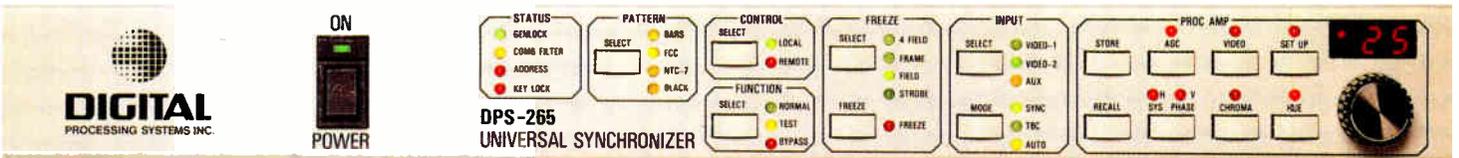


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\*Based on published list price of leading industry manufacturers.

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**BME's**

# Television Engineering

MAY 1990

VOL. 26, NO.5

## Features

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*Closeup of a newsroom computer screen courtesy of BASYS, Inc. Photography by Fried-Louis Studio, Yonkers, NY. Cover story begins on page 26.*



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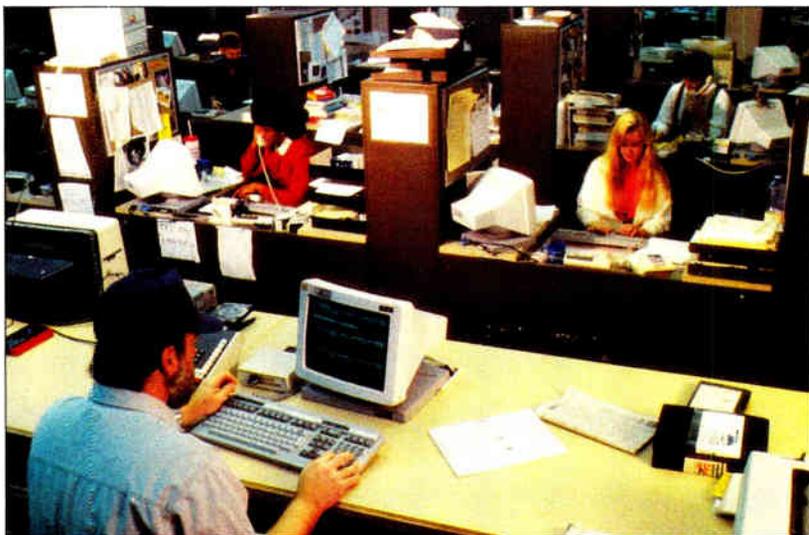
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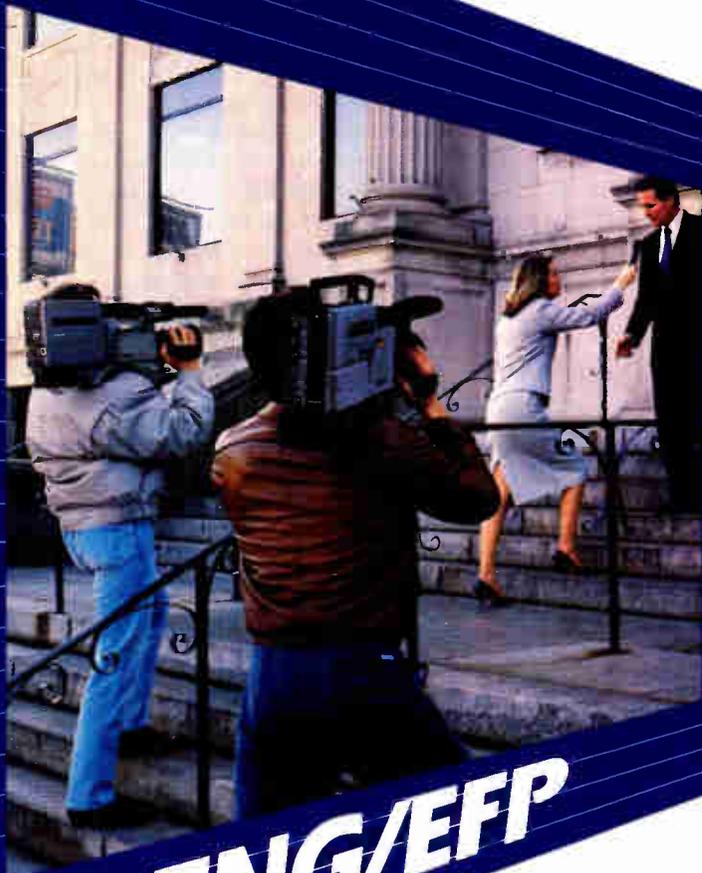


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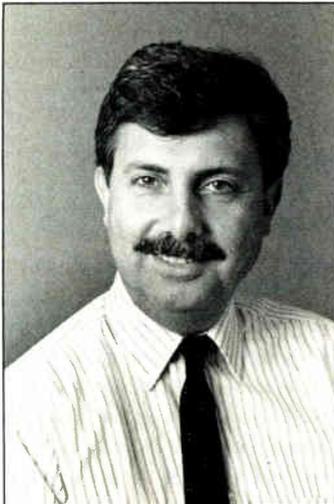
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# VIEWPOINT

**The FCC did the right thing by rejecting HDTV augmentation systems and postponing selection of an EDTV standard.**



# O

ur slow, deliberate march toward establishing an advanced TV transmission standard in this country took two steps forward recently when the Federal Communications Commission stated its intention to back a simulcast system, and to rule on a high-definition TV standard by mid-1993, prior to ruling on any standard for enhanced-definition TV.

By opting for the simulcast route, whereby stations would be given second six-MHz channels on which to simultaneously transmit a compressed HDTV signal of their NTSC programming, the FCC effectively precluded the establishment of cumbersome augmentation systems. (Under an augmentation system, stations now transmitting NTSC would be assigned second channels of between three and six MHz to transmit supplemental information needed to "augment" their NTSC signal for better resolution and aspect-ratio changes. Special home sets would combine NTSC with augmentation information to create HDTV images.)

In making this decision, the FCC, at a stroke, eliminated potential spectrum-availability and utilization problems that the selection of an augmentation system would entail. That's because once an augmentation system got established, it would perpetuate double-channel transmission of each HDTV signal, which would occupy nine to 12 MHz of bandwidth. With simulcast, each HDTV-transmitting station would initially occupy 12 MHz of bandwidth—six MHz for NTSC and six for HDTV. However, once HDTV sets penetrate a sufficient number of TV homes, the NTSC channels could be dropped, liberating precious bandwidth for other purposes.

The FCC's other decision—not to rule on any EDTV system prior to reaching a final ruling on an HDTV standard—eliminates the possibility of an enhanced system taking root in the marketplace before HDTV. Such a development could stall the emergence of a full-blown HDTV standard, which is now obviously the Commission's goal.

In making both of these decisions, Chairman Sikes's FCC clearly declared itself in favor of high technical standards and maximum picture quality. Assuming that full HDTV signals can be successfully compressed into six MHz, and that space can be found on the terrestrial spectrum for all the additional channels necessary to set up a nationwide simulcast NTSC/HDTV system, 1993 will indeed be an exciting year. ■

A handwritten signature in blue ink, appearing to read "Peter Caranicas". The signature is stylized and fluid, with a long, sweeping tail on the right side.

Peter Caranicas  
Editor in Chief

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# UPDATE

*HDTV Teleconferences Take to the Air . . . .  
Airwave Overcrowding Warned Against . . . . Ampex Helps  
Free Romanian Television . . . . Survey on Uplink-Provider  
Practices . . . . What's Hot, What's Not, at Sony . . . .  
Strategic Alliances: Aston/Paltex, Chyron/Midwest*

## HDTV Teleconferences Take to the Air

In an industry where "firsts" are announced on a regular basis, two recent claims are notable, at least for their use of HDTV technology.

On February 12, the Sony Advanced Systems Company combined with Scientific-Atlanta Inc. to produce what was billed as the "first live HDTV interactive teleconference" for MAST Industries, Inc. The conference allowed merchandise buyers and design officials located at MAST's Andover, MA offices to view fashion merchandise from vendors located in Hong Kong.

MAST Industries, Inc., is the design and purchasing division of The Limited, Inc., a major fashion retailer with over 3100 stores operating under the following names: The Limited, Victoria's Secret, Lerner, Lane Bryant, Henri Bendel and Abercrombie & Fitch.

The teleconference provided close-up HDTV images of fashion merchandise, so that buyers could make "on-the-spot" decisions without traveling to Hong Kong to meet with the vendors. The quality of the HDTV image made it all possible, according to Martin Trust, the president of MAST. "In our business, color, texture, style, quality and timeliness are essential factors in making buying deci-



MAST Industries, Inc. teleconference delivered the goods for store buyers halfway around the world.

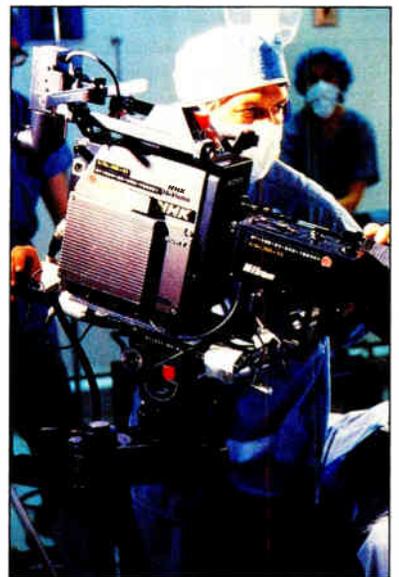
sions," he says. MAST officials believe that the use of teleconferences will shorten the amount of time between the purchase of offshore merchandise and its appearance in local stores.

Prime contractor for the teleconference was Sony Corporation of America. Sony's Video Conferencing and Satellite Systems Division and the Sony Advanced Systems Company participated in the project, with Sony-supplied hardware used in Hong Kong and Andover.

Steve Lysohir Productions produced the American segment, with Sony HD Software Company of Tokyo handling production in Hong Kong.

Scientific-Atlanta, Inc. HDB-MAC technology was used for transmission, which included two bidirectional satellite hops: over the Pacific via Intelsat, and over the U.S. via GE Americom. Land-based fiberoptic links were used as well, with Cable & Wireless (HK) Ltd., and Hong Kong Telephone providing fiberoptic circuits for the Hong Kong segment. The entire network was assembled by Vision Accomplished of Santa Monica, CA.

On March 3, Los Angeles, CA-based Hospital Satellite Network, a provider of medical educational programming to hospitals throughout the country, produced what was billed as the "first HDTV interactive medical teleconference." The program, "Innovations in Rhinoplasty: Augmentation/Reduction," featured highlights of two pre-taped operations performed by Jack H. Sheen, a noted plastic surgeon, along with questions from the live viewing audience.



"Innovations in Rhinoplasty," a teleconference produced by Hospital Satellite Network, brought plastic surgery to life in HDTV.

According to Richard Schreier, VP of Hospital Satellite Network, his company elected to produce the program in HDTV "because HDTV can generate more realistic, [more] dimensional images than regular TV." The teleconference was beamed to two HDTV sites: Sunderland Auditorium at St. Lukes-Roosevelt Hospital Center in New York City, and Factor Auditorium at UCLA. An additional 1700 hospital sites viewed the program via a standard NTSC satellite feed.

Technical support was given by NHK Enterprises USA, Inc., with Hughes Communications Inc. providing satellite transport.

With this use of HDTV for business and educational programs, these "firsts" are most likely the first of many firsts to come.

—William A. Owens

## Airwave Overcrowding Warned Against

The National Association of Broadcasters has filed with the FCC, cautioning the Commission against overcrowding the airwaves by approving too many new services, such as mobile services, a satellite sound-broadcasting service in the 500–3000 MHz range, and HDTV satellite broadcast. Questioning whether any more spectrum space can be supported without interfering with or displacing TV and radio signals now in use, the NAB urged the FCC to "responsibly [assess] whether there is any demonstrated need for the suggested services, especially in light of the intense use of these frequency ranges for conventional broadcast and broadcast auxiliary services." Pressing the issue further, the NAB advised regulators to follow allocation policies that will "stress the use of terrestrial, local stations to provide responsive programming in the local pub-

lic interest. At stake, according to the NAB, is "the universal availability of free, over-the-air radio and TV service." ■

## Ampex Helps Free Romanian Television

Fighting during Romania's December overthrow of dictator Nicolae Ceausescu damaged the state television facility, resulting in the loss of much technical equipment.

Working with the United States Information Agency (USIA), Ampex Corporation dispatched a crew to evaluate damage and to assist in the start-up of newly formed Free Romanian Television. The company donated Betacam-format studio VCRs and ENG equipment to the fledgling service.

Ampex claims to be a major supplier of television equipment and tape to Eastern Europe and the So-

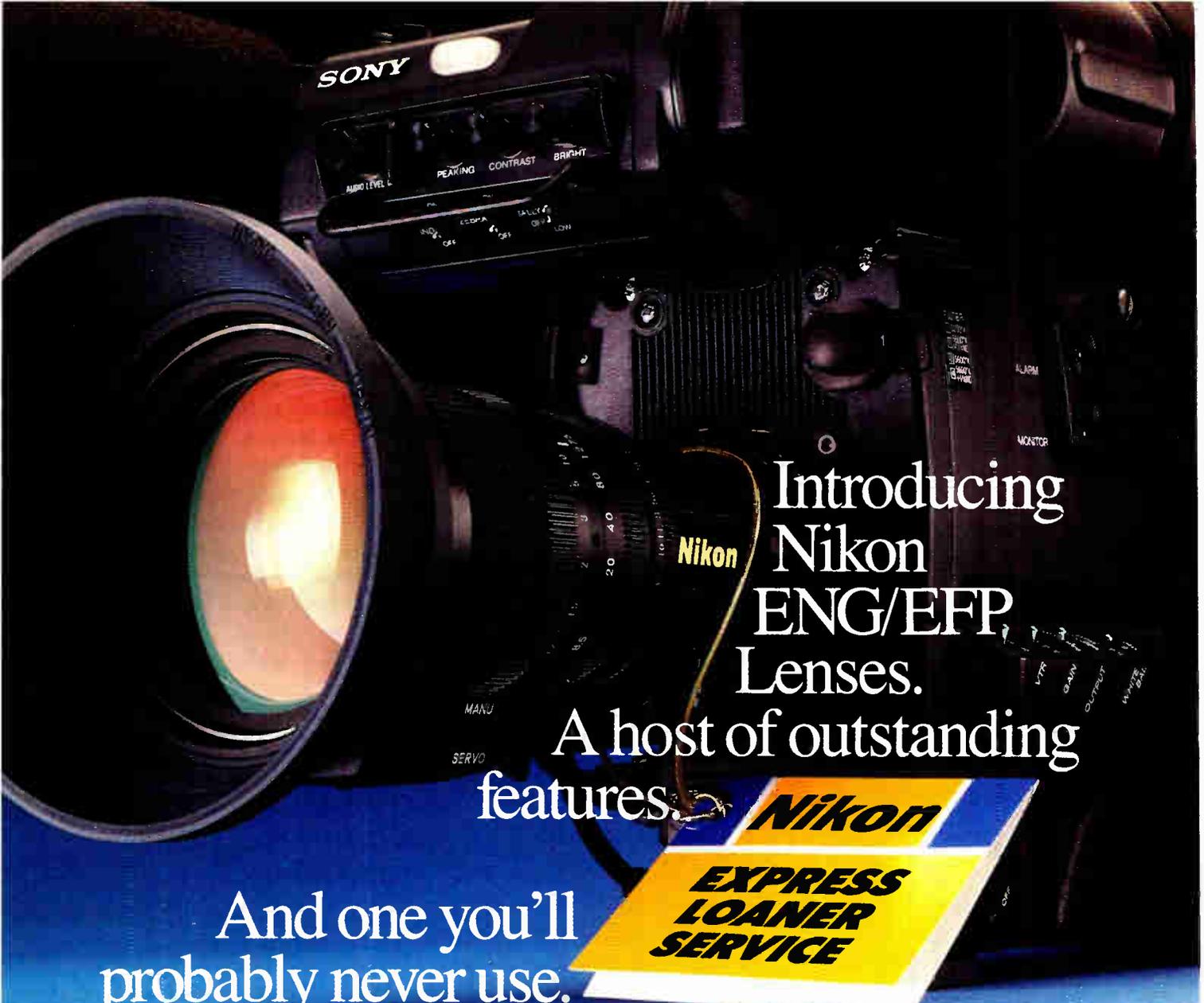
## Company News

Two major competitors of post-production services in Dallas, TX have merged: **Dallas Post-Production Center** and **Tele-Image** have combined to form **Pyramid Teleproductions**, which now lays claim to being the largest video post-production firm in the Southwest . . . **Calaway Editing** has named two distributors: **Beers Associates** in the Northeastern U.S. and **Shoreline Professional Video** in southern California . . . **New England Digital** says its fourth-quarter 1989 sales show that the digital audio workstation maker is broadening its customer base. In addition to members of the music recording industry, video post-production houses and broadcasters have joined New England Digital's customer list . . . **Paltex** will market its editing systems in Japan through **The Victor Company of Japan, Ltd** . . . **Canon U.S.A.** has moved its Broadcast Equipment Division headquarters to Englewood Cliffs, NJ . . . **Ampex** has added **Video Industries, Inc.**, Tolland, CT to its list of dealers . . . **FlyPak**, a portable multi-cam production unit, is the marketing objective of a joint venture between **One Pass** and **Starfax** . . . **Dubner Computer Systems** has agreed to sell **ImageWare** software as an option to Dubner's Paint Systems . . . **A/Z Associates**, a new marketer of high-end telecines, editing systems and automated program-delay systems, has been created by Harry Adams, founder of manufacturer **Adams-Smith** . . . **Neve** has changed their address to 7 Parklawn Dr., Bethel, CT, after a move to larger facilities in the same industrial park; phone and fax numbers have not been changed . . . **VSC Post** has opened a second facility at 25 West 45th St. in New York City; equipment includes Grass Valley Kaleidoscopes, Sony Beta SPs, and a Harry LP with Harry Sound . . . **Telmak U.S.A.**, which markets the Neriki Image Master and Desktop genlocks, has moved from New York to Glendale, CA . . . **CMTV** says its new home in Burbank, CA, is four times the size of its most recent facility . . . **Tektronix** recently entered the image-processing market by teaming with **Image Data Corp.** to create a fully integrated image and graphics superworkstation, available later this year. . . **First Choice Market**, a new broadcast manufacturer marketing firm, will be based in Seattle, WA. ■

viet Union. According to Ampex President and CEO Ron Ritchie, Ampex has had a relationship with Dr. Stanciu [deputy general manager of FRT] since 1971.

"We realized that we had equipment that could help FRT resume normal operations," Ritchie says.

The Ampex donation may not be the last from U.S. companies. USIA di-



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rector Bruce S. Gelb and FRT officials are discussing ways in which the U.S. private sector can help.

A classic example of good business relations, Ampex's donation may help the company exploit some burgeoning markets. Dennis Atkins, Ampex's marketing manager for Europe, Africa and the Middle East, sees great potential for the company in the privatization and deregulation

sweeping European broadcast industries: "Countries where there was a single government-controlled broadcaster only a few years ago are blooming into two or three channels of regional broadcasting. Plus, there's been a tremendous opening up of Europe to commercial stations." Atkins also sees a notable expansion of video and post-production currently underway in Europe. ■

## Survey on Uplink-Provider Practices

Automatic Transmission Identification System (ATIS) is not catching on with the satellite uplink industry, according to results of a recent survey of 40 uplink providers by Hughes Television Network (HTN). Despite an FCC recommendation to do so two years ago, none of the 40 satellite uplink providers are using any method of ATIS.

Although ATIS is touted as a method of identifying and alleviating signal interference, David Higgins, director of engineering at HTN, sees three roadblocks to implementation: "vast differences between ATIS methods," "high costs" and "lack of a clear mandate for their use."

HTN's survey, which focused primarily on transmissions involving single, full-transponder video and dual-subcarrier audio, also revealed a wide consensus on signal-transmission lev-

els for video, but no such consensus on audio. Ninety percent of the providers reported using 10.75 MHz video peak deviation for 36 MHz occasional C-band transmissions. For audio, HTN says the uplink providers appear to honor customer requirements.

HTN hopes to help establish standards for uplink practices. The company has recommended the survey's consensus video spec to NAB and will recommend audio subcarrier deviation levels of 25 KHz at 0 dbm for average program levels and 75 kHz at +10 dbm peak levels. ■

## What's Hot, What's Not, at Sony

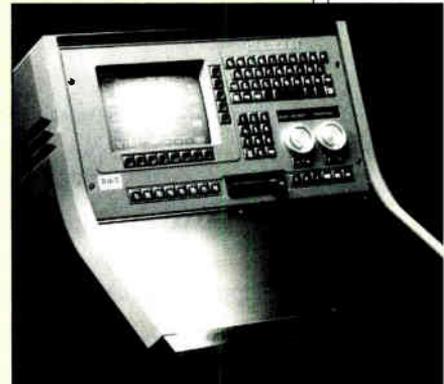
On March 6, at its annual "Pre-NAB" press briefing at its Teaneck, NJ offices, Sony clearly directed major promotional efforts towards its D-2 and Beta-SP tech-

## Equipment Sales

**T**urner Broadcasting in Atlanta has installed an **Abekas A53-D Digital Effects System** to produce 3-D effects for commercial television . . . . **Telecom Australia** has purchased 95 video measurement sets from **Tektronix Australia PTY Ltd** . . . . **The Weather Channel** is upgrading its master-control facility with two **Odetics** products: a **TCS2000 Cart Machine** and an **XR800 External VTR Controller** . . . . **Paltex** has installed an **Elan 4/8 editing system** at **KBRK-TV** in Sacramento, CA . . . . **Unitel-Mobile's Red Unit** moved with "Steel Wheels"—the recent Rolling Stones tour.

The mobile unit, featuring double expansion capability and 69 monitors, covered the Stones in Montreal's Olympic Stadium and at the Atlantic City Convention Center . . . . More for Stones fans: **Broadway Video Graphics** of New York was called upon by Andrew Solt Productions of Los Angeles to create the 52-second opening title sequence for a Stones video . . . . CBS is using two

**AMS AudioFile** systems, one for post-production and one for TV production—including "on-air" applications . . . . The Home Sports Entertainment Network, Houston, TX became the site of the 200th installation of **Chyron's CMX 3600 editing system** . . . . **Rebo Studios** in Manhattan is expanding; four video post suites, two off-line edit rooms, and two computer graphics suites are among the additions to Rebo's facilities . . . . **British Columbia Television Broadcasting System** has upgraded its **Satellite Information Systems Company (SISCOM) NewsPro** newsroom computer system . . . . Recent customers of **Neve's Prism** signal-processing systems include **The Castle Recording** and **Javelina Studios** in Nashville and **Sting's Roxanne Music** . . . . **Midilab** of Chicago recently purchased a **Digital Dynamics ProDisk-464** digital audio recording and editing system. ■



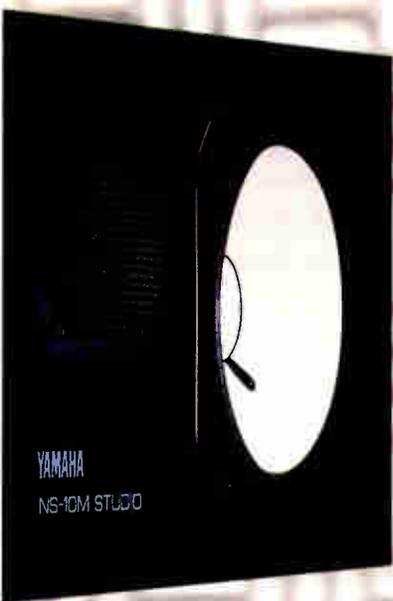
AMS AudioFile.

nology. While company officials gladly quoted sales statistics on both D-2 and Beta machines, no mention was made of sales figures for D-1, or of its future pros-

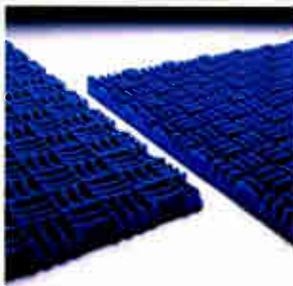
pects.

Interestingly enough, much was made of Sony's new video-switcher line, and of the black boxes planned by the company to

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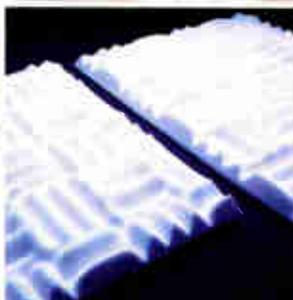


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help interface digital and component analog signals into the composite analog world.

It would appear that station and facility owners are holding back on the purchase of "pure" digital

equipment, waiting for less costly models, or perhaps for a better market climate. Sony's focus on D-2 may well be a reaction to customer needs for a less expensive "high-quality" technology. ■

## Strategic Alliances: Aston/Paltex, Chyron/Midwest

Character-generator makers etched a lot of business news in the days leading to NAB, as Paltex International and Aston joined forces for marketing clout, while Chyron Corporation and Midwest Communications agreed not to merge.

In late February, Paltex International, Tustin, CA, announced that it had completed negotiations on an exclusive licensing agreement with Aston Electronic Designs Ltd., of Surrey, England. The agreement calls for the immediate takeover by Paltex of manufacturing, sales and technical support of all Aston products designed for NTSC applications and markets.

Since its acquisition of Convergence Corporation just over a year ago, Paltex has built a solid dealer base in the U.S. The licensing

agreement provides that network with the line of Aston products, including the Caption and Aston 4 character generators, and the Wallet still store.

Paul Stewart, with Aston since its debut in the U.S., joins Paltex as Aston product specialist, to provide customer support as well as assistance to the new dealer group in the training and technical areas. He will be based in Tustin.

The manufacturing, quality control, and distribution activities of Aston will remain in Kansas until the facility in Tustin is able to accommodate them.

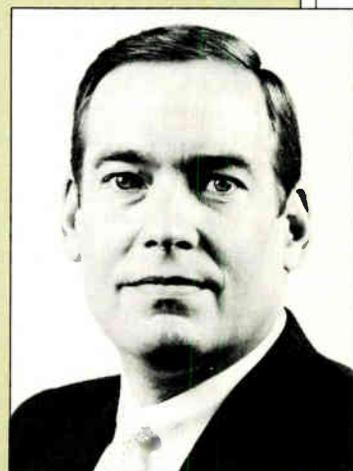
Meanwhile, the much talked-about merger of Chyron Corporation and Midwest Communications has been called off. A March 2 press release stated that the two companies "had been unable to reach agreement on definitive terms for the merger."

Midwest is a major video equipment distributor and systems integrator. The Chyron Group includes Chyron, DSC, CMX and Aurora.

Chyron's press release stated: "Neither [Midwest or Chyron] expects that the failure to reach agreement will disrupt their long-standing commercial relationship." ■

## People on the Move

**S**ony Corporation of America continues to make key personnel moves in its Business and Professional Products Group. Most recently, the company appointed presidents at three of the four arms in BPPG: the Sony Communications Products Company (SCPC); Sony Operations and Technical Services; and Sony Systems and Technology. Mark Gray, who joined Sony in 1989 and has over 20 years in broadcast-related industries, is the new SCPC president. Richard K. Wheeler is now president of Sony Operations, and Dr. Harry Taxin is the new president of Sony Systems. Taxin is responsible for R&D systems development and for Sony's Advanced Video Technology Center. Late last year, Sony made several appointments at Sony Professional Video, one of three operating groups in SCPC. Gary Johns was appointed to a new position as national sales manager for business applications; Luke Rawls



Mark Gray, Sony.

became sales manager of Video Library Systems; Conrad Coffield is now director, marketing; Jack Mann is marketing manager of display products; Adam Shadle is marketing manager for production video tape recorders—responsible for developing marketing programs for U-Matic, U-Matic SP and Betacam products; and Steve Difranco (formerly with Dynatech Corp.) is marketing manager for systems products. On the audio side, Courtney Spencer has joined Sony as VP of SCPC's Professional Audio Division. "We recognize that our customer base, customer requirements and products are expanding," comments Charles Steinberg, president of Sony's Business and Professional Products Group . . . **Allied Film & Video** has named Mark Anzick as its director of engineering . . . Max Berry has joined **Faroudja Research Enterprises** as strategic planning manager. Berry will help define strategies for the Super NTSC and HDTV . . . Houston Pearce, president of WTUG-FM, Tuscaloosa, AL, has been appointed to the **National Association of Broadcasters Radio Board of Directors** . . . Stuart R. Smith has been recently named new chief engineer at **WMAG-FM** and **WMFR-AM** of Greensboro, Winston-Salem and High Point in NC. ■

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.

# AUDIO FOR VIDEO

## Viacom Breaks the Digital Barrier

By Dan Daley

Viacom International's recent conversion to a total D-2 digital tape operation—making it the first such installation—is not only a large undertaking for the company, but one with portentous overtones for an industry that sometimes regards digital technology as a paradox: both inevitable and an expensive luxury.

Scott Davis, Viacom's senior VP for network operations, concurs wholeheartedly with the inevitability of digital, but does not see it as an expensive luxury. "We checked the economics very carefully when we first considered this change," he explains. "Given the advantages that D-2 offers us in terms of power consumption and space savings, among other things, we expect it won't take long to recover the conversion investment. It's really a natural part of the progression of updating the industry."

Davis says Viacom selected D-2 for a variety of reasons, including the fact that D-2 offers both video and audio in a digital format while making available four independent digital audio tracks.

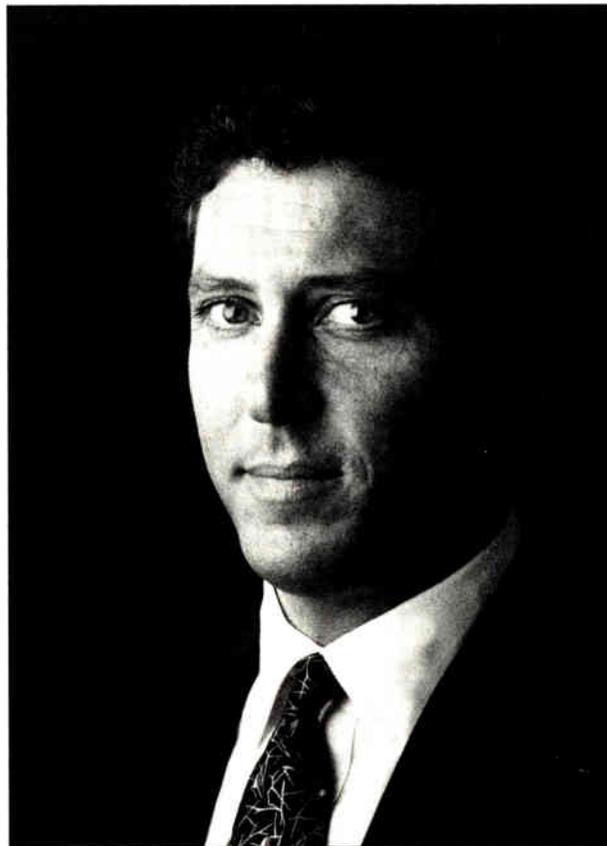
Viacom International Inc., which owns and operates MTV, VH-1, Showtime, The Movie Channel, Nickelodeon and the nascent Ha! The TV Comedy Network, spent "several millions" of dollars on the transition, Davis says. In addition to upgrading to Sony D-2 decks, Viacom began to convert to the Sony LMS (Library Management System) last December, with completion expected by last month.

The LMS equipment, which was installed at Viacom's Network Operations Center in Smithtown, Long Island, NY includes three 1000-bin LMS machines, two 300-bin machines and a single 80-bin machine. MTV and Nickelodeon/Nick-At-Nite were the first to go on-line with the D-2/LMS combination, with Showtime

coming on shortly thereafter. Showtime will use two of the 1000-bin machines and one 300-bin unit. VH-1 and The Movie Channel will use a 1000-bin machine and a 300-bin machine, respectively. The 80-bin deck will be employed for network continuity and compilation.

The LMS system has up to six videotape transports per unit; software programs—in this case modified by Sony to Viacom's requirements—direct the storage and loading of cassettes placed in the bins. Information about each cassette is contained on bar codes, cross-referenced between a data base and a log which is constantly being monitored and reviewed by the LMS computer. "Among the modifications we requested from Sony is the capability within the software to vary the duration of time prior to the indication of when a new tape needs to be actually loaded into the LMS," Davis says.

"The system produces a series of flags alerting us to when we have to intervene in what is otherwise a sophisticated computer-assisted and error-free system of event management," he adds. Also, system management efficiency becomes enhanced; for example, the tech staff can call up reports on a variety of categories, such as inventory, running



Scott Davis, Viacom's senior VP for network operations, says the move to D-2 was a "sound business decision."

logs and as-run logs, rather than have to go to each machine independently.

LMS is expected to be a particular boon to the audio-conscious MTV, according to Davis. "Unlike broadcast networks, MTV's elements are not standard 15-, 30- and 60-second lengths," he says. "The LMS system will total the elements' running time automatically, either for a given hour or from any two points we choose within the hour. Now all we have to do is look at the surplus time, remove the option elements that total that

surplus, and bring the network back to time—all at the touch of a button.”

While the LMS system puts Viacom at the leading edge of program management technology, it wasn't purely the lure of state-of-the-art that triggered Viacom's move to digital tape operation. The benefits that Davis alluded to earlier are documentable and substantial: 1) an anticipated 50 percent reduction in power consumption at the Smithtown facility; 2) the capa-

*“This is the new one-inch, and what it can do for audio for video is really astounding.”*  
—Scott Davis, Viacom

bility to preserve quality from generation to generation; 3) the freeing-up of one third of the technical floorspace at the Operations Center; and 4) longer tape stock life.

But don't discount state-of-the-art, either. Aside from bringing digital audio quality to the most consistently high-profile user of audio for video—



Viacom has three of the above DVR-10 Composite Digital Recorders in its all-D-2 environment.

MTV—the use of D-2 positions Viacom like the prow of a ship in the midst of a huge and significant turn towards the future of the industry's technical side. “Until now,” notes Davis, “television couldn't compete with the level of audio quality that MTV and VH-1 listeners have come to take for granted from audio-only sources, mostly CDs, but DAT cassettes as well. A lot of music is being recorded and released in an all-digital domain. Now we are positioned to make digital available to the home [TV] set.”

Over the horizon, the extension of digital audio capability has implications for the industry. If suppliers of programming and other material are making and providing product in a digital domain, and that product can remain in a digital format right through to the point of transmission, it could spur consumer demand for and acceptance of digital television. And as the popularities of CDs and 8-mm have shown, consumer demand has an increasingly large influence on pro side choices. (Viacom is currently bumping non-D-2 programming and commercials to the digital format, but expects shortly to begin asking suppliers to provide programming on D-2 tapes.)

Because D-2 enhances the audio quality of movies in broadcast, it could provide a catalyst for HDTV movie production. With both audio and video in one digital format, rendering quality control no longer a concern, and HDTV's putative potential for visual resolution married with the sorts of audio special effects that digi-

tal allows, film studios could begin looking over their shoulders very soon.

Davis says that any real resistance to D-2 within the industry is attributable to a lack of awareness of the true costs of digital, relative to the cost of not converting. “This is the new one-inch,” he states, “and what it can do for audio for video is astounding.

“Viacom's move to D-2 was a well-thought-out and sound business decision,” Davis continues. “It's part of a rollover in videotape technology, and part of its significance lies in the fact that D-2 inherently means better-quality picture and sound.” ■

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

## The D-2 Story

The D-2 format is a digital component recording system using both analog inputs and outputs (i.e., the video and audio signals are digitized inside the recorder). This makes the D-2 system considerably easier to interface with current station technology than, for instance, the component digital D-1 format.

The D-2 format hardware uses an eight-head helical scan system running at approximately 312 inches, or 26 feet, per minute. The tape, which is cassette-loaded, measures 0.55 mil in total thickness, and it holds four digital tracks.

D-2's sales have been slow up to this point, according to a spokesperson at Ampex, which first developed the format, and which is betting a sizable portion of its future on it. Cost is the primary reason, said the source, although equipment manufacturing for D-2 has lagged below expectations as well. Added to this is the usual problem that accompanies new technologies. How long will the format last in the marketplace? Could it be replaced by a half-inch digital tape?

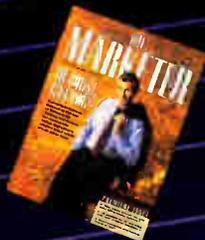
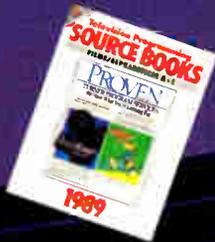
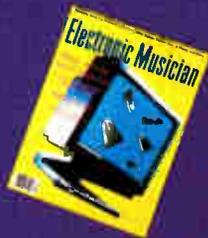
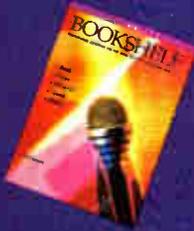
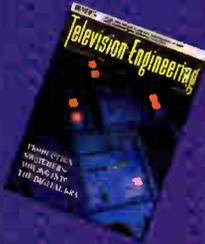
While the crossover is slow right now, insiders expect the move to D-2 to increase substantially over the next two years, as normal equipment-replacement cycles come due. And as more stations buy into D-2, the price will slowly decline, allowing an even greater number of stations to invest in the format. “I doubt if five percent of stations now have digital equipment,” said the Ampex source, “but that's going to change dramatically in two years. Right now, the D-2 is the Cadillac of the industry; when it becomes the Chevy—from a cost point of view—it'll really take off.”

—D.D.

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# ATV WATCH

## From Kowloon to Andover, HDTV Gets Down to Business

By Eva J. Blinder

As the technologies available for HDTV production and distribution mature, each month we seem to learn of a new business application for high-quality pictures. One of the more interesting items to cross our desk so far this year was the news of a live HDTV satellite videoconference held in mid-February that linked the Andover, MA headquarters of MAST Industries, Inc., a division of clothing retailer The Limited, with its offices in Hong Kong for a high-definition fashion show. [See "Update."]

According to T.C. Browne, VP of Sony Corp.'s Videoconferencing and Satellite Systems Div., the idea for the videoconference started on a boating trip. Leslie Wexner, chairman of The Limited, and Michael T. Schulhof, vice chairman of Sony Corp. of America, were out sailing last fall when Wexner began to complain of the high costs of sending personnel back and forth to the Far East for buying trips. The company had rejected teleconferencing because the resolution and color reproduction of NTSC video weren't sufficient to convey fabric textures and clothing styles with the accuracy the buyers needed to make crucial business decisions. Schulhof's suggestion that the company try HDTV intrigued Wexner enough that he agreed to an experiment.

Logistics for the two-way international transmission, which involved two satellite hops and a fiberoptic link on the Hong Kong side, were complex. Planning began in October, almost as soon as Sony and MAST shook hands on the idea. The project involved several U.S. and Japanese divisions of Sony, two divisions of Scientific-Atlanta (which provided HDB-MAC satellite transmission technology), and Vision Accomplished, a Santa Monica, CA company that ar-



ranged for appropriate uplinks, downlinks and transponder space.

"[Before any real work started,] we had to determine if it was technically feasible," Browne commented. "No-



body had ever transmitted HDB-MAC across fiber, no one had tried to mate fiber and satellite transmission in a network carrying high-definition television, and there were a lot of regulatory problems in Hong Kong. High definition takes a lot of transponder capacity."

Kim Vaughan, COO and general manager of Vision Accomplished, characterized the high-def videoconference as "extremely difficult to set up," due to the plethora of technical and regulatory hurdles it faced.

Vaughan himself went to Hong Kong to help figure out that end of the project. Hong Kong Cable and Wireless, one of the regulatory agencies involved on the Far East side,

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*Above: "Home-base" area for MAST teleconference featured seating for on-camera talent, two HDTV cameras, and an HDTV monitor for talent viewing.*

*Left: Videotape area with one-inch Type C VTRs for HDTV playbacks.*

# ATV WATCH

placed some initial barriers when it refused, for reasons of local policy, to allow an earth station to be located directly at the MAST offices in Kowloon. The solution to that bit of the puzzle was to set up a fiberoptic link to go the 15 km from the Kowloon offices to an earth station complex in Stanley, Hong Kong.

The greater overall problem was setting up a system with the bandwidth and noise specs required by the high-definition television system. Scientific-Atlanta's HDB-MAC, a high-definition variant of the company's well-established B-MAC satellite transmission system, requires a carrier-to-noise ratio of 17 dB and 36 MHz satellite transponders.

"We had to figure out how to squeeze that out of two satellite hops and a 15-km fiberoptic link," Vaughan said. "We ended up using

the most powerful domestic links we could find"—a portable link on the East Coast and a semi-portable on the West Coast, both five-meter Ku-band.

"Then we went to Intelsat and found there was virtually no space segment available [with the required bandwidth at the times needed]," Vaughan continued. By going through some "back doors," Vision Accomplished managed to find the time. Because of the bandwidth requirements, the international segments of the videoconference had to use 30-meter up/downlinks.

"We really went after a deluxe system, so everything would work well," Vaughan said. "We needed extra oomph out of all the components to achieve that 17 dB carrier-to-noise."

According to Vaughan, the U.S.-to-Hong Kong side of the videoconference was converted to the HDB-MAC

format in Andover, then uplinked to General Electric's K-1 satellite for the domestic hop. Intelsat's Pacific Ocean Region POR-174 satellite took the signal from the Pacific Northwest to the Stanley downlink site, and the fiberoptic link relayed the signal to MAST's Kowloon offices. The return trip was similar, except that it used Intelsat's POR-180 satellite. For typical international links, a single 18.5-MHz transponder channel is sufficient, but the high-definition signal required the use of a full 36-MHz transponder each way.

Production of the teleconference was handled by Sony personnel and directed on the Kowloon side by the Sony High-Definition Software Co., Sony's Japanese production arm. Steve Lysohir Productions of New Jersey produced the U.S. end.

Lighting the videoconference "was

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Digital Audio Mastering Tape

UDS II Studio Audio Cassette

a big trick because high-definition monitors only work well in a low-light environment," Vaughan said. The MAST Industries Kowloon offices were set up for the conference with six 28-inch Sony HDTV monitors, requiring careful lighting techniques to ensure that both the monitors and participants would be visible. The output of three Sony HDTV cameras was switched into the HDB-MAC encoder for the trip back to Andover.

According to John Messerschmitt, senior director, advanced television systems for Scientific-Atlanta, HDB-MAC was selected for its conditional-access security features, its compatibility with the 1125/60 HDTV standard, and the fact that its equipment is currently available.

HDB-MAC grew out of S-A's five-year-old B-MAC system, which is in wide use for fixed business networks.

(According to Messerschmitt, B-MAC users include General Motors, Chrysler, Eastman Kodak, Cable News Network and the Armed Forces Radio and TV Services.) The high-definition version uses a 525-line progressive-scan structure and offers approximately 500 lines vertical and 1000 lines horizontal resolution in 16:9.

A "neat twist" is that an HDB-MAC transmission can be received by a standard B-MAC decoder and displayed as a 4:3, 525-line interlace picture. Its requirement of 10.7 MHz of baseband, however, puts it out of consideration for use as a terrestrial HDTV format.

"We have put [HDB-MAC] over satellite, through fiber and down coaxial cable," Messerschmitt stated. "It works perfectly, but it's not designed for six-MHz compatibility. [It should fit into the overall U.S. HDTV

scheme] as a feeder signal to terrestrial HD transmission systems because we can deliver a high-definition 16:9 component, 525-progressive signal via satellite." In addition to its video capabilities and conditional access, HDB-MAC carries six channels of audio, teletext and data signals.

Despite some reservations based on logistical difficulties encountered, Vaughan was cautiously optimistic about the practical uses of HDTV videoconferencing, especially for this kind of application, where detail and accurate color representation are of paramount importance.

"It's gorgeous," he said. "It's very exciting to see something that beautiful. [Hong Kong vendors] held up swatches of material next to the monitors, and the audience was just floored. They couldn't believe how accurate the colors were." ■

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# N NEWSROOM COMPUTERS

*Powerful, less-expensive systems are helping a wide range of stations get a scoop on the competition.*

**By James McBride**

**T**he days of "rip-and-read" news coverage are quickly fading into memory. Increasingly, broadcast news organizations are trading in their old typewriters and wire machines for integrated networks of mini-computers, capable of automating everything from scriptwriting to camera moves. In the last decade, 80 percent of all stations in the top 20 markets have computerized their newsrooms. Most station managements make the purchase of newsroom computers for the efficiencies this type of technology can bestow upon their operation. However, the upgrade to newsroom automation is not inexpensive. The decision to install computer systems can



*Workstation's small "footprint" leaves plenty of room for other important items on reporter's desk: written notes, calendar book, soft drink.*

lessen the work burden on personnel, but can also impact the organization's ability to acquire and maintain other programming resources.

This is especially true in smaller stations, where every dollar spent is carefully watched. News, like other station departments, must show a return on investment. The need to be competitive, the pressure put on news directors to get the story on the air first, has generated considerable interest

for both customized and generic computer networks.

High-end market stations continue to gobble up features such as control of still stores, character generators, closed captioning, robotic cameras and cart machines. But for a majority of stations in the country, automation of all these functions is still a long way off. There does seem to be a trend, however, towards the integration of customized software and cheaper, off-the-shelf hardware, creating hybrid systems at significant cost savings.

"We looked at several newsroom systems. A couple had what we needed, but none of them had exactly what we wanted. We also thought they were substantially overpriced for what they were delivering," says Richard Edwards, VP of engineering at Guy Gannett Broadcasting in Miami. "We went out and bought our own PCs, tied them into a mainframe and wrote our own software. We also bought modems for reporters, so they could file their stories directly from the field."

Edwards indicates there weren't really any dilemmas involved. It was simply, as he says, a need whose time had come. "Ten years ago when we started looking at computerizing our newsroom, we took note of what these systems would not do," he continues. "We decided we had people in-house who could put a system together for a lot less money than the vendors and probably do more. We've got less than \$40,000 tied up in a system that might have cost \$500,000 to \$750,000 from an outside source."

#### **NETWORKS, LARGER STATIONS PAVED THE WAY**

Interest in newsroom computer packages really got started in 1978, when Cable News Network (CNN) totally automated its news operation due to the enormous need to

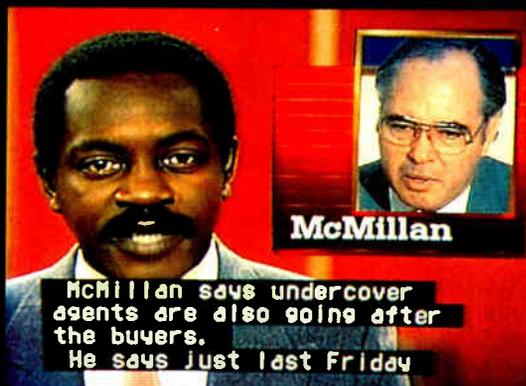


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<b>CKCO-TV</b> Kitchner, ON	<b>KSL-TV</b> Salt Lake City, UT	<b>WBRC-TV</b> Birmingham, AL	<b>WHO-TV</b> Des Moines, IA	<b>WLNE-TV</b> Providence, RI	<b>WTMJ-TV</b> Milwaukee, WI
<b>KABC-TV</b> Los Angeles, CA	<b>KTBS-TV</b> Shreveport, LA	<b>WBZ-TV</b> Baton Rouge, LA	<b>WINK-TV</b> Fort Myers, FL	<b>WNEP-TV</b> Moosic, PA	<b>WTNH-TV</b> New Haven, CT
<b>KATU-TV</b> Portland, OR	<b>KTRK-TV</b> Houston, TX	<b>WDIV-TV</b> Detroit, MI	<b>WISC-TV</b> Madison, WI	<b>WPLG-TV</b> Miami, FL	<b>WTOL-TV</b> Toledo, OH
<b>KCRA-TV</b> Sacramento, CA	<b>KTVI-TV</b> St. Louis, MO	<b>WESH-TV</b> Winter Park, FL	<b>WISH-TV</b> Indianapolis, IN	<b>WPVI-TV</b> Philadelphia, PA	<b>WTSP-TV</b> St. Petersburg, FL
<b>KFDM-TV</b> Beaumont, TX	<b>KVOA-TV</b> Tucson, AZ	<b>WFLA-TV</b> Tampa, FL	<b>WISN-TV</b> Milwaukee, WI	<b>WREG-TV</b> Memphis, TN	<b>WTVG-TV</b> Chattanooga, TN
<b>KGO-TV</b> San Francisco, CA	<b>KXAS-TV</b> Fort Worth, TX	<b>WFSB-TV</b> Hartford, CT	<b>WJLA-TV</b> Washington, DC	<b>WRGB-TV</b> Schenectady, NY	

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# NEWSROOM COMPUTERS

it is easier to make changes and to hone things to make better sense on the air. We make fewer mistakes, and there are more hands on the product. More can get done with fewer people, and our broadcast looks better."

Feder says WJXT is currently beta-testing NewStar's new Touch-Screen, which controls the still store, character generator and bar-coding of tapes. "We have always liked to get into things when they are new. I think this has been a very cost-effective attitude. Our timing was very good with the computers because we made these decisions at a time when news was expanding. If we had to make them today, they would be very tough to make."

## A CHANGING MARKET

Despite the advancements, only 35 percent of the affiliates in the top 75 ADIs are equipped with newsroom computers. Most of these stations have the older word processor-type configurations with none of the advantages of automation. Because of the gap between station needs and funds available, many manufacturers will be positioning their marketing at these small to medium-sized stations in the next several years.

Vendors have been sensitive to emerging user needs. BASYS now offers software products for the newsroom, including MCS-1, the recently introduced MCS-2, and the PC-based Newsdesk software, which allows several automated functions without needing the expense of a large-scale hardware system. The company has also added the ability to access and exchange information from different systems via networks and serial ports. Generation Technologies has developed an OS2-type environment for multi-tasking of functions, and SISCOM has increased the amount of files a user can store, combined with a parallel instant-update system to minimize data loss.

Other players in this arena include Media Computing in Scottsdale, AZ. This company has developed software that can run on IBM-compatible systems and offer editing, archiving, remote interfaces for VTRs and data-base options called TEN (The Electronic Newsroom). Media Computing also markets election graphics software called ANGIS (Automated News Graphics Interface Systems), which interfaces with a character generator.

ANGIS has made quite a name for itself in the last several years because of the specialized needs growing out of election tabulation. The software has been used in over 40 elections since it was introduced at the 1986 NAB convention. However, stations need to make sure that this software will drive their particular model of character generator. ANGIS runs on a variety of Chyron products, including the 4100 EXB, the 4200, RGU and the Scribe. It is also compatible with the Aston 4 character generator, and interfaces to AP Election Wire, the News Election Service, UPI and the SportsTicker.

ANGIS can also be used in conjunction with Media Computing's newsroom computing system and NCI software, allowing the news staff to enter supers directly into

terminals. NCI then acts as an electronic translator to update displays for the character generator.

"We are installing our second-generation computer system, which attests to our dependence on this technology," says William Napier, director of engineering for WBTV in Charlotte, NC. "Our hardware simply began to wear out. The thought of using typewriters again brings terror to the newsroom because they are so inefficient. We originally had the ENT system by Jefferson Pilot. It did script processing, electronic output to the teleprompter, ingestion of wire services and stacked the show."

## MAKING THE CHOICE

The options for stations considering automating their news operations are straightforward. There are three categories of computers: mainframes, minis and microcomputers. Mainframes are usually overkill for the average station. These machines are utilized by networks and the largest affiliates. A mini network can serve approximately 30 to 40 people and costs range from \$50,000 to

## Newsroom Computers . . . Another View

**T**here is no question that computers have made the work of the newsroom much easier, providing the ability to process information faster and more accurately than ever before. But there are also some risks involved, risks that need to be addressed before one spends those important dollars on a newsroom system.

One of the leaders in newsroom automation, KRON-TV, will be remembered from the NBC network coverage of the recent San Francisco earthquake: Anchors sitting in a candlelit studio, reading notes from scraps of paper. The point here is that the best computer system in the world is of no use if you don't have the electricity to power it. No station should become so dependent on any type of automation, be it newsroom, camera robotics, or master-control switching, that the station's basic on-air functions can't be performed without it. Stations need to recognize that automation is an assistant, not a replacement for a well-trained staff.

But there is a darker side to newsroom automation as well. Television is an industry where employees frequently change jobs, where the folks working beside you today may be your cross-town competitors tomorrow. The recent case in the Tampa, FL market, where former employees of one station raided its newsroom computer, via modem, for the benefit of their new employer, brought to light the potential for all kinds of mischief. A prime concern of anyone considering a system should be its provisions for security.

—William A. Owens

# NEWSROOM COMPUTERS

\$500,000. Most micros serve one person at a time; however, modern configurations have enabled users to tie them together for a variety of functions.

When considering vendor-supplied systems, thought should be put into the amount of customer support a package will ultimately receive and what upgrade programs are available, if at all. Another area of scrutiny is the amount of expandability the software is capable of. Buyers need to be aware of these limitations if they plan on adding more hardware down the line. The vendor should be asked what type of licensing agreements are mandated because some systems require purchase of a second copy of software to run expanded configurations.

Some stations are looking at sharing the cost of newsroom computer systems with other media, such as co-owned radio stations. And the facilities- and manpower-management functions make the systems useful to the engineering and operations departments as well.

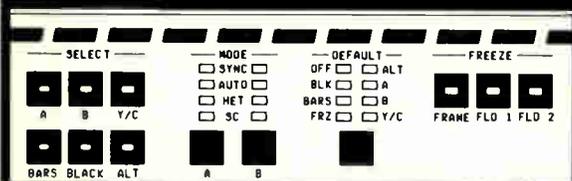
"The cost for a computer system would not be justifiable at this time, except that we are a UPI subscriber, and UPI has a program to get a BASYS system in," says Doug Ballin, news director at WTTV in Indianapolis. "We will consolidate it with the rest of the station staff."

Companies are continually offering updates to complement their existing systems. Dynatech has an IBM-AT configuration to provide script archives, VTR libraries and laser-disc storage for large-capacity needs. The company also offers dial-up, intersystem mail and Betacart access systems currently in use at CBS. BASYS has a system compatible with the Mini-VAX II that can be used in addition to Parallel and Onyx computers, as well as an IBM-AT system for smaller newsroom-computer networks. Large disks can also be added to the ATs with a split-screen.

On-line graphics, once thought to be an unattainable domain for many smaller news operations, is now readily compatible with most of the workstations on the market. ColorGraphics has the ArtStar III-D, which can simulate lighting, camera zooms, pans and spline-curve motions, and can be coupled with a VTR to produce animated graphics. Chyron offers the 4200 with motion.

It is important to keep in mind that newsroom computers are not a panacea for all operational problems. They don't directly affect viewers, and it is doubtful that many news directors contemplate purchases of such systems with the idea of a direct correlation to ratings points. Yet

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computers do make the day-to-day operating environment easier and more efficient.

"We use the computers for general assignment work, series and documentaries," says Alan Griggs, news director at WSMV-TV in Nashville. "We keep a big file system for reporters' notes, and we are just getting into closed-captioning in conjunction with our character generator. We needed a shot in the arm because we were working with typewriters. Pushing deadlines is always going to be difficult, but it is minimized with computers."

Griggs cautions colleagues contemplating newsroom-computer purchases that the systems are only as good as their users, and that the ease of use can lull some staffers into a false sense of security. "The only big problem is the potential for abuse and pushing back things that are urgent," he maintains. "It is definitely something you have to work on in the minds of reporters."

KRON-TV's Trumbull agrees: "The computer is no magic bullet for getting ratings. Sometimes you can get so bogged down in the daily grind of doing things that you lose sight of what you are trying to accomplish. Just hacking information into a computer does not mean it will make any more sense on the air." ■

### Newsroom Computer Systems

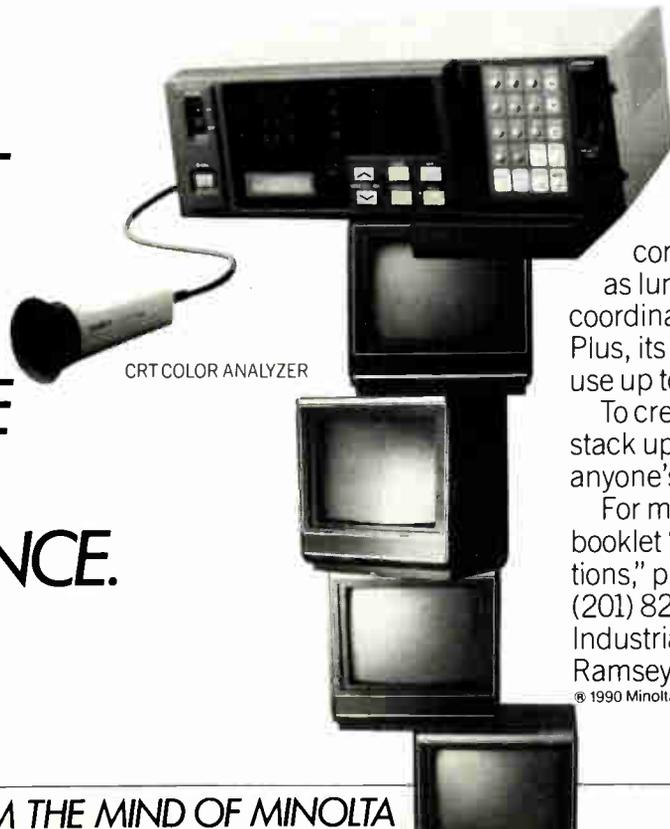
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# STATION ENGINEERING BUYING 1990

*Television Engineering debuts its exclusive study of purchasing trends among TV stations. This month: the role of engineers and others in equipment decision-making.*

**By  
Peter Caranicas**

**A**n unfortunate coincidence now greets TV station executives. On the one hand, recent swift technical advances have laid before them an unprecedented array of new technologies from which to choose. On the other, never before has the broadcast industry been so financially ill-equipped to invest in new equipment, let alone risk dollars on technologies that offer no assurance of making it in the marketplace.

What's going on in the minds of TV station engineers as they face this enormous dilemma, and how are they proposing to allocate short-term resources? To reach some answers, *Television Engineering* conducted a scientific survey among 245 stations nationwide [see box].

We found that fully 11% of TV stations in the 150 largest markets have no plans to purchase equipment in 1990. Among those that do plan to buy hardware, spending is flat compared to 1989 (it was up in 1989 over the year before).

This is the first of a series of three



# EQUIPMENT

features presenting the findings of our research. Here we define our sample of respondents by job title and assess their roles in the entire station equipment purchasing process.

Future installments of this series will present our findings on specific station equipment budgets by calendar year and by market size, on how the various equipment categories are impacting on stations, budgets and the plans of engineers in the areas of digital recording and high-definition television.

## THE RESPONDENTS

The researchers telephoning the stations began by asking to speak to the person "most familiar with the station's technical equipment . . . and the purchasing of it." If that person was not available, they set a time to call back. In each of the 245 completed calls, that person was reached and asked a total of up to 77 questions.

Of the respondents answering the telephone interviewers' questions, most had engineering titles, with 69% being chief engineers or assistant chief engineers; 14% directors or managers of engineering. The balance consisted of production managers (9%), operations managers (6%), and "other" (2%).

An astounding 88% of our respondents had worked 10 or more years in the industry when they answered our questions. Only 4% have been in broadcasting 7-9 years, 5% 4-6 years, 1% 1-3 years, and 1% 0-1 years.

Markets of all sizes were well represented. Twenty percent of respondents worked at stations in markets 1-25, 17% in markets 26-50, 31% in markets 51-100, and 23% in markets

**TABLE 1**

	Major Role	Minor Role	No Role At All	Position Does Not Exist	DK/NA
Director or Chief of Engineering . . . . .	95%	4%	1%	—	1%
Owner or station management . . . . .	68%	28%	3%	—	1%
Production Manager . . . . .	45%	48%	4%	1%	1%
Staff Engineer . . . . .	24%	64%	9%	2%	1%

**QUESTION:** How much of a role does the \_\_\_\_\_ have in initiating equipment purchase discussions at your station?

**TABLE 2**

	Major Role	Minor Role	No Role At All	Position Does Not Exist	DK/NA
Director or Chief of Engineering . . . . .	95%	4%	—	—	1%
Production Manager . . . . .	38%	52%	8%	1%	1%
Staff Engineer . . . . .	33%	53%	10%	2%	2%
Owner or station management . . . . .	31%	54%	14%	—	1%

**QUESTION:** How much of a role does the \_\_\_\_\_ have in studying and evaluating the equipment being considered by your station?

101-150. Equally well represented were varieties in station affiliation. Twenty-one percent of respondents were ABC affiliates, 22% were affiliated with CBS, 20% with NBC, 13% with Fox, and 23% were independent.

## ROLES IN PURCHASING

As might be expected, chief engineers

are said to have a "major" role at all stages of the equipment-purchase decision-making process. Ninety-five percent of all respondents said CEs play a major role in initiating equipment-purchasing discussions, and only 4% attributed a "minor" role to them. Conversely, station owners or managers were said to play a major

# STATION EQUIPMENT BUYING/1990

## PART I: THE DECISION-MAKERS

**TABLE 3**

	Major Role	Minor Role	No Role At All	Position Does Not Exist	DK/NA
Director or Chief of Engineering . . . . .	97%	3%	—	—	1%
Owner or station management . . . . .	46%	46%	6%	—	2%
Production Manager . . . . .	36%	54%	7%	1%	2%
Staff Engineer . . . . .	22%	61%	13%	2%	2%

**QUESTION:** How much of a role does the \_\_\_\_\_ have in deciding which general pieces of equipment should be recommended for approval by your station?

**TABLE 4**

	Major Role	Minor Role	No Role At All	Position Does Not Exist	DK/NA
Director or Chief of Engineering . . . . .	94%	5%	1%	—	—
Owner or station management . . . . .	37%	51%	11%	—	1%
Production Manager . . . . .	31%	59%	9%	1%	2%
Staff Engineer . . . . .	18%	65%	14%	2%	1%

**QUESTION:** How much of a role does the \_\_\_\_\_ have in deciding which specific equipment brands and models should be recommended for approval by your station?

role by 68% of the respondents; a minor role by 28% of them. Production managers were given a major role by 45%, a minor role by 48%. And staff engineers were said by 24% of the respondents to play a major role; by 64% to play a minor role. [Table 1].

While a considerable number of station owners and managers seem to play a significant role in the initiation process, their importance diminishes when it comes to studying and evaluating equipment being considered. At that stage, the role of station management and ownership drops considerably [Table 2], with only 31% of all respondents telling us that management plays a major role.

When it comes to deciding on equipment purchases in general, as well as on specific brands and model numbers, engineers remain firmly in control [Tables 3 and 4].

### BUDGETS

Engineers may reign supreme in the evaluation and selection of equipment, but they play distant second fiddle to ownership and management in the setting of overall station equipment purchasing budgets, as well as in the approval of equipment purchases.

A hefty 59% of all respondents said corporate ownership or management "ultimately" sets the yearly equip-

ment budget. Add to that the 29% who say the general manager or station manager sets that budget, and you get a total of 88% who say non-engineering management titles set annual equipment expenditure budgets. Only 21% say engineering titles set yearly equipment budgets. [Chart 1].

Who approves equipment purchases? The story here is similar. According to 74% of the respondents, station ownership and management titles (corporate ownership/management, GMs, station managers) "ultimately" approve equipment purchases. Only 21% say that those purchases are ultimately approved by directors/managers of engineering or by CEs [Chart 2].

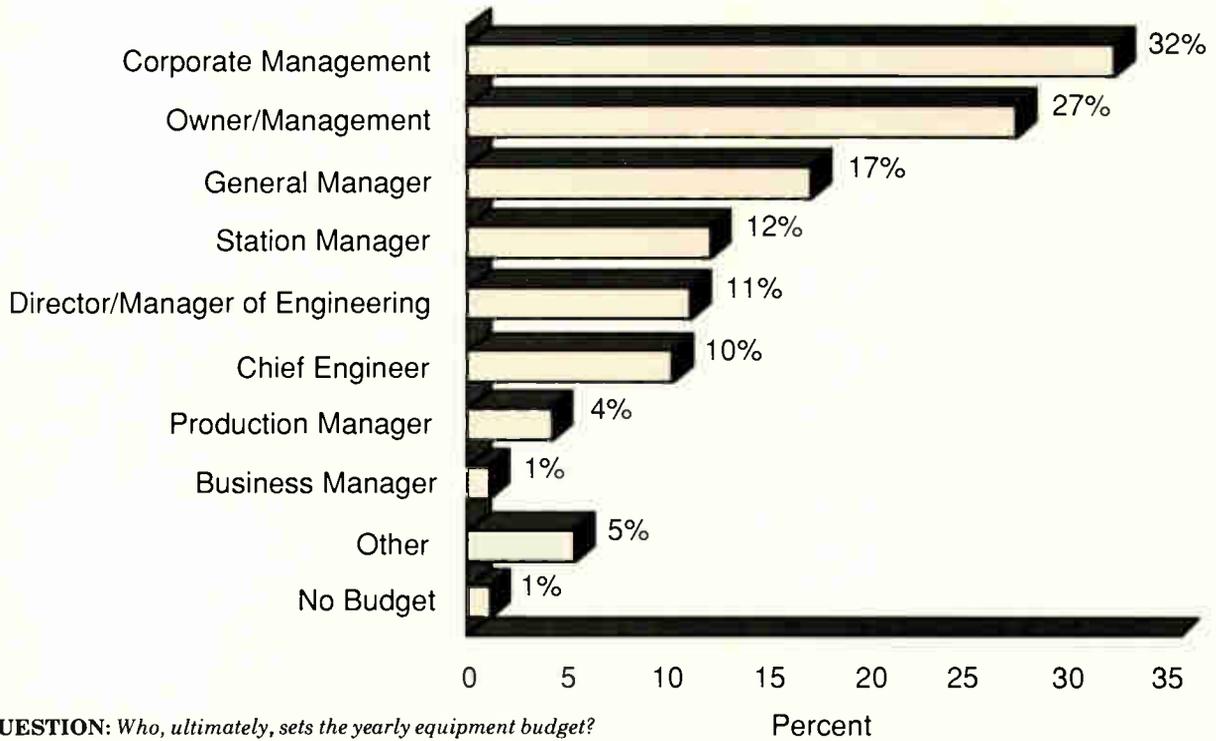
Interestingly, in more than three stations out of five (62%), the individual who sets the yearly equipment budget is the same person as the individual who approves equipment purchases.

In its July issue, *Television Engineering* will quantify station equipment purchasing budgets for 1988, 1989 and 1990. ■

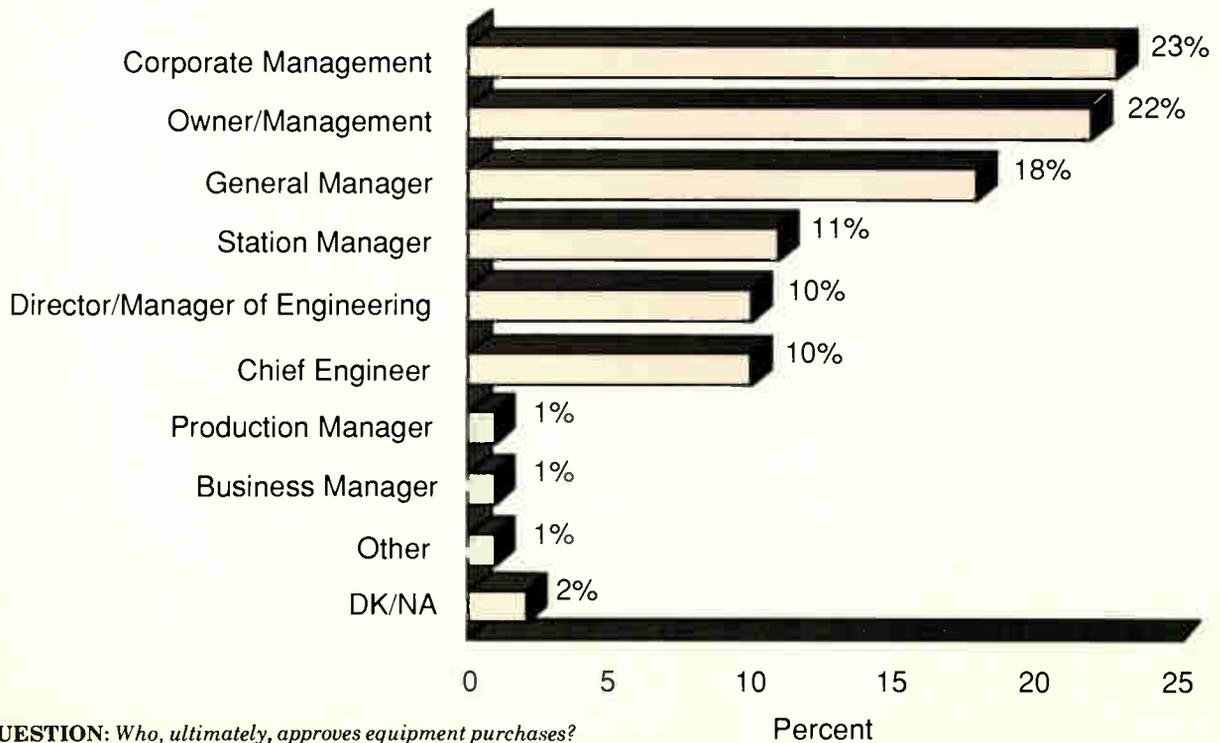
## Methodology

Last year, *Television Engineering* commissioned the research firm Frank N. Magid Associates to conduct an equipment-purchasing survey among television broadcasters in the nation's 150 largest markets. (Markets 151 through 213 were not contacted in order to limit the research to those buying sites that purchase the lion's share of TV equipment.) In late November and early December of 1989, Magid researchers conducted a random-sample survey by telephone of 245 stations in these markets, out of a total universe of 875 such stations. The resulting margin of error is plus or minus five percent, and the survey's findings are projectable to that entire universe of stations. ■

**CHART 1**



**CHART 2**



B R O A D C A S T N E W S !

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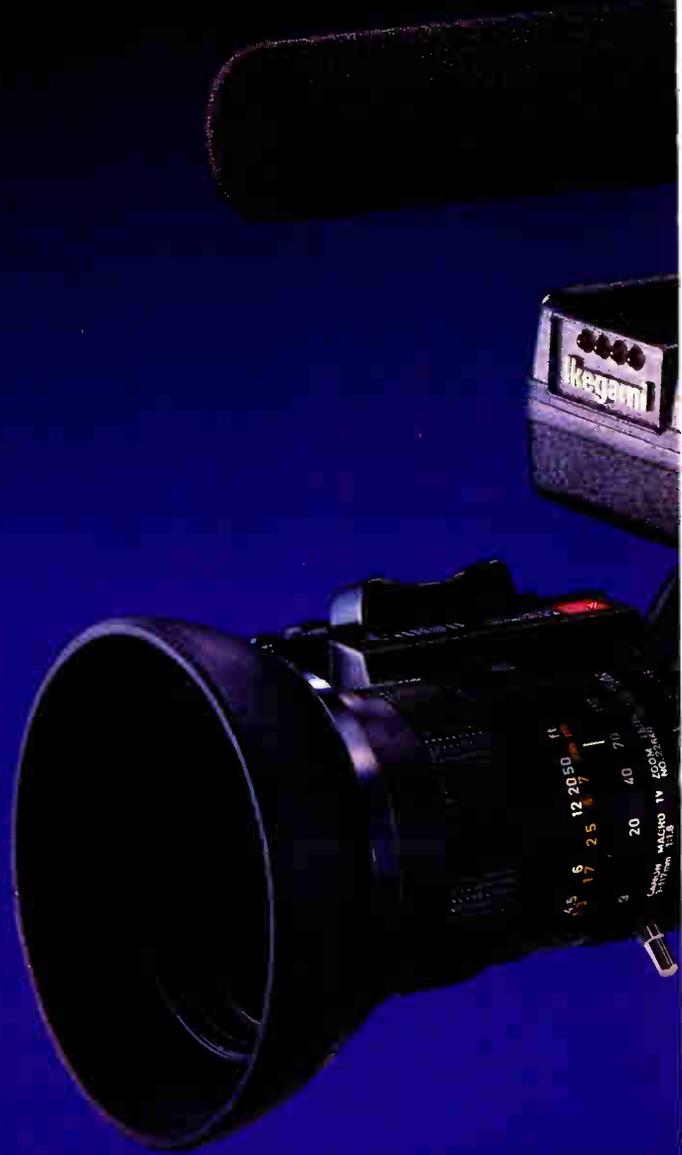
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# KEEPING IT ALL IN

# T I M E B



By  
**William A. Owens**

*Time-base correctors and frame synchronizers set off a revolution in broadcasting. Now, many years later, they're just part of everyday reality.*



ack in 1956, when that first "CBS News with Douglas Edwards" rolled off an early quad machine, who could have imagined that, 34 years later, members of the viewing audience would be making their own home "videos," and that a show built around them would be rated in the top 10 programs? That's how far video recording technology has progressed. And yet, without modern time-base corrector (TBC) and frame synchronizer technology, "America's Funniest Home Videos," one of the most popular programs on the air today, would be impossible to produce.

With tapes arriving in the various

"home" formats, the use of time-base correctors and frame synchronizers is essential to the program's success. These little black boxes allow the home videotapes to be converted for broadcast use. Today, the technology of those black boxes is a given; the jobs of engineers a lot easier. But it was not always so.

The year: 1973. The place: Washington, DC. Tucked away in the "K" wing of the Sheraton Park Hotel was Suite K708, a most unlikely place for the start of a revolution. Yet those leaving the suite were describing its contents as "revolutionary," "mind-boggling," and "the biggest thing since the introduction of the VTR it-

self." Not since that first Ampex videotape recorder was placed into service at CBS had technology created such excitement in the broadcast business, or created the potential for such dramatic changes.

It is not unusual to find exciting new things at an NAB convention. It is unusual to find exciting new things that change the basic way in which broadcasters do business. This was the year that a small company, one that applied too late to gain booth

*Microtime dual TBC/effects system features multi-system inputs.*

# KEEPING IT ALL IN TIME



Host Bob Saget at taping of "America's Funniest Home Videos." ABC's suddenly popular Sunday night program would not be possible without the use of TBCs and frame synchronizers.

space on the convention floor, sparked a revolution that continues today.

The introduction of the digital time-base corrector by Consolidated Video Systems started the move to broadcast helical videotape formats. The CVS 500 TBC provided an exceedingly wide correction window, about 30 times greater than previously possible. The new device converted incoming video signals into digital, and inserted both regenerated sync and burst information. The result was a broadcast-ready video signal, capable of being timed to the rest of the video plant. This would permit the on-air use of helical-type videotape recorders. With the cost of a helical VTR and TBC package considerably

less than that of the typical two-inch leviathan, there was no question that quad technology was doomed. It would be just a matter of time—and of time-base correction.

The basic technology used for time-base correction was created long before 1973. RCA's PIXLOCK and CA-VEC electronics, and Ampex's COLORTEC and AMTEC, were subsystems of those first-generation quad VTRs, designed to handle time base and other signal-reproduction errors. These were integral systems, circuits built into specific machines as part of the signal-processing path.

But it was not until the late '60s, with the new low-cost helical-scan VTRs coming on the market, that

thought was given to the need for standalone TBCs. Companies like Consolidated Video Systems and Television Microtime, Inc. realized the potential that existed for low-cost VTRs at television stations unable to afford, or unwilling to spend, the heavy investment needed for quad. Within a year following the CVS introduction, 10 more manufacturers had jumped into the market with their own TBCs. Users discovered that with the use of a standalone TBC, a low-cost VTR's output signal could be cleaned up for broadcast. Stations could convert to helical tape for local production, network delay or archiving, without the high price tag or costly care and feeding required by a quad VTR.

Today, one would be hard-pressed to find a television facility that does not use some form of time-base corrector. Be it standalone, or built into a tape machine, today's TBC goes far beyond the simple function of bringing a playback tape into the television signal path for broadcast. TBCs allow us to fix in post the errors in color, lighting or filtering that somehow creep into our field tapes. And they allow us the freedom to make even the most marginal-quality tapes air-worthy.

## IN SYNC

But there's another use of TBC-like technology. Engineers have a habit of finding new problems to solve, and just as TBCs helped solve the problem of integrating playback tape into the broadcast chain, engineers looked at another problem and found TBC technology to be the basis for a solution.

Back in television's Stone Age, signal synchronization was a difficult process. The sync generators of the day took up a full rack and needed constant attention. The broadcast of network programming required, in many cases, taking a roll as receivers lost lock during the shift between local and network-originated sync.

One who remembers that era is Robert Hurst, manager of digital video interactive programs for GE Gov-

ernment Services. Hurst was an engineer at WAVE-TV, Louisville, KY in those early days.

"It was quite dangerous to run on network sync," Hurst told us. "Signal quality of the early network lines was poor, and every minute you took a chance of losing sync." Hurst remembers one incident where WAVE-TV picked up World Series games aired over WLWT-TV in Cincinnati for re-broadcast. "With a receiving antenna mounted at the 200-foot level on our transmitter tower, we were able to pick up WLWT with a small amount of noise, but we couldn't get [the signal] to lock up through our system," he explains. "We finally fed the WLWT off-air signal into a 10BP4

monitor on the studio floor, and shot the face of the monitor with one of our TK-10 studio cameras. We used a blanket to cover the space between camera and monitor, to eliminate reflections. The trick worked, and allowed the station to switch cleanly in and out of the games."

Such solutions were impractical for long-term usage. After a short flirtation with the use of atomic clocks for local-to-network synchronization, a new, improved method appeared.

With TBC technology as a base, it was a short stretch to envision the ability to lock up an incoming feed in a similar fashion. The frame synchronizer is a TBC-based device that will lock the inbound, free-floating video

signal to the sync platform of a timed video system. GE's Hurst, who was involved in the creation of the RCA TFS-121 frame synchronizer, pointed out the difference the years have made in the technology. "It took 30 years to go from a sync generator filling a full seven-foot rack to a chip-sized one, yet it only took eight years to go from a full-rack-sized frame sync to a chip-sized one," he says.

For proof that TBCs and frame syncs have changed the industry, one need look no further than "America's Funniest Home Videos."

Each day, over 2000 home videos arrive at ABC. Rene Sanchez was the ABC Network's videotape supervisor for the original pilot program, and

## TBC/FRAME SYNCHRONIZER MARKET GUIDE

Manufacturer	Simple TBC	TBC with Effects	Frame Synchronizer	Frame with Effects	Dual Channel w/Effects
Alta Group		✓		✓	✓
Ampex	✓				
Crosspoint Latch					✓
Digital Processing Systems	✓	✓	✓	✓	
For-A	✓	✓	✓	✓	✓
Grunder Associates (Cel)			✓	✓	✓
Harris		✓		✓	
Hotronic	✓		✓		✓
I.Den	✓	✓	✓	✓	
JVC		✓		✓	
Microtime		✓	✓		✓
Nova Systems	✓	✓	✓		
Panasonic	✓				
Prime Image	✓	✓	✓	✓	✓
Progressive Image		✓		✓	
Sony	✓			✓	✓
Tektronix			✓		
Videotek			✓		

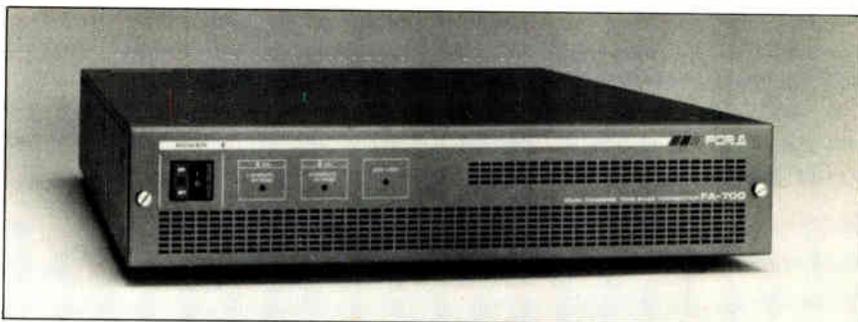
# KEEPING IT ALL IN TIME

continues to be involved in its production. "The tapes we receive are a mixed bag of formats and speeds; lots of VHS, along with S-VHS, Betamax, Super Beta, 8 mm and Hi8," he says. "Many are shot under poor lighting conditions, and mistracking is a constant problem."

## ON THE RACK

Tapes are screened for funny content, and rated on a laugh scale of 1-10. Those rated five and above are sent to "the Rack" for a bump to Beta SP. Built by the ABC crew, "the Rack" is home to playback machines in all the consumer formats, as well as the required signal-processing gear. The home tapes roll through a frame synchronizer during the bump-up process, and are logged as to the subject matter.

Once the show's producers deter-



For-A TBC, "THE DUALIST," features two independent full-frame TBCs.

mine what segments will be used, the Beta SP file reels are edited and dubbed onto a one-inch type-C element reel. During the edit and dub process, the tapes are fed through an ADO for repositioning (to "legalize" the image technically, and to eliminate head-switching at the bottom of the picture) and color correction. Au-

dio is cleaned up and delayed to compensate for the length of the signal-processing path.

Finally, the element reels are played back to the studio audience for their reaction, and later video is inserted into the master show tapes. This saves another generation. "By the time we air a program, we've added four to six generations to the home video," Sanchez notes. "And many times, the tapes we receive are several generations away from the original. We do everything possible to provide a top-quality, technically legal image for our viewers."

Sanchez proudly pointed out that with the possibility of expanded use of home tapes by the news department, "the Rack" has been made available to the network's news operation even as it continues to be used on "America's Funniest Home Videos."

The TBC/frame sync devices available today fall into one of four categories [see table]: a simple "one-function" TBC box; a TBC with limited effects capability, like freeze or posterization; a box that combines TBC and frame synchronizer; and a TBC/frame synchronizer with built-in effects. An offshoot of the last category is the multiple TBC (or TBC/frame sync) channel unit with built-in effects generator for A/B rolling with digital effects between sources. Many units are designed to input and output a variety of signals, including composite, component and Y/C 358 for S-VHS.

The blurring of the line between pure broadcast and non-broadcast ap-

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# KEEPING IT ALL IN TIME

plications has created market opportunities for vendors at all levels. Within each category, there is a wide range of price and performance level available. While some manufacturers have taken a General Motors approach [offering a product at every price point], others have taken the niche approach, concentrating in select segments of the market.

## LITTLE BOXES

There is no question that these boxes have greatly reduced the cost of creating professional effects, thus sparking into existence a multitude of small video production facilities.

Perhaps the most striking example is in the area of low-cost dual-channel TBC/effects units. These units cost less than the last generation of single-ST channel TBCs, yet allow two playback tapes to be matched for color

and synced, utilizing built-in special effects circuits to create a variety of wipes, dissolves and digital effects.

For the broadcasters, the availability of low-cost boxes means expanding production capability, with prices low enough to permit equipping several edit bays with A/B roll effects for what one bay would have cost a few years ago.

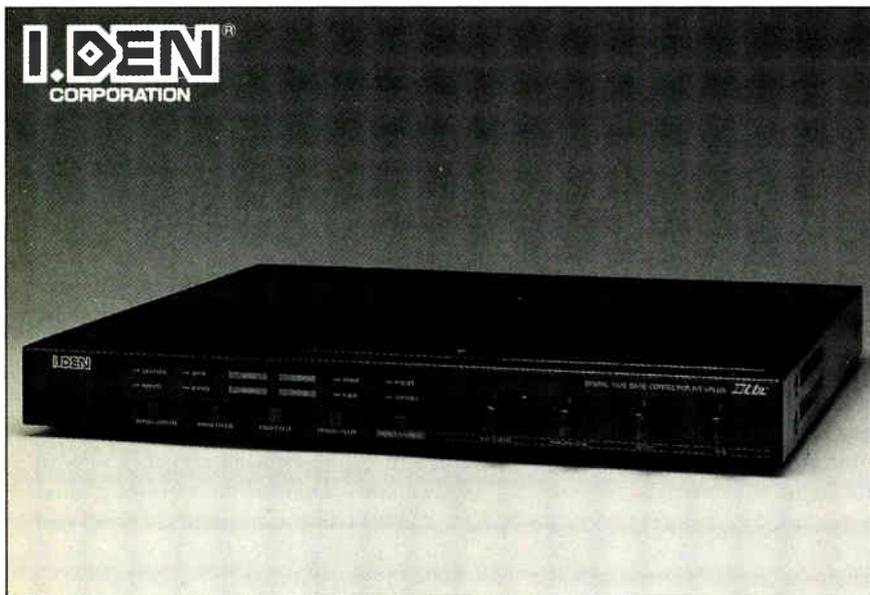
But digital effects are not confined to dual-channel devices. Even many low-cost single-channel boxes include field and frame freeze, and many also include posterization, mosaic and other effects.

There are several interesting mid-range single-channel boxes available, with limited digital effects capability. Some include limited or full-scale compression, joystick positioning, wipes and pulls, and an internal keyer. At the upper price range, a few

include a host of effects, keying, still store, color generators and more.

Of course, the folks with unlimited budgets can always find some new toy with which to play. But after years of playing follow the leader to ever more expensive boxes, many in our industry have decided to buy the box that does the job required at the best price. In fact, one major network has equipped all of its O&Os with a \$10,000 digital effects device, bypassing more expensive products. And that's just the beginning.

There is no doubt that the TBC/frame sync revolution has been driven by technology. But it has also been driven by economics. For the manufacturers, it means more business. And for the users, it means a better selection of cost-effective alternatives. It seems like a good deal for all concerned. ■



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# T RANSFERS IN RANSITION

*Digital equipment is invading the telecine suite, but the choice between digital and analog is not black and white.*

**By Claudia Kienzle**

**W**hen the producers of commercials, music videos or television programs bring their 35 mm film to a video post-production facility, the first stop is the telecine suite. "The telecine feeds our edit bays, our graphics area and duplication," says Patti Mauck, VP sales and marketing, Editel, L.A.

"Clients tend to keep the entire job under one roof to avoid shots that don't [color] match and [to avoid] inconsistencies of quality. So, if I don't get the transfer, I won't get the edit or anything else," Mauck told us.

Post-production houses, in order to offer more capabilities to their clients, are bringing more digital equipment into telecine suites. Some are using Rank Cintel's digital URSA telecine and/or digital support equipment to aid the colorist.

This influx of digital equipment does not change the basic importance of the telecine—or of the colorist. No matter what type of transfer equipment is used, the colorist must exercise his or her technical and aesthetic judgments to make the film look good on tape. "What I use to make pretty pictures shouldn't make a difference to my clients. Even if I use sticks and stones, if I can make the prettiest pictures in town, they'll come to me," says Nick D'Antona, Sr. VP and cre-

ative director of New York City's Manhattan Transfer.

The colorist's primary tool is the secondary color corrector—a vital peripheral in the telecine suite on jobs other than straight archival transfers. "Whereas primary color correctors in the telecine allow one to manipulate approximately six hues, making an awful picture look nice and acceptable, the secondary color corrector offers manipulation of up to 30 or more, allowing the colorist to do much more," says Geoffrey Orme, president of Rank Cintel's Unimedia Division. "The colorist can isolate those areas of the picture [that need] to be adjusted.

"Art directors and creatives, producing national ads, now spend a lot of time in 'color-correction suites,' matching the nail polish on the model's hands to the exact shade of red on the bottle, or showing only the product in color while everything else in the shot is monochrome," he explains.

"Whereas a commercial client will go for product color that is very exact, with refined image enhancement, the music-video client may want the shots all green and blown out," says Bill Willig, sr. colorist at Princzko Productions in Manhattan. The telecine suite at Princzko is organized around a Turbo Rank telecine, with a Palette II secondary color corrector. The suite also includes an Ultimatte 5, Faroudja encoders, an Ampex ESS-5 still store, and an Accom DIE 125

noise reducer.

Princzko's Rank MkIIIC telecine was rebuilt by Rank Cintel's Unimedia Division, resulting in a conversion to an equivalent of Rank's current model "Turbo." According to Orme, "When the owner of an old MkIII or MkIIIC is not interested in the sophisticated digital-effects capability provided by [Rank Cintel's] top of the line URSA, he can choose the more cost-effective route of upgrading his machine into a Rank Turbo. We incorporate all the newly developed features and functions not available when the MkIII was first introduced. Turbo modifications are designed to improve signal handling and interface with third-party manufactured equipment." (The MkIII is no longer being manufactured. Unimedia, recently acquired by Rank Cintel, created the Turbo design.)

Digital-effects capability, however, did sway The Post Group in Los Angeles to buy the URSA telecine. The Post Group also sports three Rank Mark IIIs with Dubner color correctors. The URSA needs no secondary color corrector, as that capability is built into it. "The URSA is an amazing device," says Steve Buchsbaum, telecine director at The Post Group. "It allows you to do a whole range of ADO-like effects, such as spins, flips and picture distortion, and the computer is able to remember your changes and recall them when you reselect your scene. We use it mainly for doing music videos, because you need to take things to extremes, and that's easier to do on the URSA." However, some telecine managers feel that there are still bugs to be worked out in both the hardware and software.

"The URSA is going to be a good machine, but [right now] it's having teething problems, like any new product," says Ted McConville, director of

engineering at Complete Post in L.A. "Fortunately, adjustments can be made in the field." In response to customer requests, Rank has begun modifying the programming software.

Complete Post is equipped with four telecine bays: one with an URSA, two with Rank MkIIICs and one with a Turbo Rank. In the Rank MkIII suites, there are three Ultimatte 4s, Rank secondary color correctors, and Matchbox or Abekas A42 still stores. Three rooms have Time Logic Controllers (TLCs), and one has its predecessor: the AVRS. "Our four rooms are running about 18 hours a day. Since no one room specializes in anything, our scheduling department has the flexibility to put any job in any bay," McConville says.

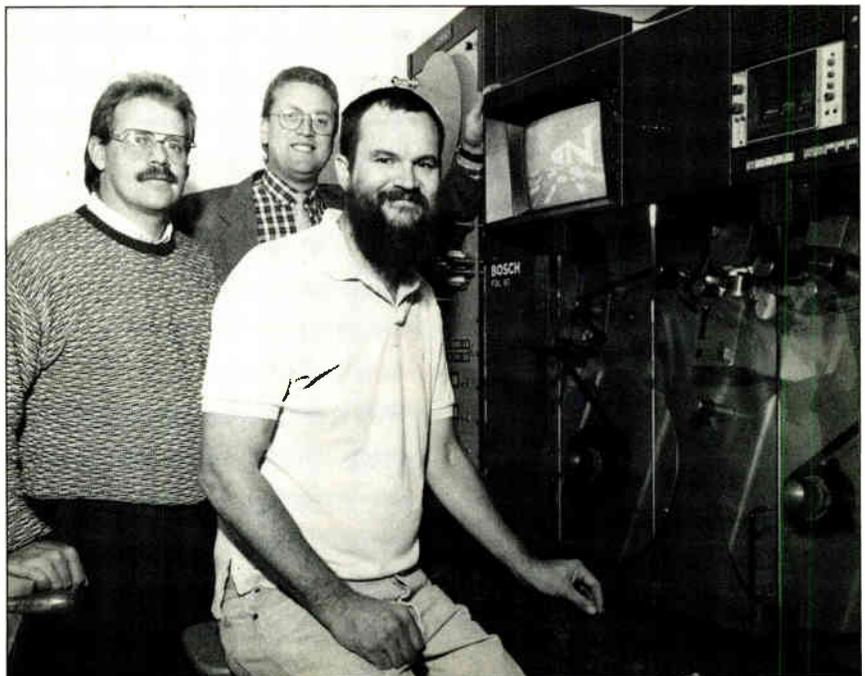
Though 35 mm film is the standard, at Complete Post, McConville finds that, "Many commercial clients will occasionally shoot on Super 8 mm if they're looking for a cinema verité look. Transferring from Super 8 mm is a trend we've been seeing in the last two years."

Small-format film has also made an appearance at Skyview Film and Video in Chicago, where colorist Pete Jannotta has seen some national ad-

vertising work shot on 16 mm. "Advertisers feel they can get good quality for their purposes at lower costs, but since it has less resolution than 35 mm film, it tends to look a little soft. We'll have a better chance of 'eeking' everything out of it if we put it on the Marconi, because the CCD sensors will sharpen it up," he says.

The Marconi Telecine, like the BTS (formerly Bosch) FDL 60, uses CCD technology rather than the Flying Spot Scanner used by Rank. Jannotta continues, "The CCD-type telecine delivers a very crisp, consistently high-quality resolution, and unlike the CRT-type Rank, you don't have to worry about excessive picture-tube aging. However, the Rank is better if you want to do zooms, X-Y repositioning, compression, or expansion to eliminate selected elements from the shot. Though a CCD-type telecine can frame up or down or pan and scan, it has no internal repositioning capabilities, so you need to go to an external device like the ADO, Kaleidoscope or Abekas A53."

These "picture-moving" devices are important peripherals in telecine suites that are built around a CCD-type telecine. In addition to the Mar-



*Telecine at GTN, Detroit. Left to right: Engineering VP Mark Piechan, Operations VP Doug Cheek, and film transfer specialist Frank Smith.*

# TRANSFERS IN TRANSITION

coni, Skyview also has a Rank Turbo, and both telecines are equipped with da Vinci secondary color correctors. "In fact," says Jannotta, "We may be the only da Vinci/Marconi interface in the country."

The da Vinci is unique in that it offers a centralized control panel for the telecine, and audio or video tape machines from its controller. It manages a list of up to 1000 color events, remembering the color choices you programmed, and recalls them to you as you go back and forth between scenes or frames. According to Bob Hemskey, the general manager of da Vinci Colorgraphics Systems, Inc., "The da Vinci is very user-friendly, executing the color-correction edit sequence all in real time." A special tape-to-tape methodology enables you to place the da Vinci between two tape machines for color correction.

At General TV Network (GTN), in Oak Park, MI, tape-to-tape color correction was used with tremendous success on a Ross Roy sales effectiveness training program. Doug Cheek, VP of operations, describes the method used: "All original film footage was taken across the BTS FDL 60 telecine in a best-light film situation. Then we cut an uncorrected submaster and color-corrected it through the da Vinci to another one-inch machine. The product was very well-received."

In another instance, related by Randy Seiler of Pyramid Teleproductions in Dallas, "When Radio Shack was putting together their Christmas spots, they used several film transfer locations around the country, and by the time they cut their spots together on videotape, much of what was on the tape didn't quite match. So we color-corrected the tapes for consistency, using the da Vinci, prior to dubbing them off for all the markets."

The SunBurst II, Palette II, Dubner or other color correctors will also program and remember color-correction choices. "Dubners pass the film image very cleanly, without a processed look, letting the quality of the film really shine through," says Manhattan Transfer's D'Antona.



*Color Correction suite at Editel, L A. In foreground: da Vinci color corrector.*

However, unlike the da Vinci, most other color correctors do not control the audio and tape machines in the suite. You need to add a controller, like the TLC which is locked to the film and uses a 60-cycle pilot tone laid across the audio and videotape machines. After the colorist enters the numbers into the TLC, the Rank finds the stop, and all the machines follow the film to that point.

StediFilm (by SteadiFilm Corp.) and Electronic Pin Registration (EPR, by Encore Video, in California) are important peripherals to the

**"What I use shouldn't make a difference to my clients . . . if I can make the prettiest pictures in town, they'll come to me."  
—Nick D'Antona**

CRT-type telecine—they hold the film steady as it moves through the gate. Orme explains the difference this way: "StediFilm takes still pictures of the film in non-real time (three f/p/s). It's relatively inexpensive and reliable. EPR electronically adjusts the picture as you go in real time (24 f/p/s), but it's relatively expensive and more technically complex." Though EPR is more costly to the facility, it can be more cost-effective to the client. According to Bill Willig, "If the client is running 50,000 feet of film, it will take days at three f/p/s."

There is no SteadiFilm- or EPR-type device yet available for CCD-type telecines, though many manufacturers are working on one. "Being able to produce a steady image is a major issue in the film-transfer business today, especially for those types of jobs where you do multi-layering," says GTN's Cheek. "We're working diligently with BTS as they develop a real-time system for their machine, to

be called Electronic Steadiness Optimizer (ESO)."

Pyramid's Seiler, however, doesn't really see a need for a steadying device for his BTS telecine: "The FDL 60 is already so steady that you can just go ahead and run it real-time. We've been able to satisfy our most critical animation clients." Pyramid, which also uses the da Vinci color corrector and an Ultimatte 4, serves major animation houses from a five-state area around Texas.

Rank also offers a slide gate for the telecine but, because there are so many other ways to transfer slides, it's not used very often. "We do a lot of videodisc projects for the military, and we occasionally need to use a slide-gate attachment," says Oliver Peters, facilities operations manager at Century III at Universal Studios in Orlando. "We rent it from Rank."

While transferring slides with a slide-gate attachment is very uncommon, grabbing still images from a still store is very common. Still stores like the Ampex ESS-5T or the Rank Cintel Matchbox, allow the colorist to store representative stills from different scenes to compare color consistency between scenes. Still stores can also freeze shots and wipe digitally between them. Rank's Slide File/Art File also stores images, but allows for some Paintbox-type treatments to the image during the transfer process. Image enhancers, such as grain or "noise" reducers like the BTS and Accom DIE 125, which works with analog RGB as well as in the 4:2:2 digital domain, are used to process grain and reduce it. Encoders like the Faroudja, CDL, Accom, and Grass Valley, produce enhanced NTSC outputs.

Most telecines today can output to either analog one-inch, Betacam SP, or 3/4-inch, or to digital machines—D-1, D-2 and A62 digital disk recorders. Facilities that transfer films into "digital production centers," where they are layered and combined with other images, use the Ultimatte, in combination with the Faroudja encoder, during the transfer process. The Ultimatte is a digital matting device

which allows for sophisticated compositing in post-production with devices such as the Harry, ADO, Paintbox and Kaleidoscope.

When planning changes to your telecine suite, you need to consider what equipment you presently own, what type of client you want to attract, and what upgrades you must make to serve your clients. But you shouldn't get so bogged down with evaluating which unit to buy that you fail to consider the dynamics of the

suite as a whole.

According to D'Antona, "It's not what color corrector will give the best shade of blue, but rather: How does this particular color corrector come into the path of the Ultimatte? Do you want to go to digital or PAL? How will this piece of equipment fit in your existing loop or signal path?" In this way, you will be assured of designing a telecine suite which is versatile enough that you can tell your client, "Yes, we can do that." ■

## Secure Future: Telecines in a High-Def World

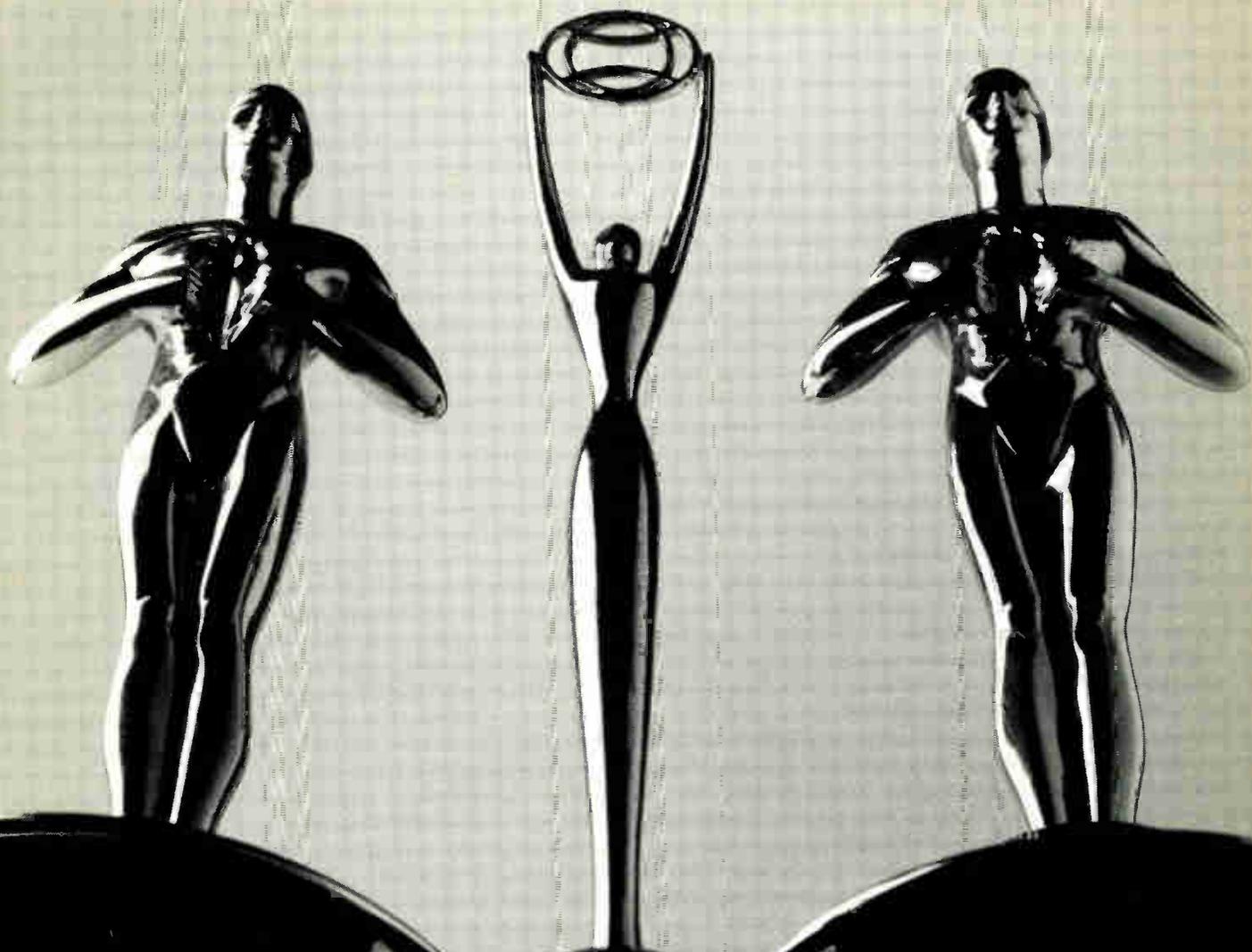
**T**hough there is still some debate about the standards and aspect ratios that will be adopted for HDTV, the future of the telecine is certain. Regardless of what standards are adopted, "there'll be a need for a telecine capable of transferring all existing motion pictures to the high-definition format," says Geoffrey Orme, president of Rank Cintel's Unimedia Division. "The future of film is just tremendous. Kodak now has a fine-grain super film stock available, and film continues to be the medium of choice," he notes.

Rank Cintel and Kodak recently entered into a partnership to develop, market and manufacture a CCD-type HDTV telecine, designed to scan negative film shot for HDTV in the 16:9 aspect ratio. Also, a prototype of the Mark III HD Flying Spot-type telecine is already available and is in use at Media Productions' 20,000-sq.-ft. facility in Pompano Beach, FL. According to President Jim Honey, "The Rank MkIII HD offers a built-in Amiga (Rank) secondary color corrector with joystick control, capable of infinite hues. A colorist needs to have a better eye when transferring to HDTV, because the colors are sharper and there's more range."

With its partner Club Theatre Networks (CTN), Media Productions used the November 1989 Leonard/Duran fight to launch a closed-circuit HDTV network around the Southeastern U.S. It is slated to have 14 theaters by the end of 1990. Southern Bell is providing a fiberoptic network to connect the cinemas. After film features are transferred to HDTV tape, they will be transmitted via the fiberoptics, from a central "head-end." The 75-seat HDTV theaters will be equipped with Barco HDTV video projectors, 10- x 20-inch screens, and Dolby Surround Sound decoders. According to Haney, "We will be transferring scientific and industrial programs, as well as first-run feature product, so the theaters can host teleconferences. Theatre owners across the country who eventually participate will be able to gain additional revenues by showing HDTV features and hosting teleconferences."

"The telecine will continue to play a very important role in the future," says BTS product manager Anthony Magliocco. "Producers are choosing and will continue to choose to work with 35 mm film over videotape because it's future-proof. And no matter which standard is selected, the producer will always be able to transfer his or her work via the telecine."

—C.K.



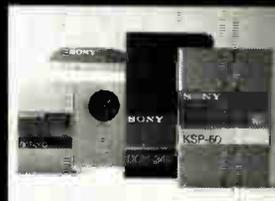
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# New Products

*This month,  
Television Engineering's  
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focuses on RF  
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Exhibited at NAB, the TRU/1000 is a 1-kW solid-state UHF transmitter featuring built-in diagnostics for troubleshooting amplifier boards and other components. Its amplifier slides out to facilitate maintenance.

**Reader Service #200**

## **TFT Model 9000 STL Composite Transmitter**

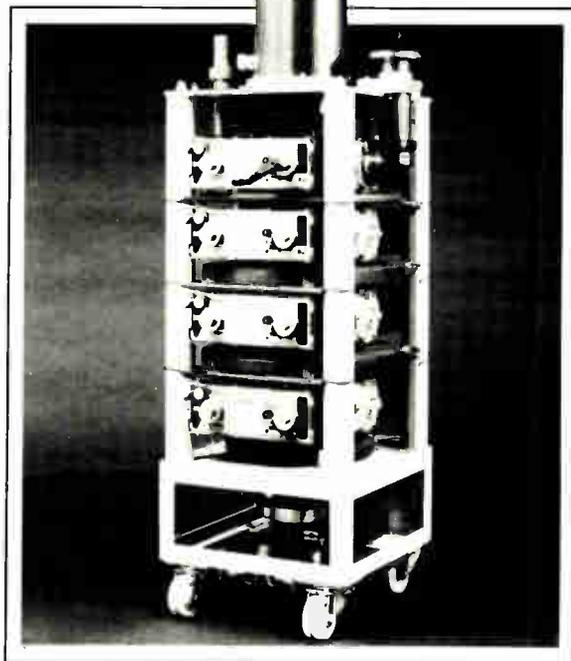
The 9000, which meets pending FCC requirements, improves audio quality if used with older receivers, according to the company. When not integrated with a receiver, it features a 944-952 MHz band, 82-dB signal-to-noise, 0.05 percent T.H.D., 60-dB stereo separation, and a 7.5-watt power output. The price, including a two-year warranty, is \$2750. The Model 9007 companion receiver should be available by May 1990.

**Reader Service #201**

## **TEKTRONIX 751 BTSC Aural Modulation Monitor/Decoder Option 01**

Outputs from a number of different demodulators, cable modulators and cable BTSC encoders can now be accepted by the 751 BTSC with the Option 01 4.5 MHz Demodulator Board. With the 01 installed, the 751 accepts a 4.5-MHz aural carrier, with or without video present, and also the Tektronix 1450-1 Demodulator's 4.5 MHz aural carrier output. The company says that such a configuration lets broadcasters locate the demodulator and 751 when far apart without appreciable line loss or ground-loop problems. Calibration is automatic, eliminating the need for a 1450-1, while field installation requires simple cable rerouting and replacement of two EPROMs on the 751's CPU board. The Option 01 costs \$2000.

**Reader Service #202**



PHILIPS COMPONENTS

## **PHILIPS COMPONENTS YK1267**

### **Klystron Tubes**

Constructed with a non-intercepting electrode that constantly regulates the beam current over the entire modulation range, these annular beam control (ABC) klystrons reportedly save roughly 25 percent of the energy expended by standard tubes. The YK12G7s have the highest output power available in this format, 70 kW, and operate over the complete 470 to 860 MHz UHF frequency range. Besides an efficiency rate of more than 65 percent (depending on the modulation circuitry), the tubes are compact, which can help conserve floor space. Price: \$32,500. Philips has also developed the YK1221, a special sound klystron that operates in a sound/vision configuration.

**Reader Service #203**

## **ANDREW CORPORATION** **Flashpac Flyaway Antenna**

This 1.8-meter earth station antenna, which is available in four pieces or eight, operates in C, X, Ku and C/Ku bands (in circular or linear polarization). It has a preassembled, aligned and matched feed system for each frequency band. All components are aluminum alloy; the segmented reflectors split into either four or eight quadrants, depending on the model.  
**Reader Service #204**

## **ANDREW CORPORATION** **Trifold Mobile** **Receive/Transmit Antenna**

Meeting FCC, EUTELSAT, and INTEL-SAT requirements, the Trifold has a manual/motorizable antenna positioner which utilizes an elevation-over-azimuth mount. The company says this 4.5-meter trailer-mounted receive/transmit antenna can be easily towed by a pickup truck or van and can be put into operation by one person within 30 minutes. Optional features include a motorization kit for elevation and azimuth control, and a remote control system.  
**Reader Service #205**



ANRITSU

## **ANRITSU MP1608A Pulse** **Pattern Generator**

This pulse pattern generator uses an internal or external clock to produce a digital bit stream at frequencies as high as 5 GHz. It can generate programmable patterns up to 512 Kbits long, allowing STM-16 patterns to be generated in one page. In addition, the Pseudorandom Binary Sequence Patterns and their mark ratio can be varied; the system will convert eight external data inputs at one-eighth of the basic clock rate to one serial data output available at the front panel.

The multiplex function works as a byte-to-bit serial converter, transforming eight separate inputs into one pattern output. The generator utilizes a 3.5-inch floppy disk to store up to 1.6 Mbytes of programmable patterns for other instrument settings. Cost: \$155,000.

**Reader Service #207**

## **ANRITSU MS3401A Network** **Analyzer**

The analyzer measures amplitude, phase and impedance of such active

## **WAVETEK FiberSAM Cable Signal Analysis Meter Provides Fiberoptic Test Signals**

FiberSAM, a cable signal analysis meter with a built-in fiberoptic power meter, measures optical power at 1330 and 1550 nm. It also measures RF signal level, carrier-to-noise ratio, hum, tilt and video-to-audio carrier level ratio. FiberSAM has an analog meter for signal peaking, while a video-minus-audio function key permits direct measurements of the video/audio carrier level relationship. A tilt function simultaneously provides a tilt reading (for slope adjustment) on the left side and the Hi pilot level (for gain adjustment) on the right side of the LCD display, with carrier-to-noise measurements indicated directly on the display. The channel plan (standard, HRC, IRC, and Jerrold formats) may be selected through a keyboard. The Hi/Lo carriers, as well as seven channels, may be user-configured for fast tuning. In the optical power area, besides a wavelength of 1330 and 1550 nm, the system has a range of -40 to +5 dBm. RF signal level measurement frequency ranges are: standard, 50-550 MHz; sub-band option, 4.5-550 MHz; sub/UHF option, -4.5-890 MHz. The range for amplitude measurement is -35 to 60 dBmV, with accuracy readings of  $\pm 0.75$  dB level accuracy vs. frequency (flatness);  $\pm 0.75$  dB level accuracy vs. level (meter linearity); and  $\pm 1.5$  dB total ( $\pm 1.0$  typical). The unit operates in a temperature range of -20 degrees to +50 degrees Centigrade (-4 to 122 F). Price: \$2,995.

**Reader Service #206**



WAVETEK

and passive components as amplifiers, crystals, filters and switches. It operates from 10 Hz to 30 MHz, features 300  $\mu$ s/point measurement speed, and displays results on an eight-inch CRT screen, using a maximum of 501 data points. Measurement dynamic range is 0.01 dB amplitude resolution and 0.1 deg. phase resolution. The MS3401A operates at sweep rates of 10 milliseconds to 27.5 hours per span, and measures impedances at 50 ohms or 70 ohms. The equipment can store as many as 10 different measurement functions on a plug-in memory card and, with a personal test automation (PTA) option, can be equipped to perform automated measurements without an external controller. The price is \$16,130; the PTA option is \$2530.

**Reader Service #208**

**MICRO COMMUNICATIONS  
Series 44110 UHF Filters**

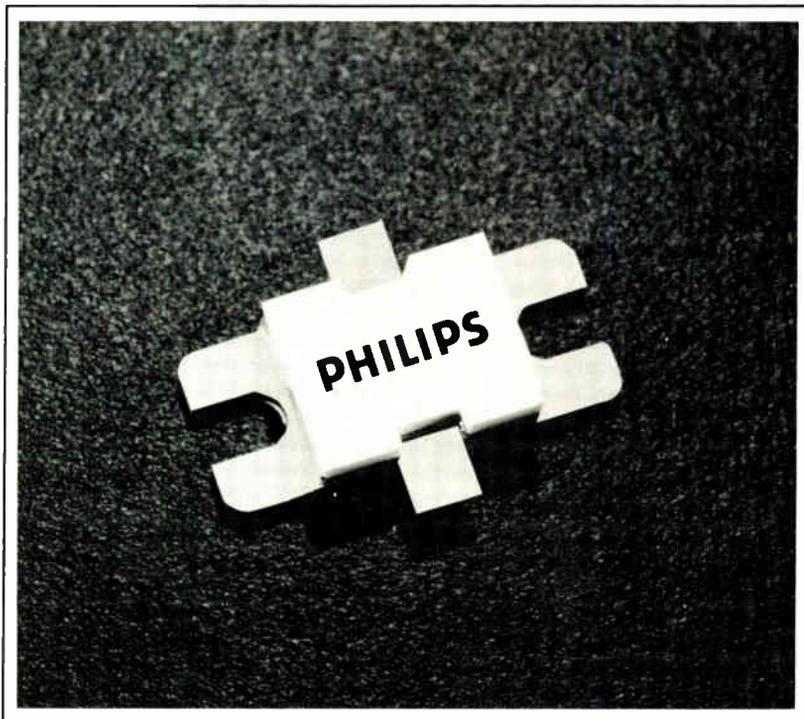
The 44110 series is designed for use in super-high-powered TV installations. The "reactive-type" filters feature 1.05 VSWR at the fundamentals, second harmonic rejection of 35 db, and third harmonic rejection of 30 db. Units allow for field-adjustable tuning.

**Reader Service #209**

**CINCH CONNECTORS 2-mm  
Flat Cable Header Connector**

Intended primarily as a component for disc drives, Cinch's cable header saves 38 percent of the PCB area in a PC board to flat cable interconnections, according to the company. The cable header is made of brass and a 50-microinch nickel contact underplating. The .020-inch (.51-mm) square pins are insulated by UL 94V-0-rated glass-filled polyester. The minimum contact retention is two pounds, with operating temperatures ranging from -55 degrees C to 125 degrees C. The connector is interchangeable with other 2-mm products.

**Reader Service #210**



PHILIPS COMPONENTS

**PHILIPS COMPONENTS PXB16050U Microwave CW Transistor**

Providing 50W continuous-wave power at 1.6 GHz, this NPN silicon planar epitaxial transistor is designed for common-bass Class C narrow-band amplifiers. According to Philips, the PXB16050U has the highest available output power for satellite links in INMARSAT systems. It operates from a 28 V supply, has a typical power gain of 9.5 dB, a collector efficiency up to 52 percent, and a thermal resistance of 1.5 K/W. The transistor has input and output prematching circuits to help distribute power equally over the total active area. The company promises improved durability and longer life for the PXB16050U because of diffused emitter ballasting resistors and gold metallization. The price is \$240 in 1,000-piece quantities.

**Reader Service #211**

**STANDARD COMMUNICATIONS  
CRC850 Remote Control  
Hardware and Software for  
MT830 Satellite Receivers**

Using a direct connection to the serial port of a computer or telephone lines, the CRC850 can configure satellite receivers from an IBM computer, automating the space segment at up to 60 times per day. Other features allow remote operation of video and audio level settings, five custom alarms that notify the com-

puter if scrambled or unscrambled video is lost, signal meter readings, and three frequency-agile audio sub-carrier demodulators with three IF bandpass filters for each demodulator. There is also a permanent serial number address in each control board. The basic setup requires a Standard Communications CRC800CI interface cable to the first MT830, then a "daisy chain" of pair cables to the other receivers. Cost: \$499 for interface board (not including software or power supply).

**Reader Service #212**

## **RF TECHNOLOGY Pathfinder Antenna System**

The Pathfinder antenna, available with either dual or quad polarization and an integral bypassable, low-noise amplifier, has been designed for medium-haul ENG applications. The system employs an offset-fed semi-parabolic antenna to provide high efficiency and very low side-lobes. Besides the single-band models, RF Technology offers 2- and 2.5-GHz wideband versions. The complete Pathfinder system includes antenna, panning table, radome, integral LNA, junction box and local control. Two- or four-wire remote control is optional.

**Reader Service #213**

## **FREQUENCY PRODUCTS SAA5964-10 and SAA6471-10 Power Amps**

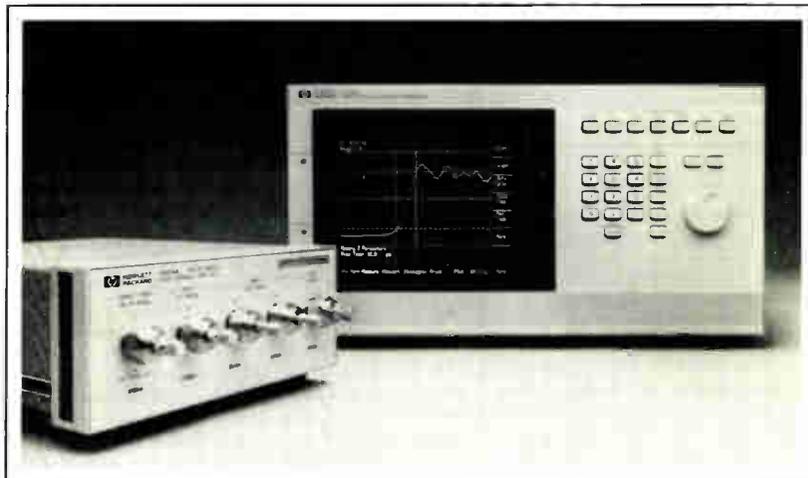
These GaAs FET 6-GHz power amplifiers are designed for saturated-mode FM operation. Options allow for exact bolt-in TWT retrofitting. Typical specs include: frequency range of 5.9 to 6.4 and 6.4 to 7.1 GHz; power output of 10 watts (+40 dbm), input level range of -7 to +3 dbm, gain of 47 db, VSWR 1.5:1, NF 6 db, and harmonics of -45 dbc. DC voltage is +12V or -24V, -48V for an office battery.

**Reader Service #214**

## **RF TECHNOLOGY 03C Series Miniature Portable Transmitters**

Designed for backpack, on-camera and lightweight portable applications, these transmitters run from 1.7 to 13.25 GHz with optional add-on power amplifiers for increased RF output power and extended range. Other features: dual high-quality audio channels with Line/Off/Mic switching, and 250 MHz frequency (including a wideband 2 and 2.5 GHz option and wide/narrow base-band switching).

**Reader Service #215**



HEWLETT-PACKARD

## **HEWLETT-PACKARD HP54124T Oscilloscope**

This four-channel, 50-GHz digitizing oscilloscope has a built-in time-domain reflectometer (TDR) that measures impedance, reflection coefficient, and distance from a reference plane. Aimed at designers of lightwave communications components and systems, high-speed digital and optical devices, and high-speed semiconductor processes and technology, the device has a 12-bit A/D converter that provides up to 14 bits (14 microvolts) of voltage resolution, yielding a sensitivity as low as 1 mV per division. Hewlett-Packard claims that its sampling oscilloscopes are the only ones on the market to employ a digital-feedback sampling scheme, thus eliminating the need for a dot-response adjustment. Price: \$42,800.

**Reader Service #216**

## **FREQUENCY PRODUCTS SAA7177-10 Microwave Amplifier**

As part of Frequency Products' C-band amplifier subassembly system, this 10-watt gallium arsenide field effect transistor [GaAs FET] power amplifier was developed for saturated mode FM microwave communication transmitters. It has seven stages of amplification, providing roughly 41 dB maximum gain. GaAs FETs are used throughout, with the first six stages single-ended, operating in a Class A mode. The output stage is derived from two identical devices combined in a 90-degree hybrid configuration that incorporates an internal load to capture reflected power. The amplifier operates from a single positive power source of +12 VDC. Also provided: an external DC to DC converter, operating from a -48 VDC supply. Other specifications: frequency

range 7.1-7.7GHz, output 10 watts (+40 dbm), gain of 41 dB, VSWR 1.5:1, NF 6 db, Harmonics -45 dbc, and DC voltage of +12 or -24V (-48V office battery). Price: \$5,200 in quantities of one to four.

**Reader Service #217**

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

According to Panasonic, chroma-enhancement circuitry enables the TBC-200 to minimize signal loss over multi-generations. Besides being able to transcode NTSC and Y/C 3.58 (S-VHS) into NTSC, Y/C 3.58 or Y/R-Y, B-Y, the system has a 16-line correction window, horizontal and vertical Y/C delay adjustments, frame-editing capability with consistent horizontal position, and QIW circuitry for stable pictures in jog/shuttle modes.

**Reader Service #218**



**FLUKE PM 3355 and PM 3375 DSO Oscilloscopes**

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

**Reader Service #219**

**RF TECHNOLOGY RF-FOM-13L  
Fiberoptic Link System**

This new system, based on a 1300 nm laser, can transmit video and four audio channels over 35 miles. It also includes diagnostics, alarms, and test waveforms. 70 MHz injection, repetition or output allows the 13L to be used as a spur from an existing heterodyne microwave backbone system.

**Reader Service #220**

**AMERITRON AL-82 Amplifier**

The AL-82 uses two 3-500Z transmitting tubes, and has an 1800-watt hypersil transformer to drive the tubes to their maximum output. Two illuminated meters are featured: One gives a constant reading of grid current; the other displays plate voltage and current, peak RF output power, and drive power/ALC. The unit has heavy-duty rectifiers in a full wave bridge supply with computer-grade capacitors. Two bias settings allow either RTTY and CW operation at 1500 watts of continuous output at nearly 70 percent plate efficiency, or low distortion 1500-watt PEO SSB, SSTV, or AM output. The Pi-L tank circuit permits full impedance matching over the entire 160-meter band. The AL-82 covers 160, 80, 40, 20 and 15 meters, and gives 80 percent rated output on 12 and 17 meters. Price: \$1,995.

**Reader Service #221**

**FLUKE PM 5781  
Programmable Pulse  
Generator**

The PM 5781 has a frequency range of 0.1 MHz to 125 MHz with an extendible range to .025 mHz and individually programmable rise and fall times from 2 ns to 100 ms. There are

two outputs for positive and negative going pulses, with independent dc offset control on the second channel output, and a third, switchable TTL/ECL level output. Because of internal 50 ohm back-matching terminations, the generator provides clean pulses even with mismatched loads, according to the company. The system's

microprocessor control includes a track mode to maintain a programmable fixed relationship between specified pulse parameters; output can be inhibited until all parameters automatically checked for inconsistencies have been defined and validated. Price: \$9585.

**Reader Service #222**



**SCHMID  
TELECOMMUNICATION SIAT  
(Short Internal Audio Testing)  
System**

This fully automated system, conforming to CCITT standards and consisting of the SZ316 Signal Generator, SZ346 Measuring Receiver, and SZ SIAT-NET Software for Network Supervision (optional), can monitor any audio network, completing an entire test sequence in as little as five seconds. SIAT checks frequency response, phase/level difference, total harmonic distortion, crosstalk, noise, channel transposition and intermodulation distortion. If tolerances are not met, the system reports a "No Go," and automatically prints out all measured values, highlighting problem areas.

**Reader Service #223**



**AUDIO-TECHNICA 600 Series Headphones**

Three new headsets are available in this series. All feature large leatherette earpads and wide headbands, newly configured oval earcup cavities, samarium cobalt rare earth magnets, 10-foot cables, and standard one-quarter-inch plugs. The ATH609 features 40-mm drivers, 20-20,000-Hz frequency response and 32 actual impedance. The ATH610 responds well in situations requiring additional isolation and maximum low-end clarity, according to Audio-Technica; it utilizes 44-mm drivers, and it has a 20-22,000-Hz frequency response and 40-ohm actual impedance. The ATH611 features 44-mm drivers, 20-23,000 frequency response, and 40-ohm actual impedance. Prices range from \$49.95 to \$69.95.

**Reader Service #224**



AUDIO-TECHNICA

**PANASONIC AG-520  
Monitor/VCR**

The AG-520 combines a 20-inch monitor with a VCR unit that uses two rotary heads and a helical scanning system. Other features of the AG-520 include internal timer playback with auto repeat, and a variety of special effects playback. Wireless remote is standard. Suggested retail price is \$875.

**Reader Service #225**

**AVITEL Digital Video  
Distribution Amplifier**

This full 10-bit digital DA with re-clocking 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 a remote-control output module assignment selector are also available.

**Reader Service #226**

**PERROTT ENGINEERING LABS  
AC Power Supply**

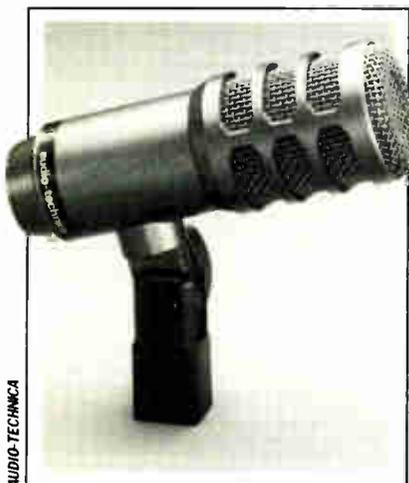
The features of this two-pound, compact, low-noise power supply include 115-bolt AC input, 12-volt DC output, 4-AH amperage, and an on/off switch and indicator lamp. Price: \$415.

**Reader Service #227**

**AUDIO-TECHNICA ATM25  
Microphone**

This wide-range, moving-coil dynamic microphone with a hyper-cardioid pickup pattern features 30-15,000 Hz frequency response, 600 ohm balanced output, and -57.8 dBm sensitivity. According to the company, the mic is well-suited for recording highly dynamic instruments. The narrow acceptance angle of its hyper-cardioid polar pattern allows the mic to focus on a desired sound source, control feedback, provide more flexible microphone-to-instrument working distances, and reject unwanted sound.

**Reader Service #228**



AUDIO-TECHNICA

**PANASONIC PT-200 Color  
Video/Data Projector**

When used with Panasonic's ET-100DS advanced digital scan converter, the PT-200 can reportedly reproduce flicker-free images on a 70- to 120-inch screen, operating at any scan frequency within 15 kHz to 37

kHz horizontally, and 50 Hz to 100 Hz vertically. It will automatically adjust to input signals when driven by any standard IBM PC/XT/AT or IBM PS/2 color graphics or compatible board. The system hooks up with many sources (analog RGB, S-VHS, TTL computer inputs), while its I-Cathode CRT maintains high-emission current

density for smaller spot diameter and sharp outline delineation. The unit has a dual-focus, six-element lens design that employs both glass and polymer components. Optical power: 550 lumens. Horizontal resolution: 1100 lines, RGB; 650 lines, video. Price: \$8000.

**Reader Service #229**

**The LINK  
should be  
in *every*  
ENG/EFP  
truck in  
the country.**

Wouldn't your ENG and EFP be easier if the crews at both ends could communicate as effortlessly as if they were all in the same building? Now, dare to imagine using dial-up phone lines or a cellular phone to connect the two ends.

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## PANASONIC UTP-2 Video Signal Transcoder

The UTP-2 user can transcode signals during editing with no generation loss, according to the company. The system, with a 5.5 MHz (-1 dB) bandwidth and a 60 dB ratio, accepts Y/C 3.58 MHz; Y/688 kHz; Y/R-Y; and linear RGB sync input signals. The transcoded output signals are Y/C 3.58 MHz; Y/688 kHz; Y/R-Y, B-Y; linear RGB sync; and NTSC composite. The unit, 19 inches, rack-mountable and one rack-unit high, lists for \$1950.

**Reader Service #230**

## JVC SA-F911U SMPTE Time Code Reader/Generator

The latest addition to JVC's S-VHS production and post-production equipment line, the SA-F911U uses a nine-pin subminiature D connector to

connect JVC parallel VCRs to RS-422 serial controllers, reading both longitudinal time code from an audio or address track, and vertical interval time code (VITC) on the video track. The unit's window generator allows the codes to be superimposed over the video signal, permitting off-line window dubs. Time code is inserted in the serial data stream for use by the editing controller. VITC can also be inserted into the Y/C 358 video signal for Y/C dubbing.

**Reader Service #231**

## PERROTT ENGINEERING LABS PB 90 Pouch Power Pack

Designed for the user who needs a lightweight belt as a power source, the PB 90 Pouch Pak can run a camera for roughly 90 minutes or a mini-light for about 25 minutes. It fits around a normal belt, is constructed of a synthetic leather-like material,

weighs one pound, and measures 8" by 5" by 1". Price: \$75 (without battery).

**Reader Service #232**

## VINTEN BROADCAST Penguin II Track-mounted Dolly

Vinten says this dolly is lightweight and its swivelling legs permit simple movement through a door when loading equipment. During a shoot, it can be lifted on and off a track, operating on standard-gauge and narrow-gauge track. It can also be run off-track in the studio, and can crab or steer on its studio wheels. The unit will accommodate existing Vinten Classic mountings from the elevation units with cam heads or heavy loads to such fixed columns and cranes as the Dolphin or Merlin. It can be fitted with pneumatic columns like the Midiped or the Osprey.

**Reader Service #233**

## TV STEREO BTSC AURAL MODULATION MONITORS



### TVM-100 AURAL BASEBAND DEMODULATOR/MONITOR

- Mono/Stereo/Multi-Channel Capable
- Digital Peak Frequency Deviation Display
- Split-Sound and Quasi-Parallel Detection Modes



### TVM-200 BTSC STEREO DECODER/MONITOR

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Circle 117 on Reader Service Card.

## HM ELECTRONICS RW760 Interface Unit

The RW760 from HM Electronics is a rack-mountable interface unit that allows HME 700 Series Intercom products to connect to two-wire, non-compatible three-wire, four-wire or telephone intercom systems. The unit has the ability to connect telephone systems to standard three-wire intercom systems, and captures and holds telephone lines. The unit comes with an AC adapter.

**Reader Service #234**

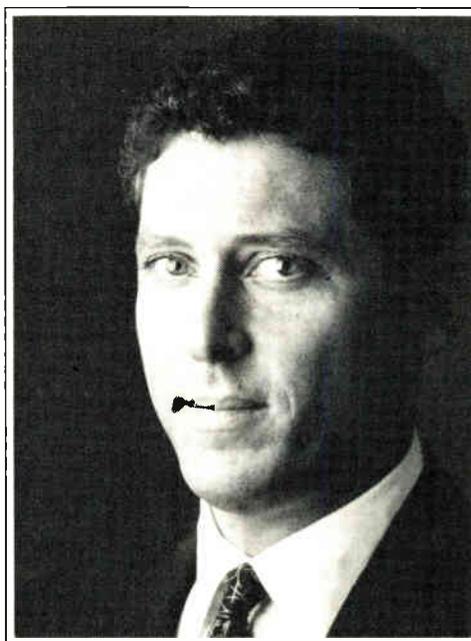
## PANASONIC WJ-MX12 Digital Audio Video Mixer

The WJ-MX12 features 500 lines of resolution and Y/C separation for S-VHS compatibility. A built-in digital frame synchronizer allows easy mixing of NTSC format sources or Y/C video sources such as cameras, VCRs and TV tuners without a time-base corrector, according to the company. Among the available digital effects that can be programmed into the unit's four separate memories: freeze-frame, negative/positive picture reversal, stroboscope, mosaic picture, and paint function. Up to 17 different wipes can be achieved by combining the WJ-MX12's wipe selector buttons, and the three video inputs allow for a number of superimposition effects. The suggested retail price is \$3000.

**Reader Service #235**

# 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**

Every operation, large or small, needs a system that's right for today's demanding applications. Yet designed and engineered to provide solutions for tomorrow. Meet the challenge with a Sony Multi-Cassette System.

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

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# SONY®

BROADCAST PRODUCTS

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Please type ad and clearly indicate where text is to appear in Capital letters and lower case. All bold words must be underlined. There are 8 lines to the inch and approximately 25 CAPITAL and bold letters per line or 32 upper/lower case letters. Rates: \$8 per line (4 line min.), \$10 per line bold type, \$10 border, \$15 screen, \$25 reverse, \$25 blind P.O. box, \$125 per inch display classified (artwork), \$75 Professional Card (2 1/8" x 1"). Logos or display advertising must be camera ready (1 column width: 2 1/8", 2 column widths: 4 1/2", 3 column widths: 7"). Frequency discount rates available. Payment must accompany ad. DEADLINE is the 6th of the month, one month prior to the issue date. Call for more information.

#### Categories Available (check one):

- |   |  |   |
|---|--|---|
| <input type="checkbox"/> Business Opportunities | <input type="checkbox"/> Equipment for Sale        | <input type="checkbox"/> Parts & Accessories    |
| <input type="checkbox"/> Duplication/Conversion | <input type="checkbox"/> Equipment Rental          | <input type="checkbox"/> Services               |
| <input type="checkbox"/> Employment Offered     | <input type="checkbox"/> Equipment Wanted          | <input type="checkbox"/> Teleprompting          |
| <input type="checkbox"/> Employment Wanted      | <input type="checkbox"/> Maintenance & Engineering | <input type="checkbox"/> Training & Instruction |
|   |  | <input type="checkbox"/> Miscellaneous          |

**I am paying by (check one):**  Visa  MasterCard  American Express

Name on Card (Please print) \_\_\_\_\_

Card # \_\_\_\_\_ Expiration Date \_\_\_\_\_

Signature \_\_\_\_\_

Check or Money Order # \_\_\_\_\_ Amount Enclosed \_\_\_\_\_

#### Mail To:

Robin Boyce, Classifieds Manager, ACT III Publishing/Technical Group Classifieds  
6400 Hollis Street, #12, Emeryville, CA 94608  
(415) 653-3307, 1-(800)-747-3703, FAX: (415) 653-5142

Please attach your ad copy on a separate sheet, typed double-spaced or printed clearly.

**24 inputs  
at a  
remarkable  
price.**

*This 24 input switcher  
has all the features  
that people have  
come to expect ...*

*but it's the price  
that has them  
talking.*



model RVS  
**424**

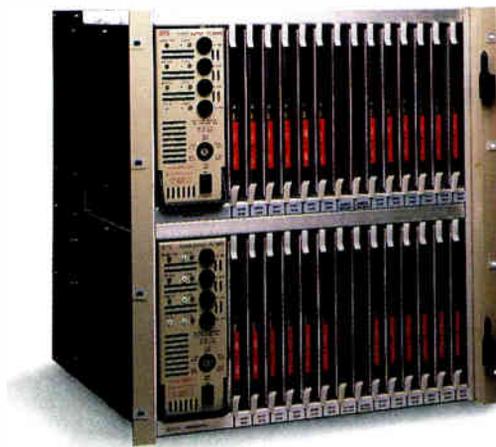
**Featuring:**  
the unequalled  
keying capability  
of the Ross  
Downstream  
Multi-Keyer



For the name of the  
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**ROSS VIDEO LIMITED**  
"The Production Switcher People"

# 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**.

**BTS**  
The name behind  
what's ahead.