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Nation's #1 website targets broadcasters**

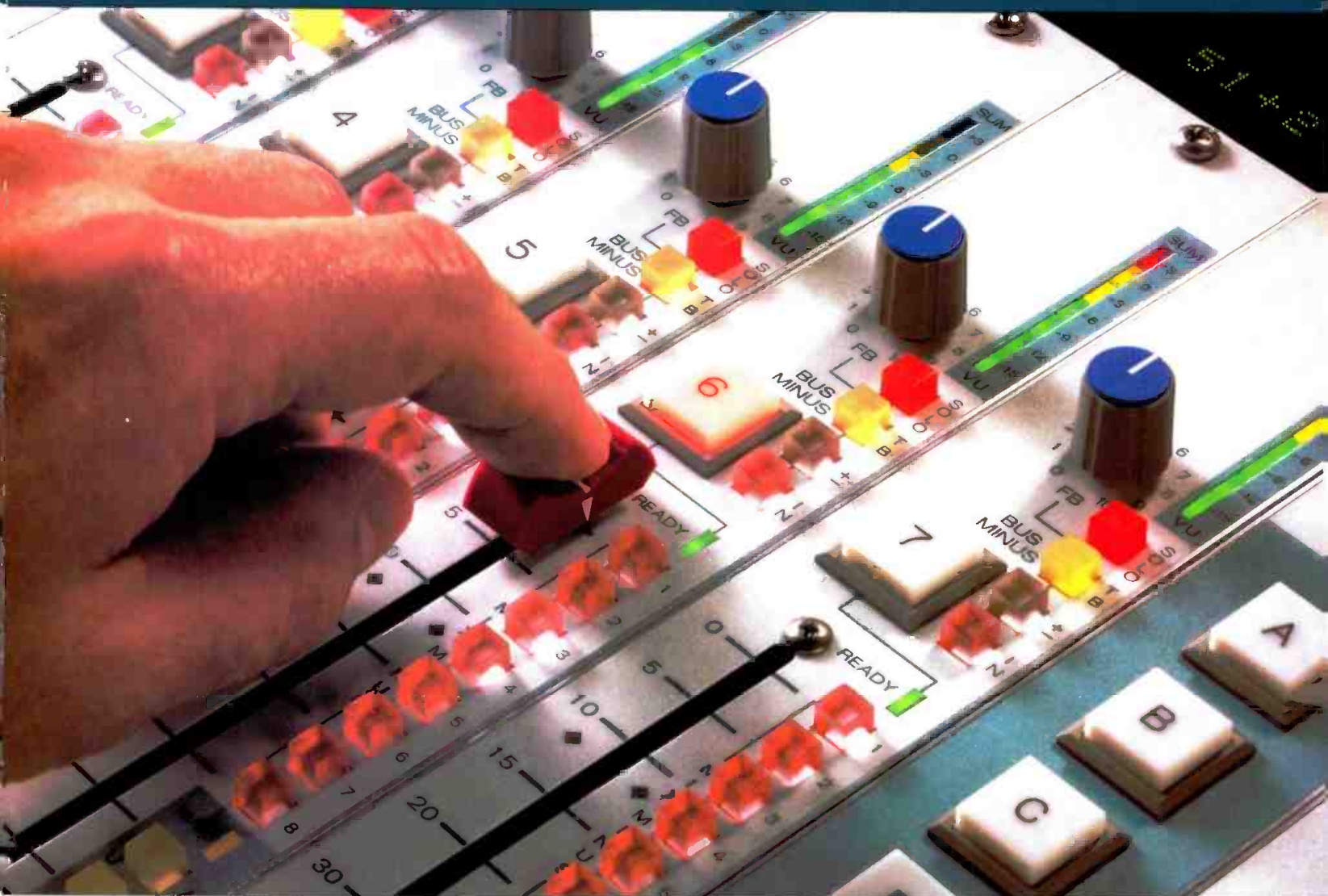


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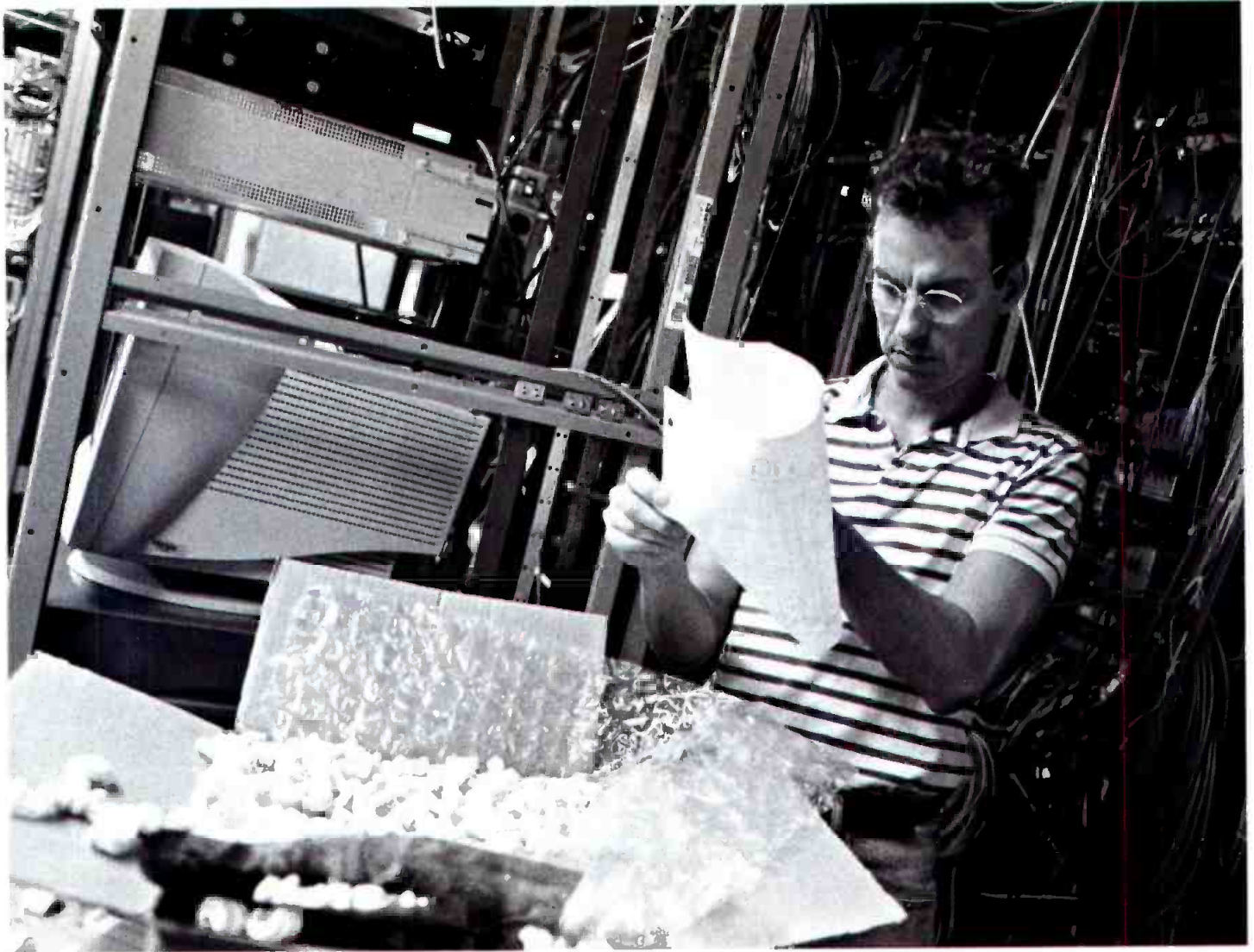
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**MPEG IMX**

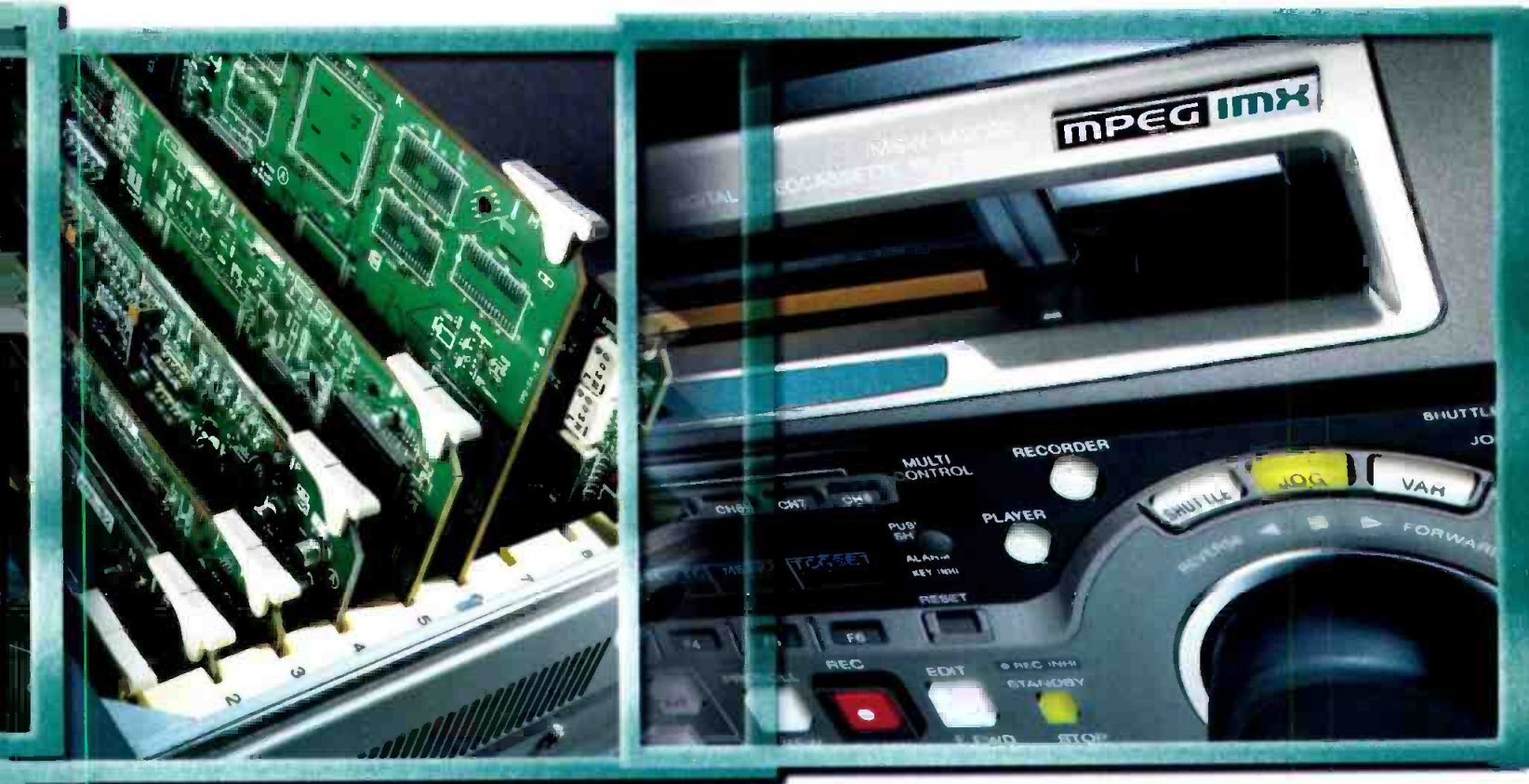


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## IN THIS ISSUE



## Features

### 74 2000 Pick Hits

*By Steve Epstein*

Twenty hand-picked new products our judges chose as among the most innovative and best solutions of the year.

### 84 NAB Wrap-up

*By BE Staff*

From storage to transmission to Web streaming, our team of reporters scoured the floor for the newest trends and products.

### 86 Product Jackpot

*By BE Staff*

New product highlights from the show floor.

### 156 Light compression for transporting contribution-quality HDTV

*By William Zou*

A light touch with compression ensures high-quality video for processing and editing.

## Beyond the Headlines

### NEWS

- 16 Webcasting technology matures
- 24 GPS becomes more accurate
- 26 FCC releases DTV status report

### FCC UPDATE

- 30 "Class A" TV in place

### EXPERT'S CORNER/VENDOR VIEWS

- 32 2GHz band update

## Digital Handbook

### TRANSITION TO DIGITAL

- 40 Routing television signals

### COMPUTERS AND NETWORKS

- 48 Testing video networks

### ASK DR. DIGITAL

- 52 Getting the most from old newsreels

(continued on page 8)



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# Systems Design & Integration

## SYSTEMS DESIGN SHOWCASE

54 EchoStar: A DBS star matures

## TRANSMISSION & DISTRIBUTION

64 Transmission lines for DTV

## PRODUCTION CLIPS

68 Digital compositing: What you need to know

# New Products & Reviews

## APPLIED TECHNOLOGY

162 Lighthouse Digital Systems OZ TDM audio router

## TECHNOLOGY IN TRANSITION

166 Cameras

## BUSINESS WIRE

170 Business highlights from broadcast and production



# Departments

- 10 Editorial
- 12 Reader Feedback
- 194 Classifieds
- 201 Advertisers' index
- 202 EOM

**ON THE COVER:** *Microcast's network and broadcast operations center in Danbury, CT. The company provides Internet video streaming services to TV stations and other media. The artist's rendition of the new facility reflects the convergence of traditional television operations and streaming Internet technologies. A. F. Associates, Inc., Northvale, NJ, provided technical design services for the Microcast project.*

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patrick\_murphy@intertec.com  
913/967-1905 fax

## FREEZE FRAME

A look at the technology that shaped this industry.

### *Hawkeye and two more*

The June 1981 issue of *Broadcast Engineering* highlighted a new camera technology called *Video Recorder/Camera*. The VRC combined a camera with a recorder in a shoulder-mounted package. The RCA version, known as the *Hawkeye*, is shown here. Two other VRCs were shown at that year's NAB convention; name them and their manufacturer.

Note, the suggested price of those VRCs was \$50,000. That's \$93,894 in today's dollars! Correct entries received by July 31 will be eligible for one of the new Broadcast Engineering T-shirts. Send your entry to [brad\\_dick@intertec.com](mailto:brad_dick@intertec.com)





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## It's a virtual world

**W**elcome to my virtual editorial. Because it's virtual, you'll get whatever you want — money, food, new car, vacation. You want red? Fine, it's red. How about green? No problem, it's green. No matter your desire, it's here. You see, it's virtual.

Anybody ill yet?

The word virtual came up a lot while touring the Sands at this year's NAB. Virtual this, virtual that. While we've had virtual sets for several years, now we've got virtual switching, virtual press conferences, even virtual companies. Broadcast knows virtual. We use virtual ads so that viewers see fake (but real-looking) logos at sporting events. For example, the beer signs at the 50-yard line

or the car ad behind the catcher or on the wall in left field? Those can all be virtual. Dan Rather got into trouble over virtual. When CBS decided to electronically erase a competitor's logo from behind him during a broadcast, the line between real and virtual became uncomfortably blurred.

Attendees at NAB could wander the halls encountering one virtual presentation after another. At one booth, I was offered a tour of a virtual switching network. I kept asking questions, but the answers were, well, virtual, I guess. After spending 10 minutes trying to figure out exactly what the guy was trying to sell, I gave up. I left the booth not understanding what it was his company did.

The virtual concept so permeated the Sands that it reminded me of the early differences that distinguished the corporate cultures of the Sands and IVCC. Three years ago, Mark Gray, chairman and CEO of Pluto, coined the phrase "Rust Belt" to typecast the "old" IVCC. While he was joking, that image has stuck in some minds.

Today, it's no longer an "us vs. them" mentality, but it's obvious the Internet, computer, virtual and software-based guys see the world differently than do some of the more traditional vendors. To that I say, "Great." We need different perspectives.

However, when I hear some X or Y-Generation exhibitor tell me the Internet will replace broadcast television by 2003, I want to give him or her a history lesson. Television is 50 years old and with that history comes some wisdom these newbies don't have. They need to be wary about telling others how the world should be. If you've only been around for two years, your perspective is, well, only virtual, not real.

There's always been plenty of not-ready-for-prime-time technology at the NAB convention. Does anyone remember the NEC SR-10 recorder? It stored 34 seconds of video on 1000 chips. 1000 ICs! I dare you to troubleshoot that. Does anyone remember the Dynatec D<sup>2</sup>S<sup>2</sup>? How many examples can you recall?

The point is not to criticize these companies or the products, but to emphasize the importance of being prudent in your selection of technology. After all, your boss probably won't settle for virtual performance when what he really wants is real performance.

Toward that goal, *Broadcast Engineering* can help. Inside you'll find coverage on more than 400 new products from this year's convention. We'll keep the hype to a minimum and focus on the solutions, products — and trends — you need to be familiar with to succeed.

Meanwhile, I wonder if there's a future for virtual editors? No work, real pay. Yeah, that sounds good. Oops. I used the word "real."



Brad Dick, editor

Send comments to:  
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# 14:24:23



Photograph of the WETA TV Washington, D.C. Master Control provided by broadcast designer and integrator, Communications Engineering, Inc. (CEI) Newington, Virginia (www.comeng.com)

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## No love for Kennard

Thank you! Mr. Kennard is no friend to either consumers or broadcasters. As a small broadcasting facility, we have already invested huge sums of capital (yet to be recovered) in digital. The only thing Mr. Kennard has done for us is try to eliminate or reduce our grade B coverage area, make over-the-air DTV the only means of recovering our investment, and turn consumers against broadcasters.

He still demands that we pay monthly rent on our frequency, give away free political ads, provide programming free of charge to the DSS folks and pay taxes.

Maybe, just maybe, he can finalize the death of over-the-air broadcasting and have a controlled, beholden industry that can be operated by the White House!

Thank you for your blunt, but accurate, portrayal of the current political situation.

MIKE SEAVER  
KHQA-TV

Having been in the broadcasting business for 20 years and now the recording industry for another 20, I fully appreciate and understand your frustration.

As a resident of Illinois and a suburb of Chicago, I get to witness firsthand the magnitude of corrupt and stupid government. The picture of Mr. Kennard and the cow is just great. It's hard

to tell who is trying to get who "mooving."

Your description of Kennard sucking up to cable hits the nail on the head. Congratulations for saying it. By the way, you and your staff publish a great magazine.

MIKE KING  
AMERITECH

### *An opposing viewpoint*

A few comments on your March 2000 editorial, "Worshipping cable."

First of all, I know little about FCC Chairman William Kennard. However, after reading your editorial, it appears you have spared nothing to vilify this guy in print. Is such an attack really justified?

Whatever his faults, Kennard is not a politician in the elected sense but an appointee who invariably serves at the pleasure of the "real" politicians in Washington, whom you also despise (fair enough). I think it reasonable to say the FCC abandoned its only legitimate mandate (establishing technical standards) years ago when "marketplace" decision making was introduced to decide the fate of competing systems for AM stereo. Therefore, at this late date, why would you expect leadership and wisdom regarding complex engineering questions about digital television to flow from these same offices?

Money and politics are what wags this dog. According to an editorial in our local paper today (*The Star Ledger*, Newark, NJ), Kennard has angered the broadcast establishment over the issue of "microradio." Kennard favors licensing many new low power radio stations operating at 10- to 100W to permit something other than the lowest common denominator to have access to the public airwaves.

Yet an old reliable red herring (interference) is being trotted out to quash 10W radio stations while the heavy guns of the trade press (*Broadcast Engineering*) are aimed at those regional cable TV systems that have been so

brash as to curry favor at that special interest superstore that once served only ABC, NBC, and CBS.

Instead of attacking the FCC Chairman for not steering enough money into the same old greedy pockets, let's see you criticize those merger-and-acquisition broadcast conglomerates who fill my radio dial with telephone talk, sports talk, celebrity talk, news talk, and a couple of (barely) music stations with computerized playlists that offer the same two dozen songs over and over.

Plenty is wrong with today's electronic medialand. Editorially, you are barely nibbling around the edges.

DON MENNIE  
TECHNICAL EDITOR  
NEW YORK

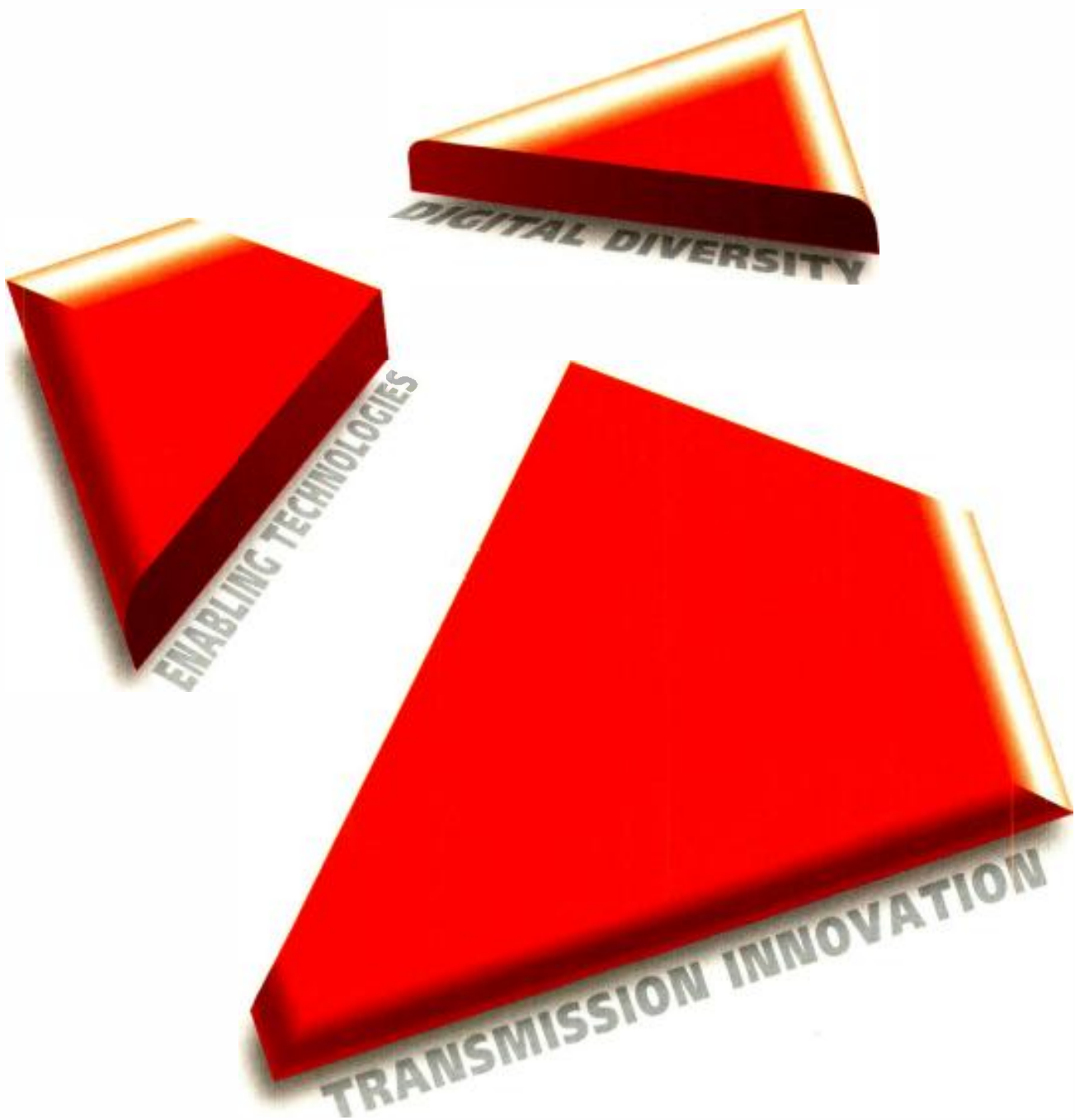
## Recent T-shirt winners

The following readers correctly identified the first of two April FreezeFrame questions. The question focused on Ampex's 1976 demonstration of freeze-frame and slow-motion playback capability on a VPR-1. What was it? The answer, of course, became known as AST, *Automatic Scan Tracking*. No one got the second part – the four manufacturer's showing helical VTRS at the 1976 NAB convention. The answer: Ampex, IVC, Sony and Recortec.

This month's winners:

Tom Cupp, WCYB-TV  
Srinu Murthy, Larcana Canada  
Don Rhodes, University of Arizona  
Len Griffin, WNJU-TV  
Jay Blair  
Don Norwood  
Karl Sargent,  
California Oregon Broadcasting  
Scott Xenophon,  
ABC News/Washington

To win your own *Broadcast Engineering* T-shirt, answer the question on page 8. Send your answer to [brad\\_dick@intertec.com](mailto:brad_dick@intertec.com).



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structure must also be able to handle changing demands three to five years later with little appreciable loss in quality. Berg notes webcasting facilities share common elements with digital television facilities. For example, Microcast's plant includes a transmission operation center, a broadcast operation center and a master control room.

Microcast's master control center combines its network operation center with quality control for program acquisition in a touchscreen environment. Equipment commonly found in large television centers, such as servers with terabytes of capacity, high-speed data networks and large databases, are standard pieces of equipment in webcasting facilities. Berg says webcasting, unlike traditional broadcasting, will likely see bandwidth restrictions disappear, forcing system integrators to consider future requirements.

Expect video quality to improve as the technology matures, just as advances in camera technology have improved picture quality for broadcast television. Webcasting is also one more way broadcasters can deliver viewers to potential advertisers, Berg said.

With the adoption of "edge technology," large servers in the range of two or more terabytes are strategically located around the world. This makes it unnecessary to tie up the entire Internet over long distances when it is determined that multiple users want specific information on an ongoing

## Perhaps the best example of what is possible with webcasting can be observed on Yahoo's FinanceVision.

basis. It can be deposited into a POP server in the local area.

Tom Gershaw, senior business development manager at Microsoft, has been working toward solutions to the Internet bandwidth problems. Gershaw said: "You just can't get good video on a dial-up 56k modem. With 300- to 700kb/s, using MPEG-4, we've gotten some fairly good re-

sults. We need to create an ecosystem that will either replace or supplement today's Internet so we can deliver much more rich content. One way of making the Internet more efficient is

began webcasting in mid-March, from its world headquarters in Santa Clara, CA. The service's facilities, located on the Yahoo campus, are reminiscent of a news depart-



Yahoo's FinanceVision broadcast facilities are similar to many smaller market television stations. The center includes a production suite, a news studio and a master control room shown here.

through the use of edge technology where local caching of material is done, thereby placing the emphasis on being 'content specific' rather than 'destination specific'."

Gershaw concluded by saying: "I see three steps in achieving our goals. First is the edge technology. That is working with content delivery networks to cache the content on local servers near the users, as mentioned. Second is a digital means of main-

taining control of the content ownership through a digital rights solution, like the encryption built into Windows Media. And

thirdly, we need the tools to allow content users to develop business models for such things as pay per view (PPV) and pay per download (PPD), so they can take advantage of the ubiquity of the Internet."

Perhaps the best example of what is possible with webcasting can be observed on Yahoo's FinanceVision ([www.financevision.yahoo.com](http://www.financevision.yahoo.com))

ment at many local television stations.

Yahoo has converted several rooms for the purpose of webcasting. One is a studio, where the T-bar ceiling has been removed and replaced with Videsence lights. Equipped with three Sony cameras on tripods, a typical news anchor desk arrangement, microphones and the ever familiar "On Air" light, it appeared to be business as usual, as it would be in most any news studio.

The second room, the control room, is typical of any small-market television control room that would be used for a newscast. Gathered in this hub of the neophyte financial news television facility were the producer, cutting and pasting stories on the fly; the director, who was also the technical director, an audio person and several others, assisting in the eight-hour weekday operation. Like many other broadcast stations, commercials were fed from a storage device similar to a video server. However, the commercials are stored in AVI format with MPEG compression, not video.

Another room was set up as a typical



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## **Tom Lookabaugh**

*President, DiviCom*

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## **Tony Ley**

*CEO, Harmonic*

"People around the world are demanding better and easier ways to communicate. Access to information is changing the way we live. Harmonic and DiviCom are joining forces to enable this new era in broadband communications.

Whatever the network, Harmonic will work with operators to build the infrastructure that makes the information age possible. And we will deliver the best technology and customer support the industry has to offer.

I look forward to service providers embracing our new company. Our customers can continue to expect the world-class broadband solutions they need to bring new services to market faster."

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production/edit suite, complete with an Avid editor. Sharing the same room was the final link to the outside world. To this point there is no reason why any broadcast engineer would have a problem using the feed from the control room for air. The pictures are good-quality analog composite signals that feed a Windows Media Encoder for 300k/100k and 56k streams, which sends everything out over the Internet.

Jon Orlin, supervising producer at Yahoo, said, "Although our pictures on the Internet are not as good, today, as broadcast quality, give us the time and we'll achieve that level."

Orlin pointed out that unlike typical broadcasting that reaches a single market, Yahoo's FinanceVision typically gets e-mail from all over the world. While most business offices lack a television, most are connected to the Internet — and at higher data rates.

Another webcasting player is a Sacramento, CA, company called PSMG ([www.psmg.net](http://www.psmg.net)). PSMG spokesperson



**Yahoo's FinanceVision webcasts are compressed by a Windows Media Encoder for either 300K/100K or 56K modem speeds. The service offers stock market and other financial news updates every half-hour.**

content.

Barker says using Play's GlobeCaster as a production tool makes a 56K experience, live or on-demand, fairly compelling. But it is not quite the television-like experience you can get at 300K. Until DSL, cable modems and other broadband connections are readily available throughout the world, content producers and broadband networks will be going through a tremendous learning curve, figuring out what

into four sections. The top section, which was less than five percent of the total screen area, was the only area that had any movement to it at all. This is where one could see the speakers and activity at NCTA. These pictures could be compared to an old 15th generation quad-tape recording. It was difficult to read print or graphic material, and although you could tell who the people were, the color and quality was smeared. Significantly better video is available on other websites.

It's obvious that there are varying degrees of picture quality on the Internet sources. Many are the old familiar postage-stamp-size, jerky pictures we are all too familiar with. However there are some significant improvements to the picture quality on some Web pages. It would seem that the key to success was keeping the detail and motion in the picture to a minimum: slow-moving cartoons look much better than fast pans of a football stadium.

The Cable 2000 show, last month in New Orleans, had a familiar ring to it. Web companies were in proliferation there as well. There were more announcements made with respect to Internet, webcasting and streaming video at Cable 2000 than at the NAB2000 a month earlier.

For example, Multicast ISP introduced a new data approach to broadband Internet Protocol (IP) that allows satellite, cable and wireless operators to cost-effectively deliver high-speed data, and Internet video and audio to users.

The key to Multicast ISP's approach is in the way it bypasses the frequently congested terrestrial Internet and more

## Microsoft's Tom Gershaw defines long-form as anything over six minutes or so.

Jeff Barker says: "PSMG is essentially a 'one-stop shop' for people, companies and organizations who wish to broadcast on the Internet. We help clients eliminate many of the technical and financial hurdles of Internet broadcasting, making it possible for nearly anyone to take advantage of this new medium."

PSMG services include production technology, bandwidth, edge-of-the-network content distribution, content syndication, viewer and traffic aggregation, advertising, e-commerce, and other Internet and broadband broadcasting services. Its clients include Play-TV, KRON, Yahoo! and Pseudo.

PSMG is different from virtually every other company in the streaming media industry. Where most offer some sort of streaming media product or service, PSMG offers essential components and provides its clients with what they need to create and distribute

works in this new medium and building their brand. "It's only a matter of time before we all can enjoy high-quality Internet broadcasting," Barker said.

Akamia Technologies transmitted interactive webcast originating from the National Cable Television Association's (NCTA) annual convention in New Orleans last month. The moderator was Maggie Wilderotter, CEO of Wink Communications. The participants were Steve Ballmer, chief executive officer of Microsoft; George Bell, president and chief executive officer of excite@home; and Bob Pittman, president and CEO of AOL.

The presentation quality wasn't high. More than 65 percent of the screen was dedicated to inanimate graphics, statements and an occasional Q&A display. The remainder of the screen consisted of a strip along the right side that was divided

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efficiently delivers real-time Internet streaming content to Internet Service Providers (ISPs), cable modem-enabled systems, DSL providers, colleges/universities and corporations throughout North America, Mexico and Central America. Multicast ISP has entered into an agreement with Yahoo! to provide Multicast ISP subscribers throughout North America with access to select multicast audio and video programming from Yahoo! Broadcast.

More information on Multicast ISP, Inc. is available at [www.multicastisp.com](http://www.multicastisp.com).

Hardly a month has passed since the California-based chipmaker, Intel, announced it would begin hosting data broadcasts, the latest in its efforts to get into the services business. This will originate from its newly created Internet Media Services group and will be marketed to companies interested in live or taped coverage of stockholder meetings, training courses or other

events that could be sent over the Web. Intel will sell its services directly to potential webcasters as well as to ISPs that want to offer the services to their own customer bases.

Intel joins a well-established ring of Web event streamers such as Yahoo, Akamai, RealNetworks and even Microsoft. Intel sees big bucks in the future of media and broadcasting services and, understandably, wants to be part of what is expected to become a \$2.5 billion industry within five years. Most industry analysts spoken to view the hosting of private streams "for hire" as a strong revenue generator.

According to Mike Witteman, Intel's director of service technology, Intel plans to invest upwards of \$200 million into the project to set up broadcasting centers both here in the U.S. and in Europe. Waiting in the wings for the services to begin are customers such as Radio Networks, Nasdaq.com and Golf Magazine. The company will also team with DoubleClick to incorporate advertisement into broadcast streams, he said.

Much like the format differences in digital television, there are a few in webcasting as well. Intel supports the streaming formats of RealNetworks and Microsoft and will add support for Apple's QuickTime technology by the end of the year.

None of those spoken to about the convergence say the technology is ready, but that only makes them try harder. Both the broadcast and Internet industries are based on sound and proven engineering principles. Webcasting is looking more like broadcasting's stepchild and a way for digital TV to circumvent some of the problems in dealing with the cable industry's inability to get its collective act together with a standard for a set-top box (STB).

Microsoft's Gershaw doesn't see people sitting at a computer to watch "long-form" television, but he does see applications similar to those Yahoo is implementing. Gershaw defines long-form as anything over six minutes or so. Interstitial programming, by its nature, is used to fill between long-form programs. It seems a natural fit.

There are two issues lurking in the wings, both of which could impact

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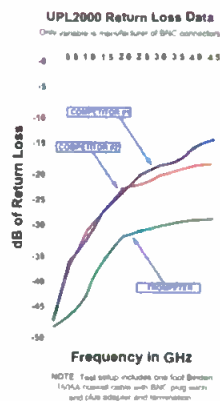
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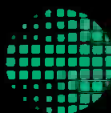
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everyone's life in a big way. First, the industry must address copyright issues. There is no question that the intellectual property rights of inventors, authors and artists must be protected. However, proposed-protection schemes fall far short of providing adequate protection.

The other issue is encryption. Encryption goes hand-in-hand with conditional access (CA).

While new encryption schemes are

announced with some frequency, none have been proven to be bulletproof.

Some firms, AT&T for example, have invested a great deal of money acquiring poorly performing systems in an effort to be able to deliver webcasts, streaming video and other Internet services through the cable world's infrastructure. Some sources say that they've paid as much as \$4000/customer in stepping up to bat. ■

## Who has the tallest?

The antenna, that essential last link in the broadcast chain, has been compared to a porcupine on aluminum steroids. Records have been kept on the tallest antennas on mountains and manmade structures.

Records over the past few years have been broken several times. It wasn't too long ago when New York's Empire State Building held the record, but that was dashed by the World Trade Center in lower Manhattan and now the Sears Tower in Chicago.

Chicago will soon be home to the world's tallest building-mounted broadcast antenna. The Sears Tower in the Windy City is adding 22 feet to one of its two digital television antennas to create the world's highest broadcast antenna atop a building at 1729 feet. The new antenna will be more than a foot taller than the one atop the World Trade Center in New York City.

Officials at the Sears Tower say the potential record is merely a coincidence. The new antenna has room for three antennas capable of transmitting signals for high-definition television.

The extension would give the Sears Tower the record for the highest antenna, the highest roof (1450 feet) and highest occupied floor (1431 feet), according to categories established by the Pennsylvania-based Council on Tall Buildings and Urban Habitat (COTBUH). The Sears Tower held the title of tallest building from 1973 until 1996, when Petronas Twin Towers in Kuala Lumpur, Malaysia, surpassed it at 1483 feet.

Chicago will most likely regain the title with the addition of a 112-story building that was scheduled to begin construction in early May. European American Realty, the project's developer, has been negotiating with a group of television stations that want to lease antenna space to broadcast digital signals. The structure is a total of 2000 feet high, if the two new 450-foot antennas are added in, but COTBUH says they can't be figured in the official calculations for the world's tallest building. The additional antennas will go a long way toward solving a pressing need for facilities for broadcasting high-definition television signals in the nation's

---

## GPS becomes more accurate

On May 1, the U.S. military ceased scrambling consumer satellite signals, a move that will make Global Positioning Satellites 10 times more accurate. Broadcasters in particular will benefit from the increased accuracy in determining frequency.

The GPS system is a product of reliable atomic clocks similar to those used by the National Bureau of Standards and many of the broadcast networks. The system is able to calculate position, velocity and time of any location under any condition.

Prior to May 1, artificial errors were intentionally introduced into the satellites' signals for national security reasons, giving the military a far more accurate system. Previously, a GPS-based navigation could give locations only within 100 yards. The signal change will reduce inaccuracies and possibly lead to greater consumer confidence in the devices.

The possibilities for increased commercial use include telecommunications, electronic data transfer, emergency response, aviation, marine navigation, construction and recreation. The most pertinent application for broadcasters is the use of determining accurate frequencies of their transmitters. This is especially true and important to those newer digital facilities that are adjacent-channel to other broadcast services and those using the GPS system to lock their transmitter's frequency to it.

"In addition to more accurate position information, the accuracy of the

time data broadcast by GPS will improve to within 40 billionths of a second. Such precision may encourage adoption of GPS as a preferred means of acquiring Universal Coordinated Time (UCT) and for synchronizing everything from electrical power grids to telecommunications networks to the Internet. For example, with higher precision timing, a company can stream more data through a fiber optic cable by tightening the space between data packets. Using GPS to accomplish this is far less costly than maintaining private atomic clock equipment."

The accuracy of GPS will exceed the resolution of U.S. Geological Survey topographical quad maps. Broadcasters, consulting engineers and others in electronic communications have been using quad maps for years to determine position and coverages emanating from antenna arrays. In checking the FCC database, many of the latitudes and longitudes filed for transmitter locations have shown these facilities to be not only off by a few yards but in some cases by miles. This improvement to the already good positioning devices will go a long way in eliminating these errors.

Electronic newsgathering (ENG) crews responding to a crisis or story will be able to determine what side of the highway they must respond to, saving precious minutes. This is especially true when dealing with limited-access highways. ■

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In addition to the 86X, the company also introduced the widest ENG lens ever (with the first angle of view over 100 degrees); the first HD lens to incorporate Canon's advanced xs technology, 16 HDxs; and the most advanced and useful digital lens technology ever, Digital Drive. Plus, for cinematographers, the company introduced the first ever film-style HD-EC lenses.

That's an impressive lists of firsts. But it's nothing new, considering that Canon was the first to introduce Internal Focus technology;

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third largest market.

The highest antenna for a full-power broadcast television station, according to John Morgan at the FCC, belongs to KBDI-TV, located on top of Squaw Mountain in Clearcreek County, CO, serving the city of Broomfield.

KBDI's Chief Engineer, Dave Cox said, "KBDI signed on the air in 1980. We are the highest full-power broadcast TV station in the U.S. at 11,476 feet above sea level. In contrast, I believe we probably have the shortest tower at 25 feet." ■

## FCC releases DTV status report

The FCC has defined a successful transition to digital as a 70 percent penetration by 2006. In tracking the progress of stations in meeting that deadline, both the NAB and the FCC have issued progress reports.

Keeping track of the progress of digital television stations applying for construction permits and turn on dates can be an indication of the progress in the transition to digital. It can be

difficult to come up with accurate figures. The National Association of Broadcasters shows a list of digital stations in operation by market size on its web page; however, there are inaccuracies in that list.

According to the NAB, as of May 2nd, there were 127 stations in 49 markets on the air. Although that sounds good, this is less than eight percent of all the full-power television stations in the U.S. However, the NAB site is dependent upon stations reporting their DTV status.

The FCC's figures in late April are an interesting comparison. In the FCC's summary of DTV applications filed for all markets: "1485 TV stations (87 percent) have filed DTV construction permit applications.

"Two hundred and twenty educational TV stations have filed applications and 46 have been granted construction permits (CP)." Educational television station filings for CPs were all due no later than May 1, 2000. The FCC has not finalized its numbers, so it is not possible to accurately report the final total filings for the educational stations.

A total of 411 stations have been granted DTV CPs. Ninety-nine stations are on the air with full facilities and 29 others are on the air with special or experimental DTV authority. The remaining applications are awaiting additional information such as Mexican, Canadian or other clearances or are the non-checklist or maximization type. The FCC says these remaining applications "are currently being processed in proper priority order."

All of the top 10 markets have at least one full-facility DTV station on the air. In the 11th through 30th markets, 78 out of 79 stations have filed applications. Construction permits have been granted to 72 stations and three others have been granted STAs to operate while action on their applications is pending. A total of 47 stations are on the air with full facilities and 29 had been granted extensions until May 1 to go on the air. For additional information, see the FCC web page at [www.fcc.gov](http://www.fcc.gov). ■



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## “Class A” TV in place

BY HARRY MARTIN

Consistent with the Community Broadcasters Protection Act of 1999 (CBPA), the Commission has issued new rules limiting Class A low-power television status to those LPTV licensees who applied for the new primary status by Jan. 28, 2000. To receive Class A status, stations must have broadcast a minimum of 18 hours daily, broadcast on average three hours of locally produced programming per week and met the Commission's LPTV station requirement in the 90 days preceding the enactment of CBPA.

The Commission predicts that more than one-third of the approximately 1700 LPTV licensees who met the deadline will fail to satisfy its strict reading of the statute. The Commission will not accept Class A applications on an ongoing basis because the CBPA was not intended to create an “open-ended class of potential Class A stations.” The Commission included a provision in its new rules under which it can grant Class A status to an otherwise unqualified applicant. Exceptions can be made where deviation from the strict criteria is insignificant or where compelling circumstances, such as a natural disaster or interference conflict that forced the station off the air during the 90-day eligibility period, mandate deviation.

The Commission will protect the service area of each LPTV station that submitted a certification of eligibility until it accepts or denies that station's Class A application. Qualified LPTV stations have six months from the effective date of the new rules to file an

application for a Class A license. The new rules became effective on June 9. Once an applicant is granted Class A status it is subject to most of the operating requirements for a full-power station, including children's television, EAS, political programming and maintaining public files. It is also subject to station identification rules and requirements.

Full-service analog TV stations must protect Class A stations, which are restricted for now to current LPTV maximum power levels.

Initially, the Commission proposed that Class A stations must protect only full-service stations transmitting in analog format and those authorized to construct facilities capable of transmitting an analog signal. Pending applications would not have been protected. In light of broadcasters' comments, the Commission expanded interference protection to include full-service and new DTV station applications that were on file on Nov. 29, 1999, which had completed all processing short of grant necessary to provide a reasonably ascertainable Grade B contour. The Commission also extended the interference protection to identified successful applicants.

Applicants for initial Class A authorization are not required to protect pending rulemaking petitions for new or modified NTSC channel allotments or new DTV authorizations. Full-service applications that were not accepted for filing by Nov. 29, 1999, including most pending television freeze waiver applications, are also not required to be protected.

Class A stations need to allow for maximization on DTV channels but only where maximization was applied for or where maximization applications were filed by May 1, 2000. DTV allotment adjustments, including channel changes, may be made later if necessary to resolve technical problems that impede rep-

lication and maximization.

Finally, the new rules require Class A stations to provide interference protection to existing LPTV and TV translator stations. The Commission intends to initiate a separate proceeding seeking comment on whether translators can qualify for primary service.

### New RF rules apply on Sept. 1

By Sept. 1, all stations must be in compliance with the FCC's 1996 RF safety limits.

In 1996, the FCC adopted new safety limits for human exposure to radio frequency (RF) radiation. Since October 1997, applicants for new authorizations and renewals have had to certify compliance with the new rules. Now, all remaining existing stations must bring their stations into compliance with the new limits or file a formal Environmental Assessment notifying the FCC of any noncompliance by Sept. 1, 2000. It is the responsibility of each licensee, not tower owners, to evaluate RF radiation levels at a tower site and file an Environmental Assessment if required. The FCC will review Environmental Assessments to determine if radiation levels should be reduced or eliminated. Stations that are in compliance but have not sought a renewal or other permit or license since October 1997 do not need to file anything by the Sept. 1 compliance deadline.

The new RF radiation exposure rules define two types of environments. Uncontrolled environments are those open to the public. Controlled environments are those restricted to employees doing maintenance or construction. The maximum permissible exposure (MPE) limits for uncontrolled environments are generally five times more stringent than those for controlled environments. ■

*Harry C. Martin is an attorney with Fletcher, Heald & Hildreth PLC, Arlington, VA.*



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### Dateline

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## 2GHz band update

BY JIM SALADIN, SENIOR ASSOCIATE EDITOR

In addition to whatever other transitions you might be making around your facility, the FCC's decision on reallocation of the bottom of the 2GHz band is due at any time. Pending since 1997, the reallocation affects ENG links and forces broadcasters to reconfigure, at best, their ENG equipment.

It is difficult for most to weed through the FCC's legalese in order to

understand exactly what's happening and how it will affect the everyday operations of a station. Indeed, as much as any other question I've posed to experts across the broadcast industry, responses to this month's question have run toward, "I'm not the guy to ask about this." If they don't know where the reallocation stands, how are you supposed to?

The right guys to talk to, David

Thomas, vice president of NuComm, and Dane Ericksen, chairman of the SBE's FCC Liaison Committee, offer their guidance on: What is the status of the 2GHz band change and what should stations be doing now to prepare for the coming changes? ■



Send questions and comments to: [jim\\_saladin@intertec.com](mailto:jim_saladin@intertec.com)

The current status of the 2GHz "BAS" band, Docket 95-18, is that it's still held up at the FCC. There have been some recent leaks that the new band configuration will be seven 14.5MHz channels. It is certainly

good news if this becomes reality. The directive to 14.5MHz channels is a far better

### **VENDOR**

David O. Thomas, NuComm

option than the 12MHz channels that have been on the table for the past couple of years.

It appears that the Mobile Satellite Service (MSS) providers are still negotiating with the NAB/FCC for relocation costs (reimbursement) for the current broadcast users. We have been promised an announcement several times since August 1999, but each date has come and gone with no resolution. This is not surprising, as the FCC has been focusing on other issues. However, the MSS folks are supposed to pay broadcasters for the move.

The delay has not only held back broadcast news organizations' investment in new equipment, but has had a negative impact on microwave vendors as well.

When the final announcement is made, broadcasters should be given a reasonable amount of time to convert current radios to the new frequency configuration or to purchase new equipment.

While we sit in this holding pattern, stations should develop a plan to deal with the new band configuration. A number of steps can be taken now to ensure a smooth transition. The lack of such a plan could jeopardize your news operation's competitiveness.

A full inventory of 2GHz equipment should be made. Determine which equipment can be upgraded and which cannot. Radios older than eight or 10 years are probably not upgradeable. However, newer radios using PROM technology for their synthesizers should be. If you're unsure, ask your micro-

on developing your transition plan now, as there will most likely be a flood of moves to do so after the announcement. Having a plan in place before the fact will allow you to react and implement the plan quickly after the announcement is made. This will ensure your stations' edge.

For those who are in the market for new ENG microwave equipment, this could be the opportunity to purchase digital-ready radios. These new radios not only will pass digital signals (COFDM), but use microprocessor technology that allows the operator to

change the frequency plan, deviation and audio levels from a front-panel LCD display

### **A number of steps can be taken now to ensure a smooth transition.**

wave vendor to determine which radios are upgradeable and which are not.

The frequency configuration change will not only impact the frequency plan. It will impact the performance of the radio as well. The deviation and audio levels will require adjustments in both transmitter and receivers as well. In addition, the receiver (portable or central receive) will require a new IF filter. In most cases, upgrades will have to be done at the factory.

The fact that there are some 8000 2GHz transmitters and receivers in the field places greater importance

without returning it to the factory.

For those who are using the 2GHz band for fixed-frequency purposes, you may be asked to move out if frequency congestion is severe for your particular area or market.

One thing is certain: The 2GHz "BAS" band change will happen. Planning now will put your new operation ahead of the competitors by allowing you to get upgrades and purchases done in a timely manner.

*David O. Thomas is vice president of Sales and Marketing for NuComm, Hackettstown, NJ.*

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The FCC decision on the reallocation of the bottom 35MHz of the 2GHz TV Broadcast Auxiliary Services (BAS) band to the Mobile Satellite Services (MSS) will most likely be released by the time you read this article. Electronic News Gathering



## EXPERT

Dane E. Ericksen,  
SBE

Second Report and Order (Second R&O) will only immediately reallocate Channel A1 to MSS; Channel A2 will remain available to broadcasters until such time as MSS can demonstrate an actual need for the remaining 17MHz of spectrum.

Under what is expected to be called Phase I, 18MHz of ENG spectrum will be transferred to MSS. It is expected that MSS will not be allowed to commence operation in the 2008-

to 2017MHz spectrum until TV BAS stations in the top-30 markets have completed conversion to a new band plan that vacates Channel A1. Broadcasters are expected to be allowed to choose, on a market-by-market basis, either six 14.5MHz-wide channels and one 15.0MHz-wide channel, or six 17.0MHz-wide channels. Under Phase II, which may never come to pass, the remaining 17MHz of BAS spectrum would be transferred to MSS. Broadcasters would then be left with one 12.250MHz-wide channel and six 12.125MHz-wide channels.

It is further expected that the R&O will adopt an immediate and mandatory two-year period for negotiating compensation. It is also anticipated that the FCC will clarify that the MSS obligation is to make incumbents (broadcasters) "whole." That is, relocation is not a simply a question of compensation, but rather a requirement that the new technology (MSS) do whatever it takes to provide incumbents with comparable facilities. Although broadcasters can elect to agree to a cash payment in lieu of equivalent facilities, the incumbent is entitled to fully constructed, tested,

authorized, and operational replacement facilities. In other words, it is expected that the FCC will find that the MSS industry's attempt to characterize the FCC policy as simply one of "compensation" is erroneous, and accordingly the MSS arguments regarding depreciated valuation are flawed and irrelevant.

What should broadcasters be doing now? First, make sure that all of your 2GHz TV BAS licenses are fully in order, because it is expected that the ET Docket 95-18 Second R&O will only give an entitlement for facilities of record as of the date the R&O gets published in the Federal Register. Second, start talking now with other stations in your market about whether to select the band plan that gives seven narrower channels or six 17MHz-wide channels. Third, check with the manufacturer(s) of your 2GHz radios regarding the feasibility, time frame and cost of retrofitting existing radios to the new band plan. ■

*Dane E. Ericksen, P.E., CS RTE is chairman of the SBE's FCC Liaison Committee and is a consulting engineer with Hammett & Edison, San Francisco.*

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## Transition to Digital

### Routing television signals

BY MICHAEL ROBIN

The original television concept was remarkably simple. It consisted essentially of three elements: A camera and a microphone, a studio-to-transmitter link (STL), and a visual and aural transmitter. As production became more sophisticated, several cameras and an array of microphones were used. To cater to these new requirements, simple video coaxial switches were used to switch from one video source to another. Call this routing of video signals. This inevitably resulted in temporary loss of vertical sync because of the random switching instant along with the fact that the camera signals were not necessarily synchronous.

A further step in refining television production was the development of vertical interval switching. The primitive coaxial switch was now replaced by an electronic switching array using diode or transistor crosspoints activated at a specific, well-defined instant during the vertical-blanking interval (VBI), e.g. line 10. The result

was smooth and predictable switching. This, of course, required that all signal sources be synchronous.

The next step was the introduction of the production switcher. Here the signal sources could be switched and/or mixed. In addition to requiring syn-

chronous, timed and phased signal sources and various switched signal destinations, required large capacity routing switchers with one or several married audio layers. These switchers had to meet very tight tolerances on such video performance pa-

### Simple digital routing switchers circulate the bit-serial signal as if it were a wideband analog signal.

chronous signal sources, they also had to be timed within a fraction of a microsecond with respect to one another. Color's introduction further refined the source timing requirement by requiring that the relative timing delay between signal sources, as well as the path-length differential of the switcher, be less than one degree at 3.58MHz.

The development of large operating centers consisting of several studios fitted with production switchers, as well as a large number of shared

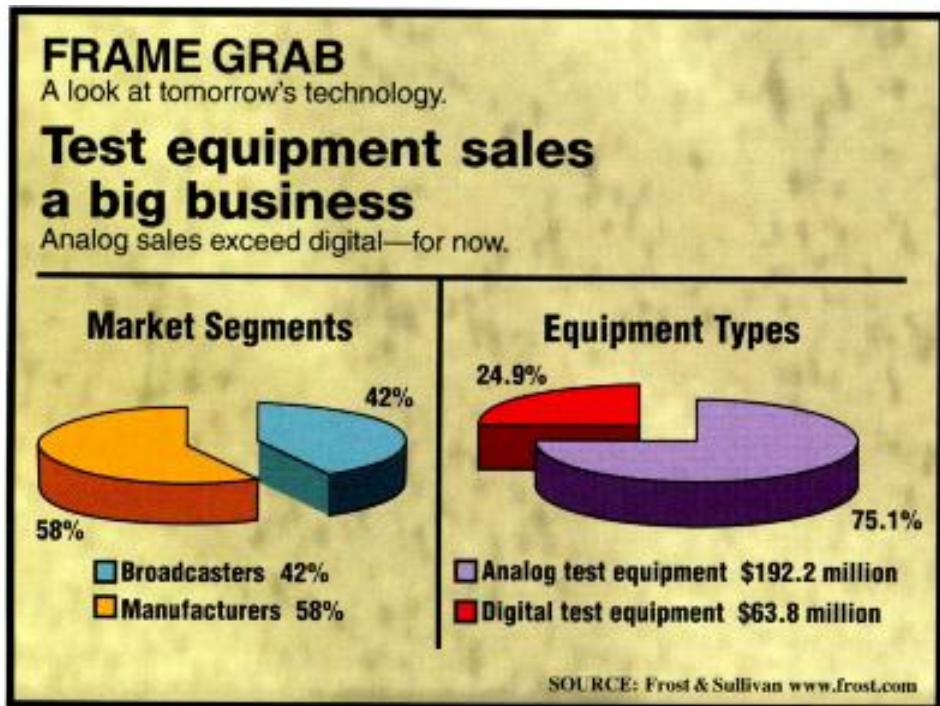
rameters as linear distortions, nonlinear distortions, path-length differentials and noise. The path-length differentials requirement had to be met specifically for signals feeding the inputs of production switchers to permit smooth mixing of various signals. Figure 1 shows a simplified block diagram highlighting the function of an analog NTSC routing switcher in a production center.

#### Digital signal routing

The advent of digital video, with its superior and constant signal quality, spurred the development of production and signal distribution equipment equivalent to that used in analog environments. Early distribution equipment used bit-parallel signal distribution, which was quickly (some 10 years later) replaced with the bit-serial signal distribution. There are many advantages to using this signal distribution method:

- Mature and cost competitive technology;
- Numerous equipment sources; and
- Allowances for embedding audio and other ancillary data, potentially reducing switching layers.

The signal encoding method is known as scrambled NRZI. On the market are a variety of routing switchers operating from 143Mb/s (4fsc NTSC)



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to 1.485Gb/s (HDTV).

There are two main SMPTE documents defining the bit-serial digital data streams: SMPTE 259 and SMPTE 292.

The SMPTE 259 standard defines the SDTV signals. It recognizes four types of bit rates as follows:

- 143.2Mb/s (Composite video NTSC 525/59.94)
- 177Mb/s (Composite video PAL 625/50)
- 270Mb/s (Component video CCIR 601 525/59.94 or 625/50)
- 360Mb/s (Component video 525/59.94 16:9 aspect ratio)

SMPTE 292 defines a bit-serial digital interface common to several HDTV source formats defined in the following SMPTE standards:

- SMPTE 260M, a legacy HDTV format with 1125 total lines per frame, 1035 active lines per frame, 2:1 interlaced with a 30Hz or 30Hz/1.001 (NTSC-friendly) frame rate.
- SMPTE 295M, a European HDTV format with 1250 total lines per frame, 1080 active lines per frame 2:1 interlaced with a 25Hz frame rate.
- SMPTE 274M, a family with 1125 total lines per frame and 1080 active lines per frame.

- SMPTE 296M, an HDTV format with 750 total lines per frame, 720 active lines per frame, progressively scanned with a 60Hz or 60Hz/1.001 (NTSC-friendly) frame rate.

All SMPTE 292M formats are transmitted using the same nominal 1.485Gb/s bit rate or  $1.485/1.001 = 1.4835\text{Gb/s}$  (NTSC-friendly) bit rate. This is obtained by adjusting the total

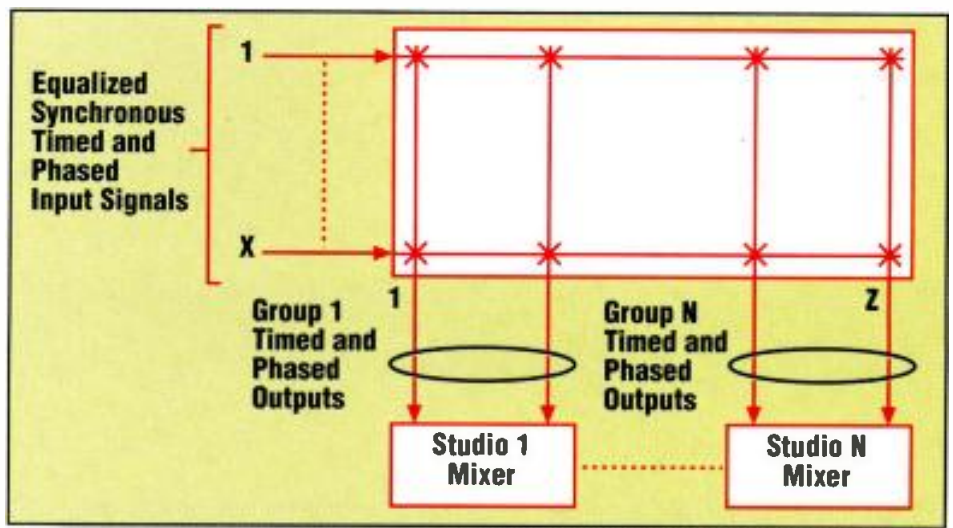


Figure 1. Simplified block diagram of an analog NTSC routing switcher.

lines per frame and words per total line while maintaining the appropriate number of active lines per frame and words per active line.

Figure 2 shows the scrambled NRZI spectrum of the various SDTV and HDTV formats. Using analog concepts, the distortionless transmission of a bit-serial digital signal would

of the switching matrix and output circuitry. This type of switcher passes any type of bit-serial signal (of compatible analog bandwidth) as it is indifferent to the data rate. The signal equalization boosts the high frequencies of the incoming signal with a peak at half the Nyquist frequency, e.g. 135MHz for a 270Mb/s

## Even a synchronous switcher cannot guarantee clickless transitions between audio signals.

require a very wide bandwidth routing switcher. Simple digital routing switchers circulate the bit-serial signal as if it were a wideband analog signal. These switchers usually incorporate an analog-type high-frequency loss equalizer for every input. The signal available at the output suffers from degradations due to the added noise and the limited bandpass

bit-rate signal.

An intermediate type of routing switcher uses analog-type high frequency input equalization and reclocking of output signals. Top-of-the-line digital routing switchers use equalizing reclockers at each input as well as each output. The input reclockers equalize the high-frequency losses caused by long coaxial cables and regenerate the input signals to the original wave shape. The output reclockers eliminate any waveform distortions and noise generated by the internal high-frequency losses of the switching matrix. With high-capacity routers these losses are quite substantial. Both the input and the output reclockers either lock automatically to the input signal or have to be programmed to operate at the selected data rate. As usual, the reclockers eliminate alignment jitter (high-frequency jitter) but pass timing jitter (low-frequency jitter).

Figure 3 shows a conceptual block diagram of an equalizing reclocker.

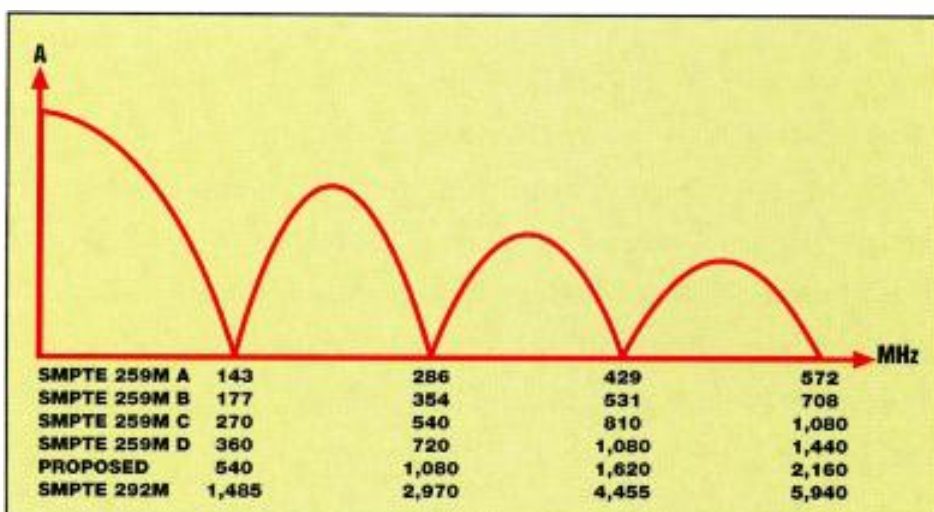


Figure 2. RF spectrum of scrambled NRZI bit-serial signals of various standardized bit rates.

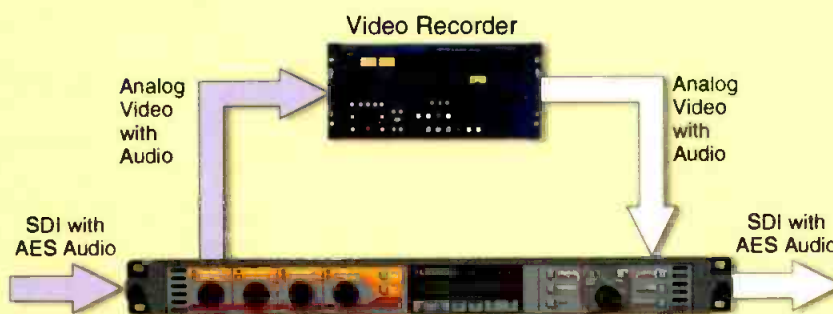


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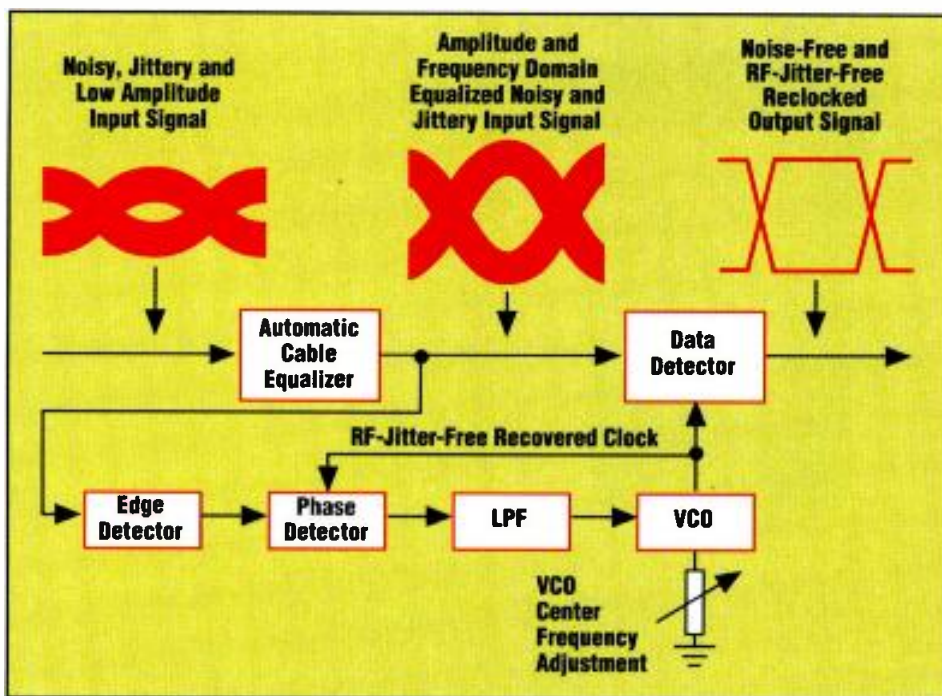


Figure 3. Simplified block diagram of equalizing reclocker and effect on input signal.

The equalizing section, which must be optimized for the specific bit rate, peaks at half the Nyquist rate so the signal amplitude is restored. However, the waveform has slow rise time/decay and looks like a sine wave because the higher harmonics are lost. The next process recovers the clock using a PLL-controlled VCO. The low-pass filter removes high-frequency instabilities of the VCO control signal at the phase detector output and the regenerated clock is noise-free and high-frequency jitter free. It can now be used to sample the incoming digital signal and recreate the original signal. The center frequency of the VCO is preset to obtain a sure lock. Some manufacturers provide an auto-lock VCO allowing the system to automatically adapt to the input bit rate.

Given the wide difference between the SDTV and HDTV bit rates, manufacturers offer several solutions. One solution is a multiformat routing switcher concept featuring a wideband crosspoint array allowing the switching of SDTV and HDTV bit rates, as well as NTSC analog signals in certain switchers. Input and output equalizing reclocking units are either SDTV (143Mb/s to 540Mb/s) or HDTV (optimized for 1.485Gb/s). Another option is the dedicated types of routing switchers for SDTV (bit rates from 143Mb/s to 540Mb/s) and HDTV (1.485Gb/s). Some switchers feature wideband

circuitry with analog equalizing of the inputs while others feature input equalization and output reclocking.

At 270Mb/s, routing switcher input circuits could operate satisfactorily with input coaxial cable lengths between 200 and 300 meters if the receiver uses a reclocker with adaptive cable loss equalization. Slightly longer cable lengths are possible with 143Mb/s and slightly shorter cables are possible with 360Mb/s. At 1.485Gb/s, cable lengths between 50 and 100 meters are possible, depending on the coaxial cable quality.

In all cases, the input signals need only be synchronous and do not need to be timed to extremely tight tolerances as is the case with analog composite signals. This is due to the fact that digital production switchers feature digital frame synchronizers at each input with a timing correction range of  $\pm 0.5H$ . However, routers as well as production switchers require sync reference to control the vertical interval switching.

Ancillary data can be carried in the horizontal- and vertical-blanking interval in specified locations. One of the more popular uses is to carry embedded AES/EBU digital audio data. It is tempting to switch SDI signals with embedded audio, but results have been less than satisfactory. The main problem is that for a smooth and clickless embed-

ded audio switch to take place, the audio and the video sampling frequencies have to be derived from the same master oscillator. In addition, a peculiar five video-frame timing relationship between the video and the audio digital signals has to be maintained for all embedded SDI signal sources. Even if these conditions are met and maintained, audio transitions may occur at a time when a large peak of one polarity in the first audio signal lines up with a peak of the opposite polarity in the other signal. Switching between these signals will produce a sharp transient click. Because of this, even a synchronous switcher cannot guarantee clickless transitions between audio signals. V-fades that make the transition during the silent period are the usual cure. Alternately the AES/EBU signals are carried on separate married digital audio switchers.

In these times of migration from analog to digital technologies, selecting a routing switcher requires a great deal of research. Given the availability of multiformat routing switchers from several manufacturers, the ideal choice would be a multiformat switcher with analog NTSC and digital SDTV/HDTV capabilities using a wideband crosspoint matrix fed by selectable groups of input cards and feeding selectable groups of output cards. Even though more expensive, choose a switcher with output and, if possible, input reclocking circuitry. Good and reliable cliff-effect-free operation is always a sound investment. ■

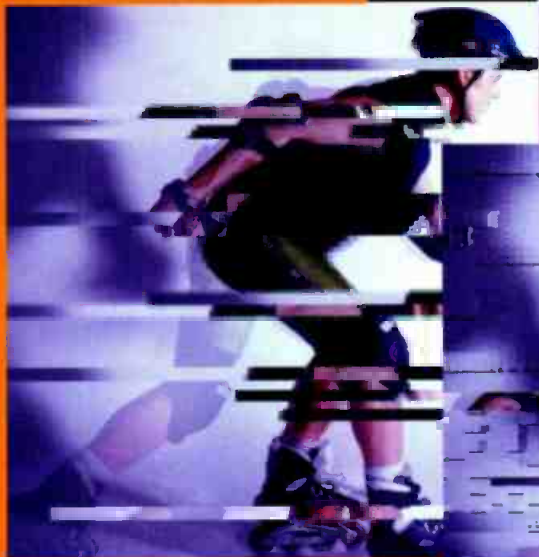
*Michael Robin, former engineer with the Canadian Broadcasting Corp. engineering headquarters, is an independent broadcast consultant located in Montreal Canada. He is co-author of Digital Television Fundamentals, published by McGraw-Hill.*

**SEND** Send questions and comments to: [michael\\_robin@intertec.com](mailto:michael_robin@intertec.com)

Michael Robin's book may be ordered directly from the publisher by calling 800-262-4729. It is also available from several booksellers.



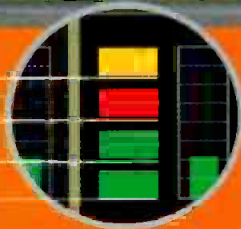
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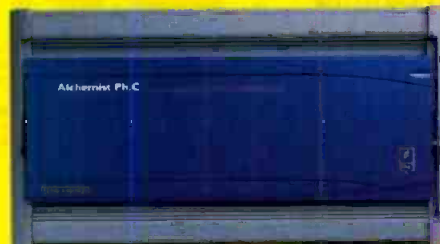
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# Testing video networks

BY BRAD GILMER



As network speeds increase and technical barriers fall, it is becoming more common for broadcasters to move audio and video material through facilities using file transfer across video networks. This month we will briefly look at the difference between file transfer and streaming, and then look at tools for troubleshooting the high-speed computer networks that are finding their way into our facilities.

### Streaming vs. file transfer

Broadcasters are quite familiar with streaming. It is the way we have always moved video from one place to another. A traditional streaming session might go like this: Route VTR-A to VTR-B, press record on VTR-B and play on VTR-A — voila, you are streaming video. Broadcasters have also used a sneaker-net version of video file transfer: Eject the tape from VTR-A. Load the tape into VTR-B” — voila, file transfer. These may not be perfect analogies of streaming and file transfer, but you get the idea. Table 1 compares some attributes of streaming and file transfer.

Broadcast facilities are typically stream-centric; they are built to move content from one place to another using video and audio router technology. Computer network technologies have been making their way into video facilities for several years. Typically, computer networks handle busi-

ness applications, automation, e-mail and so on, while broadcast routers move program content. As the performance of computer networks increases, they are beginning to be used for moving programming as well.

Several high-speed network technologies are available to broadcasters today. It is likely that most high-speed networks are delivered as part of a

tion. However, be aware that the information may be somewhat one sided.

### Testing networks

Testing network performance typically starts with a check of the physical layer for that network. All network architectures rely upon a physical (or RF) connection between devices. These architectures also have sup-

## Broadcast facilities are typically stream-centric; they are built to move content from one place to another using video and audio router technology.

total system. For example, if you buy the Leitch ASC server, it comes with Fibre Channel. If you buy the new Onneon system, you will get IEEE 1394. If you have any one of a number of high-performance graphics systems, you may get Gigabit Ethernet. You may even find that ATM is delivered with some equipment, and no doubt, in the future there will be more networking architectures available. A good source of information on these or any networking technology is the Web. Searching for the name of a technology along with the terms FAQ or white paper almost always returns a wide variety of technical informa-

tion. This is not at all surprising considering that the majority of network problems involve a physical device or connection.

A few years ago, this column stated that one of the most useful troubleshooting tools is the desktop computer. This is still the case. PC network cards are available for all but the most obscure network architectures. Almost all of these cards come with diagnostic utilities that not only test the viability of the card itself but also provide diagnostic tools to check for a link between cards or devices. Also, many of these cards have troubleshooting lights that provide basic information about your network. These lights can save you a lot of time, especially when you are called in to look at a problem and do not have test equipment readily available.

If your high-speed network supports TCP/IP, and many of them do, there are a few commands that may help in isolating the problem. The exact for-

Stream	File Transfer
Bounded Quality	Guaranteed quality
No guaranteed delivery mechanism	Guaranteed delivery
Unidirectional	Bi-Directional
Delivery time pacing (1x, 4x, etc.)	Any desired delivery time (faster or slower than real time)
Push only	Push and Pull
Useful as a "Broadcast" format	Useful to move content from one place to another
Expensive Video Infrastructure	Inexpensive Networked Infrastructure

Table 1: Comparison of various parameters associated with streaming and file transfer.

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mat of the commands differs depending on the computer's operating system. This discussion assumes that you are using an Intel machine running a DOS window in Windows 98. First, find the IP address of another computer on the network that is working normally. Next, go to the computer that is having difficulty, and select Start/Run. Type "Ping [IP address]," where [IP address] is the address of the computer that is working normally. If you see a message that shows reply times, your system is communicating with the other computer. If you see a request timed out message, there is a problem either with the wiring or the driver.

### Testing tools

If the PC-based tools do not help, it may be time to look at some dedicated test equipment to help you resolve the problem. There are many manufacturers that make test equipment for testing unshielded twisted-pair (UTP), coax and fiber optic network cable.

Testing products are available for both wire and fiber applications. Generally manufacturers provide everything from low-end continuity testers to very elaborate test sets with graphical capability, traceable standards measurement and a host of other advanced features. In many cases, the low-end test equipment works just fine and can identify the majority of cable problems.

The MICROSCANNER from MicroTest is an example of such a piece of test equipment. It is small and inexpensive; checks wire continuity and wire configuration; pinpoints opens, shorts, crossed and split pairs; measures wire length; and generates multiple tones for locating cables. Such feature sets are common in pocket test devices. The Photonics LanLite is a product that provides simple power and loss measurement for fiber optic cabling. Such test equipment, while not providing exhaustive testing of the fiber in question, does answer the basic question of whether the fiber will pass a signal.

For more elaborate testing, most manufacturers produce products that run from moderately expensive to

- Use the right wire and connectors.
- Run extra cable. Cable is cheap, installation is expensive.
- Use certified network components.
- Use fiber trays and cabinets to avoid sharp bends.
- Use dust caps on unterminated fiber optic cables.
- Use indicator lights and interface card diagnostic software.
- Learn your computer's operating system.
- Check the Internet for additional technical information.

**Table 2: Some video networking tips to keep you out of trouble.**

downright frightening. As you would expect, features and performance increase accordingly.

The Sיעor OTDR Plus II is an optical time domain reflectometer (OTDR), power meter (reading both absolute and relative power), visual fault locator. OTDRs provide a very accurate graphical depiction on a foot-by-foot basis of the transmission characteristics of the fiber. Time domain reflectometers operate by sending out a very sharp pulse and then listening for reflections. Using time to track the characteristics of the reflections, they plot the performance of the cable. It is sort of like a graphical standing wave

## OTDRs provide a very accurate graphical depiction on a foot-by-foot basis of the transmission characteristics of the fiber.

ratio meter that shows you SWR at any point on the cable. The OTDR coupled with the other functions in this box make it a top-of-the-line piece of test equipment.

If you check the cabling and all seems right with the world, but you still have a problem, then it may be time to bring in the pros. There are a number of networking companies that specialize in troubleshooting broken networks. When they arrive, one of the tools they are likely to employ is a protocol analyzer or sniffer. Sniffers are complex software packages that usually run on common PC platforms. The sniffer allows a trained technician to look at the messages traveling on the network. From these messages, they can tell a lot about what is going on, and they can determine why and where network messages are getting scrambled.

The Fluke Protocol Inspector is one

such analyzer. To give you some idea of the power of these programs, these analyzers typically provide complete seven-layer packet capture, offer decode and filtering capabilities, and show real-time network conversations and health statistics. Many can decode over 150 protocols including TCP/IP, IPX, SNA and

Appletalk, as well as allowing you to filter to just the source and destination addresses, protocols and applications. These specialized programs also provide triggering of analysis based upon certain network events. These powerful tools in the hands of a trained specialist, combined with an advanced network OTDR test set provide sufficient horsepower to decipher even the most challenging network difficulties.

One of the possible sources of network difficulty could be a datastorm. A defective Network Interface Card usually causes a datastorm. The card releases a constant stream of gibberish, blocking all communication on

the network. Such a problem can be difficult to locate in large networks. A sniffer may be the only way to find and fix the offending NIC.

Finally, you might wonder how you ever got along without this last goodie. If you troubleshoot fiber optic cables on a regular basis, you might want to check out the Sיעor SmallTALK fiber communicator. This simple battery operated unit provides two-way radio-like communications across a fiber optic circuit. While not for everyone, if you find yourself in a wiring closet trying to yell to a co-worker down the hall, you will wish for these little boxes and a piece of dark fiber. ■

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*Brad Gilmer is president of Gilmer & Associates. He is also executive director of the AAF Association.*

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## Getting the most from old newsreels

BY STEVE EPSTEIN



I'm getting access to about 125 hours of old newsreel footage (16mm B&W with an audio track). A second audio track will be needed to record a running commentary from our historical expert. I'd like to transfer all this footage to tape and create an easy-to-access stock footage library. I'm also planning on re-purposing it to make short historical shows. I have previously worked with an Avid non-linear editor (NLE) and would like to use one for this project.

My question is what format tape should I store the footage on? I've heard Digital Betacam is great, but expensive, and DVCPRO 100 is untested (I would prefer to only buy one deck). I'd also be interested in storing it on hard drives, but I'd need 2TB and that might be cost prohibitive. What do you suggest?

Michael Addis  
Retrospect Film Archives



Based on the numbers you gave me, that calculates to about 3.5 Mb/s. Both DVCPRO 100 and Digital Betacam record at higher data rates, and both use some form of compression. (Digital Betacam's compression is essentially lossless.) More importantly, both are recording and compressing chroma information. With B&W footage, there is no reason to waste space on color. Also, for preservation reasons, I would be concerned about using compression.

The maximum resolution of a frame of today's 35mm color film negatives is around 4000x4000 pixels, although most current systems only captures 2000x2000. Normally that is captured using three-color channels at about 10

to 12 bits per channel. It is safe to assume that older B&W print stock is no higher. Because you have 16mm B&W, the image size is much smaller (~1/4 the size of a 35mm image) and you only have to capture a single channel (luminance) of information.

You can save each frame as an uncompressed .TIF or .BMP file. These would be individually accessible on any computer. Avid NLE files are generally compressed. You could build the compressed Avid NLE files from

### Whenever you are recording information for archive purposes ... use quality media.

the individual .BMP files, but this could be time consuming unless you used a macro to automate the process. If each reel is 10 minutes, that adds up to 240 frames. At 1000x1000, eight bits, each file (frame) would be 1MB. A CD will hold 650MBs, or about 30 minutes. Uncompressed stereo audio (48kHz sampling/16 bit) requires about 11MBs per minute. The newsreel audio probably does not need that resolution, but you may want it for the running commentary. However, if the running commentary is for internal use only, you may be able to get away with reduced resolution. In any event, keep both audio tracks at the same resolution to avoid problems.

Based on the numbers above, it would take about 250 to 300 CDs to archive the footage. This would preserve everything that is on the original film in an uncompressed digital format. You could then clean up any frames that need it and use them for a variety of projects.

As far as the tape machine goes, the professional versions of the DV format (DVCPRO 25, DVCAM) are very

popular today but offer features you may not

need. If that is the case, you could save some money and use the consumer DV format. It is the same quality as DVCPRO 25 and DVCAM, but it just lacks some of the pro features. Consumer DV tapes can also be played back on consumer decks, DVCPRO (all flavors) and DVCAM decks.

Basically, capture at the highest possible appropriate resolution (this is dependent on the quality of the film). Doing this creates an accurate copy of the original. Don't use compression in the capture process (once it is thrown away, you cannot get the data back). Store the digital captures as archives (it would be prudent to have a backup or two of these) and work from copies. Edit using a nonlinear system and output to tape for portability. Finally, let me know how it turns out.

On a somewhat related note, whenever you are recording information for archive purposes, whether it is archive news footage or important files from your computer system, use quality media. As more people have access to CD-ROM recorders, many assume that CDs are good for life. That is not the case! Many cheaper recordable CDs are not reliable, just like many consumer versions of tape. Yes, they will record and playback a signal, but possibly not for long. There are several types of dyes used for CDs and they are not all applied consistently. Using quality media will improve your chances of recovering the information several years down the road.

If you are having a problem with equipment or a manufacturer, or simply have a comment, drop me a note at [drdigital@compuserve.com](mailto:drdigital@compuserve.com). ■



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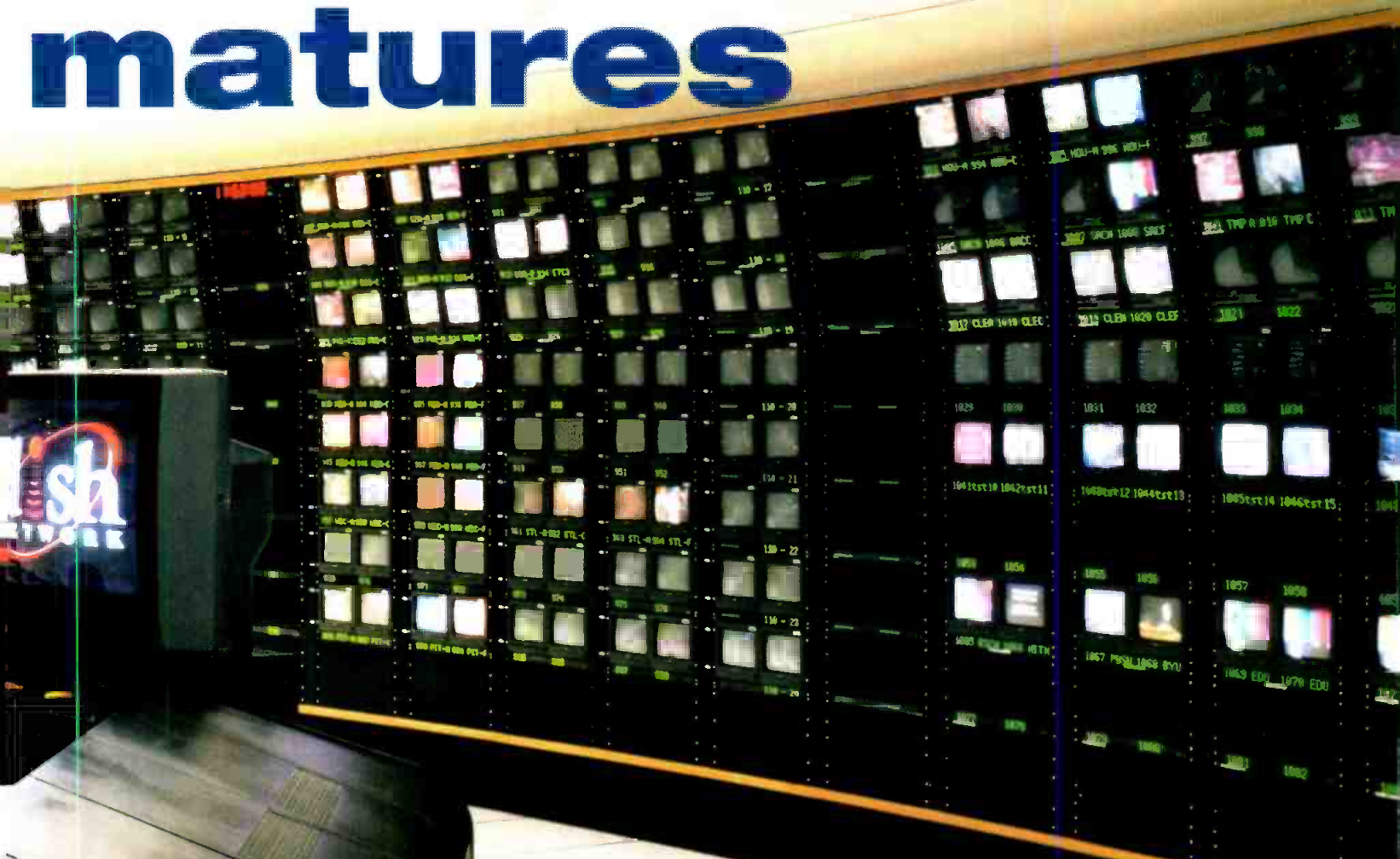
# SYSTEMS DESIGN SHOWCASE

# EchoStar:



EchoStar's Satellite Uplink Center in Cheyenne, WY, monitors over 500 digital direct broadcast satellite channels. The Network Operations Center is equipped with 1020 receivers and 1020 JVC monitors. Photos courtesy of IMMAD ECVS.

# A DBS star matures



BY DAVID GEORGE,  
TOM FERGUSON  
AND MATTHEW BROWN

Operating under the clear skies of the Wyoming countryside, some 6000 feet above sea level, EchoStar operates the Cheyenne Digital Broadcast and Uplink Center. EchoStar was a pioneer in the direct-to-home (DTH) market. In the 1980s, it became a leading provider of DTH hardware and services worldwide and now serves 3.4 million coast to coast.

EchoStar's state-of-the-art Direct Broadcast Satellite (DBS) system offers customers more than 500 channels of digital video and CD-quality audio programming, MPEG-2/DVB compliant hardware and custom installation. EchoStar Technologies Corporation (ETC) designs and oversees manufacturing and distributes DBS set-top boxes, antennas and other digital equipment for the DISH Network and various international customers that include Bell ExpressVu Canada and Via Digital systems in Spain. ETC also provides uplink center design, construction oversight and project-integration services for customers internationally. Satellite Services provides the delivery of video, audio and data services to business television customers and other satellite users. These services include satellite uplink, satellite transponder space-usage and other

# EchoStar

services. Satellite Services also administers SKY VISTA, a direct broadcast satellite service offering up to 27 channels of popular digital satellite television programming to viewers in Alaska, Hawaii, Puerto Rico and the U.S. territories in the Caribbean.

The EchoStar Uplink Center is at the heart of EchoStar's DBS system. The facility receives video, audio, pay-per-view programming and data information downlinked from various satellites. The center generates pay-per-view and special programs from its own studios, and then combines the information into a single digital stream that is uplinked to EchoStar's five direct broadcast satellites. These satellites relay the programming streams to millions of DISH Network customers throughout the continental U.S. A sixth satellite will serve Hawaii and Alaska.

In November 1994, EchoStar began construction of the Satellite Uplink Center on the outskirts of Cheyenne. The 138,000-square-foot, state-of-the-art facility is located on a 50-acre site and houses a sophisticated array of satellite communications equipment and signal-processing operations. The facility began live demonstrations in

August 1995 and was completed later that year. The DISH Network first broadcast from the Uplink Center to customers' homes in March 1996. The Uplink Center is the gateway for all DISH Network digital services. In

More than 2 million  
feet of cabling  
was installed,  
about half of which  
was utilized  
in support of the  
router system.

addition, the facility houses editing and production facilities, and offers studio space for use by other businesses. It is a growing, evolving facility, which has more than doubled in size during its first four years.


To provide the television infrastruc-  
ture for this emerging new service,

IMMAD Broadcast Services was contracted to provide television system design and integration services. This included design, engineering, supply and installation of all baseband facilities as well as telephone, LAN, security and card access systems. The necessary infrastructure included satellite and fiber receivers, file servers and tape machines for source material, all feeding a large BTS Venus analog router. The router outputs fed Divicom MPEG-2 encoders that, in turn, were multiplexed to the uplinks. There were also three special event rooms (SERs), one with a BTS Saturn Master Control Switcher, three edit suites with ImMIX TurboCubes and an audio production suite with a Pacific Recorders Editor. In the following year, IMMAD initiated Phase II, which expanded the facility with more turn-around receivers and encoders and added a Utah Scientific 256x256 router.

The uplink center began its conversion to an all-digital television facility in 1997. By necessity, the earlier phases of infrastructure had been largely analog. IMMAD installed a system of Leitch Digibus equipment, twin 256x256 Grass Valley Group 7000 SDI routers and replaced the existing Digital Betacam VCRs with Grass Valley Profile file servers for playback and record systems. A third Network



Operators assess quality control from confidence receivers in the NOC. Signals to the receivers are routed by a Grass Valley Group digital 1024x128 monitoring router, through GVG A/D converters and to Leitch analog video and audio DAs.



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# EchoStar

Operations Center (NOC) was added, and a large Sports Control Room for live events was installed. By this time EchoStar was offering some 300 channels and still growing rapidly.

The Receiver Area utilizes Leitch Digibus technology for the baseband A/D conversions for all inbound signals. Each receiver area cluster has its own monitoring station, which includes Leitch 12x1 monitoring switchers, Wohler amplifiers, Ward Beck metering systems, Bittree audio and video patching and Aphex four-channel audio processing.

In 1998, EchoStar entered Phase IV, launched its fourth satellite and added a second building in Cheyenne that more than doubled operations space and allowed for further expansion. IMMAD ECVS partnered with the Grass Valley Group and added two GVG 256x256 SDI routers, additional Leitch Digibus equipment and expanded the growing Supervision and Reporting (SAR) monitoring system. Signals from building one were trunked to building two, and the two main equipment rooms were interconnected. In 1999, IMMAD ECVS expanded the baseband systems by adding a 1024x1024 GVG router. The delivery of the Series 7000 routers, which offer nearly 1.2 million crosspoints, coincided with EchoStar's launch of two new satellites designed to boost its DBS capacity by 300 more channels. Located in the Master Equipment Room (MER-2), the routing system incorporates 32 GVG 7000 series frames in 32 Stantron racks, accompanied by 32 router output secondary switchers and 11 racks densely packed with 1024 GVG 1x9 digital DAs to feed the inputs of the 32 routers' frames. There are five more racks of patching: two for router inputs, one for monitoring and two for signal outputs, all utilizing ADC High Density Digital patch panels. More than 2 million feet of cabling was installed, about half of which was utilized in support of the router system.

The new 7000 Series systems joined three other 256x256 Grass Valley routers already in the EchoStar Uplink Center, all of which were networked

via Grass Valley Series 7000 network control systems. EchoStar also relied on 18 Profile digital video servers linked by a Fibre Channel network and a variety of signal-management modules, including Grass Valley's M9107 for A/D signal conversion and multiplexing of analog output from satellite receivers to serial digital vid-

ated supervisory system to monitor and assist even routine operations. IMMAD ECVS had developed multi-channel monitoring systems for the cable industry, and it expanded a similar system to meet EchoStar's needs. The resulting SAR-II monitoring system consists of audio/video monitoring circuits, a control computer,



The facility's routing system employs 1024 Grass Valley Group 1x9 digital DAs feeding 32 routing frames.

eo (SDI) with embedded AES audio. Additional Leitch Digibus frame synchronizers and noise reducers were also added to turn-around channel paths. The commercial insertion equipment was replaced and expanded with SeaChange servers and switchers, and more turn-around receivers and Divicom encoders were integrated.

Monitoring more than 500 channels of programming is no easy task and requires the development of an auto-

LED-based under monitor displays (UMDs) and networked monitoring PCs and workstations. The software will accept inputs from program monitoring and switching circuits channels and will log and report status information on the current operating state of some 700 channels. Information is passed over a network to PC workstations for action and logging and to displays beneath the individual monitors for status notification. Main



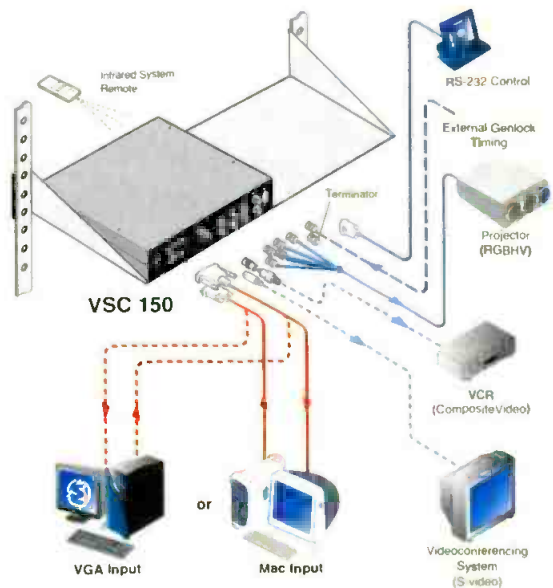


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### Transmission lines for DTV

BY DON MARKLEY

The advent of DTV has placed new demands on broadcasters in all areas, including the loading on existing towers. For most stations, adding a new channel has required the addition of another antenna and transmission line complex.

For many VHF stations, there really is no choice but to add a new transmission line complex if the existing antenna is a batwing type using two phased feed lines. The exception is stations where the DTV channel is also VHF and is in the same band. The reject load port on the hybrid combiner can be used for the DTV input, resulting in two outputs on the same transmission lines. This approach is acceptable if the batwing antenna bandwidth is sufficient to provide a good match at both channels after careful adjustment of the fine matching devices at the antenna. Because the batwing configuration results in a fairly broadband system, the station stands a relatively good chance

of success, based on measurements of the system. Obviously, the measurements should be performed well in advance of the anticipated DTV sign-on date to avoid significant

one of the NTSC lines in the transmitter building after the hybrid combiner. The second combiner, used to separate the two signals at the tower top, would be placed in

### Very good antennas are available for DTV use.

embarrassment if it won't work on that 1954-vintage antenna.

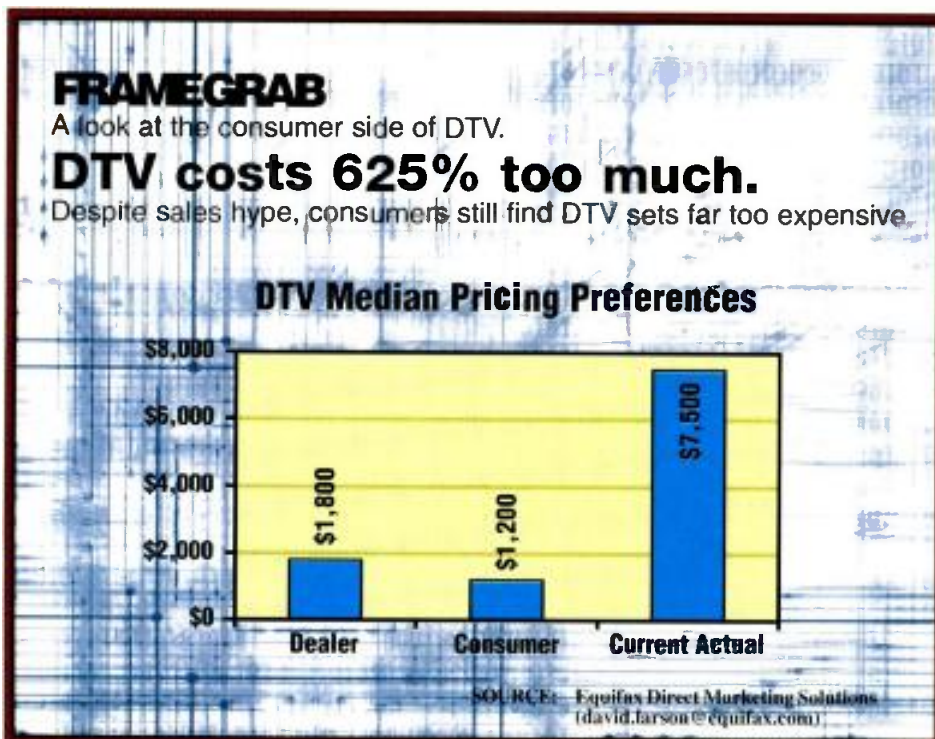
#### Some options

Several manufacturers now make a dual-band combiner that will allow a UHF and a VHF signal to be combined into a single transmission line. Theoretically, one of those combiners could be used on one of the lines feeding a batwing antenna to combine a UHF DTV signal with the VHF NTSC signal. This would require reworking the phasing for the batwing antenna, which could be done. The combiner would be placed in

that line prior to the elbow complex. Then the length of the other line would have to be increased to adjust the phase to compensate for the phase delay caused by the two combiners. Again, this is theoretical and the problems encountered might be more trouble than the savings resulting from not having to purchase another transmission line.

One problem would be the power rating of the feed lines. Many VHF NTSC stations have been allocated high power levels for DTV. Since many of these older systems use three-inch coaxial line, the power rating is simply not sufficient to handle both signals. In addition, the loss for three-inch line at UHF frequencies is usually too high to be acceptable unless the run is very short; in which case, an additional line is probably not a problem. This type of system is probably only practical in those cases where DTV power is low and the tower simply will not support another transmission line. Very good antennas, which are lightweight and do not have a high wind load value, are available for DTV use. The same cannot be said for transmission lines. If the efficiency is to be acceptable at UHF frequencies, the line will be large and the wind load caused by the line may be the deciding factor.

The use of these combiners can be very economical in other large systems. For example, one new facility



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is currently under construction where the NTSC channel is low-band VHF and the DTV channel is UHF. Fortunately, the channel combination happened to be one where the same transmission line length was recommended for both channels. This facility will use a 2000-foot tower with a top-mounted UHF antenna and a wrap-around panel antenna for the VHF channel. A single six-inch coaxial line is being installed with the two channels combined in the transmitter building and divided into separate feeds at the tower top. For this project, the loss in the six-inch line is acceptable and the power handling capacity is adequate. On the other hand, the cost savings are very significant. First, eliminating one six-inch transmission line reduces the tower loading. Even more significant is that the cost of the project is greatly reduced. Although the combiners are expensive, the cost of a 2000-foot run of six-inch line is much greater.

That particular project was fortunate in that the same line lengths were usable for both channels. However, if that was not the case, an obvious solution exists. Multiple manufacturers now offer transmission lines in varied lengths that eliminate the problem of reflections from flanges and bullets combining to prohibit the use of any given channel. As the cost of such lines is

### Too many elbows

Another problem has been noticed as stations utilize multiplexed antennas for multiple stations. The transmission lines must be sufficiently broadbanded to work well on all of the channels. On simpler systems where the line only has one elbow at the



**Tuning is important in systems used for multiple channels. Placing elbows too close to each other can increase the complexity of tuning the system.**

tower base, this is not an overwhelming problem. However, some multiple station systems are at complex installations or on tall buildings where the transmission line run can contain numerous elbows. In those instances, special treatment of the systems is necessary. First, the elbows all need to be tuned at the factory for the particular channels that are anticipated. Simple off-the-shelf hardware simply

right together. It seems to be much easier to tune elbows if some distance separates them (preferably the equivalent of at least several wavelengths, or 10 to 20 feet). This makes sense because the elbows are then matched to a piece of transmission line on each side rather than simply to another

elbow. It seems that the elbows talk to each other if together, meaning they may not be actually matched to the characteristic impedance of the line but to some artificial impedance created in the middle by the matching process. This is the same problem that occurs when tuning adapters for testing purposes. The adapters cannot be connected directly to each other but must be separated by a length of line to ensure that the adapters are tuned to the line rather than to each other.

In designing your transmission line run, attempt to minimize the number of elbows needed. Where possible, space the elbows some distance apart to reduce the difficulty in their tuning. Most of all, don't accept off-the-shelf hardware. Especially for UHF, the elbows should always be tuned at the factory and match marked to insure that they are installed as tuned. This will result in a better system for the station and will eliminate the problem of all that bad language from the engineer who tries to tune your system after installation. ■

*Don Markley is president of Markley and Associates, Peoria, IL.*



Send questions and comments to:  
[don\\_markley@intertec.com](mailto:don_markley@intertec.com)

## Especially for UHF, the elbows should always be tuned at the factory and match marked to insure that they are installed as tuned.

not significantly greater, their use may be advisable in any case, because no one really knows what channels may be used at some future date. That applies to additional stations that may be located on the tower in the future as well as to channel changes that could someday occur. Stranger things have happened, especially as the industry goes through the channel changes associated with DTV.

will not do the job. One current system has eight elbows within 100 feet of the diplexers. To describe such a system as a "pig" doesn't do justice to either the difficulties involved or the animal. To get the desired results, part of the system is currently being replaced with semiflexible line simply to eliminate some of the elbows.

When too many elbows are involved, broadbanding becomes a problem, especially if some of the elbows are

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In addition, Standard's TVM550II is the acknowledged agile workhorse of the industry, offering re-broadcast quality and minimized noise and spurs for extraordinary reliability and performance. And if cost is a concern, the SCM550HP offers the same high quality and reliability, but with an eye on your budget.

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## Digital compositing: What you need to know

BY DOUG KELLY

**D**igital compositing is the digitally manipulated integration of at least two source images to produce a new image. Driven by lower hardware prices and significant improvements in software, digital comps are becoming commonplace. Studios are using compositing tools for everything from virtual-set productions to simple mic rig removals. You would be hard pressed to find a nationally distributed production that does not contain at least one digital comp.

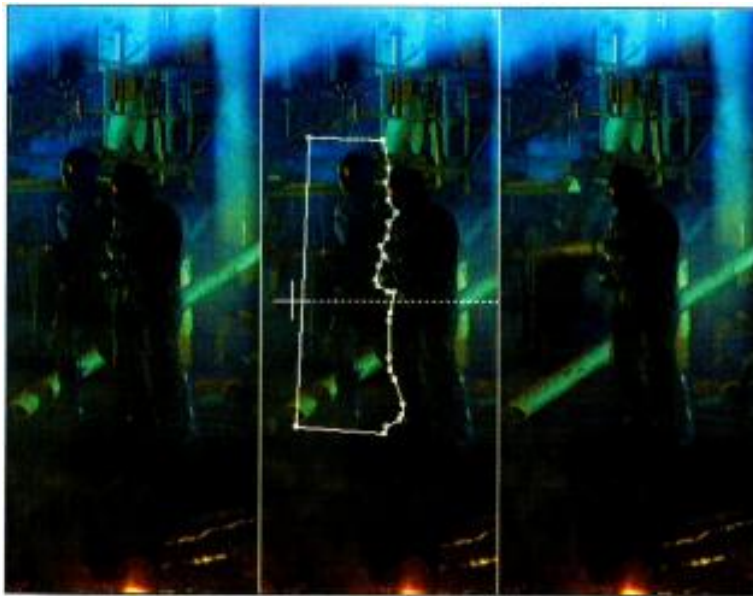
Digital compositing tools are unlikely to be the biggest item in your budget, but their place in the post-production pipeline means they can have a disproportionate effect on your overall success. If you make good choices in purchasing and using digital compositing tools, you can dramatically improve your facility's post-production capabilities and product quality. If you make poor choices or misuse the tools, you may have to choose between broadcasting low-quality ma-

### Digital compositing is the art of the invisible effect.

terial or subcontracting a compositor at the last minute.

Digital compositing is the art of the invisible effect. The best comp looks like all the elements were in front of the camera and were simply filmed in one shot. Comps can put live actors into virtual sets, virtual actors into

real locations, or assemble bits and pieces of reality to create an impossible but believable new world. These abilities are driving the boom in science fiction and fantasy productions.



Advanced digital compositing operations like this hand-rotoscoped actor removal can accommodate a change in script or fix an error in principal photography to save the cost of an expensive reshoot.

They also make it easier to salvage footage and production expenses.

#### Offline vs. online

With few exceptions, digital compositing is an offline process. Vendors may claim and, in rare cases, even deliver hardware and software capable of compositing multiple image streams in real time. However, those are the exceptions rather than the rule. The increased data rates of HD make it even more difficult to build a real-time compositing system. You'll use the available time, money and talent more effectively if you plan for digital compositing as an offline process and accept the occasional near-real-time comp as a bonus.

More importantly, digital composit-

ing is a graphic art form. You'll get better results from compositors if you don't expect them to fine-tune a difficult matte extraction with five minutes to air.

#### Purchasing decisions

Offline compositing frees you from the financial demands of near-real-time systems. Proprietary turnkey-compositing systems are the most expensive in today's market, followed by software tied to proprietary acceleration hardware. The least expensive systems are software only, designed to take advantage of industry-standard graphics cards and multiple CPUs for faster rendering.

The software-only approach gives you flexibility in designing work-

stations, but it requires you know more about specifying or building them. You should avoid any software that does not support multiple processors, network rendering or film-resolution images. A number of popular entry-level programs render through only one CPU and bog down on HD images. You should avoid these dead-end programs.

If you build your own system, you'll be responsible for keeping the machines working. Coordinating the separate but interdependent upgrade paths of hardware, driver software, application software and operating systems can become a full-time job. If you factor that additional work into the balance sheet, the expensive turnkey compositing workstations, complete with maintenance contracts, start looking more cost effective.

Digital compositors are artists.





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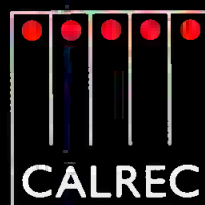
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**Redwood (LA & Nashville)** Tel : (615) 871 0094 Fax : (615) 872 7080 e-mail : redwood@isdn.net

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Choose the tools they want to work with. If you choose the wrong tool, you may have to replace the artists. Platform wars don't make a significant difference anymore in terms of features, functionality or price. However, platform choice does make a difference in the user interface. If your artists are used to Macs, buying a suite of NT comp workstations (or vice versa) could be a disaster.

Many compositing operations depend on accurate color. If the artists can't see it, they can't work with it. You must hold monitors, other hardware, and workstation siting and lighting to at least the same standards as other color-correction gear. One

## Digital compositing tools are not a one-time-only purchase; it's more like a subscription.

computer with a tiny, cheap monitor stuck in a glare-ridden corner of someone's office does not qualify as a digital compositing workstation. At a minimum, it should have a large, high-quality computer monitor, a broadcast-quality video monitor, controllable task lighting and monitor light shields.

Digital compositing tools are not a one-time-only purchase; it's more like a subscription. The publishers will revise the software, and you should take advantage of reasonable upgrades. Budget for it, and plan for your compositors to have retraining time with each upgrade. Many vendors provide resources for training and troubleshooting, including listservs and online archives. Make sure your compositors have access to them, and know how to find them yourself. It's not a good sign if the vendor doesn't provide an open support forum for users.

Vendor support of third-party developers can be important. Few software publishers can afford enough programmers to support every possible compositing feature. Instead, they produce a core program that can handle the most common tasks, and leave specialized tasks to third-

party plug-ins.

Brand-new companies are not the only publishers of digital compositing software. Some vendors of keyers and related hardware have made the transition to digital compositing by leveraging their technical experience. If you trust a vendor's hardware, you should find out if that vendor also produces digital compositing programs or plug-ins.

### Basic functions

A handful of basic mathematical operations are at the core of almost every comp. Comps are very sensitive to errors in these operations. The software's internal accuracy should be at

least one order of magnitude better than the color depth of the final delivery medium. You

should also look for software that works with floating-point normalized values (0 to 1) rather than bit depth-specific values (0 to 255, 0 to 1024, 0 to 64K).

The ability to pull a clean matte is crucial to many compositing operations. The program should be able to produce a clean matte from good blue screen, green screen, or luma-key footage, or pull a difference key with a clean plate. The real test is how well it deals with an uneven blue screen, a range of blacks in a luma key or noise in a difference key. Can it erode or choke the matte to make effective spill correction or handle nonstandard or oddly lit chroma key colors?

The software should convert between RGB and YUV color spaces. It should also include gamma, gain, fade, contrast, brightness, saturation, multiply, divide, histograms, lookup tables, compress, expand, clamp and set controls.

Creating titles and other text-based motion graphics is the bread and butter of many compositors. The quality of the text, the typefaces available (TrueType, PostScript, or both), and the animation and effects you can apply to the text all make a big differ-

ence. Changing the size and orientation of an element is especially crucial to motion graphics. At minimum, your software should be able to crop, scale, resize, pan, rotate, flip, flop, pin, warp and displace elements.

Basic timing comps can reverse, hold, drop, duplicate or append existing frames. Better tools can stretch or compress footage by creating new frames using motion blur and resampling. Image processing filters should include blur, sharpen, grain, smear, median, emboss, dilate and erode operations. The software should also enable you to create your own filters, to import third-party plug-ins or both.

### Common problems and solutions

Unless all your footage is from locked-down cameras, you'll need software with good tracking features and stabilization to remove unwanted camera motion. Any stabilization software should also be able to destabilize or restore the camera motion.

4:2:2 sampling misses half the available color data. Because many mattes are based only on color, those missing data can make the difference between a clean or a noisy matte. If you can't sample at 4:4:4, you'll need to process the footage to simulate the missing data.

If you need comped elements, such as motion graphics, that you can key over a live feed, the compositor can precomp, or render in advance, all the other elements over a solid background that is compatible with your existing keyer.

NTSC-legal color limiting is a common operation for CGI or film elements. Low-end programs limit by boosting the bottom of the signal to 7.5 IRE, wiping out any zero IRE or super-black areas. If you need super black to key the comped elements over another feed, you need tools that can preserve or restore super black. ■

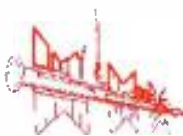
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*Doug Kelly is editor of Keyframe Magazine and a freelance writer and animator. His latest book, "Digital Compositing In Depth," published by The Coriolis Group ([www.coriolis.com](http://www.coriolis.com)), is available through major booksellers. You can contact him through his website at [www.megalink.net/~dakelly/](http://www.megalink.net/~dakelly/).*



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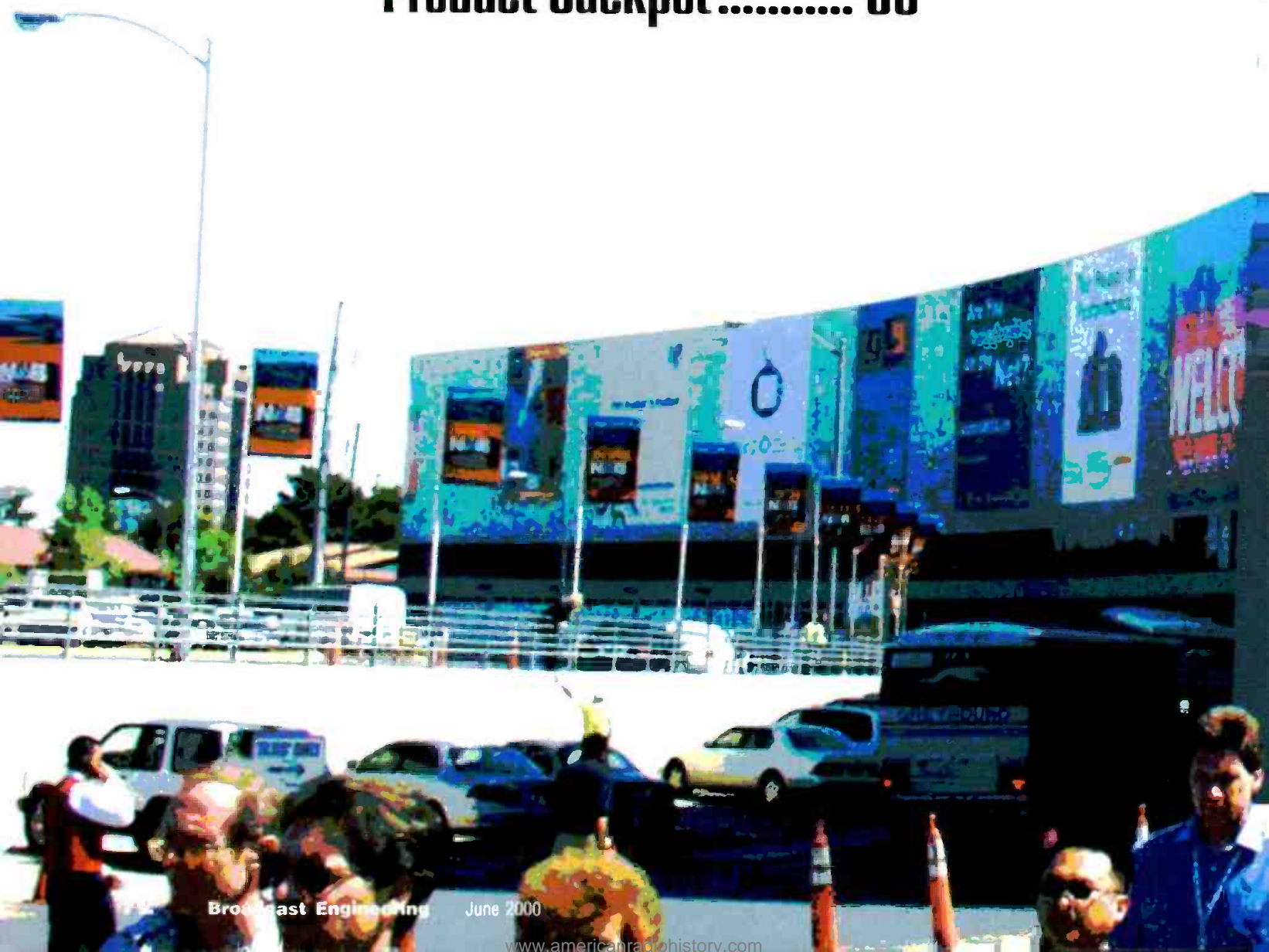
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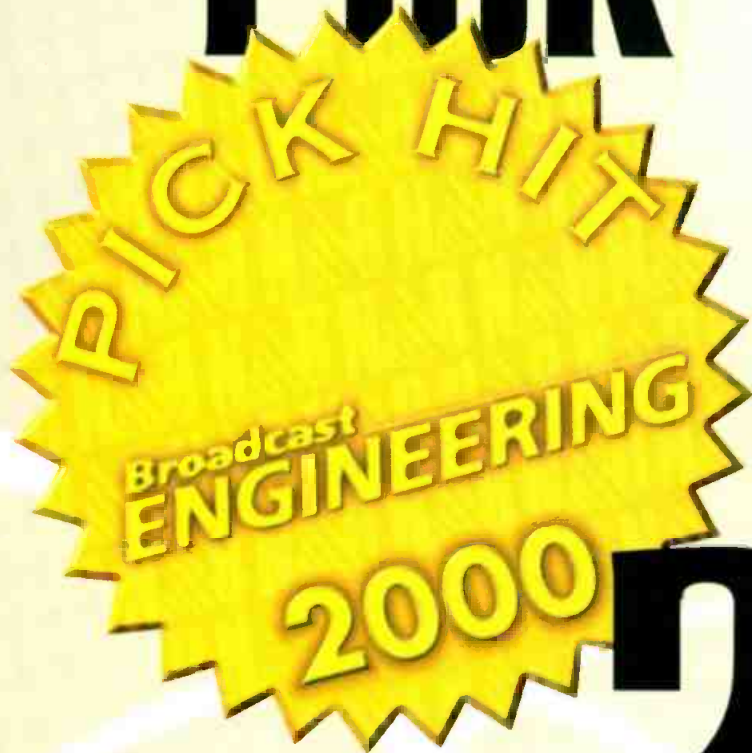
# NAB 2000

<b>Pick Hits .....</b>	<b>74</b>
<b>NAB Replay .....</b>	<b>84</b>
<b>Product Jackpot .....</b>	<b>86</b>





# Pick Hits of NAB 2000



**By Steve Epstein, technical editor**

Broadcast Engineering's Pick Hits are the longest running and most prestigious technical awards given at the annual NAB convention. Started in 1985, the BE Pick Hits are the only awards chosen on site by named industry experts. Throughout the first few days, our experts quietly scour the show floor for the best new offerings. On Wednesday, they meet to determine the winners. The winners are announced Thursday morning on the show floor and are posted to [www.broadcastengineering.com](http://www.broadcastengineering.com) as part of our NAB coverage.

Unlike other awards, the BE Pick Hit awards are not influenced, or chosen, by members of the magazine staff. Nor do unnamed judges who can hide behind a mask of anonymity choose them. Instead, the Broadcast Engineering Pick Hits are chosen by industry professionals who face the daily challenge of running a broadcast or professional video facility. They know the difference between marketing hype and true solutions to today's problems.

Congratulations to this year's winners.



## Pinnacle Targa 3000 Editing System

This desktop editing and compositing solution can process up to eight layers in real time. It offers the choice of creating in DV, MPEG-2 or true uncompressed 60i. For uncompressed compositing of more than eight layers, the Instant Compositing tool accelerates rendering and allows for quick creation of multilayer images. Each layer supports pushes and slides, sub-pixel 2D DVE, image zoom and alpha, chroma and luminance keying. I/O video support is extensive and includes analog and digital, component and composite, S-Video, and on-board DV/1394. On the audio side, you will find balanced and unbalanced line inputs, AES/EBU, SPDIF and TDIF. The Infinite 3D option provides full planar 3D moves, more than 40 programmable warp shapes, soft-edge drop shadows as well as particle and painterly effects.

650-526-1600; fax: 650-526-1601;

[www.pinnaclesys.com](http://www.pinnaclesys.com)

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## JVC DVD-RAM Library System

Looking for an easy and economical way to store a few terabytes? The DVD-RAM system from JVC may just be the solution you are looking for. DVD-RAM media offers 4x the capacity of a CD and the capability to overwrite in excess of 100,000 times per disc. With up to 600 disc capacity, these modular units support up to six drives. Custom trays for storing/transporting the media, combined with internal air filtration systems maintain a clean environment for increased data reliability. These libraries can hold up to 1.56TB, and up to three independent SCSI buses are used to interface the system to other devices. A front-mounted mail slot makes it easy to load and unload media, and for bulk load/unloads, the discs are held in 50-disc magazines.

973-315-5000; 800-JVC-5825;

fax: 973-315-5030;

[www.jvc.com/pro](http://www.jvc.com/pro)

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## Leader LF-982 Signal Level Meter

Leader's LF-982 is a portable signal level meter that can be used with TV, CATV, FM (46MHz to 870MHz) and satellite signals (950MHz to 2150MHz). The LF-982 works with a broad list of worldwide channel assignments and provides level readings for conventional and digital broadcasts. It can be used with a variety of analog and digital modulation schemes including 8VSB, OFDM, QAM -16, -32, -64, and -256, QPSK, 8PSK and BPSK. It can store up to 200 measurement setups as well as 200 data sets. For monitoring, there is a built-in speaker and an audio line output as well as a video output. A basic spectrum display provides verification of reception conditions. For satellite work, there is a C/N measurement and a DC output provides for LNB power/control.

516-231-6900; 800-645-5104; fax: 516-231-5295;

[www.leaderusa.com](http://www.leaderusa.com)

Circle (260) on Free Info Card



## TeraNex Xanthus All Format Converter

Xanthus enables conversion between analog, digital, NTSC, PAL and HD. The PixelComp motion-compensated deinterlacing preserves the full resolution of interlaced materials. Powerful enough to process HD images on a pixel-by-pixel basis, the Xanthus line is easily upgradeable to support new technologies. Due to the differing color primaries and luma equations of the various standards, gamma correction is removed first and then reapplied after the matrix transformation, providing accurate color conversions. Thirty-two-point interpolation preserves the detail of the input images while removing any alias components. For film-related work, the 3:2 pulldown can be easily inserted or detected and removed. Other features include scene detection, aspect ratio control and detail enhancement. A remote control interface and internal test pattern generator simplify installation and operation.

407-517-1086; fax: 407-517-1101; [www.teranex.com](http://www.teranex.com)

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## Telestream ClipExpress Video Delivery System

ClipExpress is an easy-to-use Internet-based media delivery system for transporting video/audio/timecode over data networks. It is designed for business users and content creators, offering selectable compression ranges from MPEG-1 at 128kb/s to MPEG-2 (MP@ML or 4:2:2P@ML) at 8Mb/s. Audio compression is MPEG Layer-2. Video/audio I/Os simplify acquisition from and recording to a variety of tape formats. A built-in standards conversion allows you to adapt your footage to worldwide standards; simplifying playback across the globe. Store and forward technology allows user selection of video quality, independent of the network connection. Internal storage is on a 10.2GB hard drive, and there is room for a second hard drive if additional storage is needed. Network connections include a 10/100Mb/s Ethernet connection as well as full or half-duplex TCP/IP.

530-470-1300; 877-CLPMAIL; fax: 530-470-

1301; [www.telestream.net](http://www.telestream.net)

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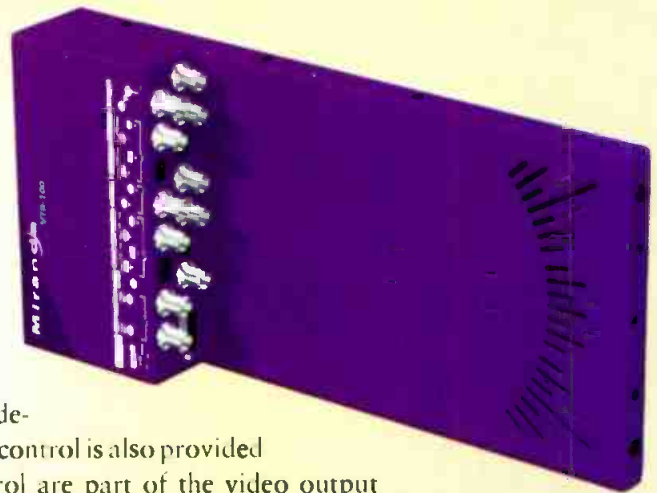




## Miranda VTR-100 A/D Audio/Video I/O Converter

The VTR-100 converts an analog VTR's signals for use in a digital environment. Providing both input and output signal conversion, the VTR-100 mounts behind the VTR, eliminating the need for extra rack space. Signal conversions include CAV to/from serial 4:2:2, analog audio to/from AES and embedding/de-embedding of audio signals within the video bitstream. TBC remote control is also provided through the VTR-100, and hue control and output timing control are part of the video output conversion process. As part of the audio conversion, channel swapping capabilities are included. Video can be converted to/from Betacam or MII standards, both with and without setup. The video conversion to analog is done using 4x over-sampling (54MHz) at 10 bits. The conversion from analog is 10-bit and 2x over-sampled (27MHz).

514-333-1772; fax: 514-333-9828; [www.miranda.com](http://www.miranda.com)  
Circle (266) on Free Info Card



## Ross Synergy 1 Digital Production Switcher

The 16-input, single MLE version of Synergy Series switcher features aspectizers for simultaneous 4:3 and 16:9 production, a 2D DVE and an Ultimatte Insider. Like most switchers, the electronics are divided into two frames, a rackmount frame and a control panel. Unlike most switchers, you can buy this one without the control panel and connect it to a Grass Valley 100/110, saving you considerable money as well as reducing operator-training time. Among the Synergy 1's other features are a 100-event memory, enhanced key border, 10 aux buses and a preview overlay. The preview overlay provides an on-screen menu for easy setup of switcher features. A third keyer and control software allow the integration of an external DVE for switcher transitions.

613-652-4886; fax: 613-652-4425; [www.rossvideo.com](http://www.rossvideo.com)  
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## Dolby DP563 Surround Encoder

The DP563 can be used to encode multichannel program material for Dolby Surround release. Featuring a digital implementation of the industry-standard SEU4 Dolby Surround encoder, the DP563 combines discrete left, center, right and surround inputs into the matrix-encoded two-channel Surround format (Lt/Rt). It can also be used to pre-mix 5.1 channel material to the four channels required for Dolby Surround matrix encoding. Individual input level trims are provided for the center, surround, and low-frequency effects (LFE) channels. LFE-channel processing includes a switchable limiter and a low-pass filter. Among the DP563's other features are a calibration mode, test-tone generator, reference clock input, output limiter and variable coding delay (field/frame/ms). A front-panel LCD shows status parameters and can be used for system setup.

415-558-0200; 800-33-DOLBY; fax: 415-863-1373; [www.dolby.com](http://www.dolby.com)  
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## Panasonic AJ-HD3700 D-5 Multi-format Mastering Recorder

Panasonic's AJ-HD3700 plays back existing 525-line D-5 (including pre-read) or D-5HD cassettes and records 10-bit uncompressed 480/60i SD video as well as 1080/24p, 1080/60i, 1080/50i, 1035/60i and 720/60p HD material. Record times (including metadata) are up to 124 minutes in 1080/60i, 720/60p and 480/59.94; 149 minutes in 1080/50i and 1080/25p; and 155 minutes in 1080/24p. It can slew between 24- and 25Hz frame rates and offers eight digital audio channels with support for 5.1 channel surround sound plus stereo. Variable speed slow motion from -1 to +2 is standard, and options include an SDTI interface and an internal video format converter. The optional HD format converter can convert between 720 and 1080 line HD signals and downconvert to 480/60i, 480/60p or 576/50i.

323-436-3500; 800-528-8601; fax: 323-436-3660; [www.panasonic.com/broadcast](http://www.panasonic.com/broadcast)

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## ADC ENVOY 7256 Router

The ENVOY employs time domain multiplexing (TDM), which provides single channel routing from within the AES channel pairs. The TDM architecture allows individual mono channels to be swapped from any input pair to any output pair, regardless of matrix size, and provides for simple linear expansion to multiple frames. It is available in synchronous, asynchronous and timecode configurations, and controllable by the ENVY and other major control systems. This wide bandwidth system is expandable to 1024x1024 without input distribution amplifiers (sync only) and is designed for zero bit error rates even when signals pass through the matrix multiple times. I/O backplanes are available with either 75Ω BNCs or 110Ω Phoenix twisted pair terminal block connectors. Options include redundant power supplies and control modules.

530-265-1000; 800-719-1900; fax: 530-265-1010; [www.adc.com](http://www.adc.com)

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## Sony DMX-R100 Digital Audio Mixer

The DMX-R100 is a 48-channel mixer with 25 motorized faders, a sophisticated LCD touchscreen control system and machine control. It offers 24-bit audio quality and operates at 44.1kHz, 48kHz and 96kHz sample rates. It comes standard with 24 analog inputs, eight aux returns, stereo program out, aux sends and monitoring outputs. An internal audio routing matrix provides crosspoint switching for virtually every input and output, avoiding the need for an external patch bay. Because of the DMX-R100's architecture, handling surround sound is easy. Six of the monitor buses are used to generate the 5.1 mix and panning is accomplished via the touchscreen. The control room monitor system has six outputs, making it easy to monitor the surround mix without sacrificing other outputs or needing an external monitor switcher.

800-686-SONY; fax: 201-930-4752; [www.sony.com/professional](http://www.sony.com/professional)

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## Extron P/2 DA1 RGB Video Line Driver

If you have ever had to drive a projector in one room with a computer down the hall, you know that computer video signals don't travel very far on typical VGA cables. This miniature, single-input, single-buffered output driver can be used to drive a high-resolution computer-video signal up to 250ft through high-quality cable. The P/2 DA1 provides amplification and peaking as well as restoring the low-level sync voltages found on many laptops to normal TTL levels. With a 300MHz bandwidth, it works with VGA, SVGA, XGA and SXGA graphics cards, monitors and projectors. Because it is housed in an adapter-sized enclosure, the P/2 DA1 can be connected directly to a laptop or computer output. A three-position switch provides user-selectable gain/peaking.

714-491-1500; 800-633-9876; fax: 714-491-1517;  
www.extron.com  
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## Sony MSW-M2000 MPEG IMX Recorder

The latest VTR from Sony can record MPEG-2 4:2:2P@ML at up to 50Mb/s. The MSW-M2000 is one of three models in the IMX family that support the SDTI-CP interface. In addition to recording and playback of the IMX format, the M2000 can play back Digital Betacam, BetacamSX, and analog Betacam(SP). For IMX recordings, maximum record time is 184 minutes from analog video, SDI or SDTI inputs. Features include frame-accurate insert and assemble editing of the I-frame recordings, and the four digital audio channels are selectable at either 16 or 24 bits, with sampling at 48kHz. Because it can input/output MPEG elementary streams over SDTI, direct transfers of the MPEG bitstream can be done easily with nonlinear editors and servers. Remote control includes RS-232, -422 and parallel connections.

800-686-SONY; fax: 201-930-4752; www.sony.com/  
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## Miranda MDC-800 Monitoring Downconverter for HDCAM

If you are shooting HD with an HDW-700A, and you need a cost effective way to monitor what you are shooting, the MDC-800 may be just what you are looking for. This miniature downconverter can be side-mounted on an HDW-700A and take its power directly from the camera battery. The MDC-800 converts the camera's HD component analog outputs to NTSC or PAL, making them viewable on standard field monitors (both composite and luminance outputs are provided). It features looping inputs and supports 1080i, 1080p/24(sF), 1035i and 720p. A built-in aspect ratio converter makes 16:9 pictures viewable on 4:3 monitors and a graticule generator (16:9 and 4:3) provides safe action markers. Power consumption is only 4W for this eight-bit downconverter, which can run on anything from 12VDC to 24VDC.

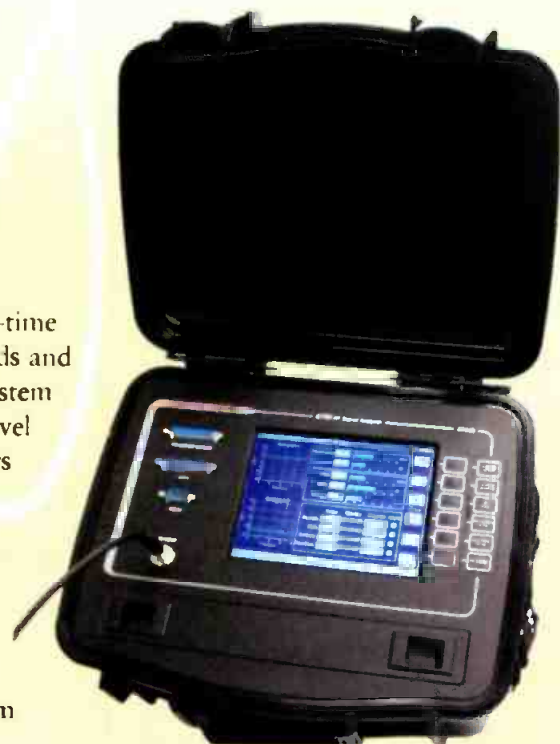
514-333-1772; fax: 514-333-9828; [www.miranda.com](http://www.miranda.com)  
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## Sencore AT986 8VSB RF Signal Analyzer

This portable signal analyzer is designed to provide operators with real-time monitoring of the ATSC 8VSB signals. It works across the VHF/UHF bands and those used for CATV. The AT986 runs on batteries or AC and has a RF system view for quick verification of parameters, including channel level, pilot level and a RF spectral display. A comprehensive view of modulation parameters includes MER and EVM. Equalizer loading is displayed as part of the multipath view, as are equalizer tap values. A demodulated parallel transport stream output allows the data stream to be ported to another device for further analysis and storage. User-configurable error checking and data logging provides an extra level of assurance that your DTV system is operating properly.

605-339-0100; 800-SENCORE; fax: 605-339-0317; [www.sencore.com](http://www.sencore.com)  
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# CINÉWAVE



## Pinnacle CineWave Editing and Effects System

Based on the TARGA Cine engine, CineWave is an editing and effects solution for the Apple G4. It can provide true uncompressed quality and supports every major video format, including SD, HD or both. The Cine engine is 64-bit single-slot PCI card with two Pinnacle DigitalTether ports. The ports allow for easy attachment of a family of analog and/or digital I/O breakout boxes. Both ports can be used in parallel to connect two breakout boxes and output SD and HD simultaneously. Software bundled with CineWave includes Commotion Pro, a compositing and effects package, Apple's Final Cut Pro for editing and Hollywood FX Bronze for creating 3D transitions and effects. IEEE 1394 is supported, as are selectable aspect ratios (16:9 or 4:3).

650-526-1600; fax: 650-526-1601;  
[www.pinnaclesys.com](http://www.pinnaclesys.com)  
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## Wohler E MON-1 Dolby E Monitor

For those implementing Dolby E or Dolby Digital, Wohler has come up with just what you need to keep tabs on those signals. The E MON-1 can output or display audio from both types of Dolby streams. It features self-powered speakers and eight high-resolution LED level meters that provide accurate monitoring both aurally and visually. An audio selection system provides operators with the means to select and monitor specific channels from within the Dolby data stream. Both 75Ω and 110Ω inputs are included for each of the two Dolby E sources, with loop-throughs for one source. A LCD screen provides status, as do individual LEDs above each channel. A data port allows for software downloads, and analog audio outputs allow for additional monitoring capabilities.

650-589-5676; 888-5 WOHLER; fax: 650-589-1355; [www.wohler.com](http://www.wohler.com)

Circle (259) on Free Info Card



## Sony BVE-700 Edit Controller

If you are looking for a quick way to get into HD editing and production, the BVE-700 may be just what you need. It is designed for HD production and includes two jog/shuttle dials for VTR/DDR control. Multiple machines (three players and one recorder) can easily be controlled with the BE-700's ergonomic control panel, which also supports pre-read. For expanded capabilities, remote control is provided for a SD switcher (RS-422A) and audio mixer (RS-422A or ESAM). An optional plug-in HD video switcher provides a cost-effective way of performing A/B roll effects in either 59.94i/50i or 24p. The switcher has five inputs, three outputs and includes cuts, dissolves, wipes and mosaics as well as keys (including an external key input).

800-686-SONY; fax: 201-930-4752; [www.sony.com/professional](http://www.sony.com/professional)

Circle (265) on Free Info Card



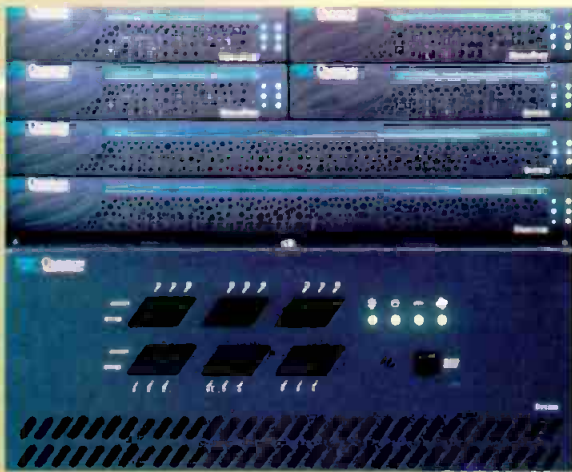
## Miranda Kaleido-QC Visual Monitoring Quality Control Solution

The new Kaleido-QC combines the features of the original Kaleido display system with new Web-based device management and control software. It can display up to 16 analog video, digital video and/or computer signals, allowing it to replace suites of dedicated control panels and monitoring equipment with a single computer workstation, or a rack-mounted, touchscreen display. Each window within the display can be configured for 4:3 or 16:9 and be independently sized and positioned. In addition, each window can include dual tally displays and a source identification. Up to 16 stereo audio signals can be displayed using on-screen level meters. On-screen alarms as well as GPIs can be used to alert operators of problems. A timecode input provides timing information for up to 16 on-screen clocks, each with a configurable offset.



514-333-1772; fax 514-333-9828; [www.miranda.com](http://www.miranda.com)

Circle (252) on Free Info Card



## Omneon Video Area Network

Based on IEEE 1394, Omneon's Video Area Network offers data-type independence with the ability to store HD, HDCAM, DV, DVCPRO 50, MPEG-2, uncompressed 601 and streaming files. IEEE 1394 provides for the transport of both isochronous (audio and video) and asynchronous (control) data simultaneously. Several modular components are used to build typical networks. Director and Store manage data storage, while MediaPort handles the connection and interface to non-1394 devices that need to be connected to the network. Switch is an IEEE packet switch that manages data transport on the 1394 network as well as providing an interface to Gigabit Ethernet networks. This allows the interconnection of multiple Video Area

Networks using standard Internet protocols, or the delivery of asynchronous streaming video directly to the Internet.

408-558-2101; fax: 408-558-2199; [www.omneon.com](http://www.omneon.com)

Circle (253) on Free Info Card

## RULES

NAB Pick Hits judges operate anonymously and independently. Each year they look for new products that meet the following criteria:

- **Products must be new and not shown at a previous NAB Convention.** In some cases, distinguishing a new product from a modified older one is difficult. For Pick Hits purposes, a new product is one with a new model number or designation.
- **Products must have some positive impact on the intended user's everyday work.** Judges search for equipment that will be used on a regular basis. Products should provide new solutions to common problems.
- **Products must offer substantial improvement over previous technology.** Unique circuit architecture need not be involved, but some new approach or application should appear in the product's design.
- **The prices of the products must be within reach of their intended users.** The judges seek products appropriate to a wide range of facilities.
- **The products must be available for purchase within calendar year 2000.** Equipment must be displayed on the NAB show floor and currently (or imminently) in production. Judges take the exhibitor's word on availability dates. Products demonstrated in private showings off the general show floor do not qualify.

# JUDGES



Stephen Damas

**Stephen Damas**  
Technical Design Supervisor  
WGBH  
Boston, MA

**Greg Doyle**  
President  
Doyle Technology Consultants  
Redmond, WA



Greg Doyle

**Aram Friedman**  
Director of Engineering, Digital Dome and Broadcast Systems  
American Museum of Natural History  
New York, NY

**Mike Grover**  
Chief Engineer  
KJZZ-TV/Larry H. Miller Communications  
Salt Lake City, UT



Aram Friedman

**Phil Hejtmanek**  
Director of Engineering Newsweb Broadcasting  
WPWR-TV/KTVD-TV  
Chicago, IL

**Brad Hughes**  
Chief Engineer  
Henninger Video  
Arlington, VA

**Philip A. Mendelson**  
Senior Vice President of Engineering/Vice President TODD-AO  
TODD-AO/Hollywood Digital  
Hollywood, CA

**Karl Renwanz**  
Vice President  
Video Transfer Inc.  
Boston, MA

**George Stack**  
Chief Engineer  
NTV International Corp.  
New York, NY

**Dan Stark**  
Vice-President Systems and Technology  
Video Post  
Kansas City, MO

**Marcus Weise**  
Marcus and Associates  
Hollywood, CA



Phil Hejtmanek



Mike Grover



Karl Renwanz



Marcus Weise



Dan Stark

# NAB REPLAY

Your personal guide to almost 500 new products and services

Storage and automation .....	85
Routing systems .....	90
Format conversion and synchronization .....	94
Compression systems.....	102
Streaming .....	108
Camera & lens technology .....	116
Production systems .....	126
Video editing .....	132
Audio for video .....	138
Test equipment .....	144
DTV systems .....	148
The RF side of TV.....	152
Product Jackpot.....	86





## Storage and automation



By Brad Gilmer

Both Grass Valley and Omneon made claims last year that left the industry wondering if they could deliver. Grass Valley said it would produce an HD server with very impressive throughput performance, and Omneon said it would deliver the Video Area Network, which was supposed to deliver great performance at low prices.

The most compelling demonstration of the Grass Valley server occurred not on the floor, but at the Pro-MPEG booth. There, Grass Valley demonstrated its PVS-2000 server playing MPEG HDTV at 78Mb/s. As you can imagine, HD at that rate looks beautiful. The PVS-2000 server can supply four simultaneous HD streams at the 78Mb/s rate. For the demonstration, the server was equipped with 10 18GB hard drives (RAIDed with eight data drives and two parity drives).

Grass Valley also conducted several interoperability demonstrations including an interface to SDTI-CP and MPEG Transport Streams and demonstrations using the Grass Valley file interchange format. Finally, the Grass Valley Net Central product showed that vendors are beginning to understand how important monitoring and diagnostics are

to the broadcaster. Net Central is based upon Simple Network Monitoring Protocol (SNMP) with Web interfaces that greatly simplify equipment monitoring in large facilities.

Omneon made a number of claims at the last NAB about their Video Area Network—a network architecture based upon IEEE1394 Firewire. It would be easy to implement, it would be cost effective, and it would allow customers to mix different types of content on a common file system. The only thing that really mattered, however, was whether they could actually deliver the product. This year, Omneon showed 21 streams being played out from a common file system. The streams included DV, MPEG, uncompressed 601 and HDCAM. Omneon also delivered video in many of the commonly used Internet streaming formats. The keys behind the Omneon approach are Firewire and the packet switching it allows; the Omneon Directors that contain the file system and provisions for placing content in QuickTime wrappers; and Fibre Channel drives. Omneon was showing both IEEE1394A and IEEE1394B. The 1394A version is copper-based, has a top speed of 400Mb/s and a maximum length of around 4.5 meters. The 1394B version is fiber, has a top speed of closer to 800Mb/s and a maximum length of 500 meters. For more information, see Pick Hits, p. 74.

In the new kid on the block category, Archion was showing high capacity, high speed Fibre Channel storage systems. While not strictly a video server,

the system is optimized for the video environment. Archion works with NT, SGI, MAC and UNIX platforms, including Avid, Final Cut Pro, Discreet Edit, Media 100, Speed Razor and other editing environments. Archion storage also works with the Profile PDR-100 and PDR-200 servers. The system works with sustained bandwidth of 70MB/s of throughput per Fibre Channel loop, and they can pack up to 360GB in a 3RU frame. Archion arrays also provide remote monitoring and diagnostics, pager call, modem connection, dual power supplies, and many other features typically expected in a high-end system.

Leitch extended their product line by showing several additional components that plug into their Fibre Channel Arbitrated Loop architecture. Their WAN Streamer can be added as a node on the network, allowing server content to be streamed at speeds from 100Base-T up to OC-12. An API is available to interface to many common WAN management applications. Leitch also demonstrated two products in the news environment. One is the A.N.N. news application that Leitch calls News in a Box. The other is an interface to the AP ENPS news-automation package running MOS protocol.

This year, Pinnacle, which purchased HP's Video Division shortly after NAB last year, introduced a scaled-down version of their MediaStream server, MediaStream 300. This small server is ideal for time delay, WAN streaming and other "edge of network" applications. It provides up to three MPEG-2 channels and 25 hours of storage in a 2RU package, with Fibre Channel and Ethernet WAN connectivity included. In a smart move, Pinnacle is packaging Crispin Corp.'s automation software with every MediaStream 300. This allows Pinnacle to provide a complete solution out of the box.

EMC had a strong showing this year at NAB. Their message, "The Core of Content," shows that EMC has a growing understanding of how their competencies fit in the broadcast environment. Their message emphasizes EMC's history of providing bulletproof storage solutions to very large companies. It will be interesting to see how this company adapts its technology and strategy as time goes on.

## Product Jackpot

QuVis was showing the QuBit Digital Motion Image Recorder. The QuBit can record and play moving images at almost any size and quality level including HD and beyond. The standard QuBit includes 36GB of hard drive space for recording 12-bit signals.

Circle (375) on Free Info Card

Toshiba's IK-TU40A is a three-CCD camera that uses 410,000 pixel IT CCDs with microlens technology. The camera package is designed for demand application and features a C-Mount and high performance digital processing.

Circle (412) on Free Info Card

Wheatstone was showing the TV 1000, a digitally controlled analog console for live TV which features total console recall, router communication package, extensive mix-minus and communications.

Circle (430) on Free Info Card

Adtec showed its Soloist 2 digital video player, designed to meet the needs of television stations, cable companies and other broadcast operations that need to perform random access commercial insertion.

Circle (281) on Free Info Card



Winsted Corp.'s Prestige Console is a low profile console system, modular in concept, that provides easy visibility in busy environments. Custom designs and on-site installation are available.

Circle (431) on Free Info Card

Sierra Design Labs was showing the HD 1.5 Plus, a full-specification DTV recorder featuring record and playback of SMPTE 274M/292M 1920x1080 interlaced signals (1080i) with the ability to switch to SMPTE 296M 1280x720 progressive scan video.

Circle (383) on Free Info Card

In an interesting technology demonstration, EMC was streaming video content in Real Video format while also playing back the *same* file using native Windows NT file systems and Windows Media Technology format. This is exciting news for anyone who is trying to manage multiple copies of media.

Asaca/Shibasoku showed a Fibre Channel video server/DVD archive that was really quite impressive. Asaca showed a 3.9TB DVD library connected to a Leitch VR server. As far as I know, Asaca was the only DVD vendor at the show who was demonstrating robots that could write on both sides of a DVD, increasing capacity to 5.2GB per disk. With cost that is comparable to tape archives, very quick access times, very stable media that should last at least 30 years, and with more than

100,000 write/rewrite cycles, the DVD's time may have come. Of course, material written to DVD must be heavily compressed, so the DVD may not be appropriate for everyone. However, in certain applications, this technology is sure to have an impact.

The JVC booth also had a DVD library system on display. The largest of the systems, the MC-7600 series, offered a 1.56TB capacity using up to six drives. For more information, see Pick Hits, p. 74.

### Automation

You may have heard of a company called Crispin Corp. Several years ago, they developed playback software primarily for Tektronix Profiles. Well, things have really changed. At the show, Crispin was showing a full automation system with all the functionality you would expect from a major player. Previous versions of their systems were written and compiled for a specific hardware configuration. Changes in hardware required a complete recompile of the system. Crispin has redesigned its software to make it hardware independent. The software consists of a number of end user applications such as play-out, compile, caching, etc., all interfac-

ing to a scheduler engine residing on a device server. The device server communicates with machine-specific DLLs. This is the only place where machine-specific code is used. The user can select different devices and the DLL is automatically included at run time.

In another major advance, Crispin incorporated an industrial-strength database, SQL 7, into their product allowing the software to support much more complex functionality than in the past. Using a database that is common in the



industry also allows the use of standardized interfaces between automation systems and customer business systems. Finally, SQL also readily interfaces to standard Web browsers such as Internet Explorer and Netscape.

Crispin software is now delivered as part of every Pinnacle 300 system. It is also available for the Panasonic DNA News Room system, the Quantel Cache-Box, Sony MAV 70s and, of course, the Grass Valley series of servers. This is a company that is on the move – watch this space. (I said the same thing about Pinnacle last year just before they acquired HP – look out!)

With the change in ownership announced in January of this year, it was interesting to take a look at the Louth booth to see what had changed. As it turned out, it was reassuring to see what had *not* changed. Of course, white Harris shirts were everywhere. Gone was the sharp Louth logo that made its debut at last year's show. But thankfully, the water bottles were still available.

Many of the familiar faces were still in place, especially some of the key developers and heavy lifters in the company. Ken Louth remains the chief technical officer. The new head of automation for Harris, Don Naab, was letting key ac-

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Website @ <http://www.ikegami.com>

Circle (135) on Free Info Card

# Ikegami

## Product Jackpot

Lemo was showing their complete line of connectors and patch panels. Lemo connectors are available in single, multi- or mixed contact arrangements. Also shown were fiber-optic hybrid connectors for DTV and HD applications.

Circle (437) on Free Info Card

A.N.N. Systems was showing OpenMedia, an automation system that delivers integrated low-res video browsing on individual desktops. The system allows users to create cuts-only video segments, browse or search and modify graphics instructions.

Circle (277) on Free Info Card

Tiernan showcased their TDR6 modular SDTV/HDTV receiver/decoder. The system offers six module slots to be used in SDTV applications requiring MPEG 4:2:2 SP@ML or 4:2:0 MP@ML and HDTV requiring MPEG 4:2:0 MP@HL.

Circle (434) on Free Info Card

Forecast Consoles was showing the Image master, a series modular components and custom-designed furniture for the broadcast environment.

Circle (325) on Free Info Card

Tektronix enhanced their RFA300 radio frequency analyzer to automatically pre-correct linear and nonlinear RF distortions when used with Zenith 8VSB transmitters.

Circle (395) on Free Info Card

Thomson Tubes showcased its TH 755, a water-cooled 44kW NTSC-compatible IOT that is fully interchangeable with most IOTs now in service in the same power class. The TH 755 features constant gain and exceptional operating stability.

Circle (433) on Free Info Card



Axon Digital was showing the ARC-3000, a 1RU aspect ratio converter designed for post-production and broadcast applications. The unit's major controls and presets can be accessed via the unit's control panel.

Circle (296) on Free Info Card

counts know that Harris intends to keep Louth independent from Harris' other business units.

On the product front, Louth continues to provide products that improve support of DTV and large systems. Louth announced a major change in their database structure. For many years, Louth used a Btrieve database – not exactly a household word. Louth announced at NAB that they now have an ODBC-compliant database. This will allow users to directly interface to the Louth database. It also will allow users to employ off-the-shelf solutions to improve database reliability, and it will make it much easier to interface the Louth system to existing business systems.

Louth also announced V-Chip capability with interfaces to EEG, Evertz and Norpak encoders, A DTV Manager that provides control of DTV transmission devices such as encoders and multiplexers, and a Media Browser providing access to low-resolution content.

Drake continues to make improvements to their core product. Many of these changes reflect a maturity that comes with a continuing understanding of the marketplace. Some of the changes announced at the show include support for SNMP, allowing the automation to report into a centralized monitoring and diagnostics facility; support for multiple time zones; support for complex DVE moves on station IDs; and improvements in fault tolerance.

OmniBus announced its Colossus multichannel system, and when they say multichannel, they mean it. The system supports a contiguous view of up to 1000 channels. The average broadcaster may not require this capability, but for complex Internet streaming applications and large pay-per-view and other multichannel playout facilities, OmniBus is definitely a contender. OmniBus is a UK-based company. They have won a number of large automation system contracts, primarily in Europe. Several years ago, OmniBus began to move into the U.S. market. They were assisted in these early efforts by Tektronix/Grass Valley. While OmniBus retains its strong ties to Grass Val-

ley, the company is stepping up its U.S. presence, opening offices in Nevada City, CA and Salt Lake City.

Automation can mean different things to different people. The systems described above are primarily station automation or playout automation systems. But automation helps the broadcaster in other areas too. Automation of graphical and Internet-related data is becoming more common, especially during election coverage. Video Design Software provides the critical "middleware" between graphics and station automation systems, such as Chyron,



Discreet, Peak, and Louth and the election and business systems that provide data for broadcast. At NAB, Video Design Software announced they were forming a new company to create broadcast-to-Internet solutions. The company announced interfaces to many typical Internet applications such as tickers, graphs, and URL data; Interfaces to Microsoft Web TV applications; and conversion of static or dynamic broadcast graphics to Web-based graphics. Another company, Mixed Signals Technologies Inc. out of Culver City, CA, is also providing much-needed interfaces for interactive content. Mixed Signals is involved in the production of interactive content with shows such as Jeopardy and Wheel of Fortune. Finally, to monitor all those various signals, a number of multiwindow display systems were shown. One of which is the Kaleido-QC from Miranda. It allows up to 16 separate signals to be displayed on a single screen. For more information, see Pick Hits, p. 74.

Circle (231) on the Free Info Card

*Brad Gilmer is president of Gilmer & Associates, and the executive director of the AAF Association.*

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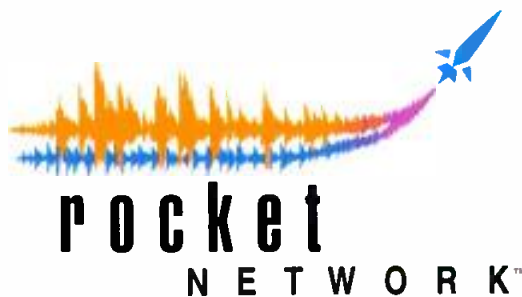
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Internet Recording Studios

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[www.americanradiohistory.com](http://www.americanradiohistory.com)



# Routing systems

By Paul Black

Signal routing has always been at the heart of most TV systems, either to allow for increased input ability to on-air or production switchers or, as the concept evolved, to make discrete signals within a facility available everywhere.

The X-Y Matrix routing concept offered a huge advantage when it came to getting signals sent to critical areas. Electronic controls and computerized control and mapping brought routing into a whole new subspecialty within the industry. Today, routers configured from 4x4 to 1024x1024 are standard items for many manufacturers. Electronic matrices are state-of-the-art. One change is in the number of signal types that can be routed. The biggest change, like most in the industry, is related to digital.



More and more manufacturers are recognizing the transitional state the industry is in. Many are providing for purchase of the basic components, such as frames, power supplies, and control accessories, and providing for matrix card upgrades at a later date. Routers with bandwidths that will accommodate true HD are becoming more common.

A common feature in any product that routes AES/EBU audio is some form of

fade or mute in the data stream at the point the audio is actually switched to eliminate the annoying pop that takes place during the switch. Most of the larger and even many smaller systems provide this capability. Along these lines, NVision (now ADC) displayed a new AES router, the Envoy 7256, that uses time division multiplexing (TDM). The TDM architecture provides considerable flexibility and size reduction. For

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Thomson Broadcasts' new light-weight, all-digital camera is designed for intensive use in all kinds of studio and many outside broadcast applications. The camera features digital triax link with no compression and easy-to-handle one-piece configuration.

Circle (409) on Free Info Card

Commscope was displaying Quantum, a series of HD video cables. The series delivers broad bandwidth with low attenuation characteristics for demanding high-definition requirements.

Circle (310) on Free Info Card

Evertz was also showing its 7705EO-HD, an HDTV reclocking electrical to fiber conversion DA, and its 7705OE-HD, an HDTV reclocking fiber to electrical conversion DA. Both provide conversion rates to and from serial video at 1.5Gb/s.

Circle (322) on Free Info Card

Standard Communication was offering the PSR942CI Alteia, a MPEG-2/DVB digital integrated satellite receiver/descrambler. The receiver is able to decode MPEG-2 4:2:2 Layer, Main Profile and 4:2:0 Main Level, Main Profile from a wide array of sources.

Circle (389) on Free Info Card

NEC America demonstrated the Digital Microwave Link, which incorporates both COFDM and MPEG-2 technologies. The system provides robust transmission and uses approximately half the bandwidth required by traditional analog transmissions.

Circle (351) on Free Info Card

Azden was showing its 411DRH, a standalone or rack mountable wireless mic receiver with 63 selectable UHF channels.

Circle (297) on Free Info Card

more information, see Pick Hits, p. 74.

A number of manufacturers now are offering routing systems that are exclusively digital in design. The ability to mix and match switching cards for digital signals is easier than within the analog domain(s), because such signals are simply digital data. Designers have a wealth of routing options from the data transmission world that can be ported to digital audio and video systems. Software control can also be implemented more easily, because control systems for data routing have matured greatly in the last few years.

Almost without exception, router control panels will control any router within a manufacturer's line. Additionally, some manufacturers have control system software and panels that will control their competitors' systems, or allow their systems to be controlled by competitors' software. The obvious advantage here is the ability to get your router system into facilities served by someone else's product.

GVG is also heavily into digital, with an extremely wide 1.5Gb/s product. It is, however, only available in a 128x128 size to begin with, so it remains a high-end item. Other products follow the more classic smaller-to-larger frame concepts as complexity and levels of control increase. Data cards of lower capability in many of their frames can be exchanged for those with higher video and audio needs like many other companies' products.

Videotek is addressing the trend in the smaller-size arena, adding to their line the RS series which, with its various models, will do simple 12x1 or 12x2 signal routing. Depending on the exact model, anything from HD signals to CCIR 601 to AES/EBU signals can be routed. Units can be stacked, and up to 30 levels can be created by adding different boxes together. While primarily designed to house stand-alone modules, such as DAs and converters, the Omniframe system provides a mix-and-match approach, allowing routing cards to be installed in it also. Different cards with different signal handling capabilities can be put into a common frame (up to 10 cards per frame).

Similarly, Sigma Electronics, who also specializes in smaller router systems, has some space-saving products, the MRX series, which are 32x32 routers

that fit within one rack unit of space. Different signal types can be controlled, and units can be stacked together to create larger and more flexible capability. Sigma also makes the 12X series, which includes 12x1 routers with high-bandwidth capability (120MHz), a somewhat interesting feature in smaller routers. Sigma sees this product as useful in QC stations and mobile systems, where space is at a premium but bandwidth capability is still critical.

Pesa is also approaching its next series of products with a heavy emphasis on digital and high-bandwidth applications. The Tiger is one of the few routers that can switch HD component video, in addition to most other digital video and audio standards. Space-wise, it can get as dense as 144x144 in 12 rack units. It also supports all video formats, including 1080i.

Sony has a new router product for the first time in several years, the X Series. Minimum size is 16x16, expandable all the way to a monster 1024x1024 routing system. Complete mix-and-match signal cards can be put into any frame any way the end user wants. Control and mapping again is computer-based under the BZR-3000 series software. Also, control panels are smart, with embedded ROM that can address many different router systems. Allowing for use with other companies' products is Sony's way of ensuring they won't make your existing equipment obsolete.

Leitch, another long-time distribution manufacturer, announced their frames can be tied together to a 512x512 matrix, which is large enough for many plants. They also allow control of the router via TCP/IP, Ethernet, Leitch X-Y control or other common control protocol. Upgrading cards to higher data rates and capabilities is also possible with their frames.

Chyron Corp.'s Pro-Bel division has also come out with new control software this year named "Aurora." It can map and control their systems and is backward compatible with other Pro-Bel products. They also have one router that does signal standards conversion. Analog video is digitized, routed and returned to analog at the output point.

Philips still supports all their older products in the field, which is considerable, and also has current product cards that can do 1.5Gb/s switching. They also



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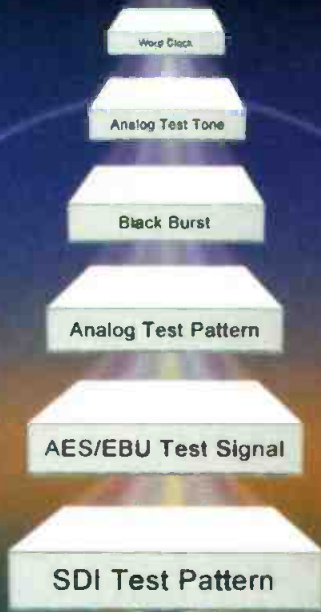
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have a unique control system, ATM (Asynchronous Transfer Mode), which means control over the Internet is possible. One could control routers in several cities from a central control point. Philips says several such systems are in use by its customers today.

If you are looking for audio-only routing, make sure you see Sierra Automated Systems audio routing systems. These are useful in dozens of ways, from providing difficult speaker/monitoring setups in on-air studios, to creating mix-minus for IFBs in the field. They also build in things that other manufacturers require you to buy external boxes for, such as digital processing of audio for delays, equalization, sensing, etc. Their products also route various forms of serial data formats.

The number of choices that are available for routing today are more flexible than ever before. If you currently plan to change or upgrade your router, there are plenty of options available both for today and for the future.

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*Paul Black is the acting engineering manager for KPIX-TV, San Francisco.*



## Format conversion/ synchronization

By Mike Betts

Format conversion covers a growing range of requirements from different field rates, line standards and aspect ratios, as well as conversion between analog component and composite and between the many digital television and computer formats currently in use. As digital television implementation progresses, the need to upconvert, downconvert and cross-convert between different formats will become routine. The addition of streaming media onto the Internet makes the format dilemma even more problematic.

Many products are available today to solve the main problem facing broadcasters of conversion between 480i and 720p or 1080i, enabling HD transmission of SD media. The acquisition format, however, governs the initial quality of material and the immediate need for conversion equipment. Use of material from outside sources or older archive material may also require additional conversions. Generally, footage should be archived at the highest quality possible to make use of high-resolution needs in the future. Ideally, the storage system should be able to manage the storage requirements and provide output in whatever format and data rates are required.

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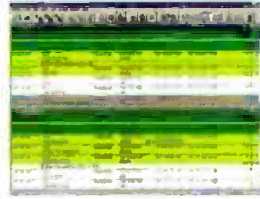


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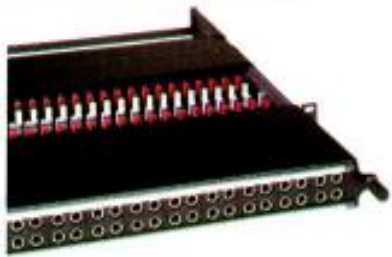
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Switchcraft showed its professional punchdown terminal, offering a split-barrel IDC terminal that allows for easy termination of audio patchbays. The unit accepts 22AWG through 26AWG wire.

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Doremi Labs introduced the V1-MP2, a digital random-access video recorder featuring MPEG-2 compression with 4:2:2@ML profile and up to 50 Mb/s throughput.

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Oxtel launched its PresMaster master control switcher, providing up to 200 automated channels that can be controlled by one operator, although the system is equally suited to single channels and manual operation.

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Maxell was showing its line of DVCPRO that features a durable shell and superior image quality. The M series is available in recording times from 12 to 66 minutes and the L series is available in 66 to 126 minutes.

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Ultimatte was showing the Ultimatte 9, a keyer designed for virtual studio applications. New features include Ambiance Logic, automatic background defocusing, and a programmable remote control.

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Telecast Fiber System introduced the HDTV Cobra, which extends HD cameras with fiber and can support multiple digital cameras on one lightweight tactical fiber cable.

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In the meantime, conversion equipment will be needed to convert from the abundance of existing formats and should be chosen based on the individual needs of the budget and local situation. While price and performance usually go together, lower priced equipment for non-critical functions will often fit the bill. For instance, the M9603HD monitoring DA from the Grass Valley Group provides HD distribution while providing a 480i SD monitoring output of the HD video with selectable aspect ratios. This allows monitoring in overscan, 14:9 or letter-box formats, solving the need for low cost monitoring while distributing 720p or 1080i to master control. A similar product is the MDC-800 from Miranda. This miniature unit attaches to the side of a Sony HDCAM and provides an NTSC monitoring output. Their VTR-100 provides compact conversion of analog VTR I/O signals for use in a digital facility. For more information on both these Miranda products, see Pick Hits, p. 74.

Many upconversion and downconversion products provide conversion from 480i to 1080i or 720p and back. Companies like Snell & Wilcox, Leitch, Miranda and DPS provide products to support these requirements. Products vary in the capabilities offered and decisions should be based on which features are needed. Features to consider are noise reduction, filtering and interpolation quality, motion detection, aspect ratio conversion, analog or digital, composite or component inputs, monitoring, and automatic input selection capability. Many companies use proprietary techniques to obtain conversion with improved filtering and interpolation results. A few companies offer cross conversion from 720p to 1080i. YEM provides this feature with two products, the HFC-1000 and HFC-292M. TeraNex is another company providing multiple format conversion capabilities with their XA6110PXC, which can convert between a very wide selection of formats. For more information, see Pick Hits, p. 74.

High-end conversion equipment needs to provide good quality conversion from

one format to another. Upconverting to a higher resolution is achieved by interpolation between the lines of fields or frames to achieve the desired result. Conversion between progressive and interpolated scanning systems is more problematic, and the prevention of motion artifacts requires special filtering and motion detection. At the top of the conversion product spectrum was an impressive demonstration by Faroudja, which exhibited a side-by-side comparison of native 1080i converted down to 480i and back up to 720p or 1080i with their DFT upconverter. Conversion up to 1080p was also shown with the DVP5000 to provide drives for applications like high quality projection



systems. Another company supporting conversion to 1080p was Miranda with their Aquila upconverter.

### Computer-to-video conversions

There is also the need to convert computer graphics, animation or computer-generated images into television broadcast formats. This requires close attention to processing in order to prevent the generation of illegal signal parameters (color gamut) or signal rise times that produce out of band energy when converted into the analog domain.

Extron, Communications Specialties and Analog Way are just some of the companies that provide conversion equipment for computer formats to those required by high resolution projection systems. These accept computer format signal inputs (VGA, SVGA, XGA, MAC, etc.) and provide component analog signals required for projection equipment or computer displays. Extron also introduced the P/2 DA1 video line driver that sends computer monitor signals over cables up to 250 feet. For more information, see Pick Hits, p. 74.

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## Product Jackpot



Leitch showcased its Opus, a multi-channel, high- and standard-definition unit that offers eight auxiliary video outputs and 16 primary and eight key inputs. It allows users to control the aux outputs from a range of router control panels.

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Odetics' Microstation is an automation system designed for smaller market stations. It includes digital disk storage, machine control, and software for automating program playback for VTRs, network feeds, and interstitial material.

Circle (356) on Free Info Card



Audio-Technica was showing the AT-895 adaptive array mic system. It uses the DSDA-PRO acoustically tuned element mic array and special analog circuitry and provides adaptive directional acquisition of sound sources

Circle (291) on Free Info Card

Aphex has customized the 1788 to allow customers to use only two, four or six channels, rather than the eight the preamp offers. Users then have the option of adding extra modules if needed to the short-loaded 1788, up to the maximum of eight channels.

Circle (288) on Free Info Card

Ensemble Designs provides multiformat conversion of MAC, PC and SGI graphics into serial digital video with their DS-1. This unit provides internal storage, network interconnectivity and support for key signals (alpha channel). AJA also provides conversion products to enable monitoring of HD signals on computer monitors by offering a converter, the HD10C, which has distribution capabilities and SVGA or CAV outputs. These offer the ability to provide high quality monitoring on lower cost display devices used by laptops or PCs.

As media servers become more common within broadcast facilities, the need to provide media storage that supports broadcast transmissions and media streaming will be required. The need for storage with simultaneous access at varying formats, qualities and data rates will require media conversion and a common storage format (or formats) to provide this capability.

### Synchronization

Products that provide video synchronization to a local reference have been around since digital technology was first introduced into the analog world.

Video synchronizers are available from many companies such as Videotek, TeraNex, Snell & Wilcox, Miranda, Leitch, Grass Valley Group and DPS.

The latest additions to this field are available as stand-alone units or as modular boards that plug into 19-inch rack frames. Often these units provide more than just the basic synchronization capability. An example is the 12-bit decoder and synchronizer from Fortel (FS-312) that provides conversion of composite analog to synchronized serial digital with proc amp controls.

The need to maintain the audio-to-video relationship while performing video synchronization is an important addition to synchronizers. A serial digital synchronizer combination, the DPS470 and DPS475, DPS provides video and audio synchronization with an adjustment range of 20 video fields.

Some Grass Valley Group converters can be fitted with the 8900FSS frame synchronizer option module that will

control a companion 8916 audio auto-tracking DA. Units with this capability allow the user to provide further adjustment of the audio delay that compensates for delays encountered elsewhere in the transmission path.

The transmission of video with embed-



ded audio can greatly reduce the problem of synchronizing audio and video. Make sure, however, that when de-embedding, the audio is provided with an equivalent delay and output in time with the video. Synchronizing AES audio is also a requirement in many installations and conversion equipment is now available that will convert both video and audio between different formats. The Leitch DFS-3005 accepts analog and digital audio and video (with embedded audio) and converts it to all these same formats on the product's outputs.

Another new area of interest is the ability to control or monitor individual units from one or more central locations. Many new products offer this ability, from modular DAs, synchronizers and converters to storage systems, routers and switchers. If this concept appeals to you it should be high on the list of features for any new equipment. Look for a system that uses a non-proprietary method of interconnecting to enable different manufacturers' equipment to be monitored without having to use multiple monitoring programs.

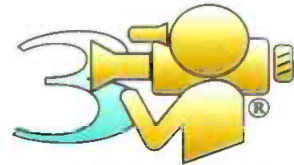
If you need to synchronize video and audio signals to a common reference or convert from one format to another, there are more products available today than ever before to achieve the desired results.

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*Mike Betts is the senior partner of Broadcast Training Partners, Nevada City, CA.*



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This unit features a dual channel, 20 segment LED level display along with 8 signal status LED indicators. Aural monitor outputs, headset or speaker, are provided. Available with 110Ω balanced input on an XLR3(F) connector, or 75Ω unbalanced input on a BNC connector.

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### ABB-1 Audio Bit Buddy™

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### ABS-1 Audio Bit Spitter

This ABB-1 companion product generates an AES/EBU or stereo analog test tone (400Hz or 1kHz). Digital signals are at 32, 44.1 or 48kHz sampling rates or may be referenced to an external source. Various signal levels may be selected.

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# Compression



By Phillip Hejtmanek

The operative term this year at NAB2000 was *bandwidth*. As broadcasters move into DTV, attention has been focused on the 19.39Mb/s ATSC bit stream and how to get the most from it. There is a continuing struggle in the broadcast community to produce a viable business model that can exploit this resource and begin to generate a payback on the tremendous investment made on DTV facilities. The need to get more from less has dictated the use of video compression equipment to put multiple programs on a given transmission channel or more video clips onto a server or storage device. Critical to all of these applications is video compression equipment, and there were many examples of such products at NAB this year.

Video compression is really another term for the process of data rate reduction. Compression involves identifying and removing redundant information within a video frame and redundancies from frame to frame. This allows a lower rate bit stream to convey a higher amount of picture information. Needless to say, there are tradeoffs associated with video compression, and objectionable artifacts will eventually appear in a heavily compressed picture. Several schemes for video compression have developed over time, and the debate still exists as to which is the best.

Current compression products generally use one of three basic compression



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## Product Jackpot

APW featured the ContrACKtor series. These extra-wide vertical cabinets provide superior storage and cable management capability for electronic equipment. They are available with fixed side panels or removable sides for multibay configurations.

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AutoPatch was showing the Epica 256, a routing system with a modular architecture that allows users to begin as small as 16x16 and build up to 256x256 per signal type.

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ProTelevision was offering the PT5664, a waveform analyzer that provides alignment and monitoring in component and composite video environments.

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Multidyne's DVM-2000 is a 12-bit video and 24-bit audio fiber optic multiplexer that will support one video, up to six audio and data channels.

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Viewgraphics' DTV:Xstream provides a bidirectional DVB-ASI, DVB-LVDS or DHEI interface that handles high bandwidth bidirectional multiplexing and demultiplexing stream processing, clean-cut splicing, table generation and transmission.

Circle (422) on Free Info Card



Calrec's M3 portable mixer is available in rackmountable and desktop sizes, and features four auxiliary sends, choice of input module types and a mix-minus send on each input.

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core of their content distribution system is a massive task, managing hundreds and eventually thousands of caches operated as one network. Companies such as iBeam Broadcasting and SkyCache are also gaining large market share.

Akamai's ([www.akamai.com](http://www.akamai.com)) FreeFlow service provides broadband customers with the technology for the reliable and scalable delivery of streaming content. Their content delivery service combined with Windows Media Technologies' high quality video and audio support and scalability makes them a key contributor to the Windows Media Broadband JumpStart initiative.

FreeFlow streaming is built upon Akamai's proprietary technology for the reliable delivery of Internet content. Akamai's service will enable Internet users to experience less packet loss and lower latency for higher quality and reliable delivery of Webcast content. The benefits include the reduction of jerky broadcasts, richer video encoding, higher fidelity audio and the creation of a larger picture than the current postage stamp standard.

Digital Island ([www.digitalisland.com](http://www.digitalisland.com)) is a content delivery service provider for the Internet. The company's initial service offering, Footprint, gives leading e-businesses the power to deliver web sites more efficiently and profitably while dramatically improving site performance. Footprint ensures the delivery of fresh web content of all types while providing management statistics that are vital to web-centric businesses. A leading provider of comprehensive content delivery solutions for e-business is expanding its global presence by deploying content delivery servers within Teleglobe's global backbone. Teleglobe will resell Digital Island's content delivery service, FootprintSM, to its e-business customers. As Internet traffic grows, web sites are challenged to find technologies that increase the speed and availability of their sites. This is critical for e-businesses whose sites are virtual storefronts. Launched more than a year ago, the Footprint content delivery network (CDN) speeds web site performance up to 10 times by distributing content from a worldwide network of servers, putting web content closer to the consumer and shortening the delivery path.

In addition to deploying servers within Teleglobe's global backbone, Dig-

ital Island will use Teleglobe's global network of Inktomi caches to quickly extend the reach of its Footprint service. Digital Island will house their servers in Teleglobe Internet access nodes and receive a direct connection to Teleglobe's global Internet backbone network. Leading Internet content providers using Digital Island's CDN will benefit from improved access to bandwidth-intensive Internet content applications such as multimedia, streaming video and e-commerce.

Adero's ([www.adero.com](http://www.adero.com)) AderoWorld service solves Web performance problems by ensuring that Internet users in Africa, Asia, Australia, Europe, and North and South America have a reliable and fast experience when they use the Internet. AderoWorld service delivers web content closer to the intended audience so that web pages and streaming media display at a very fast rate, often up to 70 percent or 80 percent faster than without the service. Adero's GeoTraffic Manager, an intelligent Internet mapping and routing algorithm, eliminates poor performance and dropped connections by redistributing Web content to the highest performing local server in the global marketplace.

SkyCache ([www.skycache.com](http://www.skycache.com)) uses a satellite broadcast network (GE-3 North America/ GE-IE Europe (KU Band)) to help improve the flow of information over the Internet. SkyCache makes its money from ISPs, who pay small fees for access, and content providers, who pay much larger amounts to have their information transmitted. SkyCache will enable content aggregators and content delivery networks to cost-effectively broadcast streaming media content directly to broadband points of presence without the need to scale terrestrial distribution networks to handle increased bandwidth requirements. SkyCache's streaming media service provides infrastructure and technology that enables broadband media to be delivered to points of presence at the edges of the Internet by broadcasting the stream via satellite to sites equipped with its downlink reception equipment. Currently, SkyCache has over 200 downlinks installed at ISPs in North America and Europe with coverage to the Pacific Rim and Latin America anticipated in the year 2000. By bypassing the sources of Internet con-

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Orad introduced a Cyberset plug-in for webcasting and interactive video, which allows user to create clickable video online and generates an enhanced video output with X/Y coordinates of any element in the image.

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Ampex's Quad Density Data Tape Drive provides uncompressed storage of 660GB on a single cartridge. The new DST data drive doubles the storage capacity of the Ampex automated archive libraries.

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Adherent introduced the Stream Grabber, a lightweight tool for field engineers working on compression equipment installation and service.

Circle (290) on Free Info Card

Vertigo Multimedia's Producer ON AIR incorporates state-of-the-art, easy-to-use software tools for efficient creation of automated broadcast graphics for any live television production.

Circle (418) on Free Info Card

Utah Scientific's Utah-1500 provides flexible migration into the HD environment and flexible control systems that interface with all current Utah series routers, master control and the earlier AVS routers.

Circle (417) on Free Info Card



Tadiran Scopus unveiled the Codico E-1500 DSNG Encoder a 2RU encoder designed to meet stringent DSNG requirements for mobile applications. The encoder can be installed in vehicles, helicopters, and other mobile or fixed locations.

Circle (393) on Free Info Card

Marconi Applied Technologies was showing the IOT900/D3000, a range of high-power plug-in IOTs for analog and digital transmitters. The series offers excellent linearity with up to 77 + 7.7kW analog and 135kW peak digital power.

Circle (346) on Free Info Card

gestion, this infrastructure provides a higher quality of service over typical terrestrial transit, is scalable, and is well suited for very large live events.

I-Beam ([www.ibeam.com](http://www.ibeam.com)) has created one of the world's largest satellite-based network for distributing streaming audio and video content for Internet media companies. The architecture of the iBeam Network allows iBeam to deliver more than 300,000 simultaneous streams, three times more than any other network. Emulating the quality of the broadcast television model, iBeam's distributed network of servers is connected via satellite broadcast, creating a series of Internet headends worldwide. This architecture enables iBeam to deliver streams with breakthrough pricing — pricing that allows content providers to webcast profitably and build a robust business.

PanAmSat ([www.panamsat.com](http://www.panamsat.com)) is a division of Hughes and the world's leading commercial provider of satellite-based communications services. PanAmSat operates a global network of 19 satellites and seven technical ground facilities. These resources enable the company to relay video programming and digital communications to hundreds of customers worldwide. Currently they provide Internet service in more than 50 countries, including Japan, Paraguay, Indonesia, Zambia and New Zealand, which obtain access to the U.S. Internet backbone over PanAmSat's satellite system.

Gilat ([www.gilat.com](http://www.gilat.com)) has recently purchased the Spacenet assets from GE. These were the original GTE Spacenet satellites. They are now offering SkySurfer VSAT with terrestrial return (2Mb/s to 35Mb/s) and Skyblaster with satellite return.

SkySurfer VSAT delivers broadband video and data directly to the LAN or desktop. SkySurfer provides a hybrid solution for broadband data access delivered over the satellite, with the return path utilizing any terrestrial connection or existing Intranet. SkySurfer is a PC-based DVB satellite receiver. The SkySurfer hub delivers a scalable 2Mb/S to 35Mb/s pipe with a terrestrial return channel. It provides individual IP access for Internet/Intranet browsing (unicast) and IP multicast capabilities.

SkyBlaster VSAT delivers broadband video and data directly to the LAN or desktop, using a PC-based satellite transmitter as a return channel. With digital

video broadcast (DVB) outbound carrier complemented by Gilat's unique satellite return access scheme, SkyBlaster offers a fully interactive VSAT on a corporate LAN server or desktop.

Teleglobe ([www.teleglobe.com](http://www.teleglobe.com)) seems to have a major push on streaming media. They have been touting their satellite capabilities to move data globally but also to limit its access within regions. Teleglobe, a leading provider of advanced global broadband services, will provide IP Transit over its multicast-enabled global Internet backbone network to deliver broadband streaming media programming. The programming will be delivered to Teleglobe's ISP customer base in over 100 countries including the U.S. and Canada.

Telestream ([www.telestream.net](http://www.telestream.net)) was showing a practical delivery tool for video communications. ClipExpress can be used for distribution of training programs, content creation collaboration and approval. For more information, see Pick Hits, p. 74.

### Real-time encoding and service bureaus

Loudeye.com ([www.loudeye.com](http://www.loudeye.com)) offers digital media applications for audio and video content on the web. These diverse applications include extending the site offerings to include streaming video, audio and images; adding "stickiness" by increasing the user's length of stay and interaction on the site; and creating additional revenue opportunities through advertising and e-commerce. In addition, they specialize in low cost encoding.

Entertainment Blvd. ([www.encoding.entertainmentblvd.com](http://www.encoding.entertainmentblvd.com)) is an end-to-end post to stream shop. They claim to be different because they also create/own some of their own content. They list high-end component video signal routing. They are/were a component Betacam production company and still use the analog router to move their video around. While this is a nuance, it means that during a conversion from tape to digital the signal must remain in the analog domain until final encoding.

Digital Outpost ([www.dop.com](http://www.dop.com)) was among the first MPEG compression facilities in the United States. They offer high-quality output and are a full service encoder with production/post-editing/compression and hosting/stor

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##### MTP48K3BPNO

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age. Their strategy of growth and quality has made them the choice for critical encoding jobs.

Activate.net ([www.activate.net](http://www.activate.net)) claims to be an end-to-end streaming provider. They seem to specialize in event-based media but push a whole range of services from post production to hosting and satellite delivery.

Streaming Experts ([www.streamingexperts.com](http://www.streamingexperts.com)) is an end-to-end service provider of streaming media. They showcased video on IBM's netfinity servers using Resonate's Central Dispatch and Commander software. They offer pre/post production, video and audio streaming, encoding, hosting, and hardware sales. The company is a small multimedia post house entering into the streaming field.

Optibase ([www.optibase.com](http://www.optibase.com)) is an award-winning, global leader in broadband digital video-networking solutions and MPEG-based digital video content creation tools. They provide solutions that enable the transmission of video over digital networks, from IP multicasting over LAN and Intranets to ATM and satellite networks. Optibase's digi-

tal video networking products include a range of DVB-compliant tools that form the basis of digital video transmission applications such as distance learning and business TV. Their product line includes encoding and playback solutions as well as software tools that enable immediate integration into large scale networking applications. This saves engineering resources and cuts product development cycles.

Sorenson ([www.s-vision.com](http://www.s-vision.com)) offers a versatile software-only tool that features preset configurations, making live broadcasts possible within minutes of installation. Custom options address fully professional webcasting requirements. These broadcasts can be transmitted using standard Internet streaming protocols and are compatible with any QuickTime streaming server.

Sightpath ([www.sightpath.com](http://www.sightpath.com)) offers an easy to use media creation and distribution hardware meant for a LAN environment to move streams around efficiently.

Eloquent ([www.eloquent.com](http://www.eloquent.com)) delivers personalized and accessible business communications via the web or

CD. They combine advanced rich media technology with full-service production capabilities, typically resulting in a cost effective and more productive alternative to live speaker presentations.

### Hardware

Akoo ([www.akoo.com](http://www.akoo.com)) has developed a hardware device that allows a connected PC to transmit audio to an FM receiver. This device connects to the USB and audio outputs, modulates the signal using 900MHz to a receiver unit that is used for tuning and retransmission to an FM radio.

SonicBox ([www.sonicbox.com](http://www.sonicbox.com)), similar to Akoo, takes Internet radio out of the computer and puts it back into the radio. Sonicbox is focused on Internet radio, and the biggest obstacle to Internet radio going mainstream is that the most consumers do not use the PC as an entertainment device. The Sonicbox allows users to sit in front of any FM radio in their homes and listen to hundreds of pre-selected Internet radio stations.

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*Steven Blumenfeld is chief technology officer for Winamp/Spinner-AOL, San Francisco.*

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AccuWeather spotlighted the new version of its UltraGraphix Ultra (V2.06). The upgrade provides current satellite and radar observations right up to airtime and automatically updates the weather presentation to include the latest weather information.

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Ktech introduced the VSB-REMOD-200, which receives an 8VSB signal on-air or via cable, demodulates to baseband data, and corrects multipath errors by forward error correction and equalization techniques and remodulates it into a new 8VSB signal.

Circle (338) on Free Info Card



CPI Eimac introduced the K2 Squared IOT power amplifiers, which feature a stable, out-of-the-way storage position and uses a cam-guided insertion mechanism to ensure positive connection to the IOT.

Circle (312) on Free Info Card



Trompeter's J314W allows full 1080i uncompressed signal processing for HD and it accepts 2.25GHz as maximum requirement for coax in-station wireline for HD on a terminated jack.

Circle (415) on Free Info Card

# Camera & lens technology



By Bob Bergfeld

One fall Sunday afternoon in the late 1950s, I can recall my parents dropping me at a friend's house to watch television. We were watching television there because they had one of the few color television sets around. The "Wonderful World of Disney," one of the few programs that was broadcast in color, was broadcast on Sundays. Over the ensuing decade, the evolution of color television occurred. Color programs and televisions became the standard of the industry by the late 1960s. Now evolution begins once again to digital and high-definition television. If the number of cameras and video recorders introduced at this year's NAB is any indication, this time the evolution may be at a much quicker pace. Nearly every camera and video recorder manufacturer introduced new products focused on digital and high-definition technology, not only for television but for the film industry as well.

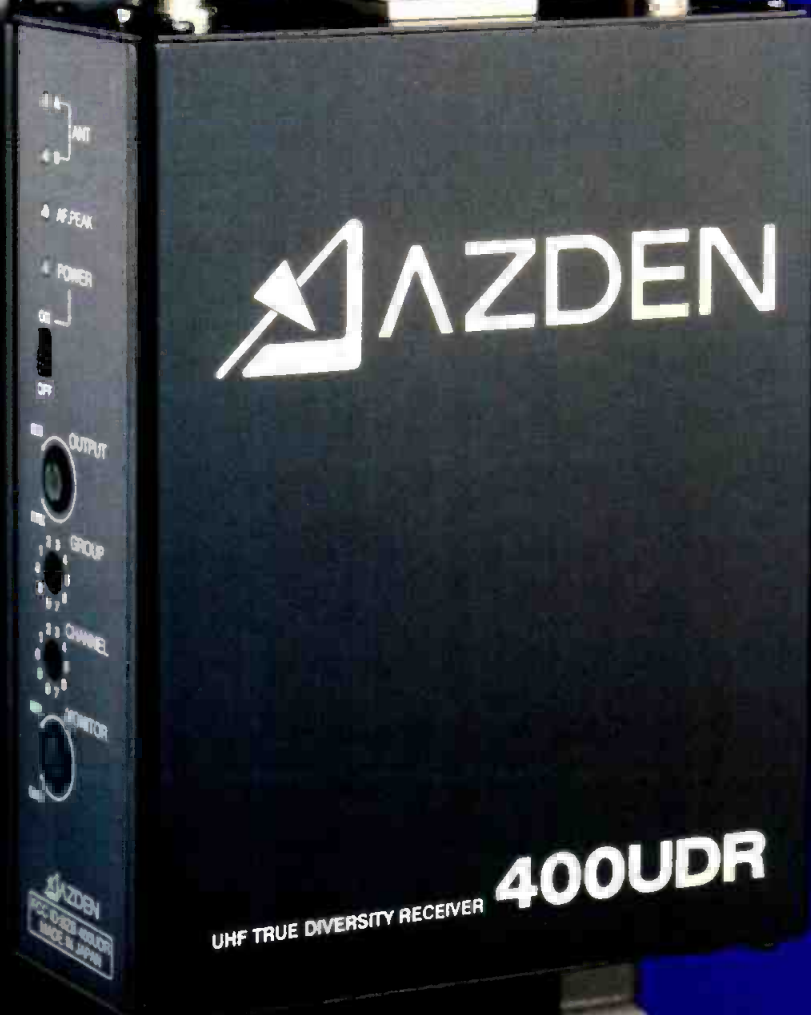
Among the manufacturers showing 24-frame products were Panasonic, JVC and Sony. Panasonic introduced the AK-HC900 series of multifunction HD cameras. The series can operate in 1080/60i, 1080/24p, and 720/60p high-definition formats, as well as standard-definition 480/60i. Each high-definition standard is native to the camera and is selected at the time of purchase. Camera base station outputs are simultaneous HD-SDI and SDTV. The camera is available in either studio or handheld configurations. The AK-HC900 series cameras will be available in the first quarter of 2001. JVC

exhibited prototype 24-frame camera and video recorder technology developed in conjunction with 20th Century Fox and Quad 1. Product availability dates were not announced. Sony has expanded the 24-frame products to include the HDC-900 and HDC-950 camera systems. The camera system features a newly developed 2.2-million pixel CCD imager, and 12-bit A/D converter. The new cameras feature five selectable capture rates: 1080i at either 60 or 50 fields per second, and 1080p at 30-, 25- or 24f/s. The cameras can also provide optional 720p outputs, in addition to a variety of SD outputs at 480p, 480i or 576i, as well as further options for NTSC or PAL formats.

NAB2000 saw the introduction of several new high definition multifunction cameras and camcorders. LDK6000 series high-definition portable cameras were introduced by Philips. These cameras contain 9.2-million pixel, 2/3-inch CCD imagers and are available in switched and non-switched versions. It supports native 1080i/60, 720p/60, as well as high-end SDTV formats. The LDK6000 series has 12-bit A/D converters, with digital processing at 22 bits. The camera's triax system can transmit up to 3000 feet utilizing standard triax cable. Studio conversion is accomplished via the Philips SuperXPander large lens adapter. Future plans for the camera series include a fiberoptic adapter. Philips has also introduced the LDK 1200 DVCPRO HD camcorder. Imaging for the camcorder is accomplished with 2.2-million pixel, 2/3-inch FIT CCDs in 1080i/60. Audio is eight channel with

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Circle (160) on Free Info Card

16-bit/48kHz sampling; the camera processing is 10 bit. The camcorder is also equipped with component monitor output for full color playback.

Ikegami's high-definition introductions included the HDK-720p camera system, and the HDL-V90 DVCPRO HD camcorder. The HDK-720p employs their newly developed 2/3-inch one megapixel CCD image sensor; 480p and 480i formats can also be supported via the CCU downconverter. Available in both studio and portable configura-

tions, the HDK-720P utilizes a 12-bit A/D converter with internal processing approaching 30 bits. Signal transmission and power feed between the camera head and CCU is via fiber optic composite cables for distances of up to 3000 meters in the portable version, and up to 2000 meters in the studio version. The Ikegami HDL-V90 camcorder employs 2/3-inch, 2.2M pixel 1080i FIT CCDs. Like the HDK-720, the HDL-V90 offers 12-bit A/D conversion with internal processing at 30 bit.

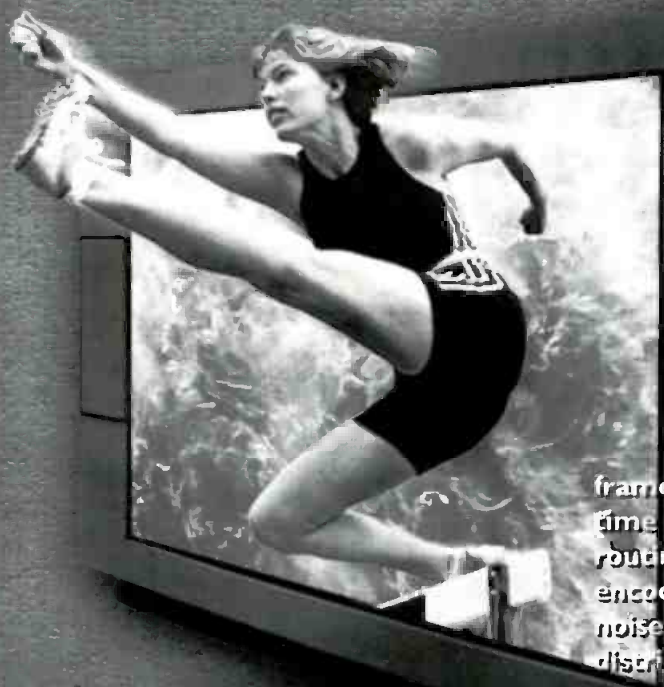
Camcorder features include a rotary encoder, memory card set up with the Smart Media SSFDC 8MB memory card, auto hue detect, and external VTR connections. The video recorder component is DVCPRO HD. Two Panasonic DVCPRO HD camcorders were shown at this year's NAB. The AJ-HDC20A 2.2-million pixel FIT and the AJ-HDC10 one million-pixel IT CCD camcorders both offer 10-bit digital signal processing and have 46 minute recording time in 1080i with two channels of 16-bit/48kHz digital audio. Both camcorders have low power consumption (30W), utilize standard 2/3-inch bayonet lenses, a PCMCIA memory card and are equipped with a SDI output. The camcorders are about 15 pounds each and have a jog dial for menu selection.

Hitachi introduced its first high-definition graphics camera. The DK-H3 utilizes the 1080i format and incorporates 2.2-million pixel, 2/3-inch IT CCDs with 1100 lines of horizontal resolution. The camera is lightweight (1.2kg) and can be remotely controlled through its RS-232 port.

Both Sony and Panasonic have introduced tape-based high-definition products. Sony introduced a new high-definition dynamic motion control video player. The HDW-2100 has the capability to play back all of Sony's 1/2-inch professional formats including HDCAM, Digital Betacam, Betacam SX, Betacam SP, Betacam and the new MPEG IMX format. The HDW-2100 is 1125-60i/50I switchable for HDTV, and 525/62.5 for SDTV. It has the ability of upconverting any of the Betacam formats to high definition and downconverting HDCAM to standard definition. The player provides digital output of both HDTV and SDTV formats, as well as outputs for analog composite and component. The HDW-M2100 provides four channels of independent audio that can be edited on the HDCAM format. Up to eight channels of independent audio can be edited in the SDTV format.

Panasonic has introduced the AJ-HD3700 D-5 HD multifunction mastering VTR. The AJ-HD3700 can support standard-definition and multiple high-definition video formats. It can record and play back 525 D-5 and D-5 HD cassettes, as well as record and play 1080/24p, 1080/25p, 1080/60i, 1080/

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## Product Jackpot

North Star's Best Power Axxium Pro is a high-frequency, transformerless UPS with standard online operational modes of on-battery, double-conversion and fault bypass.

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Louth was offering Weblink, a product developed in cooperation with Microsoft that allows the Louth system to communicate with Windows CE-based set-top boxes and permits the preloading of a URL into the STB.

Circle (344) on Free Info Card

Anton/Bauer was showing the Hytron System, a series of 50W and 100W hour high-performance batteries. They can be charged with any existing InterActive charger and offer low impedance.

Circle (287) on Free Info Card



Sony's Recording Media division was showing 1/2-inch videocassettes designed for use in MPEG IMX VTRs. In the MPEG 50 mode, these tapes offer three-hour recording times in large cassettes and up to 60 minutes in small cassettes.

Circle (387) on Free Info Card



BARCO launched their ADVM 28 digital broadcast monitor, adding to their ADVM line. The ADVM 28 is a 28-inch hybrid digital/analog monitor, featuring SDI and composite inputs. The monitor offers full remote control compatible with other BARCO monitors.

Circle (298) on Free Info Card

50i, 1035/60i, and 720/60p high-definition standards. The AJ-HD3700 has 10-bit component recording at 74.25MHz (Y) and 37.125MHz (Pb/Pr) sampling and offers metadata recording. It also offers eight digital audio channels that support 5.1 channel surround sound and stereo in the HD format, as well as Dolby E. The recorder can also play and record four- or eight-channel audio from previous D-5 HD VTRs and supports eight-channel audio. Recording time for the AJ-HD3700 can be up to 155 minutes when recording 1080/24p, with lower recording times of 124 minutes and 149 minutes in other HD formats. Variable speed slow motion (-1 to +2) with auto tracking heads is also included with the deck. Among the options for the AJ-HD3700 are an SDTI compressed data interface and an internal format converter that can convert between 720 and 1080 line high-definition signals, and downconvert to 480/60i or 480/60p 525 line standards, or 576/50i for 625 line standards. For more information, see Pick Hits p. 74.

Several standard-definition, switchable aspect ratio cameras and camcorders were also introduced at NAB2000. JVC introduced the GY-DV700W switchable aspect ratio camcorder. This DV-type camcorder is fully compatible with both DVCAM and DVCPRO formats. The GY-DV700W is switchable between its 16:9 aspect ratio and the traditional 4:3 ratio and features three new 2/3-inch IT CCDs. Sensitivity for the camcorder is  $f11@2000$  lux, with the camera portion delivering the equivalent of 750 lines of horizontal resolution. Features include 14-bit digital signal processing, full auto white, genlock, black stretch/compression and a zebra level indicator.

Hitachi unveiled the SK-777 dual aspect ratio portable camera. The SK-777 has a 12-bit A/D converter and 2/3-inch 640,000-pixel FIT CCDs. The camera has 850 lines of horizontal resolution and a sensitivity of  $f11@2000$  lux. The camera also incorporates automatic flesh-tone detail and plug in set up cards. Hitachi has also introduced the HV-D5W selectable aspect ratio camera that is directed to graphics, pan/tilt, and tower type applications. The camera incorporates 2/3-inch 510,000-pixel CCDs, with a sensitivity of  $f11@2000$  lux. Other features include an automatic electronic shutter, auto iris and AGC.

Ikegami introduced the HL-DV7W DVCAM dual aspect ratio camcorder. The camcorder contains 2/3-inch, 520,000-pixel, 16:9 IT CCDs; and the sensitivity can be enhanced to 48dB, allowing a minimum illumination of .12 lux. The HL-DV7W has 10-bit A/D conversion, an i.link terminal, a series of detail functions, and has an S/N ratio of 55dB. The camcorder's horizontal resolution is 750 lines. Ikegami also introduced the HL-59WNA extended optics digital portable camera. The camera's optical assembly can be separated up to 20 meters from the camera body for special system applications such as helicopter gyro-stabilization. The selectable aspect ratio camera employs the same 520,000-pixel IT CCDs as the HL-DV7W. Significant specifications include a 70 percent depth of modulation, an S/N ratio of 62dB, 42dB gain, and a minimum illumination of .25 lux/f1.4. Ikegami further introduced two new Editcam-2 hard disk based dual aspect ratio camcorders. The DNS 201W contains 520,000-pixel IT CCDs, and the DNS 21W contains 520,000-pixel FIT CCDs. The resolution for both camcorders is 600 lines with a signal-to-noise ratio of 62dB. Both camcorders have selectable gain from -3 to +48dB and 10-bit D/A processing.

Panasonic has introduced the AJ-D610WA 16:9/4:3 DVCPRO camcorder. The AJ-D610WA has 10-bit digital processing and contains 520,000-pixel IT CCDs. The camcorder consumes less than 24W and weighs 14.5 pounds. Other features include a PCMCIA memory card, a 1.5-inch viewfinder, internal color bar generator, genlock, six speed electronic shutter, monitor speaker and a phantom power supply. The camcorder also incorporates 36dB gain for low-light applications. To further expand DVCPRO camcorder capabilities, Panasonic has introduced a digital triax system. The system is comprised of the AJ-CA900 camera adapter, the AJ-B900 base station and the AJ-RP900 repeater. The system can transmit digital component video signals for distances up to two kilometers with the inclusion of three repeaters. Signals available at the base station include SDI, 4:2:2 digital component, analog composite video, program audio, RTS and ClearCom intercom and tally. Signals available at the camera include prompter video, the choice of one of two channels of return

# AD953-II



## NEW Features and Capabilities!

The AD953-II provides a complete test solution with the capability to record, playout and monitor HDTV streams in real time. It provides you with the ability to capture, edit and analyze complex transport stream with multiple video, audio and data services.

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Record, playout at 90 Mbits/s continuously with looped streams and automatic updating of timestamps.

### Real-time Monitoring

Provides PID and program oriented bar charts, moving PCR timing, TS rate and fullness plots. Features full display of PSI/SI/PSIP information and flexible trigger-based capturing of errors. It also includes extensive logging with colored fault identifiers and ETR290 and ATSC compliance checks.

### Stream Creation

The AD953II provides Multiplexer/Demultiplexer to create multi-program transport stream with custom SI for both DVB and ATSC.

### Stream Manipulation

Provides stream cutter, packet editor, and PSI/SI/PSIP editor.

### Enhanced Hardware

The AD953-II is designed around a Pentium II platform with 17" monitor and DVD/CD-ROM. It provides dedicated stream storage (9 Gb expandable) with sample test streams. The Stream Station II is available with a wide range of interfaces including DVB-SPI, ASI, DHEI, M2S, SMPTE 310M, L-Band, and others under development.

# HDTV Solutions from Sencore

The AT970 ATSC "Stream View" from Sencore, has been specifically designed to provide a system solution for HDTV multiple stream real time monitoring.

The AT970 allows:

### Transmission quality to be maintained

Through continuous monitoring at multiple points in the broadcast chain stream errors and potential equipment failures can be quickly detected and corrected.

### Comprehensive error testing

Stream View detects errors such as EPG failure which cannot be effectively identified by a wall of video monitors.

### Lower operating costs

Incorporated as part as a networked monitoring system, multiple Stream Views can be linked to a central monitoring point which can be more efficiently managed.

Circle (162) on Free Info Card

### Reduced operator learning curve

Stream View has been designed to be used by engineers who are not MPEG/ATSC experts, the intuitive GUI presents error status in a simple, yet powerful format which is easily understood.

### Increased equipment reliability

Stream View provides a detailed fault log which can be used to pinpoint regular failures allowing remedial action to be taken.

Stream View is designed to meet your complete real time monitoring requirements, forming part of a network control system solution. The AT970 provides you with a cost effective, scaleable, flexible and upgradable monitoring system.

# AT970 ATSC "Stream View"



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video, intercom, two program audio channels, camera control and DC power.

Sony introduced the DXC-D35/D35WS series cameras with 10-bit A/D processing. The D35WS is selectable between 16:9 or 4:3 aspect ratios. Features common to both cameras are skin detail correction, 19-step color temperature adjustment at 3200K and 13-step color temperature adjustment at 5600K, multiple gain selections including 42dB, built-in 1kHz audio reference, adjustable black stretch and compression, dual zebra striping, and self diagnostics.

Thomson exhibited their 1657D/1557D series of switchable aspect ratio cameras. The series is available in wide variety of configurations that include portable and studio.

### Standard-definition offerings

Although not in as great an abundance as in years past, standard-definition 4:3 cameras and camcorders were introduced by several manufacturers. Philips introduced the LDK-200 digital camera system, the successor to the LDK-20PS. The portable triax camera

weighs 10.8 pounds, possesses a rotary triax connector, has three layers of remotely controllable filters comprised of individually selectable ND and FX filters, as well as electronic gel filters. The camera fully supports TFT prompts with both signal and power. Studio conversion is via the Philips LDK 4482 large lens expander kit.

The DY-70 D-9 camcorder was introduced by JVC. The camcorder is all digital 4:2:2 and incorporates 380,000-pixel 1/2-inch IT CCDs. The DY-70's sensitivity is  $f11@2000$  lux, with a minimum illumination of  $.75$  lux@ $f1.4$ . Automatic functions include auto white tracking and automatic video level control. The VTR portion is 50Mb/s, 1/2-inch component digital D-9. JVC has also introduced the GY-DV550 camcorder as a companion to the very popular GY-DV-500 camcorder. The GY-DV550 incorporates all the features of the GY-DV500 with the addition of a built-in 26-pin interface for CCU control and intercom capabilities.

Sony introduced two new DVCAM camcorders. The DSR-300A camcorder contains 10-bit A/D processing with 1/2-

inch CCDs. Other features include i.link communication, multiple gain selections including 36dB, 19-step color temperature adjustment at 3200K, 13-step color temperature adjustment at 5600K and skin detail adjustment. The Sony DSR-PD150 DVCAM camcorder contains 380,000-pixel 1/3-inch CCDs. The camcorder comes with a 12x zoom lens, has two-channel XLR connectors with a 48V phantom power supply and a 2.5-inch built-in LCD monitor.

Sony unveiled the MSW-2000 series of MPEG IMX VTRs. The IMX series consists of three different models. The native recording format for the series is MPEG 4:2:2; however, based upon the selected model, the MSW series is capable of multiple types of Betacam playback. The MSW-2000 supports MPEG IMX and Betacam SX playback. The MSW-A2000 supports MPEG IMX recording with MPEG IMX, Betacam SX, and analog Betacam playback. The MSW-M2000 supports MPEG IMX recording with MPEG IMX, Betacam SX, analog Betacam and Digital Betacam playback. For more information, see Pick Hits p. 74. The MSW-2000 series supports multiple input and output bit rates of 30Mbps, 40Mb/s and 50Mb/s, with all recordings are stored at 50Mb/s. The MPEG bit stream data transfer is over standard SDTI, allowing transfer to other MPEG devices including nonlinear editors. The series also supports all editing functions including pre-read, variable speed control and high-speed picture search. Audio includes eight 16-bit digital audio signal channels or four 24-bit digital audio signal channels standard.

### Lenses

As the camera manufacturers introduce new high-definition products, they create a need for more advanced technology and higher quality lenses. The lens manufacturers have responded by introducing several new advanced technology lenses, with many directed to high definition and cinema technology.

Many of the introductions from Fujinon at NAB2000, were directed to the cinematography market and begin with the introduction of a series of five high-definition cine-style prime lenses. The series features markings for zoom, focus, iris, and cine-compatible gearing for interfacing with existing cine controls and



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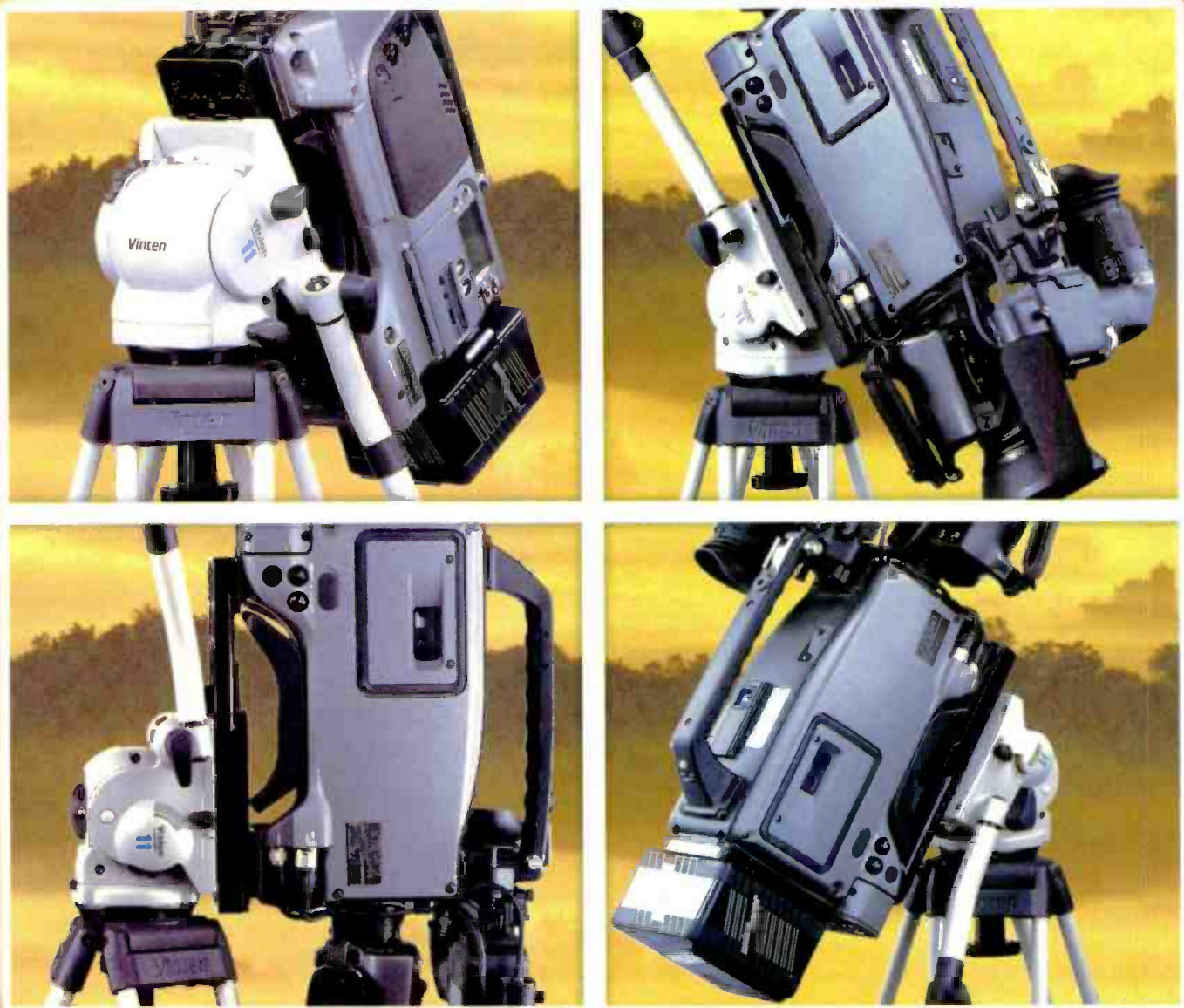
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## Product Jackpot

Wegener introduced its UNITY5000 Pro broadcast receiver for MPEG-2 4:2:2 and 4:2:0 recording in high-quality contribution and video distribution networks. The receiver features MPEG-2/DVB-compliant operation and support for advanced modulation formats.

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Communications Specialties was showing its Scan Do Pro II, which features studio timeable genlock, component output (YUV or RGB format), switchable vertical filter and optional SMPTE 259M serial digital output.

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Panasonic showcased their new AJ-D610WA 16:9/4:3 switchable, 2/3-inch IT three CCD camcorder which allows users to shoot in 4:3 or 16:9 widescreen. It also features 66 minutes of record time, 10-bit digital signal processing and an S/N of 55dB.

Circle (362) on Free Info Card



Magni Systems introduced the SDM-560, a monitoring system for both Serial 601 and composite analog video. The composite, S-video and SD 601 display outputs on a single screen that provide picture, waveform, vector, audio and digital readouts for monitoring

Circle (345) on Free Info Card

Telemetrics unveiled the TM-CTS, a lightweight, low profile curved camera trolley track for a wide range of applications. The system features easily mountable aluminum tracks, smooth, quiet operation and can be configured to a single coax cable connection.

Circle (397) on Free Info Card

matte boxes. Among the prime lens series is the HAF5B-10 wide angle lens that features an angle of view of over 87 degrees, and focusing as close as .5 meters. This series also includes the HAF40B-10, featuring an angle of view of slightly over 13 degrees, with focusing from .5 meters to infinity. Fujinon introduced two cine-style high-definition zoom lenses with the same cine markings as their prime lens series. Both lenses also incorporate Fujinon's newly developed inner focus mechanism, with low dispersion, highly refractive, lightweight glass. The HA10x5B-10 cine style high-definition zoom lens provides a wide angle of view over 87 degrees with a 10 x zoom range. The HA20x7.8B-10 offers a 7.8mm minimum focal length and a zoom range of 20 x. Fujinon has further introduced new high-definition studio and field lenses. The HA22x7.2ESM high-definition studio zoom lens has a 22x-zoom range with a wide end focal measurement of 7.2mm. Zoom, focus and iris servo controls are fully digitized, with key features being digital quick zoom, one shot preset, angle of view compensation while focusing, and f number limit. The 2 new high definition field lenses are the HA10x5E and the HA20x7.8E. Both lenses feature a new servo module, quick zoom, inner focus, one shot preset and RS-422 control. An additional feature, Cruise Zoom, allows the operator to fix the zoom speed to a selected constant rate.

Fujinon also introduced several standard-definition lenses. The A17x7.8E lens is directed towards the broadcast news and production markets. Maximum lens focal length is 133mm (266mm with the 2x extender) to 7.8mm. The lens features Digi Power servo and quick zoom. The Digi Power series of zoom lenses from Fujinon has been expanded with the introduction of the Ah80x9.5E and the Ah80x13.5. Both are directed to extreme close-up applications. The Ah80x9.5E features focal lengths of 9.5mm to 760mm (19mm to 1520mm with the 2x extender), while the Ah80x9.5E features focal lengths of 13.5mm to 1080mm (27mm to 2160mm with the 2x extender). Both lenses incorporate all the features of the Digi Power series.

Canon has introduced two cine style HD-EC high-definition zoom lenses to accompany their existing series of high-definition prime lenses. The HD-EC lenses incorporate cinema type markings

with the T-stop measurements and distance scales marked from the plane of the CCD. The lenses have .8 modulus gears on the zoom, focus and iris rings to provide compatibility with studio follow focus rigs, manual fluid zoom drives and motorized control systems. The HJ9X5.5BK.L-SC is 5.5 to 50mm T2.3 macro zoom, while the HJ18X7.8BK.L-SC is 7.8 to 144mm T2.5 macro zoom. Canon also introduced a newsgathering high-definition zoom lens, the 16 HDxs (HJ16x8B IRS/IAS). The lens contains Canon's xs technology, as well as Canon's new Digital Drive. Digital Drive incorporates several new features including Shuttle Shot, allowing the operator instant back and forth zoom between two preset positions Speed Preset the ability to use a preset zoom speed multiple times, and Framing Preset multiple time recall of a preset zoom position. The HJ16x8B IRS/IAS is the successor to Canon's HJ15x8B, with a lens barrel that is 13mm shorter, and overall 17 percent lighter. The lens also has an improved zoom ratio of 8 to 128mm and minimum focus distance of .7mm.

Canon also unveiled the Digi Super 86XS field production/sports zoom lens. The Digi Super 86XS(XJ186x9.3B IE has a newly developed optical stabilization system that can eliminate vibrations up to a frequency of 10Hz. Designed to operate in both standard and high-definition applications, the lens has a maximum focal length of 1600mm with the 2x extender. The lens also incorporates a power optical system, digital servo system, constant angle focusing system, and has a built-in, front element protection filter. Completing Canon's new lens introductions is the J11ax4.5BIRS/IAS1fx wide angle zoom lens. The lens' wide viewing angle is 101.14 degrees in the 4:3 aspect ratio. Maximum focal length is 100mm with the 2x extender, minimum focal distance is 0.0 (that's right) 0.0 meters. The lens also incorporates Canon's new Digital Drive technology as will all the 1fx series lenses in the near future.

Leading Angenieux's introduction into the cine-style high definition market is the CIA 35 HD prime lens adapter. Developed in conjunction with Carl Zeiss and marketed by Angenieux, the adapter allows the mounting of high-quality, professional 35mm prime lenses on 2/3-inch high-definition cameras.



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## Product Jackpot



Lighthouse Digital Systems Modular II system include SDV to fiber, fiber to SDV, AES to fiber, fiber to AES, AJA 10-bit NTSC to fiber, Fiber to AJA 10-bit NTSC, analog audio to AES fiber and AES fiber to analog audio modules.

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Vibrint introduced the NewsLog, a new tape logging station that operates in conjunction with existing preview decks throughout the newsroom and runs on desktop computer.

Circle (419) on Free Info Card

DNF Controls introduced the DMAT Sports Controller, which is based upon DNF's new ST400 controller. It interfaces with multichannel video servers and enables continuous record and simultaneous playback of sports action.

Circle (314) on Free Info Card

LeBlanc was offering its SuperTowers, 2049-foot guyed towers capable of supporting 60 tons of top-mounted antenna equipment and 75-foot candelabras.

Circle (339) on Free Info Card

Litton was showing the L4482, which features peak sync output (vision only) 64kW, common mode peak sync output power of 44kW visual/4.4 kW, and peak output power digital operation of 85kW.

Circle (343) on Free Info Card

Belden Wire & Cable introduced the Brilliance Plenum-Rated HD Coaxial cable. The HD coaxial cable features 14 AWG solid copper conductor, gas-injected foam, FEP dielectric, a foil/braid shield and Flammarrest jacket.

Circle (300) on Free Info Card

Benchmark was showing the AD-2404-96, a four-channel audio A/D converter that provides word lengths up to 24-bit and sample rates up to 96kHz.

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Also shown for the first time in the Angenieux booth at NAB2000 were two new high-definition lenses. The 20 x 7.5 HD studio lens contains Angenieux's Assisted Internal Focusing (AIF) mechanism. It has a wide viewing angle of 65 degrees and is constructed with a waterproof/anti-dust system. The 60 x 9.5 HD high-definition sports lens has a 60x external range and also contains the AIF mechanism as well as the waterproof/anti-dust system. Other high-definition lenses displayed by Angenieux included the 11.5 x 5.3 HD cine style high-definition zoom lens with an 84-degree viewing field and an 11.5 zoom range and a T1.9 aperture. The Ange-

nieux 10 x 5.3 HD high-definition wide angle zoom lens also offers an 84-degree viewing field but with a 10x zoom range and an f1.9 aperture. The HR series lenses shown this year were the 12 x 5.3 AIF HR wide super zoom with a wide angle 5.3mm capability; the 15 x 8.3 AIF HR zoom lens with a 8.3mm to 125mm (16.6mm to 250mm with the 2x extender); and the 72x AIF HR with a zoom range of 9.5mm to 684mm at f3.6.

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*Bob Bergfeld is president of Presentation Systems Design, St. Louis.*

## Production systems



By Ed Fraticelli

Nonlinear editing and compositing systems have certainly lured numerous post-production facilities away from traditional linear post-production gear. This year's NAB offerings were no exception. But the equipment continues to evolve as traditional operations, such as live news and programming, and new services, such as live webcasting, keep developments fresh and exciting.

### Standard-definition offerings

While HDTV continues to wallow in a pool of indecision, standard-definition equipment continues to be used everyday for a large percentage of digital

television content. Recognizing this fact, manufacturers continue to add new ideas and concepts into their designs.

Ensemble Designs expanded the Catalyst digital switcher/compositor to be able to accept up to four basic SDI inputs. The Catalyst is ideal for telecine suites, with basic built-in compositing capabilities.

Echolab has changed its name to e-StudioLIVE, reflecting the growing trend to media streaming on the Internet. They have elected to continue the Echolab name in marketing their switcher lines. This year, the top-of-the-line 5900 Super Switcher offers up to 33

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inputs, a Pinnacle 3D DVE, an Inscribe CG and a DPS Clipstore, through the use of an integral Windows NT networked system. The smaller units include the 5800 and 2000 series to fit any SD digital switching needs.

An e-StudioLive streaming server can be attached to the Super Switcher to allow live broadcasts to the Internet, directly from the switcher, utilizing RealNetwork's G2 bit streaming. Also, every system now comes with a remote Commander, which allows configurable one-button selection of the switcher or its attached devices utilizing 100baseT networking. This year, Grass Valley had a large NAB presence. The Kalypso Video Production Center, its cornerstone product, houses a very powerful live production workhorse. With four M/Es (each with four keyers), a built-in, six-channel DVE and up to 80 inputs, there's no show this box couldn't tackle. Other features include an upgrade path to HD and multiple simultaneous outputs for providing multiple clients with customized feeds.

At Newtek, the Video Toaster has been revitalized with the release of Toaster version 2. This low-cost system com-

bines major post components and provides up to 24 live inputs, real-time DVE and digital compositing.

The DD-35 continues to be refined and offered by Philips Broadcast. Used widely for live sports and entertainment production, the DD-35 is what Philips' new HD switcher line, the Seraph, is based on.

Pinnacle Systems had quite a variety of production-oriented products on display. The CineWave system provides editing and effects for Apple's G4. CineWave can handle DV, component analog video, HD and even 1080p/24. Pinnacle also introduced the Targa 3000. The Targa 3000 is a real-time compositing solution that offers 4:4:4:4 internal processing of uncompressed YUV and RGB images. For more information on either of these products, see Pick Hits, p. 74.

A new area from Pinnacle Systems is a dedicated switcher platform called the PDS-9000. It provides for up to 36 inputs, 2.5 M/Es, RGB and YUV color correction and an impressive nine channels of DVE, as well as 19 framestores. The system can also utilize Pinnacle's BroadNet graphics

transfer protocol to move files and graphics. In addition, it can network to additional DVExtremes, if nine isn't enough!

Always a fun one to watch, Play has developed and announced Trinity version 2.1. The Trinity combines digital switcher, DVE, CG and compositor into a dedicated hardware box controlled by an NT front end. Some new goodies include Autobats to enable easier editing to the rhythm of music tracks and faster video scrub modes.

At Ross Video Limited, the Synergy 1 digital switcher line utilizes Ross' unique Aspectizers to allow simultaneous 16:9 and 4:3 production outputs. The Ultimatte Insider option provides the highest quality blue and green screen matting, and existing Ross analog switchers can upgrade to Synergy systems.

Perhaps the best idea in this area is Ross Video's digital upgrade system for existing Grass Valley 100/110 switchers, of which over 10,000 have been sold over the years. A Synergy 1 chassis attaches to an unmodified GV100/100 control panel, and shift-key functions expand the compact unit's capabilities, which saves customers a lot of expense. Ross is sure to sell a lot of these! For more information on the Synergy 1, see Pick Hits p. 74.

Snell & Wilcox has repackaged the Magic DaVE system into the Golden DaVE digital SD production system. This system can accommodate 12 to 24 inputs and contains three full keyers plus a downstream keyer. Color Correction and DaVE DVE options can be added to round out its capabilities.

Thomson Broadcast Systems introduced the ALTEO line of SD production switchers. The systems come in a full range of sizes from one M/E to 3.5 M/E and 54 inputs, to suit any live or post configuration. 625/525 and 16:9/4:3 switchability makes for a flexible unit.

Video Gainesville/For.A offered two separate lines of switchers. The Cybervision switcher line offers several size configurations, four-channel framestore and internal 3D DVE effects. The MightyMix switchers offer mixed analog and digital inputs and a built-in DVE.

Reflecting a prevalent theme at the NAB this year, Videonics premiered their MXProDV switcher with two Firewire IEEE 1394 inputs, two analog inputs

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## Product Jackpot

Avica unveiled the Vecta AMS, an NT-based asset management system that allows users to view stored images from a remote location and use a centralized archive.

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NDS limited unveiled as Value@TV, a suite of interactive TV software applications that enables broadcasters to offer interactive programming.

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Cintel showed its full range of telecines, including its C-reality and Rascal. The company also announced that it is offering an upgrade to users of its Ursa Gold and Diamond systems.

Circle (308) on Free Info Card

HD Vision was showing the HDV-5, a 53-foot mobile production unit equipped with Sony HD cameras, Canon lenses, a Snell & Wilcox digital switcher and Pixel Power graphics products.

Circle (330) on Free Info Card



Equi-Tech unveiled its redesigned Wall Cabinet System, which offers improved phase accuracy and balance. The system extends the bandwidth of common mode noise attenuation into the 200MHz+ range and features distribution for 10 branch circuits.

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Nova Systems was showing the SM2000, a time based corrector that features full bandwidth processing with adaptive digital comb filtering and a wide range of VCR signal correction and video interface requirements from desktop video to satellite systems.

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and one Firewire output. It has been specially designed for live Internet streaming productions.

### Higher definitions

Certainly, the bigger players had their high-definition production solutions prominently shown. But, big or small, any HD need could be fulfilled, as feature sets go up and prices come down.

Panasonic's MilleniumM series of HD production switchers include the AV-HS3100 and 3300 systems. They are designed to be multiformat, processing all standard HD scan rates, including 1080i/60, 1080p/24 and 720p/60. With 10 inputs/2.5 M/Es and 33 inputs/3.5 M/Es respectively, the line can be applied to the largest live production as well as a small HD post operation.

The Philips successful standard-definition system, the DD-35, has evolved into the Seraph line of high-definition production systems. This giant can have up to 90 inputs and four M/Es, depending on the configuration. The Philips system can also handle all of the popular HD formats. An added feature is that the Seraph's panel can control a DD-35 SD chassis, making simultaneous SD and HD program production possible.

DaVE from Snell & Wilcox has gone HD also. The HD DaVE models include HD1010 with 10 inputs, the HD-1012 with 12 inputs, the HD-1024 with 24 inputs and the HD-2524 with 24 inputs and 2.5 M/Es. Additional features include up to 1000 internally stored stills and multiformat operation, including 1080p/24.

Sony's HDS-7000/7100 switchers, along with the HDME-7000 effects system, were shown at the heart of the 1080P/24-post system, jointly developed with 24 other equipment manufacturers. This system has been developed for post work in the episodic network entertainment business, as well as the burgeoning E-Cinema concept.

The switcher has a flexible control system and utilizes Sony's DME-LINK to allow complete control of the DME. Also ideal for live productions, such as

sports, the SMPTE 274M 1080i switchers offer up to 30 HD SDI inputs and 2.5 M/Es.

Videotek was showing a 12-input HD switcher. The RS-12 offers a small system's solution for limited post and telecine HD applications.



### Integrated HD post systems

Last year, Chyron introduced the Duet integrated HD production system, for both SD and HD applications. Running applications such as Liberty paint and Lyric CG text generation programs, the Duet can be utilized in multitude of different ways in an HD environment. This year, Chyron added the MPx option, which allows for multiprocessor rendering speeds. Also, the Duet can enable multiple application outputs simultaneously.

The U.S. division of Pixel Power has changed their name to Collage Graphics, and continues development on the Clarity HD integrated production platform. Offering real-time HD graphics, animation and character generation, Clarity's version 2 operating software adds real-time animation playout and offline graphics composition.

Clarity has been offered for standard-definition applications as well. An interesting way was shown to use the Clarity in a four live channel SD operation or mixed HD and SD simultaneous output mode.

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*Ed Fraticelli is the director of engineering & post production for Production Masters, Inc. Pittsburgh, PA.*





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LeCroy introduces the LA302/LA303, a series of analog oscilloscopes. The LA302 measure 2Hz to 100MHz and the LA303 operates up to 200MHz. The third channel provides three sensitivity levels for a wider range of measurements.

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Modulation Sciences' msi2080 unit is designed to deliver the high levels of functionality along with the ability to easily upgraded. It features real-time pictures and parameter readings and real-time and virtual constellation displays.

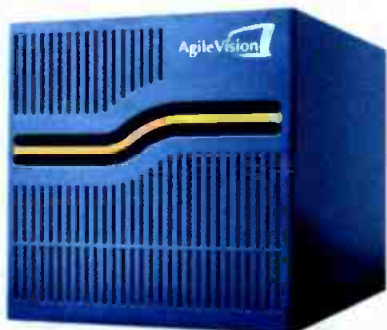
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Harris announced the launch of NewSource, a television news solution which links the Louth automation system with a newsroom computer to allow broadcasters to control news servers, VTRs and cart machines from one system.

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Sonic Foundry showcased its Viscosity editing system, which fuses animation and the image editing process into one application. It also offers integrated multiframe editing, animation effects, web optimization and real-time playback.

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AgileVision presented its AGV 1000, which seamlessly splices and inserts datacasting, PSIP and local station branding into a compressed DTV transmission stream. The "DTV Station in a Box" offers high picture quality originating either in SD or HD.

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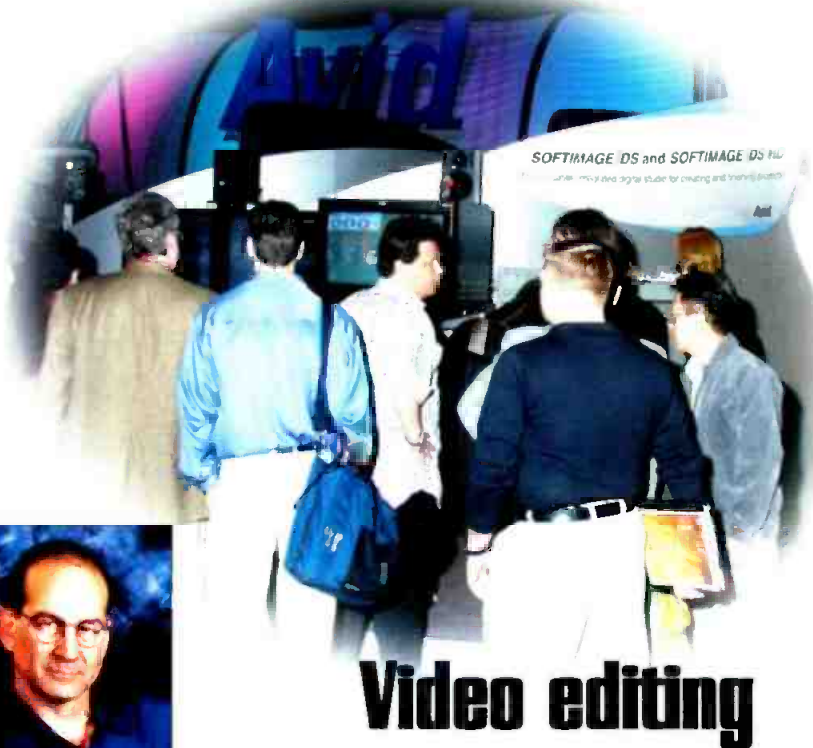
By Marcus Weise

From the least expensive to the most complex, fully configured systems, the ability to network, access common servers, and share data and files was a prime selling point at this year's NAB. This allows users to be in separate locations and still work on a common project in real time. Not all the systems at the show had this ability, but those that did were quick to point it out.

The EIDOS Judgement, for example, which sells for under \$1,000, has connectivity via the Internet. Use of Quick-Time 4 allows a wide range of video, audio and graphic file formats, including video formats suitable for multimedia and web streaming, to be exported. It can also be networked so multiple users can access the media.

Other systems in the less than \$2000 price range include Digital Origin that goes from under \$100 to \$800; the Videonics Video ToolKit; the Darim DDClip, which is a simple Windows-based, nonlinear editing system; Adobe Premiere; and Apple Final Cut Pro.

Digital Origin is distributed by Canon. Their EditDV system, which lists for \$800, is Windows 98/2000/Mac-based, DV native and uses FireWire to output ready-for-broadcast video. The Videonics Video ToolKit is a linear editing program that is PC-based using Windows 95 or NT and controls up to seven



## Video editing

devices at a time. It can export video over the Internet in storyboard form and outputs EDI's in CMX or Media 100 formats. The Darim DDClip is an NLE system that uses Windows 95 up through NT and allows the use of two video tracks and up to 32 audio tracks.

Adobe Premiere has improved its look and ease of use. It has a streamlined interface, high quality audio, long-format editing tools for programs up to three hours in length, and a new title window that makes it easy to add rolls and crawls. Apple's new version of the Final Cut Pro supports 16:9, has increased rendering speeds and supports PAL video.

The \$2,000 to \$20,000 range includes the Matrox RT2000. While this is not a turn-key edit system, as the user must supply the PC, the complete package of software and hardware as supplied will turn a PC into a complete nonlinear editing system that can also output real-time streaming video for Internet use. In this same price range is the Predator by Play, the DPS Velocity, Canopus DVR-exRT, United Media's On-Line Express, Darim's Forward, ProMax FireMAX Studio, Discreet's new combustion\* and edit\*, In-Sync's Speed Razor, Editing Technologies' Ensemble Pro, Incite Studio, Fast's Silver, the Blossom series of NLE systems and the Apple Final Cut Pro.

The Predator is a dual-stream NLE that can handle linear editing as well. It

# HDTV

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## Product Jackpot

Accom announced Abekas HDevous, a new high definition effects system featuring RGB/YUV color correction, target frame store and SurfaceFX with dual light sources. HDevous is also available as an upgrade to existing Dveous systems.

Circle (278) on Free Info Card

Folsom Research unveiled the ScreenPro 8, a high-resolution seamless switcher. The ScreenPro8 offers switching of all video formats (15KHz to 130KHz and up to 1600x1280 resolution). The unit also features eight inputs to one programmable output format.

Circle (324) on Free Info Card

AMS NEVE was showing Libra Live Series II, which features multi-format surround sound options and 24-bit analog and digital interfacing, as well as mix-minus, GPI and other broadcast-specific facilities.

Circle (285) on Free Info Card

Artel unveiled its Cross Stream 155 Video Access Multiplexer, combining advanced MPEG switching technology with the ability to transport compressed video over WANs. Each unit is packed with standards-compliant interfaces for MPEG/ATM environments.

Circle (289) on Free Info Card



Broadlogic showcased its TerraCast DTA-100, an HDTV receiver that can receive both NTSC and ATSC signals. It supports all ATSC video formats utilizing software MPEG-2 and Dolby digital (AC-3) decoding.

Circle (304) on Free Info Card

Nucomm Microwave introduced its NEWSBLASTER and MEGA-BLASTER ENG truck-mount antennas. They are designed to mount on ENG Truck Pan and Tilt/Telescopic Mast System and work with all Nucomm's ENG transmitter systems.

Circle (355) on Free Info Card

has 3D effects, a character generator and a paint program as part of the package. The DPS Velocity is a real-time NLE system that combines a dual-stream DDR, a video mixer-keyer and two graphics framestores. The Canopus DVRExRT offers an NT-based nonlinear system with real-time moving titles, keying, transitions, color correction and picture-in-picture effects.

On-Line Express from United Media can be used for multicamera editing with dual-stream video and graphics tracks, real-time motion effects and an optional 3D DVE. The multicam mode supports up to four cameras. Darrim enters the field again with the Forward. This system contains a Virtual Set creator, titling, and a scheduled video playback feature that can be used for video output. ProMax Systems offers FireMax Studio, which is based on Final Cut Pro. Instead of just the program however, ProMax offers a package that creates the complete nonlinear editing suite.

Discreet has two systems in this price range, the new combustion\* and the edit\*. Combustion\* is a junior version of flame\* and offers color correction and a chroma keyer with key tracking. This system, as with all Discreet products, connects to all their other systems. In-Sync has several versions of the Speed Razor. The 2000X version is an upgrade to real-time video, audio and effects compositing software. The new version includes multiple bins and the ability to export files in Quicktime format.

ETC's Ensemble Pro is a linear editing system that can handle up to nine VTRs, has 10 bins for storing EDLs, contains cleaning and tracing programs, and supports pre-read. Incite offers a software bundle that is designed for the Matrox DigiSuite series. In its fully configured form, the Studio FX handles in real time two streams of video, a graphics and titling channel, four channels of 2D effects, 3D effects, and keying.

Fast has the new Silver. The company designed both the hardware and the software, so it is a fully integrated system. It is a real-time NLE with two video tracks, a titling channel, DVE, wipes, keying and color correction. It

works in multiple standards including MPEG-2, DVD and SDI. The Blossom Fury, FuryX2 and the new QuatroX4 provide a range of capabilities. The QuatroX4 handles four channels of real-time video, three of them uncompressed. It comes equipped with Adobe AfterEffects, Sound Forge and TrueSpace. It also has an option for a V-



LAN that adds linear editing to the system.

In the \$20,000 to \$75,000 price range, there is the Accom Axial linear editing system and their Affinity nonlinear editing system. Editware's new 500 series linear/non-linear hybrid, Editing Technologies' Ensemble Gold NLE, Media 100, Panasonic's DVEdit, JVC's MW-S1200, the Pinnacle Vortex and the new Lightworks VOX [populi].

Accom's Affinity is a real-time system incorporating the Abekas DVE and Dveous. It handles, in real time, five streams of video simultaneously, eight audio streams, DVE effects, and can handle uncompressed and compressed material together. Editware has brought out its new Series 500 hybrid linear/nonlinear software that uses the Tektronix Profile. The upgrade has enhanced protocols for the new digital switchers, storage of digital TBC settings, multichannel digitizing, and a new PEGS function that stores the TBC settings along with the edit so that all settings return when an edit is recalled.

ETC's Ensemble Gold is a hybrid NLE based on the Tektronix Profile. It is open architecture that can work with existing hardware such as switchers and DVEs and can accept new equipment that is acquired or becomes available. Media 100 has several new products with the Internet in mind. The iFinish (for Windows NT) is an integrated system that incorporates editing, effects and streaming video all in one system. It handles transitions, 3D

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animated titling and color correction.

Panasonic is offering the DVEdit, which is an NLE with titling, unlimited video and audio layers, 200 2D effects, and is SDI, analog and FireWire compatible. They also offer the new AJ-LT85, which is a laptop editor that combines two VTRs, two monitors and an edit controller in a briefcase-size carrying case.

JVC showed the MW-S1200, a non-linear editing system, as the newest in their TimeGate series. It can work at

24fps as well as the standard 30fps. It is native D-9 format that works in real time with two streams of uncompressed video. It can handle unlimited layering by recording to the hard drive and then playing back the composited video. The original layers still remain so that changes can be made even though the layers have been combined.

The Vortex by Pinnacle is a news editing system that is designed to be completely networked. It supports up to 100 workstations and allows materi-

al to be edited before the entire clip is captured. It also contains a character generator, still store and two DVEs. With the MontageIV NLE, the system offers real-time motion effects and 3D effects packages.

The new Lightworks VOX [populi] is a less expensive version of the Lightworks VIP.

It includes variable compression, 16:9 support, multicamera editing, real-time keying and internal 2D effects, scene-to-scene color correction, and full high-bandwidth connectivity.

Among the high-end systems (those over \$100,000) are the Quantel Editbox, Avid, Philips Editstream, the newly relaunched Lightworks and the Discreet line of systems from the flint\* at \$125,000 to the inferno\* from \$600,000 and up.

Quantel's Editbox Magnum has four layers of active video, real-time transitions with DVE, keying, color correction and texture effects. Avid introduced an upgrade to their Unity MediaNet. Avid not only offers complete connectivity but, for a charge, supplies a web portal to allow multiple users to interconnect, thus allowing users worldwide to work on a project simultaneously in real time. The new version includes support for up to 25 clients for a total of 50 video streams and 100 audio tracks.


Philips' Editstream is a real-time networked nonlinear news editing system that allows simultaneous access to a shared media pool from three to more than 100 workstations. It is designed for broadcast-quality, including video and audio effects, publishing of finished products to a variety of transmission servers.

Discreet's onscreen on-air online system provides users with a new way to distribute, communicate and share a variety of media in real time. Also introduced were new versions of inferno\*, flame\*, flint\*, and effect\*. Discreet has also added Web streaming and DV/MPEG-2 support for edit\*, and smoke\* now has full HDTV functions.

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Marcus Weise is a post-production supervisor based in Hollywood.

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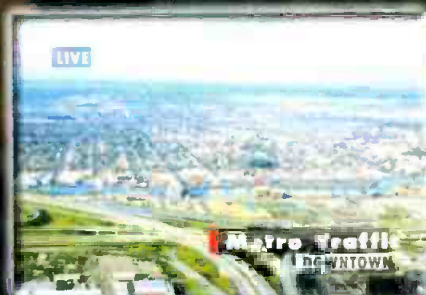
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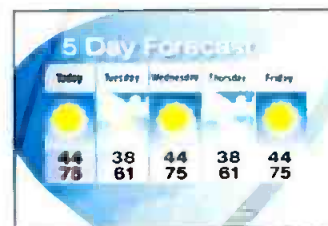


On-air broadcast environments are not the place to mess around with under-powered titling systems. Trinity's broadcast character generator, TitleWave, is built to handle the fast pace and complex treatments required today. TitleWave



makes older CGs seem like antiques, with its unmatched quality, extreme range of text attributes, flexible multi-layering and smooth real-time text effects. It imports standard Windows text files, graphic elements and TrueType fonts in a snap. Over 100 scalable fonts from the industry-standard Bitstream broadcast font library are even included.

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## Product Jackpot

Netcom showcased PatchAmp, a combination of five 24-position patch panels and 24 1x5 distribution amplifiers within a 14RU frame for digital video and AES applications. Other features include a 75Ω impedance HD frame and low power consumption.

Circle (352) on Free Info Card

SADiE's RADiA workstation offers four inputs and outputs and up to 24 tracks. The 48kHz system is available as a single PCI card or a complete turnkey hardware solution with removable SCSI audio storage.

Circle (405) on Free Info Card

Chyron's Aprisa SSX stillstore management system can operate as a stand-alone or with an Aprisa 100 for a complete solution. Features of the system include accelerated frame grab and record, a familiar user interface, and the potential for use with multiple channels.

Circle (402) on Free Info Card

Scientific-Atlanta announced plans to collaborate with Broadlogic to provide complete data broadcasting systems including their MPEG-2 compression and encoding equipment, the PowerVu and PowerPlus lines, and Broadlogic's broadband networking equipment.

Circle (379) on Free Info Card



Pioneer's DVD-V7400 system is the second generation of industrial DVD-video players, adding component video output capability with BNC terminals to the DVD-V7200. Other additions include digital audio support for a DTS format and playback in NTSC and PAL.

Circle (403) on Free Info Card



By Roy W. Rising

Once again I am amazed at the scope of the show. Here are some highlights.

### Digital recording systems

360 Systems' TCR8 Synchronous Master Recorder, a personal favorite from last year's show, has been updated with important new features. The TCR8 delivers several hours of internal hard disk storage and complete timecode implementation plus VTR emulation, while employing excellent 24-bit quality. It is the only recorder available that delivers bit-for-bit reproduction of 24-bit PCM, Dolby E and AC-3 recordings.

The TCR8 is the first professional recorder to provide a standard DVD-RAM drive for transporting and archiving needs. A 250MB Zip Drive permits moving of program segments up to one-half hour in length. More important is the ability to upgrade the Flex-Logic Programmable Hardware through use of updates delivered on Zip disks, postponing obsolescence indefinitely. Also present are the powerful file interchange, editing and interfacing features for which 360 Systems has become known.

Denon's DN-F20R portable IC-based recorder made its debut this year. Weighing just over two pounds, the package eliminates moving parts by recording on CompactFlash memory cards. Multiple standard recording formats in stereo or mono with bit rates enable efficient use of storage. Over three hours of broadcast quality material may be recorded using MPEG-2 Layer 2 set to 64kb/s. Mic inputs benefit from switchable low-

## Audio for video



cut filters, attenuators and limiters. Line inputs and a parallel remote jack for external control are also provided.

### Microphones and mic accessories

AKG Acoustics' new CK77-WR is a tiny perspiration and water-resistant dual-diaphragm mic for clip on and concealed body mic applications. Two vertical back-to-back active diaphragms and one horizontal passive diaphragm deliver lower noise, greater dynamic range and improved rejection of cable noise. An internal capillary tube connected to a compensation cavity and sealed with a soft, flexible passive diaphragm provides barometric pressure compensation.

Sennheiser now offers the Digital 1000 Wireless Microphone System, a four-channel, user-selectable unit operating in the 900MHz ISM band. Internally mounted antennas operate in two independent diversity receiver sections. Digital circuitry eliminates the need for audio compression/expansion. Inputs for optional external antennas accommodate extended range applications. Handheld, body pack and musical instrument versions are available.

Shure previewed the FP23 Ultra-quiet Mic Preamp for field production. Even more rugged than the older FP11 and nearly 20dB quieter, 24 hours of operation are delivered with two AA cells. All metal construction, special filtering and transformer I/O isolation give the FP23 excellent resistance to RF interference. Maximum 66dB gain is adjustable in 11 discrete steps. An extended range peak limiter makes the signal virtually



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"unclippable." The unit also may be used as a high gain line amplifier suitable for driving long cable runs.

New from DBX is a vacuum tube stereo mic preamp with digital outputs. Selectable noise shaping algorithms and dither types augment sample rates from 44.1kHz to 96kHz and word lengths of 16, 20 and 24 bits. Standard balanced mic and line inputs and outputs plus a high-impedance instrument input are provided as well as word clock sync I/O. Special attention is given to matching of vacuum tubes to assure ideal distortion, microphonics, drive characteristics and tonal versatility. (For users who are not satisfied with the absolute fidelity of solid state amplifiers? I'd recommend semi-annual tube replacement to avoid noticeable changes in performance.)

Also new from Shure is UP4, a camera-ready wireless diversity receiver. Offering over 100 selectable frequencies in the 692-716MHz and 782-806MHz UHF bands, the UP4 is compatible with existing Shure UC and UHF transmitters. Equipped with PLL and microprocessor controlled Predictive Diversity, supplied mounting hard-

ware facilitates easy use with NP-style and Anton-Bauer Gold Mount battery packs. A headphone output has independent gain control and three bi-colored LEDs monitor battery life, RF lock and audio signal/peaks.

#### Consoles and mixers

Solid State Logic introduced Aysis Air Mobile, a new compact-format console for outside broadcast vehicles and space-restricted studios. Using the standard Aysis Air software, the channel-layering function enables a fully specified 96-channel console to be fitted in a 48-fader frame less than 92 inches wide. A 64-channel, 32-fader version also is available in a 66-inch wide frame. Both versions provide four subgroups plus four control groups with fully featured controls and an ergonomically optimized master center section.

Midas launched the analog B2000, its first venture into the broadcast world. Designed specifically for TV studios and mobile production, the system also is suitable for film, music and post production. Mixing for mono, stereo, surround, 5.1 or 7.1 is supported. A range of standard features that are expected in

the broadcast environment accompanies digital assisted setup and snapshot automation. AES input and output converters are optional.

Sony's new DMX-R100 digital mixer has 48-input channels and eight aux returns. Two touch-screen pages, each with two levels of access, control an internal routing matrix. The DMX-R100 includes 99 scenes of snapshot automation. Comprehensive dynamic automation can be synchronized to time-code (both MIDI and SMPTE). For more information, see Pick Hits p. 74.

#### Effects and processing

Lexicon launched their new technology platform, the 960L Multi-channel Digital Effects System. Featuring hundreds of factory presets and surround reverb algorithms, the 960L has eight balanced inputs and outputs, four pairs of AES I/Os, word clock in/out/loop and MIDI in/out/through. The 4RU 24-bit/96kHz system is managed by LARC2, a new alphanumeric remote controller. There is a 3.5-inch floppy drive for saving programs and system configurations plus a CD-ROM drive for

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## Product Jackpot

Artesia's TEAMS 3.0 asset management system is the newest release in its TEAMS line, offering enhanced search options and customization of user interfaces. The solution converts content into reusable digital assets, and allows them to be catalogued and managed.

Circle (406) on Free Info Card



Yamaha showcased its AW4416, an audio workstation providing automation/snapshot capability, phrase sampling, and full 32-bit DSP mixing. The workstation records up to 16 tracks of true 24-bit digital audio and includes motorized faders.

Circle (432) on Free Info Card

Dalet Digital Dalet5.1 provides capability to acquire audio from a variety of sources, and production, scheduling and broadcasting tools. A module allows broadcasters to create online content to complement their on-air programming.

Circle (407) on Free Info Card

Tandberg Television demonstrated their TT6000 Medialink MPEG-2 processing and media interface unit integrated with a Packet-over-Sonet Network Interface for IP video transport.

Circle (394) on Free Info Card

Peak Broadcast's Pilot Tool Kit for Interactive TV allows for the simultaneous delivery of supplementary information, including graphics, into on-air programming and web-based content.

Circle (365) on Free Info Card

software upgrades. The system is completely hardware/software upgradable.

### Digital accessories

Ward-Beck expands its 8200 Series family with four units based on a single printed circuit board design. The D8205 digital processing amplifier provides remote or local level adjustment of AES signals, sample rate conversion, mixing of two AES signals creating summed outputs of the A and B data streams and signal distribution. The D8206 is an AES reference signal generator creating DARS and word clock with sample rate conversion and synchronizing to AES or video reference signals. The D8207 is for sample rate conversion only, and the D8208 provides independent level adjustment of two AES signals and their distribution.

Gepco launched the new 96kHz/Extended Distance 110Ω digital audio cable. Designed for superior electrical and mechanical performance, the 5596 series features an extended 12.3MHz bandwidth, ultra-low attenuation and jitter plus precision 110Ω impedance. The series is optimized for 96kHz and runs 60 percent longer than other twisted pair types are realized, reducing the need for transformers or repeaters. 5596EZ is designed for permanent installations while 5596M delivers enhanced flexibility for studio cable runs.

For those wishing to encode their own surround sound, the Dolby DP563 encoder is available. It allows multichannel program material to be encoded for Dolby Surround release. For more information, see Pick Hits p. 74.

### Intercom products

Telex introduced the Radiocom BTR-300 wireless intercom system. Optimized for today's expanded frequency spectrum and taking into account the increasing presence of DTV, the BTR-300 offers twice the available frequency bands of its predecessors. It features more channels, improved battery life and a rugged case. Improved front-end filtering combats interference from other transmitters and a greater number of belt packs and base stations may be used together. Flexibility for connection to popular wired I/C systems and audio equipment is stressed. Optional NiMH batteries improve operating time and reliability and may be charged without removal from the belt pack.

Clear-Com presented powerful new VOX capabilities for Matrix Plus digital intercom systems. A station's individual keys can be set to "open" when the other party speaks. This functions as a voice-activated "push-to-talk" service for hands-free operation. When joined by special noise gating capability, a user in a noisy environment can set the talk function to trigger only above the background ambient threshold. Gating also aids the user who must constantly monitor a party in a noisy area. The VOX allows the listen key to remain activated but only be opened by the voice signal.

### Testing and monitoring tools

Ward-Beck introduced the XTM4 Extended Range Test Meter. Four moving needle meters deliver simultaneous VU and peak information over a 90dB range. Mode and sensitivity are shown on an easy to read alphanumeric screen, and instantaneous phase is presented on an LED array.

The new Neutrik Minilizer is a compact palm-sized analyzer providing comprehensive measurement and analysis functions. A high-resolution 100x64 pixel backlit LCD screen shows numerical values, bargraph metering, or curve vs. frequency in the sweep mode. Peak or RMS levels, either absolute or relative to a definable reference, are measured in selectable units.

For monitoring Dolby E signals, Wohler had the EMON-1 on display. The EMON-1 is the first in-rack audio monitor capable of outputting and/or displaying audio from Dolby E streams. For more information, see Pick Hits p. 74.

Dorrough Electronics now offers an Extended Range Stereo Signal Test Set, model 1200. The 2RU package provides two Relative Loudness-to-Peak LED arc displays selectable to I/R or Sum/Difference. A 96dB measurement range is adjustable in 1dB steps within two sensitivity scales. Barrier strip and parallel XLR connectors with audio loop-through provide installation flexibility. Front and rear panel monitor jacks are available to feed headphones, an oscilloscope or monitor amp.

Circle (239) on the Free Info Card

*Roy Rising is a systems engineer and production mixer based in the Los Angeles area. He is a contributing editor for BE's sister publication, Video Systems.*

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BT Broadcast Services announced the opening of a second teleport in the U.S., based in Marina Del Ray, CA. The teleport will allow broadcasters additional transmission solutions including satellite, fiber and microwave transmissions.

Circle (305) on Free Info Card

DVS introduces the ProntoVision 2000, an uncompressed HD disk recorder. The ProntoVision 2000 records, stores and displays various HD standards in 8- and 10-bit resolution; including 1035i, 1080i, 720p, 1080p/24 and 1080sF/24.

Circle (317) on Free Info Card

Quantum introduced its line of Snap Servers, a line of easily configurable file servers for digital video, audio, animation and other multimedia applications. Storage size ranges from 10GB for the Snap Server 1000 to 120GB in the Snap Server 4000.

Circle (374) on Free Info Card

Video Networks Inc. was exhibiting its NewsTracker, a news-on-demand system that allows producers to access and manage broadcast-quality digitized new content. The system allows users to browse and select video clips and scripts from their desktop.

Circle (420) on Free Info Card

Path 1 Network Technologies introduced the PG1 Gigabit Ethernet Gateway, which features interfaces for video, audio and data for transport over Ethernet/IP networks. The unit employs TrueCircuit, which allows IP networks to accommodate real-time streaming

Circle (364) on Free Info Card

Telescript introduced new 12-inch and 15-inch teleprompters this year. The 15-inch LCD flat panel systems is designed for studio applications, and the 12-inch system is designed for field and studio applications and can run off a 12-volt battery.

Circle (398) on Free Info Card

# Test equipment



By Paul Black

The emergence of the need to measure new forms of digital information has led test equipment manufacturers, who previously did very little broadcast-related business, into the industry. Additionally, companies who have made the traditional test equipment that the industry is familiar with have had to expand into the digital test areas to remain competitive.

Monitoring digital video has the same challenges as monitoring data transmission. Digital domain signals typically need to be monitored by computers. Many manufacturers are taking advantage of this by simply putting plug-in cards and custom software into PCs and selling the resulting product as a piece of test equipment. Although it may seem to be an easy way out, it actually has some advantages. One advantage is the computer can be easily expanded, adding more test capability and increasing its usefulness. Instead of needing two pieces of gear to do separate tests, they can be combined into one. Another advantage is that software upgrades can also be easily added, potentially making the original hardware more accurate or more flexible.

The output of most of this test equipment can be sent to a printer for logging purposes or monitored on the computer display screen. Running records can be observed, logged and printed for later analysis. Monitoring different sites at a distance can even be done securely over the Internet. As with most software-driven equipment, the choices in

display type, data arrangement and sampling methods, among other things, are many and varied and most systems allow customization based on user preferences.

Analyzing the SMPTE 310 videostream is the one of the latest challenges engineers face. Fortunately, there are several companies that make products to accomplish this. At NAB, the traditional broadcast test equipment manufacturers were joined by some that are less well known within the industry. Amongst those are Wavetek Wandel Golterman, PixelMetrix, and Rohde & Schwarz. The latter may be somewhat more familiar to engineers than the other two.

Wavetek Wandel Golterman is actually a combination of older test gear manufacturers. The Wavetek name still remains on some non-broadcast pieces of test gear, and Wandel and Golterman is both a manufacturer and international distributor of test equipment around the world. They have a very strong presence in South America, as well as the Far East.

WWG showed their line of digital video analyzers, mostly aimed at the transport stream. These computer hardware-based products are a card in a machine with appropriate software. The use of different probes allows the same card and software combination to measure different streams types and, in the case of MPEG, different profiles. Both rack-mountable and portable test pieces are offered. The new stream monitor, part of the DTS-300 family, is unique in that it writes a certain amount of the stream to hard disk, then plays it back





## A Full House of Transmitters



We wish to thank everyone who visited our booth at NAB 2000 and experienced the zany exploits of Helga and Dr. Bitterror and "DTV Science." At this very successful show, we showcased ADC's comprehensive line of transport and transmission solutions for the broadcast industry, including our "full house" of analog and DTV transmitter products.

With nearly twenty years' experience in the design and manufacture of television transmitters, we continually strive to build a product line that is responsive to the needs of broadcasters. The Innovator™ Series of high-power solid state transmitters is available in power levels up to 120kW or 60kW digital using the latest LDMOS transistors. If your application requires an IOT, our Visionary™ Series of High Power UHF transmitters at 420kW analog or 180kW digital power levels is the card to play. ADC's hand includes the 800 Series of low and medium power transmitters, available with either solid-state or Diacrode amplifiers at power levels to 10kW analog or 5kW digital. With so many choices, you can bet that we have a product to meet your application.

Whether your needs include DTV transmitters, digital routers, signal management equipment or patching products, ADC provides the solutions to build your digital infrastructure. For additional information about our full line of broadcast products, please visit our web site at [www.adc.com/broadcast](http://www.adc.com/broadcast) or call (800) 215-2614.

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## Product Jackpot

BUF Technology was showing its VTC-4000, a multiple VTR editing controller. The VTC-4000 is able to control up to 10 machines and allows the user make frame accurate edits with a number of record machines.

Circle (306) on Free Info Card

Puffin Design introduced Commotion 3.0, compositing and effects tool for desktop systems. The software features timeline and keyframing, composite previews, two-way paint, Super Cache Disk Playback and more than 75 effects filters.

Circle (373) on Free Info Card

SeaChange introduced its MediaExpress service, a satellite delivery system for television ads. Spots are encoded in a high-quality MPEG-2 format at 18Mb/s 4:2:2, uplinked and distributed to television stations.

Circle (380) on Free Info Card



Avid announced Xpress Version 4, offering users new features for creating digital media for the Web and DVD. Features include QuickTime Reference Movie support and the capability to archive selected footage.

Circle (294) on Free Info Card

Pilat Media was showing its IBMS (Integrated Broadcast Management System), a multichannel scheduling and traffic system. The system tracks program acquisition, finance, planning and scheduling and pay-per-view and NVOD services.

Circle (367) on Free Info Card

and creates a complete time-referenced report. This allows the operator to see where errors took place and analyze conditions around them on a time basis. One customer uses two of these, one at the studio and one at the transmitter to trap errors in a terrestrial DS3 STL line.

Sencore has a signal analysis tool designed for field use, the model AT986. Incorporating a digital analyzer along with an RF spectrum analyzer and a summary function, this unit can replace several individual items for ATSC analysis. For more information, see Pick Hits, p. 74.

Each of the previously mentioned devices are easy to use and can go a long way towards assisting the harried engineer trying to figure out why the DTV picture is pixellated or suddenly went pastel-colored for no apparent reason.

An extremely well rounded selection of products is available from Rohde & Schwarz. Because they ended their marketing agreement with Tektronix, they are now selling their entire line in the United States instead of just part of it. This includes everything from transmitters to oscilloscopes to digital test gear. The TV Messenger is a multifunction signal generator that provides low-level transmitter output signals for demodulator testing. The EFA 50 series is a full DTV test receiver. One unique item is an MPEG-2 real-time monitor for use by operators to see if problems develop during on-air conditions.

No less useful in these areas are new introductions from Pixelmetrix, a Singapore-based manufacturer. The VP2000 Picture Quality Analyzer displays a graphic representation and one-sentence description of the analyzed stream on a standard VGA computer monitor. For example, "Edges and detailed textures are extremely distorted" is one possible warning. A technician can then call up screens that allow further analysis. This unit will also work with SMPTE 259M as well as HD.

On the RF side, Bird Electronic Corp. introduced a digital wattmeter that uses a transmission line insert with the familiar plug-in elements to measure both peak and average power. Line sections can be installed in several lines, or sections of the same line, and the wattmeter plugged into them. This allows power to be measured at different points with the same meter, increasing accuracy and lowering

cost. It's fully digital-modulation ready.

Tektronix's newest item is an A/V Delay corrector system that uses digital watermark technology to synchronize the digital audio stream with the video. Digital watermarking is used over the Internet to embed copyright protection in intellectual property. While not available yet, Tektronix claims this system will continuously update the data, eliminating lip-sync problems.

Leader introduced a surround-sound monitor in the familiar package that their waveform monitors and vectorscopes are in. Like most of the larger manufacturers, they have a full line of digital video generators and test gear, but oriented more towards CRT-based test equipment as opposed to computer-based products. Also from Leader is the LF 982 signal level meter. This portable unit can be used to monitor TV/CATV/FM and satellite signals. For more information, see Pick Hits, p. 74.

In the Videotek booth, they were showing the latest version of their VTM series, the VTM-400HD, which provides multi-format HD on-screen monitoring with automatic verification. In addition, they showed the SpyderWeb, which allows centralized verification, monitoring and remote control of multiple VTM-300 series or VTM-400HD nodes via LAN, WAN, Internet or serial communications.

A nice surround/5.1 monitor system is out from Dorrough, a company known for their audio measurement gear. In a five-rack unit space, five large LED bar graph displays can be mounted. A glance across the room and operators can see that all five channels are all right.

A unique remote video and audio monitoring system was shown at Broadcast Video Systems. This remote-mountable box takes a line of designated video and sends it back via modem to a computer for display. One can monitor the video quality with a refresh every two seconds, making it useful as a remote waveform monitor. Audio levels can also be monitored, and alarm closures are available. This system also does multiple sites. This is a good way to provide for diagnosing a transmitter site problem remotely.

Circle (240) on the Free Info Card

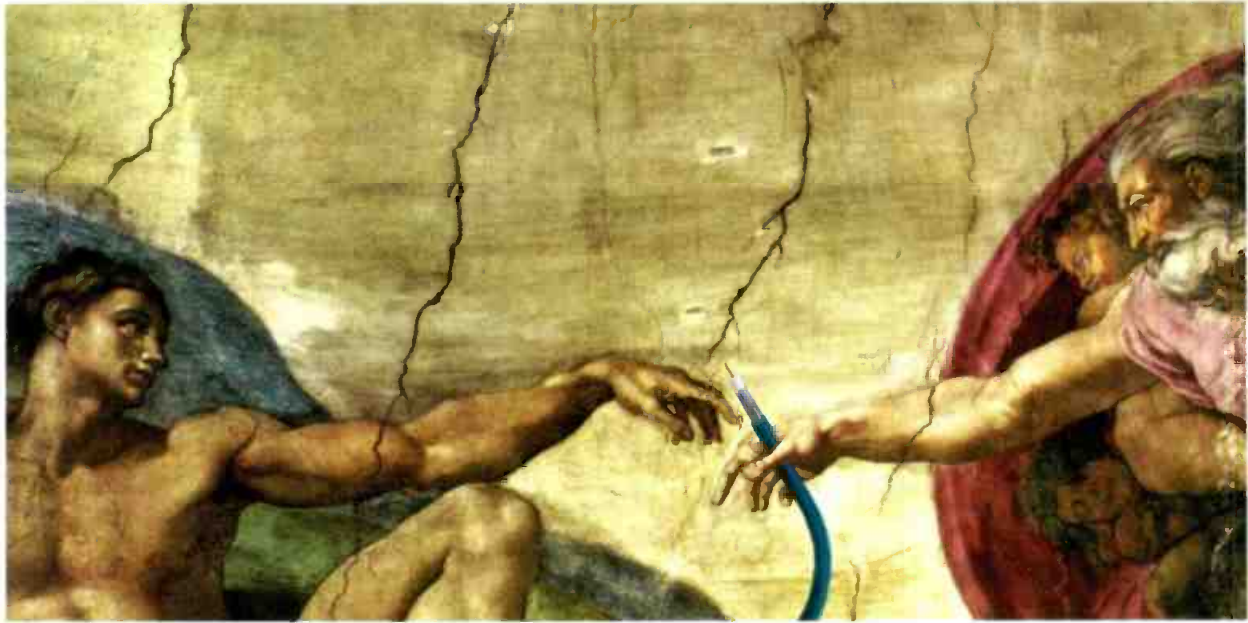
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*Paul Black is the acting engineering manager for KPIX-TV, San Francisco.*

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Circle (177) on Free Info Card

WaveXpress was demonstrating its e-commerce and datacasting services. Using 2Mb/s of the ATSC stream, WaveXpress hopes to deliver broadcast-quality video, games, software, music and Internet content to PCs equipped with a DTV tuner card.

Circle (427) on Free Info Card

Tower company Spectrasite, showcased its services in tower design, construction, management and leasing.

Circle (413) on Free Info Card

Synergistic Technologies displayed its wares as a system's integrator and reseller. It's current projects include the new Scripps Howard broadcast center.

Circle (392) on Free Info Card

Sundance Digital introduced IntelliSat, a comprehensive satellite and broadcast feed recording management package designed to operate in conjunction with the company's FastBreak Automation or as a stand-alone product.

Circle (390) on Free Info Card

Videotek and Miranda teamed up to integrate Videotek's VTM-300 multiformat, on-screen monitor into Miranda's new Kaleido-QC Visual Monitoring and Quality Control solution. The addition will allow direct monitoring of audio and video parameters.

Circle (421) on Free Info Card

Panasonic announced new internal transcoding cards for its DVCPRO and DVCPRO50 VTRs and servers. The cards enable playout to MPEG-2, allowing users to connect easily to standard satellite and terrestrial transmission links.

Circle (361) on Free Info Card

Panasonic announced a 50Mb/s version of its newsBYTE newsroom editing system. newsBYTE 50 features a built-in 50Mb/s 4:2:2 DVCPRO50 VTR and is switchable between 50Mb/s DVCPRO50 and 25Mb/s DVCPRO operation.

Circle (360) on Free Info Card



## DTV systems

By Marvin Born

HD television systems cover a large area at NAB from the small items, such as monitor switchers, to complete transmission systems and antennas. There were several systems to see and a few made a memorable impression. What was interesting was that some of the systems made an impression on non-technical people. These systems should be discussed since they have ramifications across the industry that will carry far into the future.

The buzzword was the Internet and its related synonyms such as webcasting, video streaming, and those dot-com companies. While some attendees were looking at how to make a web page, others were watching five simultaneous HD video feeds into the Sony booth via the Internet backbone. While there is something for everyone at NAB, the spread of Internet technology is staggering. First, there is the web page then audio streaming followed by video streaming. These operational concepts that will make a buck for a few lucky ones are here today. That is the whole idea, find a niche if you will, find a new outlet and make a buck. There were roughly a dozen vendors, including Pinnacle Systems and RealNetworks, selling Webcasting services. Unlike last year, there were general managers and corporate-level people taking a look and seeing dollar signs. These systems are out of the suites, on the floor and the sales people were looking for purchase orders.

Speaking of suites and new ideas, a

number of companies in Las Vegas were demonstrating and discussing ideas to marry the Internet and digital TV. The two companies that come to mind first are Geocast and iBlast. Their basic concept is similar, but their execution is different.

Geocast wants to use a part of the digital spectrum to transmit (as in broadcast) data to the consumer. Geocast would take a mix of national and local compelling content such as popular web sites, local news content, etc., and send a continuous data stream to RF receiver boxes connected to PCs. The consumer would purchase the receiver for approximately \$299. The box receives and decodes ATSC digital information, then stores the information until retrieved by the user. This is not information in the auxiliary data channel. The data would require a minimum of 3.5Mb/s of the main 19.39Mb/s ATSC stream. The average data rate is actually close to 7Mb/s. Part of the package would allow the user to filter the information that is stored and delete what is not of interest, thus not filling up the storage in a few minutes. Geocast, who is alpha testing in San Jose, CA has a number of large broadcast groups supporting their efforts.

iBlast is a similar service and is also backed up by heavyweight broadcast groups covering 102 broadcast markets, including the top 25. Those groups include Tribune, Gannett, Cox, Post-Newsweek and Scripps. iBlast plans to have more than 95 percent of the broad-

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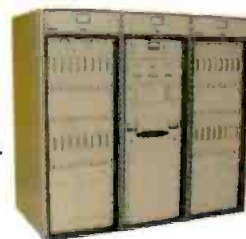


**2**

Solid-State UHF Transmitters.  
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**3**

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**4**

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## Product Jackpot

Columbine JDS now offers VideoActive Express, new station management software for Broadcast Master allowing frame-accurate viewing and editing of program and spot material from any desktop within a television facility.

Circle (309) on Free Info Card

Teranex showcased its Starfront DTV compression pre-processor, which combines the features of a compression pre-processor and aspect ratio converter in the same box. It offers motion adaptive de-interlacing, down sampling and noise reduction filters.

Circle (399) on Free Info Card

DPS unveiled the newest version of dpsVelocity, which allows real-time Web video output in a variety of formats, including MPEG-1, MPEG-2 and RealNetworks RealVideo. dpsVelocity 7.5 also adds analog-style audio scrubbing and 16:9 support.

Circle (316) on Free Info Card

Preferred Video Products announced MTI CineDeck, a new Total Image Management Environment combining multiprocessor servers with a storage network. CineDeck's storage area network provides interactive linkage to the Telecine and color control systems.

Circle (370) on Free Info Card

JVC introduced two new color video monitors, the TM-1650SDU and the TM-950DU. The monitors offer full SDI input connectivity and active through output connectors, conforming to CCIR 601 standard.

Circle (337) on Free Info Card

JVC introduced a new upconverter, the BC-D2300, which utilizes Adaptive Motion Algorithm technology to allow users to convert 480i video signals to 1080i or 720p HDTV standards. The BC-D2300 features 2D enhancement and three aspect ratio conversion modes.

Circle (336) on Free Info Card

ESE introduced the ES-185A, a GPS-based master clock timecode generator.

Circle (321) on Free Info Card

cast homes serviced by their product and multiple stations in each market carrying their data, thus increasing data throughput. Unlike Geocast, iBlast seems to be a more oriented to the pipe side of the service. They want to deliver a minimum of 7Mb/s to the homes of subscribers. This is about 200 times faster than a 56K modem in use today and about five times faster than cable modems. The theory is that 95 percent of the users of the Internet look at one percent of the sites. If a company could deliver that one percent quickly and efficiently, they could have a business and a new service. Look for this type of company to be the cable companies of the future if their idea takes off.

There is a down side to this new service, or should I say a low-res side. The total payload on an ATSC digital station is 19.3Mb/s. iBlast wants a constant 7Mb/s and bursts of more. Geocast wants an average of 3.5Mb/s. It's interesting to note that none of the major broadcast networks have jumped on this bandwagon. As a matter of fact, some of the networks are issuing warnings regarding leasing part of the digital bandwidth. Part of the pitch is to become part of the service, provide bandwidth, and promote the service in return for a share of the income.

The idea being presented is that broadcasters sign a contract and then watch the money roll in. Several people have questioned whether giving up spectrum is a good idea for broadcasters. It is also difficult to put a price tag on the digital payload. Is it worth more or less today than it will be in five years? What about in 10 years? Being first has its value, "If I had only bought Cisco a few years ago," is heard many times around the coffee machine. From that point of view the sooner you sign, the better. But on the other hand, spectrum is like land. They don't make it anymore, so get as much as you can and keep it for as long as you can. This issue is simply a matter of control, control of the pipeline into the home and controlling the value of that pipeline.

This 7Mb/s is more than one-third of a DTV channel's capacity. The managers of iBlast and Geocast say their services complement digital television by adding a new digital service along with traditional television programming. However, giving up more than one-third of your bandwidth will affect

HDTV programming quality. The demo in the Geocast suite showed a before and after picture in a 16:9 aspect ratio with little difference, but no mention of resolution was given.

WTHR in Indianapolis experimented with rolling back the data rate to 14Mb/s for a 1080i signal and concluded there was a noticeable loss of resolution, especially on fast moving sports events and scene transitions, such as dissolves. I can imagine what 12Mb/s will look like. However, HDTV is a new service and technology may prevail to allow both.

On the other hand, if one were to consider only transmitting SDTV in digital form, one could actually handle two standard signals and the datacasting no sweat. This makes a nice package for a station looking for quicker revenue stream from DTV without regard for HDTV. This program bears watching for a while.

### Other developments

On the other end of the HDTV wire is the antenna. Andrew developed a new antenna system call the Stacker. What is interesting about this product is that it is a different way to stack not two, but three antennas on one stick. We all know how to stack one antenna on top of the other. The problem is getting the transmission line for the top antenna past the bottom antenna without degrading the lower antenna's pattern. This is especially problematic when dealing with high power UHF channels that have small wavelengths but large transmission lines. With the number of installations of DTV antennas, this is a problem many of us have faced. The typical solution is either stacking your NTSC and DTV on one tower or stacking a pair of DTV antennas.

Back to the Stacker. Visualize a section of tower with a slot antenna mount on top. Pretty standard. Now visualize one of the legs of the tower as a slotted antenna. Since the other two legs are 10 to 12 feet away, they do not cast as big of a shadow passing the antenna aperture as they would if they were close to the mast in a normal stack. One of the remaining legs can house or shield the transmission line to the top antenna. This makes a very nice arrangement, since the bottom half of the Stacker can be a tower section of the main tower or the bottom half of a top mount.

Additionally, Andrew has developed

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## Product Jackpot



SGI introduced their scalable, rack-optimized SGI 1200 server. The server is designed to support Internet applications and server clusters. It features a Linux operating system, an Intel Pentium III processor server and robust remote management options.

Circle (382) on Free Info Card

Vinten showcased a full line of weatherproof robotic heads, including HS-102PE, HS-105PE and HS-2010ME models. The robotic heads feature specially gasketed seams and waterproof connectors, allowing them to be used in a variety of locations.

Circle (423) on Free Info Card

Philips introduced SURF, an asset management system designed to allow broadcasters to manage broadcasting assets. Users can view a shared station video library and create content at a lower bit rate, so that it may be viewed on any PC desktop.

Circle (366) on Free Info Card

Sencore Electronics showcased their AT951R ATSC Stream Player, which provides a reliable ATSC signal source for repeatable test signal. It can play pre-recorded complete transport streams at 19.4Mb/s for distribution or at 45Mb/s for contribution.

Circle (381) on Free Info Card

Datatek's D-2800 now feature doubled crosspoint densities in all configurations. 128x128 systems are available in 11RU and 196x196 systems are available in 22RU. The switcher is also complemented by UMDs, virtual tally displays and a line of control panels

Circle (313) on Free Info Card

Avstar's Media Browse 2000 streamlines TV news production and Internet newscasting and provides multiple users simultaneous access to view video assets, select clips and perform simple edits at their workstations.

Circle (295) on Free Info Card

slot technology for high band VHF antennas. This development now allows the VHF stations with an UHF DTV allocation to solve their mounting problem. You can make one leg of the stack an UHF antenna and the top mount a VHF antenna or the other way around. Towers have three legs, so the third leg can also be a slot antenna. Not only has Andrew developed a solution of the VHF/UHF stacking problems, they can make us some revenue by renting the other leg to a competitor. Yes, renting space on your DTV antenna (tower) does count as income earned from digital. Just ask your accountant if you don't believe me.

Circle (242) on the Free Info Card

*Marvin Born is vice president of engineering for the Dispatch Broadcast Group in Columbus, OH.*

## RF at NAB



By Don Markley and Jeremy Ruck

Small improvements and additions rather than something huge characterized RF equipment at this year's convention. For example, Andrew displayed their line of dehydrators but with a new twist. This year, they introduced a membrane nitrogen dehydrator. While the concept has been available in the past, this is a new item for a manufacturer who is primarily broadcast oriented. The system is designed to provide nitrogen rather than dry air for large systems, replacing the old, familiar bottles for good. While a bit pricey for small systems, the system has a lot to offer to those users of long, large

coaxial or waveguide systems.

The marriage between Sinclair Broadcast Group and Acrodyne has resulted in a new line of transmitters called the Quantum Line. These transmitters are IOT based, something new for Acrodyne, and are available in power levels up to 280kW for analog users and 120kW for digital applications. In addition, Acrodyne has partnered with Rohde & Schwarz to market a line of solid state television transmitters. Power levels are up to 15kW average for DTV, 40kW peak for UHF NTSC and 20kW peak for VHF NTSC. The solid state units are available as either air-cooled or liquid-cooled systems for flexibility in installation. The diacode transmitters are still available.

ADC introduced a variety of new products, including a solid state transmitter available at power levels up to 120kW analog and 60kW DTV. A new television exciter that can switch between NTSC and ATSC was also introduced. The new exciter includes linear and non-linear adaptive pre-correction for DTV operation. ADC also unveiled a new signal analysis system that measures the normal parameters in the transmitter output signal to permit adjustment of the pre-correction circuitry.

Comark introduced a new twist on their transmitter control systems. While everyone has the ability to access the transmitter to view measurement data and have some degree of control over the system via modem, Comark has extended the feature to Internet access. This might seem to be a hacker's heaven at first, but they assure us that adequate safeguards are built into the system to deny unauthorized access. On the other hand, the system offers the obvious advantage of inexpensive and fast access to a lot of information for both the station operators and the manufacturer. Now the chief engineer and the manufacturer's service department can view the same information simultaneously and diagnose system errors. Comark also introduced a liquid-cooled version of their solid state DTV transmitter.

Liquid cooling was popular this year for solid state transmitters. It offers a distinct advantage for transmitters where high volumes of air are not readily available. For instance, outside air can be several rooms away for systems in large buildings. Those buildings often offer stations chilled water for their system cooling. That would easily allow, through

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## Product Jackpot

Richland Towers was offering its spectrum management services including acquiring strategic locations, tower design and construction, RF facility operation management and complete DTV interference and coverage analysis.

Circle (376) on Free Info Card

ROHN was offering a full range of tower design, construction and repair services for DTV systems including site location and installation and plus design and installation of tall (2000-foot) towers by fully qualified crews.

Circle (377) on Free Info Card

Trilogy Broadcast was offering the Mentor Plus, a digital SPG and TSG designed for the requirements of digital, mixed digital/analog and 525/625 mixed standard environments.

Circle (414) on Free Info Card

WAM!NET was showing the WAM!BASE, a storage and archive service for temporal media with a full range of content management services.

Circle (426) on Free Info Card



Prime Image unveiled the serial digital version of the Time Machine, which creates up to 30 seconds of extra commercial time in a 20- to 30-minute program. Digital I/Os are standard and the system provides four channels of analog or AES/EBU audio.

Circle (371) on Free Info Card

Parkervision demonstrated the P/TV Studio Automated Production system, a fully integrated and automated live production system, now incorporates producer's rundown capability from Avstar or AP news servers.

Circle (363) on Free Info Card

Thomcast showed the SD series digital MMDS transmitter, with power levels from 15-200W and 16VSB or 256QAM modulation.

Circle (408) on Free Info Card

a simple and small heat exchanger, liquid-cooled transmitters to be installed at such locations. In addition, liquid cooling allows more compact construction resulting in a smaller footprint.

Dielectric introduced two products that were extremely interesting. The first is the DCR-RFR antenna that reduces downward radiation. Downward radiation has been reduced in the past by one-half wavelength spacing between bays, which results in significantly lower gain than for fully spaced systems. The new Dielectric antenna provides nearly the gain of a fully spaced antenna but without downward radiation. The second is an IBOC FM bandpass filter. This filter is designed to offer flat in-band insertion loss with high rejection of those frequency components just outside the desired band.

Harris exhibited a large number of items designed to make dealing with DTV easier. Those included systems for improved transmitter and signal monitoring, improved network access products and new systems for remote broadcasts. The queen of the Harris DTV transmitter fleet was the DiamondCD Series solid state transmitters. Perhaps the best news concerning that item is that the price is becoming much more competitive with IOT systems. Make no mistake about it – solid-state DTV can no longer be considered a “nice-but” item. It is a realistic option.

In addition to their standard line of transmitters, Larcen Inc. introduced a new solid-state DTV transmitter designed to ease the path into the DTV world. The DTV-Lite transmitter is a low power unit in a single five foot high rack. The system includes the complete transmitter (including exciter) but without encoder. The idea is to allow a station to start DTV broadcasting at low power to meet sign-on requirements while allowing the station to grow at a more controlled pace. The big push at Larcen/LeBlanc was on their systems' capability to construct major tower and antenna facilities.

Plessey Microwave and RF showed an interesting line of microwave products. It was showing spread spectrum digital radios for use at 2.4- and 5.8GHz. These radios are designed for short to medium distances. While not designed for full ATSC system usage, they provide reasonably priced systems for digital data for information transfer.

TCI displayed a new television-trans-

mitting antenna utilizing a slot panel radiator. The antenna features broad bandwidth for multiple UHF stations with a very smooth pattern. The slot design allows shaping of both the vertical and horizontal patterns and has extremely good pattern circularity.

RFS displayed their combiners for multiple station operation. The combiners feature low insertion loss, very low group delay and are much smaller in size than conventional units. Basically, these combiners are constructed in a manifold fashion with each station having a three or four cavity filter mounted on a waveguide strip.

Mitsubishi displayed a solid state 1kW DTV transmitter. While it is a low power unit, it is highly sophisticated with full feed-forward compensation. They also demonstrated a line of encoders and decoders for DTV use for remotes.

In the Marti Electronics booth, they were showing a new digital aural STL. Using Dolby audio coding, the audio channels are transported to the transmitter site independently. The stereo generator, which Marti also manufactures, is then installed at the transmitter site.

Moseley was also showing a new digital STL system. This system also delivers the channels to the transmitter site individually and offers a stereo generator for location at the site. The big advantage of this system is that it interfaces directly with existing PCL 6000 and 606 radios.

Myat displayed a new two- to eight-way hybridless combiner for UHF systems. The system will accommodate up to eight power amplifiers and handles input faults on any input without affecting the match on the other ports. The system will handle up to 6kW on each port with less than 0.1dB system attenuation.

Adaptive Broadband displayed the latest versions of their MRC radio systems. The hottest item is their Twinstream radio system that can handle both an NTSC signal and a 19.39Mb/s signal over the same set of radios. The system can be modified later to two ATSC signals if desired.

NuComm also was showing a two-channel system for combined DTV and NTSC operation. In addition, both manufacturers offered single channel digital STL systems.

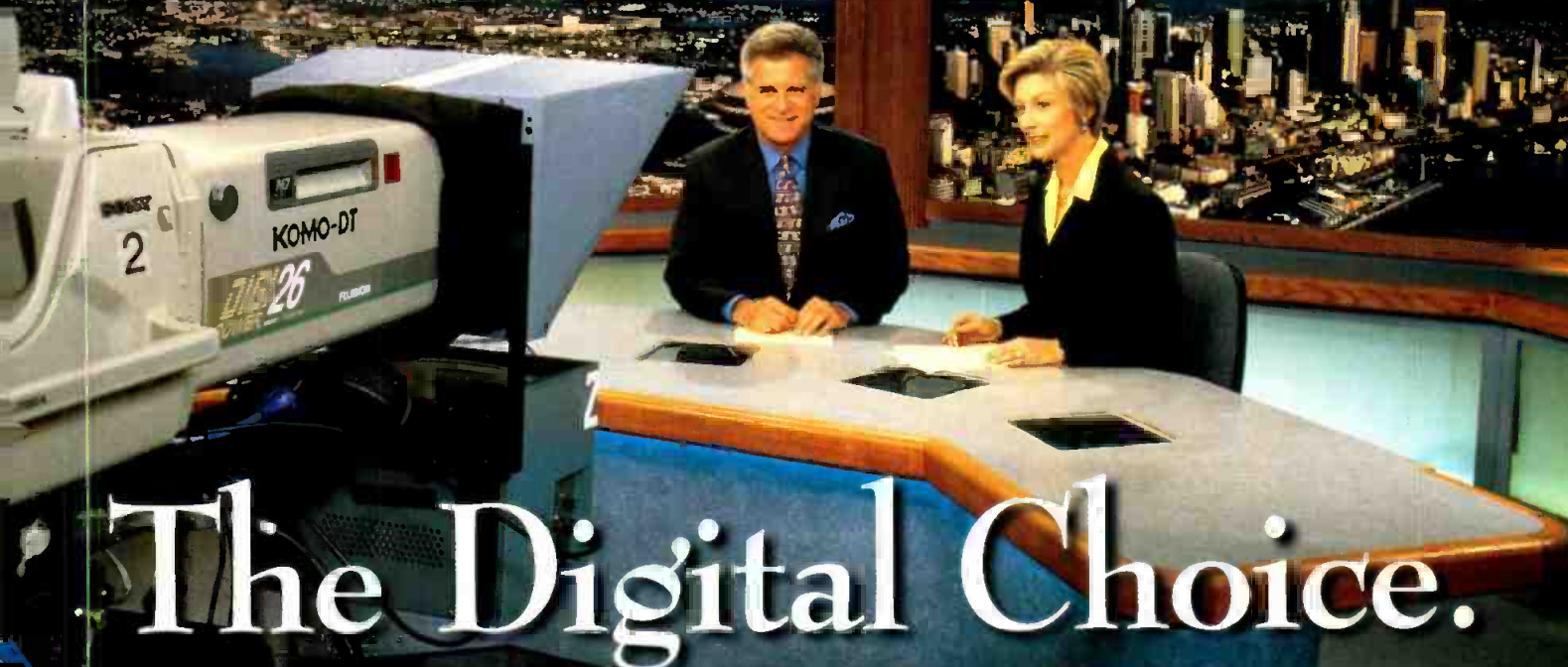
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*Don Markley is president and Jeremy Ruck is senior engineer with Markley and Associates.*



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# Light Compression for Transporting Contribution-Quality HDTV



Light MPEG compression offers facilities an easily implemented way to transport high-quality video. Fox Sports Net employs Tandberg Television evolution 5000 encoders for distributing and receiving content. Photos courtesy of Communications Engineering Inc.

## By William Zou

In the past decade, one of the most significant developments in broadcasting technology has been video compression. Video compression as a technology in the DTV transmission system development is now being used

in program production, distribution, contribution and storage. Transporting contribution-quality HDTV requires light compression (also called "Mezzanine Level" compression) so that enough quality headroom can be preserved for downstream video processing including editing, insertion and manipulation. To meet the increasing demand, various compression methods and products have been developed such as MPEG-2 4:2:2 Profile and DV-based compression.

## Standards for contribution-quality video

With the same motivations as video distribution/broadcast (DTV and Direct-to-Home) and program storage (DVD/server), light compression is used to reduce data rate while maintaining required video quality. MPEG-2 4:2:2 Profile at Main Level was developed to augment the original MPEG-2 profiles for improving chroma signal resolution. Later, MPEG-2 4:2:2 Profile at High Profile was standardized by

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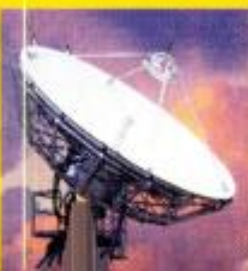
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		PROFILE					
		Simple	Main	SNR	Spatial	High	4:2:2
LEVEL	High		4:2:0 1920x1152 80Mb/s I,P,B			4:2:0, 4:2:2 1920x1152 100Mb/s I,P,B	4:2:2 1920x1088 300Mb/s I,B,P
	High-1440		4:2:0 1440x1152 60Mb/s I,P,B		4:2:0, 4:2:2 1440x1152 60Mb/s I,P,B	4:2:2 1440x1088 80Mb/s I,B,P	
	Main	4:2:0 720x576 15Mb/s I,P	4:2:0 720x576 15Mb/s I,P,B	4:2:0 720x576 15Mb/s I,P,B		4:2:0, 4:2:2 720x576 20Mb/s I,P,B	4:2:2 720x480 50Mb/s I,P,B
	Low		4:2:0 352x288 4Mb/s I,P,B				

Table 1. MPEG-2 profiles and levels.

SMPTE (SMPTE308M-1998) for HDTV professional applications. Table 1 shows all of the MPEG-2 profiles and levels.

It should be noted that the rates in the table are upper bounds. In addition to MPEG-2 standards, light compression systems have been developed for HDTV production, storage and playback. Among these are Panasonic's HD D-5 and DVCPRO HD, JVC's D9-HD and Sony's HDCAM digital VTRs. All of these are DCT-based I-frame only compression. The data compression is achieved via quantization followed by variable length coding (VLC). The video bit rate is in the range of 100Mb/s to 235Mb/s.

### MPEG-2 compression for contribution/production

Using compression for production saves the cost of storing and switching programs within the studio and distributing or contributing signals between network and affiliates. The compression ratios should be chosen so that the video quality meets requirements of the general applications of contribution versus distribution, as well as specific applications such as production mixing and editing. The selection of compression ratios is also influenced by the cost of storage and switching. For contribution and/or distribution, compatibility with industry interface standards will be an advantage since existing equipment can be used and signal transport in other media can be easily accomplished. In general, the range of bit

rates suitable for production quality and supported by existing technologies is from 45Mb/s to 300Mb/s.

The MPEG-2 4:2:2 Profile can provide higher video quality, better chroma resolution and allows a higher bit rate (at Main Level, up to 50Mb/s; at High Level, up to 300Mb/s) than MPEG-2 Main Profile @ Main/High Level. With a higher bit rate and chroma resolution this profile can be used for applications requiring multiple generations of encoding/decoding, picture manipulation or change in picture coding type between generations.

Unlike compression in digital tape recorders such as DVCPRO and HDCAM, which is I-frame only coding, using MPEG-2 4:2:2 at High Level has advantages in terms of flexibility and coding efficiency. Coding using I, P, B GOP structure improves coding

efficiency especially in the range of 45Mb/s to 200Mb/s. Higher compression ratios can be achieved by I, P, B encoding at the cost of increased latency. The main advantage of MPEG-2 encoding is its utilization of adaptive quantization inside the pictures. The quantization scale can be changed from macroblock to macroblock. This allows one to change the degree of quantization as the scene content is changing from macroblock to macroblock. Additionally, adaptive frame/field DCT encoding and alternate zigzag scanning can be used to improve coding efficiency, especially for encoding interlaced video.

### Concatenation issues

Currently, network contribution/distribution involve at least three compression/decompression cycles for a live HDTV broadcast event:

- Originated from camera feed and compressed at 45Mb/s (4:2:0), transmitted via satellite or fiber.
- Received at network, decompressed to the digital baseband at 1.5Gb/s (SMPTE292M), edited, re-compressed at 45Mb/s (4:2:0) for satellite network-to-affiliate distribution; and,
- Received at affiliate station, decompressed to the digital baseband at 1.5Gb/s (SMPTE292M), edited (including local insertion), re-compressed at 19.3Mb/s for DTV emission.

This configuration is constrained by the satellite transponder bandwidth and lack of 4:2:2 HD encoding/decoding equipment on the market.

An alternative is to use higher bit rate compression with 4:2:2 coding and



Computer-based systems make extensive use of compressed video. As computer use in facilities increases, so too will compression use.

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using fiber networks for the contribution and distribution. With the high bandwidth capacity of fiber networks the bit rate can be in the range of 100Mb/s to 300Mb/s, which provides enough headroom for downstream compression. The tariff of a 270Mb/s connection is now affordable and competitive to some lower bandwidth connections such as DS-3 at 45Mb/s. As specified in the MPEG-2 4:2:2 Profile @ High Level, the following GOP structure can be used:

- I-only (interlaced scan)/I-only or IP, or IB (progressive scan) for bit rates from 230Mb/s to 300Mb/s;
  - I-only or IP or IB for bit rates from 175Mb/s to 230Mb/s; and,
  - Any allowed GOP for up to 175Mb/s.
- The GOP structure and associated bit rates are estimated based on scaling up (6:1) of 4:2:2 Profile @ Main Level (SDTV).

### Compression vs. format conversion

Generally, format conversion is used to convert one format to another in both the spatial and/or temporal domains. For network-to-affiliate distribution there are two approaches that trade-off video quality and cost of investment: one is using compression and another is up- and downconversion. In the latter, the network distributes its HDTV signal in downconverted SDTV format (ITU-601) and upconverts it to HDTV format at the affiliate. This approach aims to utilize

existing SDI infrastructure at affiliates. Less bandwidth for program distribution is required. The disadvantage is that the upconverted HDTV isn't a true HDTV quality. Upconversion starts from

lite with increasing availability and competitive tariffs. The major limitation of satellite transmission is the constraints of transponder bandwidth. The upper bound for compressed HD over

## The selection of compression ratios is also influenced by the cost of storage and switching.

a SDTV spatial resolution (720x480) and processes it by interpolation and resampling. However, no new information can be created through any conversion processing. In other words, conversion creates an HD-like format without true HD resolution. The approach of using compression preserves the HD spatial information critical to the human visual system (assuming it does a good job) while eliminating less important components to reduce data rate. Therefore, the decompressed signal has true HD resolution.

### Transporting contribution-quality HDTV

The applications for transporting lightly compressed HDTV include network-to-affiliate program distribution, transmission of live event/backhaul, remote program production/post production and industrial, educational and medical images. Currently, satellite is the primary medium for content transmission; however, fiber-based networks are getting their market share from satel-

lite is less than 100Mb/s. Transporting lightly compressed HD over a fiber-based network does not have the bandwidth constraints as over satellite.

### Interface

As mentioned earlier, selecting the right transmission interface will be an advantage in utilizing the existing equipment and reducing implementation costs. There are existing interface standards for various transmission medium and applications, such as SDI/SDTI, ASI and DS-3. DS-3 has a data rate of 44.736Mb/s. SDTI has a transmission rate of 270Mb/s (payload of 180Mb/s) or 360Mb/s (payload of 240Mb/s). ASI has a transmission rate of 270Mb/s with up to 216Mb/s-payload capacity.

SDTI has a frame-based structure (525-line/frame) with 1440/1920 words/line. Frame-based switching can be done if each frame (I-only) can be compressed without exceeding the limitation of 756,000/1,008,000 words/frame. Padding is needed to fill up the frame space as well. ASI does not have the frame-based structure, and the payload can be transmitted as a burst of contiguous bytes or as individual bytes.

A demonstration was conducted recently by the University of Washington and Sony to transmit HDTV video over Internet2. HDTV video was compressed MPEG-2 at 45Mb/s in ASI, as well as compressed Sony HDCAM at 143Mb/s and transmitted in SDTI over 270Mb/s. With the availability of HD 4:2:2 encoding/decoding equipment and increasing demand for high-quality HDTV program, light compression for transporting contribution/distribution HDTV is likely to be adopted and implemented. ■



As facilities transition from analog to digital to high definition, the use of digital compression will become more prevalent, in part to reduce the cost of storage and switching.

*William Zou is an industry consultant based in San Diego.*

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### Lighthouse Digital Systems OZ TDM audio router

BY RICK GRANT

Once an analog audio signal is digitized, it stops being audio and becomes digital data. At this point technology has created a better way to accomplish an old task. Using a "more value for less cost" philosophy, the OZ audio routing system from Lighthouse Digital Systems is the next generation of large-scale audio routers. The OZ system solves one of the biggest problems of the new millennium: the digital/analog signal dilemma.

Based on a high-speed TDM/DSP addressing engine, the routing system is a connectivity device similar in function to a traditional routing switcher, except there are no crosspoints. It digitizes all inputs synchronously (analog audio, digital audio, timecode, machine control, etc) and sends them to the TDM/DSP core with the routing functions directed by an addressing engine. The 32-channel I/O modules also perform other necessary processing. All inputs are synchronized/re-clocked and sample rate converted to house sync (usually 48kHz). MADI (56 audio channels) is demultiplexed for transferring to and from the TDM/DSP core. As with all Lighthouse K-Series switchers, OZ uses a multiple module design to allow easy configuration and expansion flexibility. In addition, unused internal bandwidth can be used for timecode and RS-485/422/232 switching. Future developments will include the generation and reading of timecode and RS-485/422/232 signals.

The advantages of this architecture are numerous. The system is format independent, and inputs can be analog, digital, synchronous, asynchronous, MADI, timecode or machine control. All sources are synchronously switched in the same system, with any input to any or all outputs. Another advantage is that it offers many

functions not possible in a matrix switcher, functions that use the power of the DSP:

- Quiet "quick-mix" audio switching. Quick-mix switching allows true click-less switching. OZ is a synchronous router but, like synchronous crosspoint-based AES routers, the OZ DSP performs a transfer curve to quickly "ramp" the audio signal to mute, make the switch, then "ramp" the newly routed signal to the proper level. This removes the step function effect of an audio signal when it is switched. While analog filtering can reduce some of the click, there will still be some component of the step that is audible in crosspoint-based systems.

- Stereo-to-mono mixing. One possible setup for a dub is to have a stereo input mixed to a mono signal (summed then -6dB) and sent to one channel of a stereo output. Then the timecode can be passed to the other channel of the same stereo output. The system

also allows routing of timecode to an AES output. There are many other mix capabilities as well.

- Assigning any switcher inputs to the two channels in the AES outputs. OZ breaks the AES/analog audio barrier by demultiplexing the AES input into its two channels, allowing the two channels of an AES output to be from any input.

- Creating and analyzing audio test signals, timecode and RS-485/422. Using the DSP core, the routing system can generate test signals at an output and then analyze them as they re-enter an input.

- Gain adjustments. OZ can change gain for a selected number of channels.

- Satellite or MADI I/O that can move inputs and outputs to distant locations. Since it is a data transmission device, it can send or receive I/O collectors in groups of 64 via fiber or coax.

The design of the system features smaller

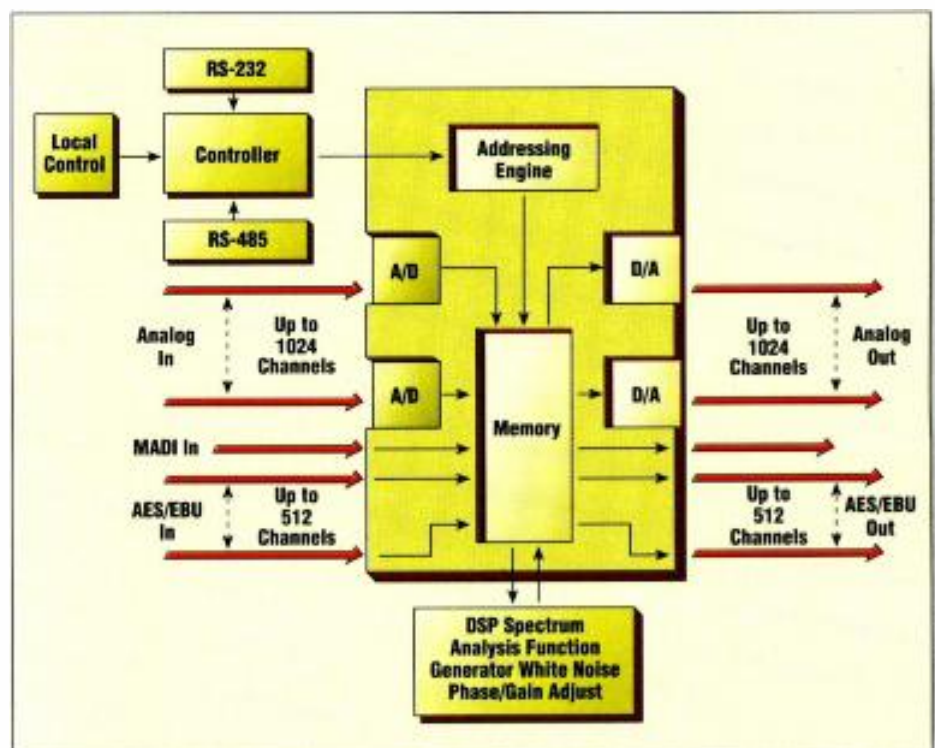


Figure 1. Simplified OZ Block Diagram



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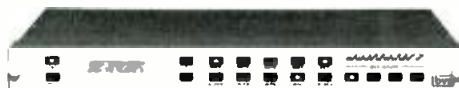
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and simpler frame requirements, less power consumption, one DSP module per system and simple expansion. Since cross-point modules are not required and it is a robust design, it sells for much less than conventional matrix switchers.

## Reliability

OZ systems are online in post facilities and 24-hour call letter stations around the world. By straight MTBF calculations, OZ is more reliable than crosspoint switchers because it has fewer parts. However, for those mission critical situations requiring the ultimate in reliability, a redundant DSP module option is available. This backup DSP module resides immediately below the primary DSP module in the K-Series frame and operates in hot standby mode.

## How OZ works

The development of ICs, memory components, ASICs and other computer hardware allowed the creation of OZ. (See Figure 1.)

The system can either free run or be locked to house AES. This generates the internal master clock that synchronizes everything. Internally, it is a time-division multiplexed (TDM) device. All the analog inputs are digitized synchronous to the internal master clock, multiplexed at each module and fed onto the TDM highways to the DSP module. All the digital inputs are sample rate converted, synchronized to the internal master clock and fed onto the TDM highways.

The TDM highways go to and from the DSP module, which contains the proprietary addressing engine. On the TDM module, all the audio data is demultiplexed and stored into shared memory arrays as directed by the addressing engine. The addressing engine is also locked to the internal master clock and performs the actual switching functions as directed by the system controller. While in this shared memory, the DSP has access to the data to perform its DSP magic. The addressing engine also controls the TDM highways to the output modules. At the output modules, the data is either converted to analog or a digital format.

Timecode (sampled at 1MHz) and machine control signals are processed into similar data streams compatible with the TDM highways, and they too can go to and from the same DSP module simultaneously. The system controller simply maps the shared memory into the equivalent of multiple switching levels. This is how multiple signal types can be combined in one switching product.

In the big picture of switching systems, OZ is just another level in Lighthouse Digital's K-Series family, which includes OZ timecode and OZ machine control, plus Navigator control. When combined with the Lighthouse 256x256 asynchronous AES matrix switchers, systems can be created with unbelievable power and unmatched flexibility, at cost savings that will be very popular with any accounting department. In conclusion, OZ is a revolutionary TDM device that is a cost-effective solution and has redefined the audio connectivity market. ■

*For more information on Lighthouse Digital Systems' OZ TDM audio router, circle (410) on the Free Info Card.*

*Rick Grant is president of Lighthouse Digital Systems, Grass Valley, CA.*

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## Cameras

BY JOHN LUFF

Think back 30 years when RCA TK-41s were still in regular use, if you were lucky enough to have been around. Even though television cameras were in their fourth or fifth generation, they were considerably simpler in some ways than they are today.

How is that possible? CCDs, replaceable boards, auto setup, auto iris, menus for everything, triax camera cable — haven't all these made cameras simpler? Well, yes and no.

Today, you can make some incredible images, but the variety of cameras you can choose from is nothing short of staggering. Think about the contrast between the first commercially viable portable camera, the PCP-90 sold by what was then Norelco and the various incarnations of Philips, and a consumer camcorder today. I suspect you could get considerably better pictures from a DV camcorder today if you could put higher quality optics on it. But the difference in prices, not considering inflation, is astounding.

Today, you can buy cameras suited to a wide variety of uses. Start with that crossover consumer camcorder. This is an ideal choice for a quick news shot, a POV for sports, a shot from a hostile environment or a shot for an independent artist's documentary. A limiting factor in performance is the resolution of the CCD (often singular), which yields pictures suitable for the professional environment only when the compromise is carefully weighted. The glass in front of the camera is equally limiting. When the whole camera/lens/recorder combination is half the cost of low-end ENG lenses, you don't get much.

The three-chip industrial cameras (high-end consumer also) are one step up the price scale. The increase in depth of modulation is dramatic. Although you have little choice in

CCDs with over 400,000 pixels, and some have digital signal processing and even switchable 4:3/16:9 imaging. Lenses vary from C mount to the same lens mounts found on some

### One manufacturer has introduced a camera that uses a six million pixel CCD that is used to output either 1080i or 720p native.

lenses, they are considerably better. Because these are all camcorders, there are no camera control units to make remote control possible. However, a good frame synchronizer will make them quite usable in some live applications.

Then there are the low-end industrial cameras without recorders, which start around \$3000 to \$5000. Some-

ENG cameras. Performance is quite remarkable, but few user features are available. CCUs are multicore and limited in cable run length. Viewfinders are pretty low in performance if available, and the extremely light weight makes good camera work difficult. VTR interfaces pretty much don't exist, as this is not the intended application.

Jump a bit in price and you hit the first ENG cameras. Some are available as two-piece "dockable" series. I suspect that some in this category are box cameras with broadcast feature envelopes to make operators more comfortable. For under \$20,000 you can get a fairly good camera with a load of features controlled by viewfinder-accessible menus. Many broadcasters have been using camcorder versions in this class to do credible broadcast news for a long time with Betacam, 8mm, SVHS, DV and



A Discovery Channel cameraperson prepares for a shot with a Sony high-definition camera equipped with a Fujinon HA10x HD wide-angle lens during the Eco-Challenge. Broadcasters should carefully consider camera applications, desired feature sets and budgets in making camera purchasing decisions. Photo courtesy of Fujinon.

times called "box" cameras, these often see use in sports venues, teleconferencing, medical applications, scientific use and education. They have

Digital S recorders. Their size makes them easier to handle, and their cost keeps them accessible to a broad market, including education and in-

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dependent producers. At the lower end of this range, event video producers ("social videos," like weddings) can find high performance on a tight budget. CCUs for the dockable cameras in this range can make rather surprising studio pictures. Most of these are 4:3, but some are switchable to the wide aspect ratio. Setup memory features, including memory cards, first show up here, allowing the camera operator to keep a library of regularly needed setups. An adjustable shutter allows control over exposure and motion rendition. Automatic color balance is improved over less expensive cameras.

Moving up in cost and performance, you encounter the "broadcast range." These offer CCDs with 500,000 pixels or more and create performance that the less expensive cameras simply cannot compete with. The range of features includes sophisticated manipulation of image enhancement to optimize color rendition on face tones. These cameras are often available with CCU adapters, including triax versions, allowing high-quality pictures over longer distances. With these cameras a full range of lenses is available, allowing the creative community many options from extreme wide angle and macro focusing to long focus and extenders. Some of

cameras can have list prices over \$100,000 and CCDs with 750,000 elements or more. Depth of modulation easily exceeds what the NTSC transmission system can deliver, and

conversion. One manufacturer has introduced a camera that uses a six million pixel CCD (1920x6000) that is used to output either 1080i or 720p native. It does this by combin-

## Moving up in cost and performance you encounter the "broadcast range."

often the CCU (and perhaps the camera head) will have SMPTE 259M outputs. The CCU interconnect will often carry multiple channels of intercom, two or more levels of tally, effects return lines, and teleprompter circuits. Utility power is usually included on the camera head for external devices. These cameras require serious support tripods or studio pedestals, and expensive pan heads for maximum performance. Be prepared to spend from \$20,000 to \$120,000 on the lens, which can offer a zoom ratio of 80:1 or more.

A few years ago only portable cameras for high definition were truly available. Those came at a price of over \$250,000, and the lenses carried the cost of \$120,000 or so. Now high-quality enhanced resolution cameras begin with 480p cameras that produce a good approximation of HDTV to

ing samples on sets of lines to make the best possible picture for all of the formats. It also will work at all the common frame rates (23.98-, 24-, 25-, 29.97-, 30-, 50-, 59.94- and 60f/s) in progressive scan or interlace. Compare the complexity of this approach in a portable camera with the PCP-90, and I would venture you will agree it is not simpler but actually more complex to understand, operate and maintain.

So how to choose? My advice would be to carefully consider the application and pick a camera with the appropriate level of performance, range of features, ease of maintenance, range of available lenses, size and weight, and price. Once you have picked the appropriate range of cameras, ask manufacturers to bring a camera in for you to try. Resist the temptation to simply set it up under controlled conditions and evaluate the resulting picture. I advise putting it in the hands of the operators and listening carefully to what they like and dislike. It will be hard to distinguish the picture quality among some directly competitive models, and you may have to make the choice on the basis of factors that are not the conventional province of the broadcast engineer. If you are replacing older tube cameras, you may have the same experience a client of ours did. Viewers called in to say how much better the broadcast looked after new modern cameras replaced older tube-based cameras that had served well for over 20 years. ■

## Today you can make some incredible images, but the variety of cameras you can choose from is nothing short of staggering.

these cameras are available as cousins of full-blown studio cameras and can accept high-quality studio lenses. Second unit photography and principal photography of high-budget documentaries tend to use cameras in this range.

As you hit the next rung of the ladder, you find cameras for \$50,000 or more for studio and location production with serious features for live television. Memory systems include variations for lens memory, and moving setups from one camera to another through the control network are possible. At the high end of this range the

many consumers (though clearly it is just a comparison to 480i and the 6dB improvement in vertical resolution that they see).

True high-definition cameras now start with camcorders from three manufacturers, which are priced under \$80,000. Studio cameras start a little higher and offer all the features of 480i cameras and, in most cases, outputs in both standard- and high definition. Coming soon are HD cameras that output their native format (most are 1080i), as well as 720p (converted, not native) and native 720p cameras with 1080i

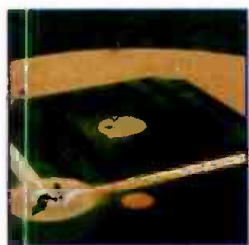
*John Luff is president of Synergistic Technologies Inc. in Canonsburg PA.*

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## Business highlights from broadcast and production

BY LAURA COLLINS, EDITORIAL ASSISTANT

**G**ranite Broadcasting Corp. recently purchased **Panasonic** DVCPRO equipment including three-CCD camcorders, AJ-LT85 laptop editing systems and an AJ-D780 4X recorder/player for installation in three of its stations: ABC affiliates WKBW-TV and WPTA-TV and NBC affiliate KSEE-TV.

VDI Multimedia purchased \$386,000 worth of equipment from Panasonic, including two D-5 HD multiformat mastering VTRs and two 1080i/720p switchable D-5 HD VTRs for installation in its facility in Burbank, CA.

Media General station WFLA-TV in Tampa, FL, purchased two of Panasonic's newsBYTE nonlinear editing systems for its high-end news production. NBC station WTVJ-TV in Miami, FL, also purchased eight of the newsBYTE systems.

New York Times Company station WQAD-TV also purchased equipment from Panasonic for news-gathering and playback to air. Equipment purchased includes 10 AJ-D400 1/2-inch three-CCD DVCPRO camcorders and a DVCPRO News Automation digital video server system.

E.W. Scripps station WXYZ-TV, an ABC affiliate in Detroit, and CBS stations WCBS/New York and KCBS/Los Angeles also purchased Panasonic's DNA digital video server system for use in post production.

Panasonic provided Media General Station WSPA-TV in Spartanburg, SC, with 65 pieces of DVCPRO equipment for its conversion to digital news operations. The equipment purchased included 19 AJ-D810A 2/3-inch three-CCD camcorders, five AJ-D230H desktop VTRs and 12 AG-A850 multievent edit controllers.

Cox Communications' CableRep division has adopted DVCPRO 50 equipment from Panasonic for its

cable advertising operations. DVCPRO 50 camcorders will be used to shoot commercials, with Panasonic's AJ-D960 VTRs used for playback and its AJ-D95DC VTRs for field viewing.

SightSound.com and Metafilmics chose Panasonic's AJ-PD900WA 2/3-inch camcorder to shoot their film, the *Quantum Project*. The film was the first to be produced specifically for download sale over the Internet and premiered May 5 on SightSound.com. *Quantum Project* is a combination of live-action and CGI and 3D effects.



Avid Xpress

Online entertainment company iCAST has chosen **Avid's** Xpress and Unity MediaNet nonlinear editing and storage tools to create broadcast audio/video content for streaming on the Web.

**Media 100** recently merged with Digital Origin in order to create an integrated streaming media application suite taking users through the streaming process from acquisition to streaming onto the Web. The suite will combine Digital Origin applications including EditDV and IntroDV and Media 100's streaming media applications.

**Miranda** will work with **Omneon Video Network** to develop the DV-Bridge from Miranda for use with Omneon's Video Area Network. The

## Screen Shot

### Fujinon shoots "Under Antarctic Ice"

Photographer Norbert Wu used **Fujinon** high-definition



lenses to shoot a nature program for Thirteen/WNET New York, "Under Antarctic Ice." Wu

used two HA10x5.2BERD lenses on Sony high-definition cameras to shoot underwater footage for the program, marking the first time high-definition equipment has been used in Antarctica.

Wu spent four months in Antarctica, working from the U.S. base at McMurdo Station. He and his crew will return to Antarctica next austral spring and summer to complete the shoot. "Under Antarctic Ice" will air on PBS stations in the fall of 2001.

video interface device provides a bi-directional link between DV on IEEE-1394 and serial digital video and audio. In the Video Area Network, the DV-Bridge will allow the capture and playback of digital video and audio between devices on the network.

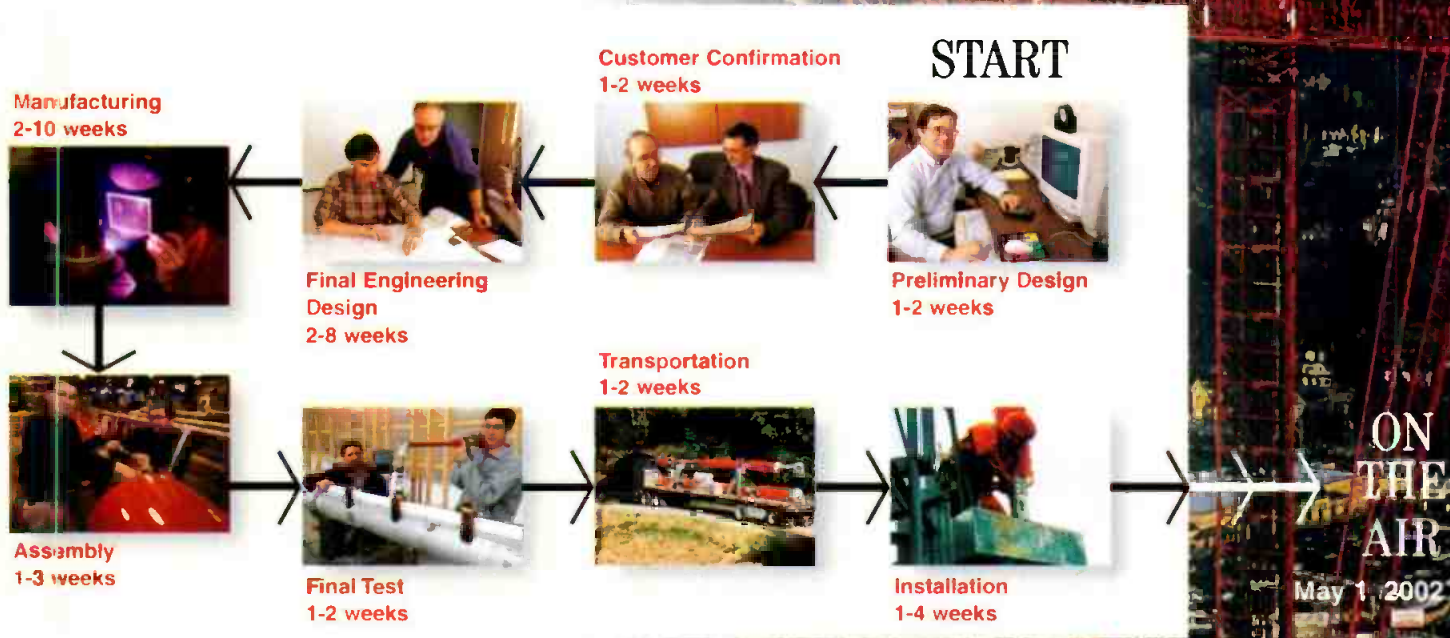
**Digital Systems Technology** recently opened its fifth office in Atlanta. DST's palletization systems can now be built in either DST's Los Angeles headquarters or in the new



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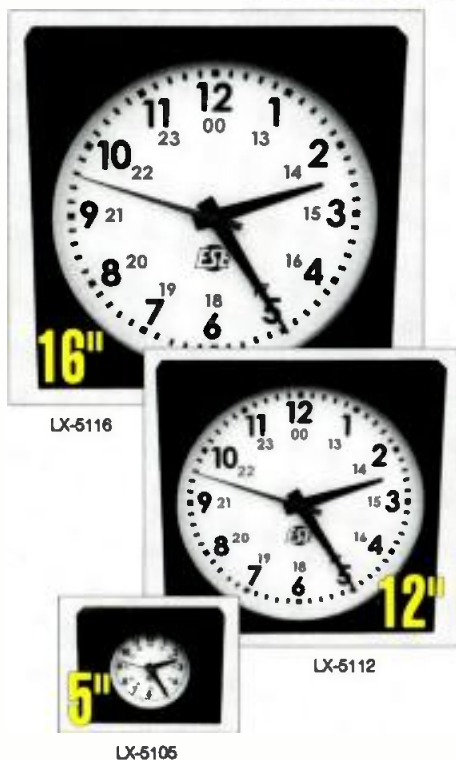
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11,000-square-foot Atlanta office. The office was added in order to better serve regional customers including CNN, FOX Sports Net South and Merideth Broadcasting's WGNX.

Members of DST of Atlanta's staff include: Partners Jay Byars and Larry Roberts, general manager Greg Garmon, engineer Phil Popp,



and project manager Dick White.

Photomag has added a second **Soundtracs** DPC-II digital console to its operations. The new console will be used in Photomag's renovated Studio A, along with an MFX 3 plus.

Ontario-based IMMAD ECVS will provide detailed design engineering services for Turner Entertainment Network Operations' new 190,000-square-foot facility.

IMMAD also signed a contract to supply EchoStar Communications Corp. with design and systems integration on backup facilities for EchoStar's direct broadcast satellite systems in Cheyenne, WY.



**Euphonix's** System 5 console was chosen by Seattle-based ABC affiliate KOMO-TV. The console was installed in KOMO-TV's new all-digital facility and will be used to mix sound for 35 hours of programming per week.

The System 5 console was also

purchased by CBS station KTVT in Texas, for use on daily news and variety programs.

**JVC** recently expanded in order to provide better customer service. Part of the expansion included opening a Professional Regional Service and Support Center in Atlanta. Satellite service centers were also opened Carlsbad, CA, and Miami, FL.

Wavexpress has chosen DBN-35 ATSC Source Media Routers from **SkyStream Networks** to assist in providing a complete, end-to-end DTV e-commerce system for broadcasters. The routers will be installed at station sites around the country to collect content from broadcasters and deliver digital television programming to Wavexpress' customers.

Televised shopping network QVC is using **Peak Broadcast Systems'** Everest 3D software to implement its new on-air graphics. The software will be used to display product descriptions and ordering information in real time, as well as to create QVC's promos, show opens and program menus.



Maryland Public Television has purchased an Avant digital console from **Solid State Logic**.

NBC and **Chyron** have signed an agreement under which Chyron will provide technology development and implementation, support, and service for the next five Olympic Games.

FOX Sports Net is using the **Associated Press'** EPNS system for its new Regional Sports Reports. The system will be installed in eight regional news hubs to aid in production of 16 local newscasts daily.

AP's EPNS system will also be installed in six television stations and one radio station owned by



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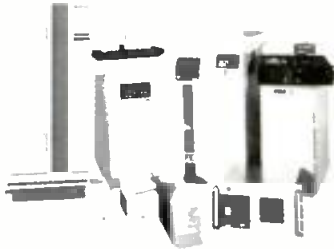
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Hearst-Argyle Television. The new installations are in addition to the newsroom systems already in use by Hearst-Argyle stations in Arkansas, Pennsylvania and North Carolina.



Canon HJ18X CINE

High-definition rental house Fletcher Chicago recently purchased HD-EC lenses from **Canon**.

UPN station WWOR-TV chose **EMC Corp.**'s Celerra Media Server and Symmetrix Enterprise Storage systems to be used in its transition to a fully digital format.

**Fujinon** will supply its HA20x7.5BERM-Digi, HA20x7.8BERM-Digi and HA36x10.5BERD-Digi lenses for the production of "Eye to Eye," a joint project by Mandalay Media Arts and Panasonic.

Kansas City Public Television held a "server shootout," testing various servers for video encoding at 12Mb/s and system redundancy, in order to choose one to assist in its transition to HD. Based on these criteria, KCPT chose **Seachange International's** Broadcast MediaCluster with Sundance automation.



Seachange also provided their Broadcast MediaCluster video server for digital delivery of programs and interstitial video at KERA, the Public Broadcasting System affiliate for northern Texas.

**Philips** is working with **Industry Click**, a division of **Broadcast Engineering's** parent company Primedia, to develop an online auction site to sell Philips equipment using the technology of IndustryClick's online industry auction unit, Digibid.

Philips is also providing over \$5 million worth of equipment to National Mobile Television. The equipment provided includes digital production switchers and routers, which will be used to retrofit 15 of NMT's OB vans.

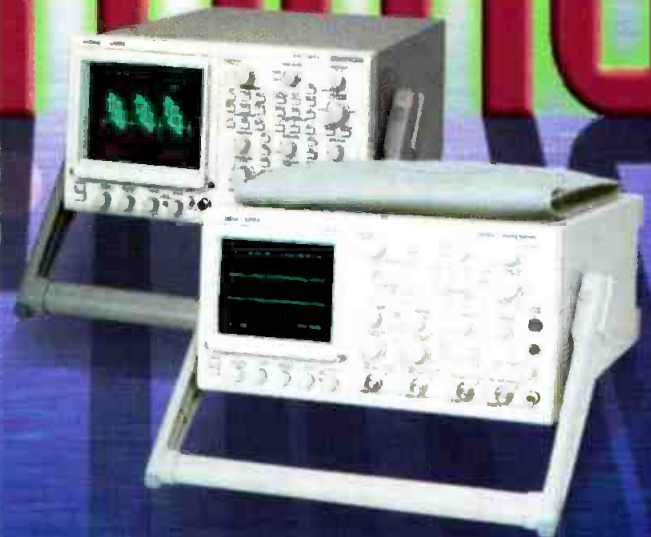
Scripps-Howard station WPTV, channel 5 purchased over \$8 million worth of studio and portable cameras, video servers, routing switchers and other Philips equipment for use in its new 70,000-square-foot broadcast facility. The facility is due for completion this winter.

Raycom Media selected **Leitch** to provide broadcast server systems for the standardization of many of its 36 television stations, three of which are already operational.

**AMS Neve** supplied their BTC-44 console to FOX affiliate WXIN-TV in Indianapolis, IN. The console will be used for the station's 35-minute nightly live

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newscast, as well as FOX 59 a.m., a three-hour daily live morning news and entertainment show.



Libra Live Series II

HBO Studios also purchased AMS Neve equipment. The studio chose the Libra Live Series II digital broadcast console for use in

Studio A. This purchase was the first purchase of the Libra Live Series II.

The CJDS DAL system from **Columbine JDS Systems** was installed in the new DIRECTV Los Angeles Broadcast Center in order to automate more than 500 DIRECTV channels. Equipment installed includes the new D-MAS A8000 Multichannel Automation System and the DMAS A8800 Ingest Automation System.



**TASCAM** provided a total of 40 MMR-8 and MMP-16 digital audio workstations to Todd-AO for use in its Hollywood post-production facilities. The equipment was chosen for its ability to read and write the Pro Tools and WaveFrame file formats.

WebFN.com, a Bridge Information Systems and Weigel broadcasting company which creates and delivers digital financial video news, purchased a Newsroom Computer System from **Avstar**.

WebFN.com will use the system to provide integration of an Internet newscast with data from multiple distribution platforms. WebFN.com offers a multiscreen format with a continuous global financial newscast and video on demand.

Hollywood-based Cinesite Digital Film Center chose the Vecta HDTV Stillstore from **Avica Technology Corp.** for color correction in film masters.

Cinesite chose the system because of its upgrade path to high definition, as well as the fact that it integrated seamlessly with their existing equipment.

**Acrodyne** recently announced orders for products shown at NAB2000, including orders for the high power Diacode water-cooled transmitter, the medium power Diacode transmitter and their solid state transmitter, as well as low power UHF and VHF transmitters.

Acrodyne also sold eight transmitters from their IOT-based Quantum line before NAB2000.

**Quantel** has partnered with **Crispin Corp.** to allow customers to use Quantel's Cachebox server in conjunction with Crispin's Commercial Insertion software. Quantel also formed a partnership with **DNF** to allow their Cachebox to be used with DNF's control panel.

In other news from Crispin, Jefferson-Pilot Communications WBTV and WWBT-TV stations will use Crispin's System 2000 automation systems to aid in total automation of their master control and programming playback operations. The stations will also be using Crispin equipment for asset management and playback.

A new game show on the Fox Family Channel will be produced using virtual studio system technology and 3D on-air graphics from **RT-SET**.

The show, "Paranoia," allows a contestant in the studio to compete with players throughout America via real-time Internet, telephone and satellite links. RT-SET's virtual studio system is used to provide a studio setting for at-home participants. Excite will serve as the Internet portal for the project.

**ADC Telecommunications** transmitters were recently purchased by three public broadcasting stations

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as part of the station's commitment to bringing DTV to the public. The stations purchasing the equipment include Louisiana Public Broadcasting, Detroit Public Broadcasting and Leigh Valley Public Television, serving Allentown, PA.

NBC will be using **Dolby's** Dolby E and Dolby Digital equipment and technology to provide viewers of their DTV programming with multichannel and stereo sound.

SeaWorld San Diego chose **QuVIS'** QuBit HD motion image server to upgrade one of the park's most popular attractions, the "Wild Arctic" helicopter ride simulator. The ride takes park visitors on a virtual tour of the Arctic using HD technology.

## People



**Joseph Flaherty**

**Joseph Flaherty** received the *International Electronic Cinema Festival's* Lifetime Achievement Award for achievements including the development of electronic cinematography, television and film nonlinear editing systems, and electronic newsgathering. Flaherty is senior vice president of technology for CBS Television and chairman of the Technical Committee of the North American Broadcasters Association.

Georgia Public Broadcasting named **Mark Fehlig** director of engineering.

**Dan Daines** was recently appointed to executive vice president of marketing and business development for Viewgraphics.

Agilevison named **Jerry Berger** vice president of marketing.



**Ted Laverty**

**Ted Laverty** was recently appointed to the position of general manager, North America, for Audio Processing Technology.

**Kent Gratteau** has joined Carlson as a manager based in Carlson's Atlanta office. Gratteau will be responsible for the implementation of broadcast application and network solutions.

**Pierre Jaspas** was recently promoted to vice president of technical and engineering operations for the Cisneros Television Group. ■





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## ScreenShot

### **Panasonic's digital format the official video format for the 2000 Games**

Panasonic's DVCPRO50 4:2:2 component digital recording format has been chosen by the Sydney Broadcasting Organization to be the official video format for the 2000 Olympic Games. Panasonic will provide more than 1000 DVCPRO50 4:2:2 recorders, over 300 cameras including the AJ-D910WA EFP camcorders and 3000 television monitors.

Panasonic will also serve as the official broadcast systems integrator for the Games, installing turnkey broadcast systems in the International Broadcast Center, Sydney Stadium and Sydney Super Dome.

### **Panasonic camcorders capture wildlife in HD for "Eye to Eye"**

Mandalay Media Arts, Japanese broadcaster NHK and the Safari Network are producing a series of six one-hour nature programs entitled "Eye to Eye." The shows will be shot on 12 Panasonic DVCPRO HD camcorders and edited and played back in Panasonic HDTV formats. The programs will capture wildlife such as the Red Panda, the Leopard Seal and the Bonobo Chimpanzee in natural settings ranging from the pampas of Patagonia, Argentina, to the ice sheets of Antarctica.

### **HDTV studio production truck from Panasonic records New Orleans Jazz & Heritage Festival**

Panasonic's HDTV studio production truck was engaged by Michael Murphy Productions to record main stage events at this year's New Orleans Jazz & Heritage Festival that was held April 28 through May 6. The footage will be used for later television broadcast.

An AJ-UFC1800 Universal Format Converter downconverted the HD signal for a feed to the Web. The webcast will be available on Riffage.com in early July.

### **Panasonic DVCPRO 50 digital camcorders document a U.S. Fish & Wildlife condor release**

The U.S. Fish & Wildlife Service recently used Panasonic DVCPRO 50 digital component camcorders to document the release of Adult Condor #8 into the Sespe Condor Sanctuary. The release site was not easily accessible, so the U.S. Fish & Wildlife Service used Panasonic's AJ-D910WA camcorders to record the event and provide a pool feed of footage to broadcasters.

New DTV antenna and tube technology ● The legality of datacasting ● Routing systems ● Data multiplexing ● Showcasing the Oxygen Channel ● A look at production switchers ● Audio for video in post ● Video servers

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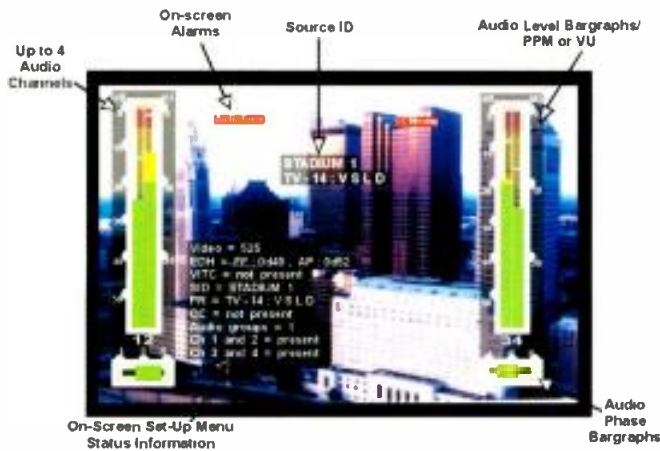
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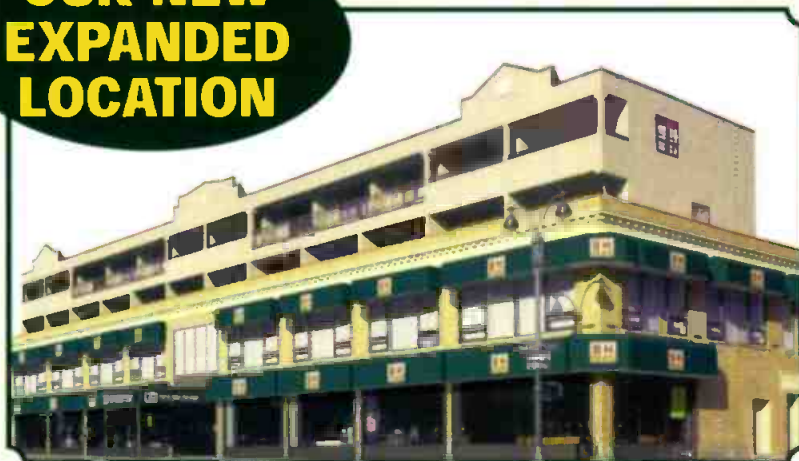
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**SONY**

**DSR-200A**

**3-CCD Digital (DVCAM) Camcorder**

Combining a compact and lightweight body with the superior picture quality of DSP (Digital Signal Processing) and the DVCAM format, the DSR-200A is the ideal acquisition tool for video journalists, event and wedding videographers, stringers and production houses. 500 lines of horizontal resolution, 48kHz or 32kHz digital audio, three hour record time, and minimum illumination of 3 lux is only the beginning. Other features include 16:9/4:3 capability, Steady Shot, time code operation, time/date superimposition and an IEEE-1394 interface for direct digital output.

- **Variable servo 10X optical power zoom lens** goes from 5.9 to 59mm in 1.7 to 24 seconds. The manual zoom roller is continuously variable right up to where the digital 20X zoom kicks in.
- **Sony's Super Steady Shot** reduces high frequency camera shake without compromising image quality. SteadyShot uses horizontal and vertical motion sensors that allow it to work accurately while zooming, moving (even shooting from a car), and shooting in low light conditions.
- Has **digital effects** including audio and video fade, overlap and Slow Shutter.
- **Automatic and manual focus, iris, shutter, gain and white balance.** Iris is adjustable in 12 levels from F1.6 to F11, shutter from 1/4 to 1/10,000 of a second in 12 steps. Gain from -3dB to +18dB in 8 steps • **Zebra Pattern Indicator,** built-in ND filter.
- **Custom: Preset function** lets you preset, store and recall custom setting: for color intensity, white balance (bluish or reddish), sharpness and brightness.



- Stores Photo, Date/Time, Shutter Speed, Iris, Gain and F-stop for easy recall. So if you have to re-shoot, you know your original settings for every scene and frame.
- **Records Drop/Non-Drop Frame time code.** Time code can be read either as RC time code or as SMPTE time code.
- Has a **large 1-inch B&W viewfinder** with 550 lines of resolution for easy focusing even in low contrast lighting situations. Separate information sub panel displays time code, battery time, tape remaining and other camcorder functions without cluttering up the viewfinder.
- Records **16-bit/48kHz audio on one stereo track** or 12-bit/32kHz with two pairs of stereo tracks (L1/R1, L2/R2), so you can add stereo music or narration.
- **Automatic & manual (20-step) audio level record controls.** Monitor audio with headphones or from the LCD panel which has an active VU meter.
- **XLR input connectors** for mics and audio equipment.

**DSR-300A**

**3-CCD Digital (DVCAM) Camcorder**



Inheriting many of the same features and functions as the DSR-130, the affordable DSR-300A actually extends operational convenience with a range of new features and peripheral products. Remarkably compact and lightweight, the improved DSR-300A provides high mobility without compromising picture quality and can be held comfortably on your shoulder through the longest shoots and gives videographers the ability to acquire their footage quickly and easily.

- The DSR-300A has three 1/2" IT Power HAD CCDs to deliver 800 lines of horizontal resolution, 62dB S/N ratio and high sensitivity of F1.4 at 2000 lux.
- **Power HAD CCDs** also gives you a low smear level of <math>110\text{ dB}</math> (DSR-200) allowing more freedom to shoot highlighted subjects.
- With built-in 26-pin VCR interface, they can feed composite or S-Video output signals to an external recorder for parallel or back up recordings. VCR recording modes including Parallel, Internal (only) and External (only) are selected via the trigger switch positioned on the operational panel.
- With the DSR-300A, a picture previously recorded on tape can be superimposed on the viewfinder screen (Freeze Mix Function), allowing you to easily frame or reposition the subject just as in the previous shot. Combined with the Setup/Log function, the relapse shot becomes a breeze.

- LSI Digital Signal Processor (the very same one used by the DXC-D30 cameras) for a high signal-to-noise ratio of 62 dB.
- Both mini cassettes (PDVM series) and standard Cassettes (PDV series) can be used with the DSR-300A. With PDV-184ME (standard), a maximum recording time of 184 minutes can be achieved. They can also play back tapes recorded in the consumer DV format.
- For operational convenience while shooting, the Time Code is superimposed on the viewfinder screen or MONITOR DUT screen, even during playback.
- DXF-801 viewfinder featuring variable peaking, 3 level tally light and a white LED light with 2 levels of intensity to illuminate the lens setting • IEEE1394 i.Link (out only).
- **Color Temperature Shift** allowing the operator to manually shift the white balance either towards blue or red to compensate for conflictive (color temp) mix and because of the wide range it also provides creative artistic painting.

**DSR-20/40 DVCAM Player/Recorders**

The DSR-20 and DSR-40 are versatile DVCAM VCRs with compact chassis and a variety of convenient functions for recording, playback and simple editing. They feature Auto Repeat Playback, Power-On Recording/Playback, multiple machine control interfaces and i.Link (IEEE1394) input and output. And, of course, they offer the stunning image and sound quality inherent to the DVCAM format.



- **i.Link** They both offer i.Link (IEEE1394) input/output. In addition, in the Digital dubbing including TC Copy mode, full information of video, audio and time code of the original tape can be copied to another tape. Especially useful when making working copies of the original tape.
- **Inputs and Outputs** They provide a full range of analog video inputs and outputs for integration into current analog-based systems. They both offer composite and S-Video input/output, while the DSR-40 (only) offers a component output as well. The DSR-20 is equipped with analog audio inputs and outputs (RCA). The DSR-40 with RCA inputs and XLR-balanced output. These connections in combination with their i.Link interface allow a smooth transition to an all digital system in the future.
- **Record/Playback Functions** Automatic repeat function for repeated playback. After reaching the end of the tape, the DSR-20/40 automatically winds the tape, then starts playing back the segment again.

- They are capable of searching for Index Points, which are recorded on the tape as "in-point" marks every time a recording starts. They can also search for photo data recorded on a DVCAM cassette by the DSR-200A/300PD-100 or where the recording data has been changed.
- **Reference Input** External sync input enables synchronized playback with other VCRs. Especially important in A/B Roll configurations. In addition the DSR-40 only allows adjustment of H-sync and SC Phase via the menu.
- **Control S Interface** The DSR-20/DSR-40 have a Control S input allowing control via the optional DSRM-20 Remote Control.
- The DSR-20 adds a **Control S output** connector allowing two or more (up to 50) DSR-20s to be daisy-chained and controlled from one DSRM-20.

- **DSR-20 Only** • The DSR-20 can be powered by AC or DC.
- Equipped with Control L interface, the DSR-20 can perform Simple Time Code-based editing when connected to another DSR-20 or other similarly equipped VCRs/cameras.

- In addition to Control L, the DSR-20 also incorporates an RS-232 interface for remote control of basic VCR functions from a PC.
- Supplied with the RMT-DS20 Wireless Remote for control of basic VCR functions.
- either manually or via its RS-422A interface.
- The DSR-40 is not equipped with a synchronization capability; the editing accuracy is performed by pre-roll and play.

- **DSR-40 Only** • Equipped with an RS-422A interface, it can perform as the editing player in A/B roll or cut editing system.
- It also has a simple recording function which can be controlled

**DSR-30 DVCAM Digital VCR**

The DSR-30 is an industrial grade DVCAM VCR that can be used for recording, playback and editing. DV standard 4:1:1 sampling digital component recording with a 1:1 compression ratio provides spectacular picture quality and multi-generation performance. It has a Control L interface for editing with other Control L based recorders such as the DSR-200A DVCAM Camcorder or another DSR-30. It also has a continuous auto repeat playback function making it ideal for kiosks and other point of information displays.



- Records PCM digital audio at either 48kHz (16-bit 2 channel) or at 32kHz (12-bit 4 channel).
- Equipped with Control L. Capable of SMPTE Time Code based accurate editing even without an edit controller. Built in editing functions include assemble and separate video and audio insert.
- By searching for either an Index point or Photo Data recorded by the DSR-200A camcorder, the DSR-30 drastically cuts the time usually required for editing. The DSR-30 can record up to 135 index points on the Cassette Memory thanks to its 16K bits capability.
- Audio lock ensures audio is fully synchronized with the video for absolute precision when doing an insert edit.

- Built-in control tray has a jog/shuttle dial, VCR and edit function buttons. The jog/shuttle dial allows picture search at 1/5 to 15X normal speed and controls not only the DSR-30 but also a player hooked up through its LANC interface.
- DV In/Out (IEEE 1394) for digital dubbing of video, audio and data ID with no loss in quality.
- Analog audio and video input/outputs make it fully compatible with non-digital equipment. Playback compatibility with consumer DV tapes allows you to work with footage recorded on consumer-grade equipment. Tapes recorded in the DSR-30 are also compatible with Sony's high-end DVCAM VCR's.



**Panasonic**  
Broadcast & Television Systems



**AG-EZ30 3-CCD Camcorder with IEEE1394 Interface**

- 3-CCDs (270,000 pixels each) with a large light-collecting area give the camera high sensitivity and wide dynamic range. Double-density pixel distribution and a gapless dichroic prism further ensure razor-sharp images and extremely faithful color reproduction.
- Selectable 2-channel 48 kHz/16-bit or 4-channel 32 kHz/12-bit PCM audio recording.
- Built-in stereo mic and external mic input as well.
- 180,000 pixel, 2.5-inch color LCD monitor. Also has a 0.5-inch color viewfinder.
- Digital Image Stabilizer for clear, shake and jitter free shots.
- 12X optical zoom as well as 30X and 120X digital zoom functions. Move from wide-angle to full zoom in 1.3 seconds allowing quick framing while in REC pause.
- Offers six digital effects: Wipe, Mix, Strobe, Gain-Up, B&W and still mode.

- Five program AE modes for shooting in a variety of different conditions. There is also a five-mode white balance: Sel, Fluorescent, Auto, Indoor and Outdoor.
- Large-diameter focus ring enables a high level of focusing precision. A Multi-Function Push Dial allows easy setting of the 16-step iris, 5-step gain control (+12dB maximum) and 4-step shutter (up to 1/8000 second). Mic Input level can also be set in steps (-20/-10/0/+3/+6 dB).



**SONY**  
**DCR-VX1000**

**3-CCD Digital Camcorder**

The DCR-VX1000 records 500 lines of horizontal resolution, and has a higher S/N ratio than cameras costing ten times more. Also records audio digitally, using PCM technology, the same as used in CDs for a breathtaking dynamic range of 96 dB. Most important though, since video and audio signals are recorded digitally, you can copy or edit multiple generations with no loss in quality. Analog tape artifacts like color bleeding, dropouts and generation loss are all a thing of the past.



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- Eight-speed 10X optical zoom lens goes from 5.9 to 59mm in 4.1-20 secs. Also provides a digital 20X zoom.
- Records 12-bit/32kHz audio with two pairs of stereo tracks.
- Automatic and manual audio level record controls.
- Built-in time base corrector (TBC) delivers jitter-free playback and dead-free stills.
- Digital effects include audio and video fade (to black), overlap and slow shutter • Time-lapse recording.
- Sony's Super SteadyShot reduces high frequency camera shake without compromising image quality.
- Records "extended data codes" automatically stores date/time, shutter speed, iris and other data for easy recall.
- Records drop-frame time code for accurate editing.
- Record still image pictures with audio for up to seven secs.

- Focusing, exposure and white balance are all automatic or can be manually controlled.
- Zebra pattern indicator just like professional cameras. (Preset, store and recall your own custom settings for color intensity, white balance, sharpness, brightness and gain shift (0dB/-3dB).
- Precision 180,000 pixel color viewfinder incorporates a separate information sub panel which displays time code, battery time, tape remaining and other camcorder functions without cluttering up the viewfinder.
- Control L terminal for communication between camera and edit controller.
- Built-in ND (neutral density) filter.
- Square lens hood reduces external light flare effects.

**JVC** **GY-DV500**

**1/2-Inch 3-CCD Professional DV Camcorder**

The world's first DV camcorder designed from the ground up for professional ENG work, the GY-DV500 combines the convenience and cost-effectiveness of Mini DV with the performance and features you need. Incorporate three 1/2-inch 380,000 pixel iT CCDs for superior picture performance (equivalent to 750 lines of resolution) superb sensitivity of F1.1 at 2000 lux and minimum illumination of 0.75 lux (LoLux mode). Rugged construction with a rigid diecast magnesium housing. Extremely portable, compact and light weight (less than 11 lbs. fully loaded). Additional features like the menu dial and Super Scene Finder assure ease-of-use and shooting flexibility, while the IEEE1394 and RS-232 interface allow integration into various non-linear and post-production systems. A professional camcorder in every sense, the compact, lightweight GY-DV500 redefines acquisition for corporate, educational, cable and broadcast production, as well as wedding videography and multimedia applications.



- Applies JVC's DSP with advanced 14-bit video processing to bring out more natural details, eliminate spot noise, accurately reproduce dark areas, and restore color information in dark areas.
- CCDs are equipped with advanced circuitry to virtually eliminate vertical smear when shooting bright lights in a dark room. Ensures efficient light conversion with a sensitivity of F1.1 at 2000 lux.
- CCD Detect Correction function evaluates white defects with the lens closed and then stores their addresses in memory. When the camera is turned on, the data is sent to the DSP for storage and real-time correction.
- Black Stretch/Compress function ensures accurate reproduction of black areas on the screen. Advanced color matrix circuits give even difficult images a very natural appearance.
- Multi-stream parallel digital pipeline processing at 40 MHz creates an ultra-smooth gamma curve, calculated using a true log scale algorithm. The result is a dynamic range of 600% to accurately reproduce fine details and colors in shadows or highlights.

- Adjustable gamma for adjusting the "feel" of the picture according to taste. Adjustable detail frequency for setting picture sharpness for a bolder or finer look.
- Viewfinder status display uses characters and menus to display selected information, including audio indicator, tape and battery remaining time, VCR operation and warning indicators. Camera settings and setup parameters can also be checked at a glance. A built-in menu dial lets you quickly navigate through the viewfinder menu.
- Highlight Chroma Processing maintains color saturation in highlights. The result is natural color reproduction, even in bright highlight portions of the picture.
- Smooth Transition mode ensures a smooth transition with no jump in color or light level taking place when manually changing gain or white balance settings.

- Multi-zone iris weighting system gives priority to objects at the central and lower portions of the picture for accurate auto exposure under any condition, even if a bright subject moves into the picture.

- **Professional Audio**
- To complement its superior video performance, the GY-DV500 offers outstanding digital PCM sound. You can choose between two 16-bit 48-kHz channels or two 12-bit 32-kHz channels with a dynamic range of 85 dB.
- In addition to camera mounted mic, has two XLR-balanced audio inputs with 48V phantom power and manual audio control. Phantom power can be switched off when not in use.
- Side-mounted speaker lets you monitor audio in playback and recording modes without headphones. The speaker also delivers audible warnings.

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## antonbauer

### HyTRON 50 Battery

Weighing a mere 31oz (880 grams) and packing 50 Watt-hours of energy - enough to operate a typical ENG camcorder for two hours, the HyTRON 50 is the most advanced lightweight battery in the industry.

- Made possible by recent advancements in a cell technology originally designed for the mobile computing industry, it incorporates nickel metal hydride cells that provide the highest energy density of any rechargeable cylindrical cell available. High performance is further assured through the integration of Anton/Bauer Interactive digital technology.
- Equipped with an on-board "fuel computer" which monitors energy input and output as well as critical operating characteristics and conditions. This data is communicated to the InterActive Charger to ensure safety and optimize reliability.
- In addition, remaining battery capacity information is available by means of an LCD display on each battery and in the viewfinder of the most popular broadcast & professional camcorders.
- Special low voltage limiter prevents potentially damaging overcharge.

**Specifications:** 14.4 V, 50 WH (Watt Hours)  
 5-3/4" x 3-1/2" x 2-1/4", 1.9 lbs (880g)  
 Typical runtime: 2 hours @ 25 Watts 3 hours @ 17 Watts

### QUAD 2702/2401

#### Four-Position Power/Chargers

The lightest and Slimmest full featured four position chargers ever. They can fast charge four Gold Mount batteries and can be expanded to charge up to eight. They also offer power from any AC main in a package the size of a notebook computer and weighing a mere four lbs! The 40 watt 2401 can charge ProPacs in two hours and TrnPacs in one. Add the Diagnostic/Discharge module and the QUAD 2401 becomes an all purpose power and test system. The 70 watt QUAD 2702 has the module and is the ultimate professional power system.

## IDX NPH-50

### 50 Watt Nickel Metal Hydride Batteries

Packed with 50-watts of power, these batteries provide long run times. Using them as you would a traditional NP-type battery. Equipped with IDX's proprietary SF technology, they can even be charged in existing Negative Delta V style chargers, like the Sony BC1-WD, or any IDX nickel cad battery charger.

Both batteries are identical except that the NP-H50DX adds a power indicator.

- High capacity NiMH cells • Standard thermal and short circuit protection • extra thermal fuse for safety, special plastic design for added strength.
- Environmentally safe • High efficiency/low temperature module • Capacity: 50Wh (13.2V/3.8Ah)
- Camera run time: 115min @26 Watts)

NP-H50 ..... \$129.95 NP-H50DX ..... \$149.95

### JL-2 PLUS

#### 2-Position Multi-Format Charger/Power Supply

Universal Charger/Power Supply. 2-channel sequential quick charger and power supply for Lithium-Ion, NP/BP-type NiCad and NiMH battery packs.

**\$649.95**

## SONY 800 SERIES

### UHF WIRELESS MICROPHONE SYSTEMS



Consisting of 5 handheld and bodypack transmitters and 6 different receivers, Sony's UHF is recognized as the outstanding wireless mic system for professional applications. Operating in the 800 MHz band range, they are barely affected by external noise and interference. They incorporate a PLL (Phase Locked Loop) synthesized control system that makes it easy to choose from up to 282 operating frequencies, and with the use of Sony's pre-programmed channel plan, it is simple to choose the correct operating frequencies for simultaneous multi-channel operation. Additional features, like space diversity reception, LCD indicators, reliable and sophisticated circuit technology ensure low noise, wide dynamic range, and extremely stable signal transmission and reception. Ideal for broadcasting stations, film production facilities, and ENG work.

## SONY

### UVW-1200/UVW-1400A

#### Betacam SP Player • Player/Recorder

The UVW-1200 and UVW-1400A are non-editing VCRs which deliver Betacam SP quality and offer features for a wide range of playback and recording applications. RGB and RS-232 interface make them especially ideal for large screen, high quality video presentation, scientific research and digital video environments.

- Ideally suited for work in computer environments, because RGB signals can be converted into component signals and vice versa with minimum picture degradation.
- 25-pin serial interface allows external computer control of all VCR functions based on time code information. Baud rate can be selected from between 1200 to 38,400 bps.
- Built-in Time Base Stabilizer (TBS) locks sync and subcarrier to an external reference signal as well as providing stable pictures. High quality digital dropout compensator further ensures consistent picture performance.

- Both read LTC Time Code and UB (User Bits). The UVW-1400A also generates LTC and UB (Free-Run/Rec-Run).
- Equipped with two longitudinal audio channels.
- Auto repeat of entire or a specific portion of the tape.
- Built-in character generator can display VTR status, time code, self-diagnostic messages, set-up menu, etc.
- Control of jog, shuttle, playback, record, pause, FF and REW with the optional SVRM-100A Remote Control Unit.
- Composite and S-Video as well as component via BNCs which are switchable to RGB output. The UVW-1400A has two switchable sync connectors and a Sync on Green.
- Built-in diagnostic function and hour meter.
- Initial set-up menu for presetting operational parameters. Settings are retained even after power is turned off.

### UVW-1600/UVW-1800

#### Betacam SP Editing Player • Betacam SP Editing Recorder

The UVW-1600 and UVW-1800 are the other half of the UVW series. They offer the superiority of Betacam SP with sophisticated editing features. They feature an RS-422 9-pin interface, built-in TBCs and Time Code operation. Inputs/outputs include component, composite and S-Video. All the features of the UVW-1200/1400A PLUS—

- Optional BVR-50 allows remote TBC adjustment.
- RS-422 interface for editing system expansion.
- Two types of component output via three BNC connectors or a Betacam 12-pin dub connector.

- Frame accurate editing is assured, thanks to sophisticated servo control and built-in time code operation. In the insert mode of the UVW-1800, video, audio Ch-1/2 and time code can be inserted independently or in any combination.

### PVW-2600/PVW-2650/PVW-2800

#### BETACAM SP PRO SERIES

Whenever versatility and no compromise performance is needed, there is only one choice. Legendary reliability and comprehensive support for its many users has established the PVW series as the standard in broadcast and post production. The PVW Series includes the PVW-2600 Player, PVW-2650 Player with Dynamic Tracking and the PVW-2800 Editing Recorder. They feature built-in TBCs, LTC/VITC time code operation and RS-422 serial interface. They also offer composite, S-Video and component video inputs and outputs. Most important they are built for heavy, every day duty.

- Built-in TBC's and digital dropout compensation assure consistent picture performance. Remote TBC adjustment can be done using the optional BVR-50 TBC Remote Control.
- The PVW-2600, PVW-2650 and PVW-2800 (generates as well) read VITC/LTC time code as well as User Bits. Ext/Int time code, Regen/Preset, or Rec-Run/Free-Run selections.
- Built-in character generator displays time code or CTL data.
- Set-up menu for presetting many functional parameters.
- Two longitudinal audio channels with Dolby C-type NR.

- Recognizable monochrome pictures at up to 24X normal speed in forward and reverse. Color at speeds up to 10X.
- Two types of component connection: three BNC connectors or a Betacam 12-pin dub connector. Composite and S-Video.
- PVW-2650 Only • Dynamic Tracking (DT) playback from -1 to +3 times normal speed.
- PVW-2800 Only • Built-in comprehensive editing facilities.
- Dynamic Motion Control with memory provides slow motion editing capability.

### PVM-14M2U/14M4U & 20M2U/20M4U

#### 13-inch and 19-inch Production Monitors

Sony's best production monitors ever. The PVM-M Series provide stunning picture quality, ease of use and a range of optional functions. They are identical except that the "M4" models incorporate Sony's state-of-the-art HR Trinitron CRT display technology and have SMPTE C phosphors instead of P22.

- HR Trinitron CRT enables the PVM-14M4U and 20M4U to display an incredible 800 lines of horizontal resolution. The PVM-14M2U and 20M2U offer 600 lines of resolution. M4 models also use SMPTE C phosphors for the most critical evaluation of any color subject.
- Dark tint for a higher contrast ratio (black to white) and crisper, sharper looking edges.
- True multi-system monitors they handle four color system signals: NTSC, NTSC 4.43, PAL & SECAM.

- Each has two composite, S-Video and component input (R-Y/B-Y, analog RGB) for more accurate color reproduction, the component level can be adjusted according to the input system. Optional BKM-101C (video) and BKM-102 (audio) for SMPTE 259M serial digital input, On-screen menus • Beam Current Feedback Circuit • 4/3 to 16/9 switchable aspect ratio.
- External sync input and output can be set for automatic switching to the selected input.
- Switchable color temp: 6500K (broadcast), 9300K (pleasing picture). User preset (3200K to 10000K).
- Blue gun, underscan and H/V delay capability.
- Parallel remote control and Tally via 20-pin connector.



## sachtler

### Tripods & Fluid Heads

#### DV Systems—Digital Support for Every Budget

Today's compact digital cameras require light, fast and highly versatile camera support systems. Starting from the DV2 all the way up to the DV12, Sachtler has a solution tailored for just about every conceivable digital camera package available today. All feature Sachtler's patented counterbalance system and Touch and Go wedge plates. And all except the DV2 feature sliding camera platform to ease in the balancing of your camera.

#### DV2 System

- The smallest head of the Sachtler's line.
- Sachtler Touch and Go quick release with automatic camera lock and safety lever/drop protection.
- One step of dynamic counterbalance.
- Frictionless leak proof fluid damping with one levels of drag • Built in bubble leveling.
- Vibrationless vertical/horizontal brakes.
- Single Stage 75mm tripod DA 75 Long.
- Lightweight floor spreader SP 75.

This system (0210) consists of: Fluid Head (DV-2), Long Tripod (DA 75), floor spreader (SP 75)

#### DV4 System

- Sliding balance plate.
- Touch and Go quick release with automatic camera lock and safety lever/drop protection.
- One step of dynamic counterbalance.
- Frictionless leak proof fluid damping with one levels of drag.
- Vibrationless vertical/horizontal brakes.
- Built in bubble for horizontal leveling.
- Single stage 75mm long tripod DA 75.
- Lightweight floor spreader SP 75.

DV4 System (0410) consists of: Fluid Head (DV-4), Long Tripod (DA 75), floor spreader (SP 75)

#### DV4XD System

- Same as the DV4 PLUS —
- Five step of dynamic counterbalance.
- Five step of vertical and horizontal drag.

DV4XD System (0610) consists of: Fluid Head (DV-6), Long Tripod (DA 75), floor spreader (SP 75)

#### DV8 System

- Same as DV6 PLUS —
- Greater load capacity.

DV8 System (0810) consists of: Fluid Head (DV-8), Long Tripod (DA 75), floor spreader (SP 75)

#### DV12

- Same as DV8 PLUS —
- Great Load Capacity
- Fits 100mm tripods



## PROFESSIONAL VIDEO TAPES



Professional Grade VHS		PG-60		PG-120	
PG-30	2.39	PG-60	2.39	PG-120	2.79
Broadcast Grade VHS Box					
BGR-30	3.29	BGR-60	3.99	BGR-120	4.49
H471S S-VHS Double Coated					
ST-30	6.69	ST-60	7.49	ST-120	7.69
M221 Hi 8 Double Coated					
Metal Particles		Metal Evaporated			
P630HMP	4.99	E630HME	7.69		
P660HMP	6.29	E660HME	10.19		
P6120HMP	8.29	E6120HME	13.59		
M321SP Metal Betacam (Box)					
05S	11.99	10S	12.49	20S	12.99
30S	14.99	60S	24.95	90L	39.95
OP121 DVC PRO					
12M (Med.)	7.49	23M	8.79	33M	10.99
63M	19.99	64L (Lo.)			22.50
94L	30.99	123L			39.99

## maxell

#### Hi8 Metal Particle (XRM)

P6-120 XRM	5.99	P6-60 HM BQ	5.09
P6-120 HM BQ	7.99		

#### Broadcast Quality Hi8 Metal Particle

P6-30 HM BQ	5.39	P6-60 HM BQ	5.09
P6-120 HM BQ	7.99		

#### P1 PLUS VHS

T-30 Plus	1.69	T-60 Plus	1.99	T-90 Plus	2.09
T-120 Plus	2.19	T-160 Plus	2.69		

#### HGX-PLUS VHS (Box)

HGXT-60 Plus	2.69	HGXT-120 Plus	2.99
HGXT-160 Plus	3.99		

#### BQ Broadcast Quality VHS (Box)

T-30 BQ	3.89	T-60 BQ	3.99	T-120 BQ	5.99
ST-31 BQ	6.79	ST-62 BQ	5.99		
ST-126 BQ	7.45	ST-182 BQ	13.99		

#### BQ Professional S-VHS (In Box)

ST-31 BQ	6.79	ST-62 BQ	5.99
ST-126 BQ	7.45	ST-182 BQ	13.99

#### Betacam SP

B30MSP	13.49	B60MLSP	19.99	B90MLSP	29.95
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#### Mini DV Tape

AY-DVM-30	6.49	AY-DVM-30 (10 Pack)	ea. 5.99
AY-DVM-60	7.99	AY-DVM-60 (10 Pack)	ea. 7.49
AY-DVM-90	12.99	AY-DVM-120	20.95

#### OVC PRO

AJ-P12M (Medium)	6.99	AJ-P24M	9.99
AJ-P33M	11.19	AJ-P66M	19.49
AJ-P66L (Large)	20.99	AJ-P94L	29.99
AJ-P126L	38.95		

#### SONY

#### Hi-8 Professional Metal Video Cassettes

P6-30 HMPX	4.59	P6-30 HMEK	7.99
P6-60 HMPX	6.49	P6-60 HMEK	10.99
P6-120HMPX	8.49	P6-120HMEK	14.99

#### PR Series Professional Grade VHS

T-30PR	2.39	T-60PR	2.59	T-120PR	2.79
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#### PM Series Premier Grade Professional VHS

T-60PM	3.99		
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#### BA Series Premier Hi-Grade Broadcast VHS (In Box)

T-30BA	3.59	T-60BA	3.99	T-120BA	4.79
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#### MQ Master Quality S-VHS (In Box)

MOST-30	7.49	MOST-60	7.69	MOST-120	7.99
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#### BRS 3/4" U-matic Broadcast Standard (In Box)

KCS-10 BRS (mini)	8.69	KCS-20 BRS (mini)	8.99
KCA-10 BRS	8.19	KCA-20 BRS	8.69
KCA-30 BRS	9.60	KCA-60 BRS	13.39

#### XBR 3/4" U-matic Broadcast Master (In Box)

KCS-10 XBR (mini)	8.79	KCS-20 XBR (mini)	10.59
KCA-10 XBR	9.29	KCA-20 XBR	10.69
KCA-30 XBR	11.99	KCA-60 XBR	15.69

#### KSP 3/4" U-matic SP Broadcast (In Box)

KSP-S10 (mini)	9.59	KSP-S20 (mini)	11.09
KSP-10	10.09	KSP-20	11.59
KSP-30	12.99	KSP-60	16.89

#### BCT Metal Betacam SP Broadcast Master (Box)

BCT-5M (small)	11.99	BCT-10M (small)	12.49
BCT-20M (small)	12.99	BCT-30M (small)	13.49
BCT-30M (small) (10 Pack)	ea. 12.99		
BCT-30ML	15.99	BCT-60ML	21.99
BCT-90ML	28.99		

#### Mini DV Tape

DVM-30EXM w/Chip	12.99	DVM-60EXM w/Chip	17.99
DVM-30EX "No Chip"	11.99	DVM-60EX "No Chip"	13.99
DVM-30PR "No Chip"	7.99	DVM-60PR "No Chip"	9.99

#### Full Size DV Tape with Memory Chip

DV-120MEM	24.99	DV-180MEM	26.99
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#### PDV Series Professional DVCAM Tape

PDVM-12ME (Mini)	15.25	PDVM 22ME (Mini)	16.25
PDVM-32ME (Mini)	15.49	PDVM-40ME (Mini)	15.99
PDV-94ME (Standard)	33.49	PDV 124ME (Standard)	37.99
PDV-184ME (Standard)	44.95	PDV1-64N	24.95
PDV1-124N	31.95	PDV1-184N	39.95



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## Avid/IBM Xpress DV On IntelliStation

Avid Xpress DV on IntelliStation is a turnkey digital video solution designed to give professional content creators in corporations, education and government institutions, the power to communicate with video. The solution consists of IBM's award-winning IntelliStation M Pro workstation, and Avid's Xpress DV digital video content creation software. Simply plug your DV camera into the IntelliStation workstation, launch Xpress DV and begin assembling a video. Using the high-powered and reliable able IntelliStation M Pro and intuitive Xpress DV software, you'll be creating professional-looking video and multimedia content for a wide variety of uses including sales and marketing videos, training videos and web-based teaching solutions-in no time.

### The Hardware

The redesigned IBM IntelliStation M Pro features a high-speed Intel 840 chip set, 600 MHz Pentium III processor, 133 MHz Front Side Bus, a Canopus DV Raptor and a Matrox display card. Designed with the Intel 840 chipset, the IntelliStation M Pro supports high-speed ATA-66 disk drives, as well as up to 1GB of ECC memory. The solution is pre-installed with the Matrox Millennium G400 4X AGP graphics card (capable of 1GB p/s transfers) with 16MB of on-board memory, and the Canopus DV Raptor Adapter IEEE1394 interface for DV I.D. It also includes two Ultra2 SCSI hard drives: a 9.1GB drive for the operating system and programs, and an 18.2GB drive for capturing data.

### The Software

Avid Xpress DV software combines powerful video and audio editing tools, digital mastering, and extreme ease of use. Xpress DV captures and edits DV video, adds effects, mixes audio, and outputs the finished results over IEEE1394 FireWire for impressive video. Dr. transcodes the content to all major new media formats: MPEG-1 (for CD-R) MPEG-2 (for DVD-RDM) QuickTime or AVI for computer based presentations or for streaming on the web. As a member of the Avid Xpress Family, The Xpress DV offers the Avid graphical user interface (GUI) based on the 3.1 version, offering powerful audio and video tools including:

- 4 tracks of nested video with single track transitions
- 8 tracks of audio with real-time mixing
- Band digitizing, and RS-422 deck control.
- Integrated EDL support with built in logging
- 32 levels of undo/redo, making changes, painless!
- Tight timeline with precise timecode editing.

- Real time 3-band EQ, and rubber band gain adjustments.
- 32 and 48 kHz sampling rate, with down sample to 22 and 11 kHz for multimedia.
- Over 50 transitions, including dissolves, motion & color effects, superimposition, horizontal and vertical wipes, chroma and luma keys, picture in picture, flips, flops, resizes, spins, peels, pushes, squeezes, and many more.
- Integrated, anti-aliased titling tool
- Export to MPEG1, 2, Microsoft Windows Media (ASF), AVI, QuickTime, or RealMedia

### The Service

IBM is maintaining a server where you can obtain disk space for approximately five hours of compressed streamed video, where your client can download your video from a customized web page, at no charge to you for the first three months (after three months it is fee based)

- IBM IntelliStation M Pro (6868-91U).
- 600 MHz Pentium III processor.
- 256MB Full Speed ECC memory.
- Matrox Millennium G400 4X AGP with 16MB of RAM.
- Ultra2 SCSI 9 GB (7200 rpm) drive/operating system.
- 18.2GB drive for video and audio storage.
- CD-RDM (20x to- 48x)
- Windows NT 4.0 with Service Pack 5.
- Complete system integration and testing.

All for the Unbelievable price of ..... **'6795.00**  
 Add an IBM 21 monitor,  
 and Roland MAB speaker set.  
 For only an additional 1000.00..... **'6895.00**

## Avid MediaDrive rS Plus

The MediaDrive rS Plus is the latest in the line of leading edge storage products from Avid. Designed exclusively for AV professionals, the MediaDrive rS Plus is available in 9 and 18GB capacities and utilizes the highest performance 10,000 rpm drives on the market today. Available in a stackable model with a rack-mount option, the MediaDrive rS Plus incorporates QuietDrive, a revolutionary sound dampening technology developed by Avid. The MediaDrive rS Plus 10K drives provide Avid customers with a very affordable, versatile, high-performance storage solution.

- Using 10,000 rpm drives, MediaDrive rS Plus offers 40% higher performance than 7200 rpm drives. The increase in data transfer rates results in fewer drives necessary to achieve higher resolutions. Real-time AVR 75 can be achieved on a single rS Plus drive. Striping only two rS Plus drives across one dual channel controller can provide dual stream AVR 77 quality throughout the entire drive
- Built-in thermal circuitry controls the speed of the fan for efficient cooling and an external indicator helps to protect your drive and critical data by signaling high temperature conditions

- QuietDrive technology reduces drive noise by up to 15 dB. This allows liner audio editing and lower operator fatigue
- An innovative vertical interlocking stacking feature provides the option to physically latch striped sets together permanently or temporarily
- With its own power and SCSI connectors (conforming to fast and wide SCSI standards), the rS Plus drive is ready to travel down the hall or around the world. You can hook up the rS Plus drive in any studio. No docking system is required
- Optional rack mount kit adds great flexibility by allowing two MediaDrive rS units to be mounted in a 2U rack format. Quick release allows drives to be removed easily for transporting or replacing with new project drives



- ### Configuration
- MediaDrive rS enclosure, 3.5 self-contained (power, cooling and connections) stackable unit. SCSI-2 68-pin connection
  - Rack mountable with MediaDrive rS rack mount option kit

rs-9 "MediaDrive" External LVD 9GB Drive.....	rs-36 "MediaDrive" External LVD 36GB Drive.....	rs-36 "MediaDrive" External LVD 36GB Shuttle.....
\$899.95	\$1799.95	\$1699.95
rs-18 "MediaDrive" External LVD 18GB Drive.....	rs-18 "MediaDrive" External LVD 18GB Shuttle.....	rs-18 "MediaDrive" Shuttle (Dider Station).....
\$1199.95	\$1149.95	\$1149.95
"MediaDrive" rs Rack Kit (2 Drives).....		
\$99.95		

## SONY ES-3 EditStation



The Sony ES-3 EditStation is an extremely flexible, powerful and high picture quality non-linear video editing system. Its self-explanatory yet sophisticated editing interface is easy to use even for newcomers to the non-linear editing realm. Its open architecture also supports popular third-party software for graphics, paint, text, and effects. The Sony ES-3 EditStation also offers the unique Sony "ClipLink" interface, allowing you to transfer only the clips you want for editing. Since The Sony DSR-300/500 cameras mark the In/out points of each shot and a still frame of every in-point called the "index picture" is recorded on the cassette memory of the DVCAM tape.

- The video and audio files stored on the disk drive of the ES-3 system can easily be converted to AVI or QuickTime file format. Allowing you to create multimedia materials for CD-RDMs, or to be streamed to the web.
- Slow and fast motion are available. The playback speed for each clip can be set to be played back at the desired speed.
- Edits on the ES-3 Timeline are converted to the Sony EDL format and displayed in an EDL window. Additionally the EDL can be printed out or saved to disk.
- Dual monitor display is available for more efficient operation.
- The ES-3 can be switched to operate in either 4:3 or 16:9 wide screen aspect ratio.

### Editor

You start with the Editor for uploading to create both video and audio clips. The Editor consists of the live picture window, In/Out point and duration windows, video/audio 1/2/3/4 selection buttons for uploading, a record clip button and VCR control functions. Using the Editor, you can upload video (including live upload) with or without VCR control.

### ClipBin

This is where you store program material designated as clips. You can group clips and customize the ClipBin according to your needs. Two main display modes: picture mode and text mode. In picture mode you can select six different sub modes:

### Timeline

The timeline is where you build your project. Each track may hold video, graphics, titles or audio. To build your project, clips (from the ClipBin), effects and transitions are dragged and dropped onto the timeline in sequential order. There are various timeline views available. You can select any items displayed such as Index Pictures of the head or tail of a clip, marker, name, duration, reel number, mark in/out and many others.

### Trim Editor

A Trim Editor is available for precise trimming on the timeline. It is opened as an independent window, with the video of the out point of the "from" clip and the in point of the "to" clip displayed. Both single and dual trimming can be performed. Clips can also be played and trimmed directly in the Clip Monitor which is selected from the edit menu.

### Audio Editor

With the Audio Editor, eight channels of assigned audio can be monitored in real-time. Each input channel can be assigned to any track in the timeline. Each channel has its own peak meter, level fader, level trim, phase control, three band EQ, panning and filters (low cut, high cut, echo, etc.). Volume and pan are processed in real-time and can also be modified in real-time using the ESBK-7011 Control Panel. Audio level and panning for each clip can be controlled directly on the timeline with the rubber band editing function. Each track has its own rubber band control, which can be activated independently.

### Control Panel

In addition to controlling non-linear functions via mouse and keyboard, also includes the ESBK-7011 Control Panel for conventional operation. Combine familiar linear techniques such as jog/shuttle control, effects transitions and audio fading with convenience of non-linear editing.

### Breakout box

The breakout box provides easy interfacing to analog or digital equipment. It offers analog composite, component and S-Video input and output. For digital video, an I.LINK input/output is standard, and QSDI (SDTI) can be activated via optional software and dongle. For audio, four input channels of XLR-balanced analog audio (two out) and AES/EBU digital audio I/O (XLR-balanced) are provided. Two RS-422 ports are provided for deck control. Finally, the ES-3 is also equipped with a genlock input and blackburst output for reference.

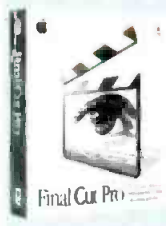


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Jonathan Perkes is the Director of Engineering for Group W Network Services in Stamford, CT.

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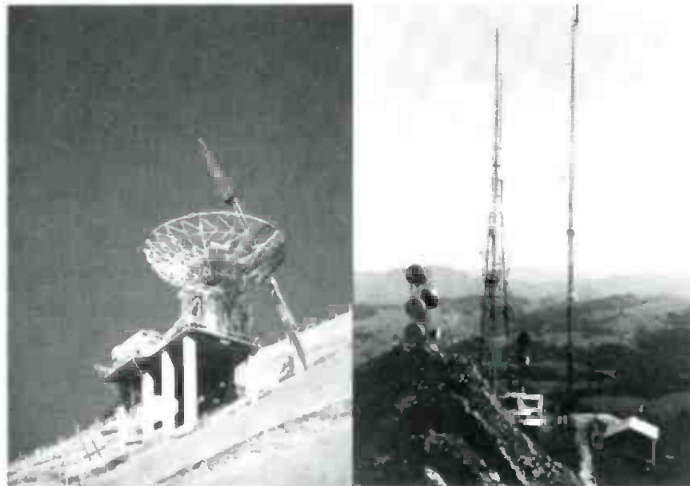
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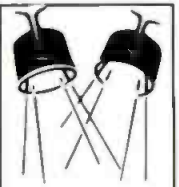
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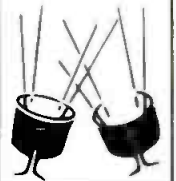
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**TECHNICAL SUPPORT ENGINEER:** KING 5 TV, the number one station in Seattle, is seeking a Technical Support Engineer. Responsible for installing, maintaining, and repairing TV production and broadcast systems. Successful candidate will have the ability to troubleshoot and repair electronic equipment to a component level, lift 50 lbs. and work on ladders up to 15 ft., a valid WA driver's license, and an FCC license required. Minimum two years' related broadcasting experience with ability to maintain computer networks and transmitting and microwave systems desired. If qualified, send 2 copies of your resume to: KING 5 TV, Attn: HR Dept., #K99R85, 333 Dexter Ave. N., Seattle, WA 98109. An Equal Opportunity Employer

**STUDIO MAINTENANCE SUPERVISOR** - Excellent Opportunity for an experienced Broadcast Engineer at the ABS O&O in New York. Responsibilities include scheduling, purchasing, and supervising maintenance engineers. Also installation/maintenance of studio, transmitter, and remote site broadcast equipment. Must have extensive experience supporting a large news organization and ENG staff. Should be familiar with a live television production environment. Must possess knowledge of analog/digital systems and a minimum of eight years broadcast television experience. Please send resume and cover letter to: Kurt Hanson, Chief Engineer, WABC-TV, 7 Lincoln Square, New York, NY 10023. No telephone calls or faxes please. We are equal opportunity employer.

**CHIEF ENGINEER:** CONUS Washington, a full service news bureau and production facility in the heart of DC, has an immediate opening for an experienced Chief Engineer. Our Chief will be responsible for the entire technical facility and engineering staff. We are looking for an organized, responsive leader to keep our business moving forward. Must be experienced with all aspects of news gathering and production equipment. Extensive satellite uplink/downlink experience required. Will administer the technical capital budget, and represent the company at local and national technical meetings. Must have extensive computer and computer networking experience. Send resume to CONUS Communications, Attn: Job # 91-00, 1825 K St NW, Ninth Floor, Washington DC 20006. Fax (202) 973-2065. EOE



### CHIEF TECHNOLOGY OFFICER

Central Pennsylvania, home to a new \$52 million science & arts center, is the 46<sup>th</sup>-largest market in the US, and is in very close proximity to New York City, Washington D.C., Philadelphia, and Baltimore. As a dynamic, entrepreneurial company located in Harrisburg, WITF, Inc. includes a public television station, a public radio station, a publishing division (Central PA magazine), a statewide commercial radio news network (Radio PA), and telecommunications/distance education services.

WITF, a pioneer in digital broadcasting, is seeking a dynamic technology executive to provide vision, leadership and workflow strategies to all broadcast, information and new technology functions. The selected candidate will develop and implement the strategic technology plan, design the infrastructure, and transition and integrate the company to a fully digital, multi-media environment within the broadcasting, telecommunications and information technology disciplines. Candidates require strong broadcasting/engineering/networking orientation, understanding of current and emerging technology trends and leadership experience in information technology and broadcast operations in a server-based environment. Please address your letter, resume and salary requirements to

CTO Search., Thomas M. Rineer, WITF, Incorporated, 1982 Locust Lane, Harrisburg, PA 17105 AA/EOE [www.witf.org](http://www.witf.org).

**BROADCAST ENGINEER FOR NEW SERIAL DIGITAL BROADCAST CENTER:** USA Broadcasting is looking for experienced Broadcast Engineers for our expanding Ontario California Multi-Channel Master Control center. Candidates should possess knowledge with: Media Pool, Louth, Saturn Switchers, and DVC Pro. Teamwork and dedication is a plus. USA Broadcasting, a USA company, is the eighth largest television broadcast group in the nation, owning 13 UHF Television stations. Please reply with resume and salary history to: USA Broadcasting / Station Works, 3833 Ebony St., Ontario, CA 91761. Fax 909-605-7301 Or Via Email at [Stationworks@usabroadcasting.com](mailto:Stationworks@usabroadcasting.com)

**CHIEF ENGINEER:** VHF NBC affiliate WTWO, Terre Haute, IN seeks a Chief Engineer. Candidate should have experience with VHF transmitters, microwave equipment, all studio related and ENG equipment. Position requires an individual with management skills as well as strong hands on capability. Major responsibilities will include managing and involvement in the daily repair and maintenance of studio/transmitter, maintaining operating budgets, capital project implementation and maintenance of a 40 foot production truck. Salary is commensurate with experience. Send cover letter and resume' to Rick Stolpe, Nexstar Broadcasting, Inc., 62 South Franklin St., Wilkes-Barre, PA 18702

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Requirements include an AS in electronics or equivalent combination of training/experience. Military experience in satellite communications may substitute; and 2-3 years experience in broadcast engineering or RF communications. Knowledge of satellite, microwave truck or remote broadcasting is a plus. SBE Broadcasting Engineer certification or FCC general class license preferred. Must have a knowledge of Microsoft Windows and Microsoft Office. Communications and team work is necessary, as well as a flexibility to work a variety of shifts.

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**KRIV FOX 26** in Houston has an immediate opening for an **Asst. Chief Engineer** - Responsibilities include: supervise technical operations of the station, design, construct transmitter and studio facilities, monitor applicable budgets and direct supervision of maintenance department. Assist the VP of Engineering in all areas including OSHA and FCC compliance requirements. Requires a bachelor's degree or equivalent experience in a related field prefer 3-5 years engineering management experience. Must have proven leadership skills including ability to face problems with confidence and assurance; demonstrated commitment to (written and verbal) communications that promote teamwork and cooperation; excellent planning and organizational skills. Hands on experience with Windows, Louth Automation, Digital Environment, Norvell networking or other networking technical skills preferred. Send resume and salary history to Recruitment, KRIV FOX 26, P.O. Box 22810, Houston, TX 77227. EOE/M/F/D/V

**CHIEF ENGINEER: KPTM** is currently accepting applications for a Chief Engineer. The successful candidate should have previous Television Chief Engineer or Assistant Chief Engineer experience and must be able to effectively lead a staff of fifteen. The candidate must also be able to effectively coordinate all operations within the stations as well as maintain FCC and Pappas Telecasting technical standards. Responsibilities include maintaining two UHF transmitters, two UHF translators, studio equipment, computers, building equipment and proprietary broadcast hardware and software. We are working with a state of the art broadcast automation system, controlling multiple television stations. If your experience qualifies you for this opportunity, please send your resume to: KPTM ATTENTION: PERSONNEL, 4625 FARNAM STREET, OMAHA, NEBRASKA 68132. No phone calls please. KPTM is an equal opportunity employer. M/F/H.

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Mail resume /salary requirements to HR-PM, 4400 Vanowen Street, Burbank, CA 91505, Fax 818-842-8945 or E-Mail to [hr.asc@leitch.com](mailto:hr.asc@leitch.com)



**MAINTENANCE ENGINEER - WDEF-TV** (CBS Affiliate), a Media General Broadcast Group station is searching for an individual with a minimum of 2 years experience in television broadcast equipment. This includes installation, setup testing, repair and maintenance of television broadcast equipment and computers. Applicant must be skilled in computer operations. Computer repair and TCP/IP networking experience helpful, SBE certification or a FCC General Class License is a plus. Send resume to: Human Resources Dept., 3300 Broad Street, Chattanooga, TN 37408. EOE. M/F, Drug Screening. No phone calls, please.

**MAINTENANCE ENGINEER:** Immediate opening for an experienced broadcast Engineer. Must have a minimum of 2 years experience in broadcast maintenance, including systems trouble-shooting and repair of studio video and audio equipment to the component level. Computer and networking experience a plus. FCC General Class License or SBE Certification is desired. Excellent wage/benefit program. Respond with resume to Personnel Administrator- 139, WTOL-TV, P.O. Box 1111, Toledo, Ohio 43699-1111. No phone calls. EOE.

**BROADCAST TECHNICIAN:** AT&T Cable Services is looking for an experienced Broadcast Technician to support its local news, commercial production, and remote production groups. Applicant must be able to perform maintenance and repair on all types of professional A/V equipment including Sony Beta and Panasonic DVC-PRO cameras and VTRs. Qualifications also include 3 years experience with professional switchers, non-linear editors, still stores, and various types of CG systems. Macintosh and PC repair experience is also desired. Associates Degree in electronics or equivalent technical or military training required. FCC general license or SBE certification a plus. Qualified candidates please send resume to or apply at: AT&T Cable Service, Attn: Human Resources, 400 Riverfront Drive, Reading, PA 19602. EEO/AA Employer M/F/D/V

**DIRECTOR OF ENGINEERING:** Director of Engineering - Curtis Media Group, with 15 stations in the Raleigh / Durham / Chapel Hill TSA, has an opportunity for an experienced professional. We need someone with good business sense as well as effective administrative, leadership, and communications skills. 50KW AM experience and familiarity with digital automation systems are a plus. Please contact us: Curtis Media Group, 3012 Highwoods Blvd., Box E, Raleigh, NC 27604. E.O.E



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Individual will take and execute reservations on the Fox Video Network; monitor status and condition of the Network and its components; book audio and video circuits on traditional broadcast networks, including satellite and terrestrial fiber; confirm audio and video broadcast levels and signal integrity for live and taped feeds. Requires strong computer skills; good trouble shooting ability and ability to work in a fast-paced environment. Operational experience with video and audio monitoring equipment and its proper use is beneficial. (Code: JH/NOC)

We offer competitive salaries and excellent benefits. For immediate consideration, please submit your resume and salary history, including job code, to: Fox Channels Group, 1440 S. Sepulveda Blvd., Ste. 353, Los Angeles, CA 90025; fax to: (310) 444-8490; email: [jobs@foxsports.net](mailto:jobs@foxsports.net). NO PHONE CALLS, PLEASE. EOE.



# ENGINEERS

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Page Number	Reader Service Number	Advertiser Hotline
Accom Inc.	17	108-650-328-3818
ADC Broadcast	62-63	129-800-726-4266
ADC Broadcast	145	176-800-726-4266
Adherent	51	125
Agilevision	159	183-609-514-4030
AJA Video	176	197-530-274-2048
Analog Way	164	184-331-644-7141
Andrew Corp.	28	115-708-349-3300
Angenieux	65	130-201-812-3858
Anton/Bauer	101	143-800-422-3473
Audio-technica	91	330-686-2600
Azden Corp.	117	160-516-328-7500
BARCC Comm.	179	199-770-590-3600
B & B Systems	196	225-818-551-5858
Beck Associates	196	224-512-252-7555
Benchmark Media	189	213-800-262-4675
B&H Photo-Video	190-193	216217-212-239-7500
Boland Comm.	108	155-949-367-9911
The Broadcast Store	195	222-818-551-5858
Broadcast Supply Worldwide	167	191-800-426-8434
Broadcast Video Systems	164	189-905-764-1584
Calrec Audio	69	133-+142-284-2159
Canon USA	26-27	114-800-321-4388
Capitol Technologies	182	205-202-723-2278
CarCom Intercom	125	165-510-496-6666
CommScope	147,182	177212-800-982-1708
Communications Spec	169	192-516-273-0404
CPI/Eimac	103	152-650-592-1221
Datatel	165	190-800-882-9100
Dielectric	171	193-207-655-4555
Digibid.com	195	221-301-571-0790
Digital Media Net	14-15	714-424-6100
Digital Media Net	33,61	714-424-6100
Digital Media Net	99	714-424-6100
Discreet Logic	181	200-514-954-7207
DiviCom	19	109-408-944-6700
Dolby Labs	95	141-415-645-5000
DPS	23	112-606-371-5533
DTV 2000	34	800-288-8606
Enseo	187	207-888-478-2687
ESE	172,182	194210-310-322-2136
Evertz Microsystems	188	201-905-335-3700
Extron Electronics	59	128-714-491-1500
Fantozzi Company	196	223-408-297-2700
Fischer Connectors	157	182-800-551-0121
Folsom Research	143	175-916-859-2500
Forecast Consoles	122	163-516-253-9000
Fujinon	155	181-972-385-8902
Grass Valley Group	25	113-800-998-3588
Harris Corp./Broadcast Div.	3	104-606-282-4800
Harris	9	105-650-843-3665
Henry Engineering	187	206-626-355-3656
Herman Electronics	182	204-305-477-0063
I-COM Industry	74	185-703-707-9094
Ikegami	87	135-201-368-9171
Industry Click	127,140	131,166-816-300-0323
Inscriber Technology	49	124-800-363-3400

Page Number	Reader Service Number	Advertiser Hotline
Intertec Publishing	188,194	800-288-8606
KTech Telecommunications	31	117-818-361-2248
Leader Instruments	93	138139-800-645-5104
LeBlanc Broadcast	149	178
Lecroy Corp.	175	196-800-553-2769
Leitch Incorporated	43,182	121203-800-231-9673
Leitch Incorporated	204	103-800-231-9673
Lighthouse Digital Sys.	114	158-888-494-7300
Lifton Electron	39	118-800-861-1011
Marconi Applied Tech.	105	153-914-592-6050
Maxell Corp.	129	168-800-533-2836
Miranda Technologies Inc.	11	106-514-333-1772
Modulation Sciences	177	198-800-826-2603
Multidyne	189	215-800-4TV-TEST
Northstar Tech. Serv.	174,188	188211-954-921-5868
NOVA Systems	118	140-800-358-NTSC
Odetics	96-97	142-800-243-2001
Omneon	41	119-408-558-2113
Open TV	131	169-650-429-5547
Panasonic Broadcast	7	800-528-8601
Pesa Switching	133	170-800-328-1008
Philips Digital Networks	35-38	303-467-2044
Pixelmatrix Corp.	45	122-604-688-0202
Play, Inc.	53,137	126172-916-631-1865
Professional Comm Sys	57	127-800-447-4714
ProTelevision Tech	94	121-800-421-0888
RFS Broadcast	128	167
Rocket Network	89	136-415-538-0123
Sachtler Corp.	21	110-www.sachtler.de
Seachange	135	171-978-897-0100
Sencore	121	162-800-SEN-CORE
Sigma Electronics	163	187-717-569-2681
SCI	111	156
Snell & Wilcox	46-47	123-408-260-1000
Sony	4-5	800-472-SONY
Sony Prof Tape	109	201-930-7081
Spectrasite	71	134-770-390-8959
Standard Comm.	67	132-310-532-5300
Switchcraft	113	157-773-792-2700
Tadiran Scopus	115	159
Tektronix	139	173-800-426-2200
Telecast Fiber Systems	90	137-508-754-4858
Telemetrics	136	218-201-848-9818
TeraNex	107	154-407-517-1086
Thomcast	153	180-413-569-0116
Tieman Communications	13	107-619-587-0252
Toshiba	151	179-800-550-8674
Trompeter Electronics	22	111-800-982-2629
Ultimate	161	186-818-993-8007
Utah Scientific	173,189	195214-801-524-9999
Videotek, Inc.	203	102-800-800-5719
Vinten	123	164-914-268-0100
Ward Beck Systems	102	144-151-416-438-6550
Wavetek Wandel-Gotemann	29	116
Wavetek Wandel-Gotemann	119	161-317-788-9351
Wegener Comm	141,188	174208-770-623-0096
Wheatstone Corporation	2	101-252-638-7000
Windows to the Web	178	

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## DTV excuses moving right along

BY PAUL MCGOLDRICK



**T**he verbal slingshots being fired between the senior representatives of the NAB and the FCC during the last part of NAB2000 were, at best, unprofessional. The public arena, with customers all around, is hardly the place for games of one-upsmanship over the future of DTV.

I am having a terrible time avoiding saying, "I told you so." But this column has pushed the simple fact that small- and medium-size market stations will not be able to afford the transition to DTV. Broadcast TV in small markets is not a license to print money, even though the prices some stations sell for might make you think otherwise. I cannot believe the NAB did not realize that as well, but it is now used as an excuse to delay the continued rollout of service.

As of today (and depending on whose numbers you want to believe) more than 60 percent of the country has terrestrial DTV available to them if they want to take advantage of it. This presumes viewers know why they are supposed to want it and are willing to pay for it. That's a pretty good percentage in terms of possible viewers but a very small percentage in terms of the number of stations. Within a year we will probably have reached the old 80-20 rule point — in this case with 80 percent of the population being covered by 20 percent of the stations.

Getting the last 80 percent of stations on the air with DTV signals leaves us with a number of possibilities. The FCC could relent and let those stations stay analog but give up their free DTV spectrum. Some sugar daddy could come along and offer a way out for the small stations with resulting consolidation in the whole industry. The government could come out with an interest-free upgrade loan. Or the in-

dustry could come up with a lot cheaper ways of doing things.

I think the last scenario will happen, saving a number of the medium market-stations. Manufacturers who find that they have emptied the purses of the big players will want to continue in business by making lower-cost ver-

### I am having a terrible time avoiding saying, "I told you so."

sions of what they have already designed and built. Even if costs fell to one-third of present equipment costs across the board, the small market stations would still be left out in the analog cold.

The idea that the government will save local TV stations with free loans is not going to happen; we have seen the NAB and NPR already do an end-run around the FCC to get low-power FM stations off the dial; that same Congress will not fight for local TV either.

What of the notion that staying analog is cool? That will simply not be allowed. The FCC wants the old spectrum. It has to have the old spectrum. It has all been pre-sold, and those dollars are in the surplus numbers you read about every week. These stations promised to go with the program. No matter how nasty it gets and how long it takes, these stations will conform or they will lose their licenses. Neither the FCC nor stations has any choice in the matter.

So, we come full circle to consolidation, just as radio did. Imagine local transmissions all emanating out of a centralized satellite antenna farm. Hardly local, hardly community friendly.

There is a small, hopeful group that believes radio consolidation has come to its final pattern after the consolidators were gobbled up by other consolidators. The hope of this group is that competing delivery systems in the form of satellite and the Internet will force stations back down to a local level.

This is a group of romantics; there is no business sense to it.

Why has it taken the NAB so long to come up

with this excuse? Is part of its agenda to help consolidation happen? It is difficult to separate the genuine lobbying activities of the NAB from commercial slants in an industry where it is simply not possible to protect all the interests of all the members at the same time. Those interests are too diverse.

Hindsight is almost always 20/20, and it would be nice to think that if we had it to do all over again, we would let market realities rather than regulations determine the future of smaller market stations in this new digital world. But promises have been made by those stations, and they must find their own individual financial solutions or technology compromises to make things happen or take the consequences. We might not like that, but that's how it is. The predicament that was so obvious at the start of this rollout cannot be allowed to be used as an excuse to delay it. ■

*Paul McGoldrick is an industry consultant based on the West Coast.*

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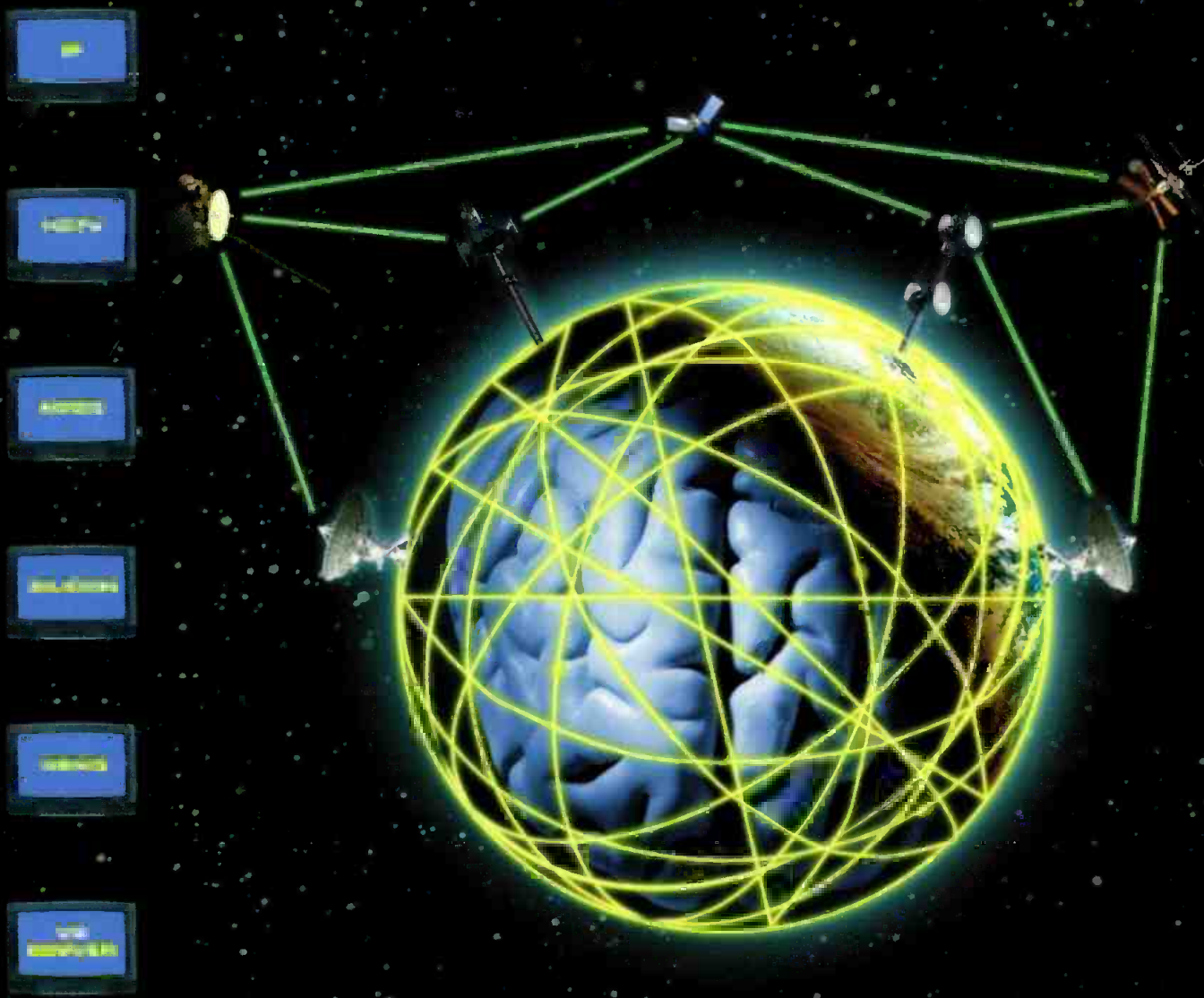
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