Yahoo! launches financial network
Nation's #1 website targets broadcasters

NAB Replay
Broadcasters go from ON-AIR to ON-LINE

MPEG Light: Contribution Quality Compression
How Do You Handle DTV Surround Sound and TV Stereo at the SAME TIME?

with ONE FINGER!

The TV-1000 Live Television Audio Console from WHEATSTONE CORPORATION, With 5.1 + 2 Surround Sound.

Wheatstone

600 Industrial Drive, New Bern, North Carolina 28562
tel 252-638-7000 /fax 252-637-1285 /sales@wheatstone.com

www.americanradiohistory.com
Bubblewrap, no challenge.
Taking advantage of the technology inside, not so fast.

You have brand new, high-tech, shiny digital equipment. Now, how are you going to get the most out of it? Harris can help. Many broadcasters work with us to engineer transmitter systems, studios and mobile facilities with the latest digital technology. But we also reach beyond future-ready equipment solutions by leading the way with a unique package of support services—from transmitter installation and systems integration to round-the-clock technical support. And our Broadcast Technology Training Center provides customized DTV instruction to help your station make a smooth transition to digital. It’s all from Harris. Because getting through the bubblewrap should be the hardest part of going digital.

1-800-4-HARRIS ext. 3042 • www.harris.com

next level solutions

WIRELESS
BROADCAST
GOVERNMENT
NETWORK SUPPORT

Circle (104) on Free Info Card
www.americanradiohistory.com
8 INDEPENDENTLY EDITABLE DIGITAL AUDIO CHANNELS

BETACAM/SP/SX AND DIGITAL BETACAM PLAYBACK
MPEG-2 technology is the open, common solution that broadcasters are choosing for their DTV operations. It's the one solution that's upward and downward scalable, interoperable and cost-effective.

Now, with the introduction of the MPEG IMX™ studio editing VTRs, Sony offers powerful tools for easy migration into an open MPEG environment supported by leading manufacturers. MPEG IMX VTRs record and play back MPEG-2 4:2:2 P0ML at 50 Mbps for very high broadcast picture quality. Sony's networking solutions let you interface with a host of MPEG-2 equipment from the most experienced names in digital nonlinear editing, routing, and servers: Avid, FAST Multimedia AG, Grass Valley Group, Leitch, Pinnacle Systems, Pluto Technologies, Quantel, Snell & Wilcox, Vibrint and others.

You'll be able to accept I-frame, single GOP bitstreams, at 30, 40, and 50 Mbps through the SDTI-CP interface. Output through SDTI-CP to Sony's MAV-555 and MAV-2000 servers. And do preread, dynamic motion control and independent editing of 8 channels of 16-bit audio (or 4 channels of 24-bit audio), for multichannel or multi-language broadcasting.

Another big advantage of the MPEG IMX approach is that you already have the acquisition tools. You can choose MPEG IMX models that play back Betacam SX®, Betacam®, Betacam SP®, and Digital Betacam® tapes, so your existing acquisition format becomes your MPEG acquisition format.

MPEG IMX gear lets everyone look in the same direction: toward an open, digital networked broadcast environment.

1-800-472-SONY ext. IMX
www.sony.com/professional

© 2000 Sony Electronics Inc. All rights reserved. Reproduction in whole or in part without written permission is prohibited. Sony, Betacam, Betacam SP, Betacam SX, Digital Betacam, and MPEG IMX are trademarks of Sony. All specifications are subject to change without notice.
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)
Today it's the news at 6:00. Tomorrow it's prime time. You need options for ENG economy and EFP quality.

You Could:
A) Buy both and break the bank.  
B) Go Panasonic.

Introducing the AJ-D910WA DVCPRO50 camcorder -- the new standard for ENG/EFP acquisition. Featuring both 4:3 and 16:9 widescreen, the AJ-D910WA offers both economical 25 Mbps DVCPRO and studio quality 50 Mbps 4:2:2 DVCPRO50 recording in a single camcorder. The new AJ-D910WA enables a complete 50 Mbps I-frame recording and editing system without the need for transcoding, plus its optional Digital Triax system permits remote camera and VTR control. Call us today at 1-800-528-8601 or visit our web site at panasonic.com/openminds. The AJ-D910WA, because you never get a second chance to make a first compression.
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.

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

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
Introducing Harris Automation Solutions. Louth, the leader in broadcast automation, is now part of Harris Corporation’s Broadcast Communications Division, an industry leader in digital and analog broadcast technology. Harris Automation Solutions is your source for industry-defining technology backed by unparalleled customer service and support. So as you create and implement your vision for DTV, multi-channel, and global networks, Harris Automation Solutions will be there with the proven solutions you’ll be sold on. Just like we were.

next level solutions

W I R E L E S S
B R O A D C A S T
G O V E R N M E N T
N E T W O R K S U P P O R T

1-800-4-HARRIS ext.3041 • www.broadcast.harris.com
It’s a virtual world

Welcome 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 LVCC. Three years ago, Mark Gray, chairman and CEO of Pluto, coined the phrase “Rust Belt” to typecast the “old” LVCC. 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 D5S?? 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
Solving the Digital Puzzle

Your Complete Monitor Wall in a Single Display

- 4:3 / 16:9 aspect ratio
- Analog / Digital / Computer inputs
- User Defined Layouts
- Compact / Light / Low power

Kaleido
Virtual Monitor Wall Processor

Circle (166) on Free Info Card
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 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, behelden industry that can be operated by the White House!

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

Mike Seaver

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 “moo-ving.”

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

An opposing viewpoint

A few comments on your March 2000 editorial, “Worshiping 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. Editorialy, 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 SAT, 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
Srini Murthy, Larcan 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 Engineer T-shirt, answer the question on page 8. Send your answer to brad_dick@interetc.com.
ANNOUNCING THE STATE-OF-THE-FUTURE

Tiernan digital encoders were key parts of the first DSNG systems, essential elements in the first 4:2:2 SDTV systems, and the heart of the first HDTV broadcasting systems. Today, as we enter a new era in broadcasting, Tiernan brings you a broad range of digital TV solutions, including datacasting, HD/SD simulcast, and multi-channel operation for the delivery of digital media. Tiernan can take you wherever you want to go, however you want to get there.
It All Comes Together on DigitalMediaNet.com

DigitalMediaNet.com helps you stay in touch with the issues, products, and opportunities that can give that all-important competitive edge. Professionals from around the world, representing every discipline in the digital media market, tune into our media channels every day. Whether you are looking for the latest news, reviews, industry trends, a place to buy or sell your new product or even a new job, DigitalMediaNet.com has a solution!
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 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 results. 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 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 maintaining 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.

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 Video-sence 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
“Our goal is to deliver broadband solutions that work for you.”

Tom Lookabaugh
President, DiviCom

This merger is great for our customers, great for DiviCom and great for Harmonic. Our customers know the DiviCom name as being synonymous with open solutions for digital television.

They’ll soon know us as Harmonic, and because of the merger, they’ll get access to even more solutions and resources to meet their broadband needs.

There is enormous synergy between DiviCom’s digital headend technology and Harmonic’s advanced fiber optic system solutions. So from a single source, customers can leverage the expertise both companies bring to the party. Together, we’ll be driving innovation in broadband from the headend across the entire broadband network.

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.”

www.harmonicinc.com  408.542.2500
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). PSMG spokesperson 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
Perfect balance despite the ups and downs ...

...of electronic reporting.

Compact digital cameras have become hugely popular. They are fast, light and highly versatile. But do they ensure a smooth take? How do you prevent vibration? What about fast panning? Special applications? Or shooting in dreadful weather conditions? You’ll find that Sachtler provides the support you never had before for a digital camera. And including all the things you expect from Sachtler: fluid damping in five steps, touch and go for speedy changes of location, and highly sensitive counterbalance – also in five steps.

You need to use a heavy lens? Or a lighting system? DV 8 and DV 12 have a carrying capacity of up to 10 kg / 22 lb and 12 kg / 26 lb. Even fast panning won’t spoil your report.

DV 8. DV 12. Because you have so much to report.

sachtler
corporation of america

Every scene is seen better with a Sachtler.
More information on Multicast ISP, Inc. is available at 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
Fear Not Any Feed!

Calling the DPS-475 and DPS-575 merely synchronizers is a bit of an injustice. We prefer the term "Audio/Video Synchronizer, Digital Noise Reducer, Bi-Directional Analog/Digital Transcoder, Framestore, Video Bandwidth Processor, Animated Logo Inserter, Linear Keyer, TBC, AGC, Audio/Video Test Signal Generator, VITS inserter and Serial Digital Audio Embedder/De-Embedder". The DPS-475 (NTSC) and DPS-575 (PAL/NTSC) super synchronizers, with their incredible array of features, are the hands-down next generation leaders. Let's talk facts. Proprietary DPS 12-bit adaptive 3D comb filter decoding and encoding ensure maximum signal transparency. Composite, Component, Y/C and SDI video I/O, optional 1394 (DV) I/O and available four-channel audio synchronizer modules provide unprecedented system interface flexibility.

For signal taming performance, reliability and economy, the DPS-475 and DPS-575 are in a class by themselves.

dps.com  DPS  800-775-3314

DPS and the DPS logo are registered trademarks and DPS-475, DPS-575 and DigDuplex are trademarks of Digital Processing Systems Inc. Features and specifications subject to change without notice.
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.

---

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 (UTC) 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.

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 (COTBHU). 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 COTBHU 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
FIVE REASONS WHY YOU SHOULD EXPECT LESS FROM YOUR NEXT ROUTER:

Grass Valley Group's new 7500 WB Wide Band router is everything you could ever want from your next router. And a lot less.

1. Less hassle upgrading to HDTV: The 7500 WB routes signals from 10 Mb/s to 1.485 Gb/s without any module changes or recabling. Each module can handle all types of signals simultaneously, including SDTV, MPEG, or HDTV, giving you total programming flexibility in a single router.

2. Less rack space: At just 25RUs, the 7500 WB 256x256 occupies about a quarter of the rack space of any other high-bandwidth routing solution.

3. Less cost: Competitive unit pricing, less real estate, less power consumption and less demand for air conditioning dramatically reduce the total cost of ownership. And because the 7500 WB is a member of the Series 7000 family, you preserve your investment in your current Grass Valley routing system. The 7500 WB may well be the last router you'll ever need to buy.

4. Less signal degradation: Every aspect of the 7500 WB is designed to ensure signal integrity, including selectable-reclocking at 14.3, 177, 270, 360 and 540 Mb/s, and 1.485 Gb/s. Our patent-pending technology reduces the number of internal modules and ensures positive signal connections. And with no need for secondary switches or input DAs the signal path is streamlined.

5. And less time behind your router: Once your router is installed, everything is front-accessible, including all modules, power supplies and even the fans and filters. Because you have better things to do than play with cables.

For more reasons why your next router should be the Grass Valley Group 7500 WB, visit our Web site at www.grassvalleygroup.com.
IN THE RACE FOR BETTER LENS TECHNOLOGY, WE'VE OUTDISTANCED THE COMPETITION.

INTRODUCING THE 86X FIELD ZOOM WITH IMAGE STABILIZER.

With the introduction of the 86X, Canon and their customers finish first...again. The longest lens ever for HDTV and SDTV, the XJ86x9.3 BIE D is also the first long lens with Image Stabilization. By comparison, the competition finished far behind.

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; the first and only broadcast lens company to introduce Image Stabilization technology; the first to use digital technologies in lens control; and much more.

Of course, if you're a Canon customer, impressive firsts are nothing new. They simply reaffirm that you're buying the best. They also provide some serious reasons for everyone to consider buying the technology and support leader. At Canon, we go the distance.
DIGI SUPER 86 HS
WITH IMAGE STABILIZER.
HDTV/SDTV COMPATIBLE.

For more info: Call 1-800-321-HDTV
(In Canada: 905-795-2012)
http://www.canonbroadcast.com

Canon KNOW HOW
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 Clear Creek 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 webpage at www.fcc.gov.

Send questions and comments to: larry_bloomfield@intertec.com
In the heart of Digital Broadcast

MPEG-2 ATSC/DVB

Visit us at CommunicAsia Booth 4B5-04

Simulation
Development
Validation

Installation
Troubleshooting

Monitoring
Supervision

Wavetek Wandel Goltermann offers a full range of innovative test and supervision solutions for world-class support of all the players in digital TV provision. Our objective is to provide our customers with complete control over all MPEG multiplex parameters and components.

Our Digital Broadcast Test Solutions enable faster time-to-market for developers, quicker troubleshooting in the field, easier system integration and maximum uptime of Digital Broadcast services, to the benefit of the end-customers.

Employing 2600 people worldwide, Wavetek Wandel Goltermann is a leading provider of a global range of communications test equipment and systems for Telecom, Datacom, Cable and Digital Broadcast infrastructures.

For more information or the free evaluation software, contact us at:
(858) 715 7053
or visit our Web site at:
mpeg.wwgsolutions.com
Also you can contact us at:
mpeg@wwgsolutions.com

Wavetek Wandel Goltermann Communications Test Solutions
“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 on-going 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 replication 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 P.L.C., Arlington, VA.
**Inputs:**
- RF CH2 - CH69
- DVB-ASI
- DVB-SPI (LVDS)
- SMPTE-310M

**Outputs:**
- DVB-ASI
- DVB-SPI (LVDS)
- SMPTE-310M
- ATSC Video Decoding To 60MBPS
- RGBHV (1080i, 720p, 480p, 480i)
- HD-SDI Option (SMPTE-292m)
- NTSC (SDI, S-Video, BNC)
- AC-3 Audio (XLR)
- Analog Audio L&R (XLR)
- VGA Monitor
- PSIP Display
- EPG Display
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?

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 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 that 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 microwave 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 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 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.
Do You Know What's Happening In The Broadcast Market Today?

Digital Webcast
www.DigitalWebCast.com

DTV Buyer
www.DTVBuyer.com

HDTV Buyer
www.HDTVBuyer.com

BE Radio
www.BERadio.com

www.digitalmedianet.com
DIGITAL TELEVISION 2000
CONFERENCE & EXHIBITION

A MUST ATTEND EVENT FOR ALL DECISION-MAKERS INVOLVED IN TELEVISION & PRODUCTION

December 6 - 8
Hyatt Regency Grand Hall
Atlanta, Georgia

CALL 225.751.5626 OR RETURN COUPON

Fill out the form below to make sure you receive all the program and registration information as it becomes available:

☐ I'm interested in attending DTV2000  ☐ I'm interested in Sponsoring/Exhibiting at DTV2000

Name ____________________________ Title ____________________________

Company __________________________________________________________

Address __________________________________________________________

City ____________________________ State ______ Country ___________ Zip ___________

*Phone __________________________ Fax __________________________

**E-mail __________________________

International guests, please include city and country codes

**Provide only if you wish to receive news and updates via e-mail

FAX: 225.751.6344
MAIL: DTV2000 Customer Service • 16016 Perkins Rd. • Baton Rouge, LA 70810 • USA
CALL: 225.751.5626
VISIT: www.dtvconference.com

www.americanradiohistory.com
Why wait for other companies to deliver on their so-called promises
A Philips DD35-series digital production switcher is more than a powerful creative tool—it’s a virtual life saver. When every second counts. When your reputation is on the line. When it's down to the wire—nothing comes to the rescue like the dependability and predictability of Philips production switchers. So go ahead, fire up your imagination, you'll have nothing to sweat. For more information call us toll free at 1-800-962-4287 or visit us at www.broadcast.philips.com
when you can get the most advanced production switcher on the planet working for you today

Super switcher
Philips digital production switchers are more than just a pretty face. They become a part of you. An extension of your creativity. The brawn to your brain. They transform the entire live production process from a musical chore to an enjoyable event. No wonder TDs can’t wait to get their hands on them.

Designed by TDs like you
The feature-rich Philips production switchers didn’t happen by chance. They happened by design. We had the world’s best TDs—like you—tell us how to create the ultimate live production switcher. Then we built it. With over 1,200 installed around the world (and growing), Philips switchers are becoming the choice for complex, graphics-intensive, real-time productions everywhere.

More features than you can shake a switch at
Philips digital live production switchers come loaded with so many features there is no way to list them all. But here are a few that will get your creative juices flowing:

- Four M/E, button-per-function control panel with up to 62 serial digital inputs
- Over 500 on-line storage registers with additional and separate 96 on-line MaKE-Memo macro registers
- Name Follow Video mnemonic displays in every bank
- Six downstream keyers (with three internal and three external)
- Three keyers per M/E
- Built-in machine control
- Integrated control of popular DVE devices on each M/E
- Double key bus rows per M/E
- Networked satellite and remote location control
- Active TFT display with intuitive 3-D GUI
- Programmable user preferences saved on internal hard drive or downloadable to diskette
- And so much more

Predictable results
In addition to the unmatched creative freedom you get from Philips production switchers, we offer something even more enticing—predictability. Every show, every switch, every effect, performs on cue every time. That’s because Philips switchers are built to the highest standards in the industry. These rugged switchers are proven in the field with over ten years of R&D behind every one.

Introducing the latest addition to the family
Philips has taken our best switch technology to the next level with the new Seraph high-definition production switcher. Once again, the world’s best TDs have told us what they want in an HD production switcher. Wait until you see what we’ve built.

For more information call us toll free at 1-800-962-4287 or visit us at www.broadcast.philips.com
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 (ENG) Channels A1 (1990-2008MHz) and A2 (2008-2017MHz) will be transferred to MSS. However, it is expected that the Office of Engineering and Technology Docket 95-18 Second Report and Order (Second R&O) will allow 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 2008-2017MHz 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 incumbent facilities 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., CSRT is chairman of the SBE's FCC Liaison Committee and is a consulting engineer with Hammett & Edison, San Francisco.
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 synchronous, 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 parameters 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.

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

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)
The Integrated Networking and Storage Infrastructure for New Media

Now a digital networking and storage infrastructure delivers the flexibility to connect all the leading distribution, production and media management technologies via standard networks to a scalable resource of multi-format storage; the scalability to provide more bandwidth in more formats to more channels and production suites than ever before; and compatibility to integrate seamlessly with current systems for easy upgrades today, while equipping your operation for the future. The performance of Omneon’s Video Area Network sets a new value standard for the industry. The unparalleled functionality makes the Video Area Network the ideal networking and storage infrastructure for the digital television marketplace.

Featuring

Data-type Independence - Supports MPEG, DV, AES/EBU, ITU 601, Metadata, HD, AAF/QuickTime™, IP Data  
Linear Scalability - Scales smoothly to hundreds of channels and thousands of hours of storage  
Shared Storage Productivity - Enables collaborative production and distribution in multiple formats  
Open Platform Compatibility - Works with transmission, production, media management and Internet applications  
Reduced Cost-of-Ownership - Lowers acquisition cost and operational and maintenance costs  
Reliability - Offers both system-level and critical component redundancy  
Increased Profitability - Provides flexibility to utilize existing assets and expand into new revenue generating services

www.Omneon.com
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)
- 270Mb/s (Component video CCIR 601 525/59.94 or 625/50)
- 360Mb/s (Component video 525/59.94 16:9 aspect ratio)
- 1.485Gb/s (NTSC-friendly)

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

- SMPTE 259M, 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 = 1.4835Gb/s (NTSC-friendly) bit rate. This is obtained by adjusting the total 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 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 bandwidth 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 bit-rate signal.

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

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 waveform. 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.
No need to trash your analog equipment.

Recycle it for your digital environment with Leitch's multiformat synchronizer.

Protect your analog investment by interfacing analog equipment with Leitch's DFS-3005 multiformat synchronizer. Designed for hybrid conversion and synchronization in the broadcast, production, mobile, teleport and telco environments, the DFS-3005 lets you manage multiple signal formats within your facility. Input a digital combined video and audio signal, for example, and the DFS outputs an analog signal for VTR recording. When you're ready for playout simply run the VTR's analog output again through the DFS-3005, and you're back in the digital domain. What's more, you can have simultaneous conversions and the convenience of local or remote control and networking capability. Composite, component or serial digital video plus analog or AES/EBU audio—Leitch's DFS-3005 multiformat synchronizer handles them all! Learn more about recycling analog equipment by calling (800) 231-9673 or visiting www.leitch.com.
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 ±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 embedded 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.
Catch digital video errors!

ALL-IN-ONE from physical to quality

The new DVStation™ Digital Video Performance Monitor features:

- All in one status at a glance
- Integrated multiple layers: error detection for RF, MPEG-2 transport, coding and quality
- Multiple ports: parallel computing power on 21 ports
- Unique freeze frame detector
- Real-time 100 Mbps MPEG-2 transport stream analysis
- Intuitive touch-screen graphical user interface

Contact us at:
North America 1-877-71PIXEL (877-717-4935)
Europe +49-89-5386-8711
sales@pixelmetrix.com

www.pixelmetrix.com
Circle (122) on Free Info Card

integrated multi-layer monitoring on 21 ports
Will your Olympic character look like a bunch of jerks?
Jerky pictures are a common problem with conventional standards conversion. Not to mention smear, judder and break-up.

And that’s no way to show the finest moments in sport.

The answer is Alchemist Ph.C from Snell & Wilcox. Uniquely equipped with powerful "phase correlation" motion compensation technology, it’s the most advanced standards converter ever built.

No wonder it’s used by the world’s leading broadcasters and facilities to create virtually transparent results.

With CleanCut™ software to overcome the blurring caused by edits and RollTrack™ for perfect lip-synch. Alchemist Ph.C completely outperforms all competitors.

So if you care about picture quality, take the plunge and upgrade to Alchemist Ph.C.
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 business 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 total system. For example, if you buy the Leitch ASC server, it comes with Fibre Channel. If you buy the new Omneon 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 information. 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 supporting technical specifications that outline the performance of the link between two devices. A whole industry has developed around providing testing systems to verify link performance. 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-

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

Table 1: Comparison of various parameters associated with streaming and file transfer.
Data Display for Broadcasters

Be First. Be Original.

Inscriber RTX is the revolutionary broadcast data-casting solution for rapidly creating custom information channels that combine streams of dynamic data with program video. RTX is the world's most widely used application for the display of sports scores, election results, financial services, stock tickers, weather displays, home shopping, horse racing, general information and digital video delivery services.

RTX provides a flexible NT-based environment for software developers to use familiar programming interfaces to produce applications in record time. With RTX, broadcasters now have the power to integrate multiple layers of text, 2D & 3D graphics, logos, animations, imagery, audio and live or digital video with full control over everything.

Be the first to deliver the information your viewers want. With Inscriber RTX be original by taking the lead and developing your own look that no off-the-shelf product can ever deliver.

Inscriber Technology
POWERFUL TELEVISION GRAPHICS TOOLS

Contact Inscriber for a free demo CD of Inscriber RTX please call +1.800.363.3400 or +1.519.570.9111, or visit www.inscriber.com

Circle (124) on Free Info Card
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 downright frightening. As you would expect, features and performance increase accordingly.

The Siecor 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 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 Siecor 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.

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

In style. The brand new AD954 Stream Grabber from Adherent is the simplest and neatest solution for field engineers working on compression equipment installation and service.

Weighing in at less than 3lb and the size of an average mouse mat, AD954 Stream Grabber is ready to use wherever you are. It functions at bit rates of up to 90Mbit/s at which it can record up to 30 seconds of transport stream. So if you need to use a comprehensive monitoring and analysis tool for MPEG-2, DVB or ATSC on the move it has to be the Stream Grabber. Don't hit the road without it.

US Distributor: Sencore  Call: 1-800-SENCORE

AD954 STREAM GRABBER

www.adherent.com
Getting the most from old newsreels

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 nonlinear 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 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.
Create Stellar Broadcast Graphics In Record Time

- Fully Non-Destructive Paint, Rotoscope, Animation and Compositing Tool Set
- Particle System Dynamics Provide Easy Real World Motion including Velocity, Gravity and Friction
- Air Brush Directly Onto Live Video with Variable Transparency and Broadcast-Quality Anti-Aliasing

Before your client even sits down with you, they've been bombarded with thousands of quality graphics on network television. Today, anything less just won't do, and that's why more and more video professionals rely on Trinity's powerful paint, animation and compositing system, Panamation. Its fully object-oriented graphics engine gives you a comprehensive set of tools for complete control of the creative process. Paint with smooth air brushes in 3D perspective and multiple layers. Use adjustable light sources to cast soft-edge shadows while drawing. Quickly create stencils and mattes with a variety of brushes and keyers. And that's just the beginning.

Of course, video production requires more than just a great paint system, and that's why Trinity includes a powerful real-time CG and lightning-fast still store. In fact, Trinity delivers all the tools of live and post production in one integrated, easy-to-use system at a fraction of the cost of comparable gear. Visit our website today to see for yourself just how far Trinity can take your productions.

For more information or to locate a dealer near you, visit our website or call today.

play.com/paint
Toll-Free 1-877-752-9594
Circle (126) on Free Info Card

Air Command™ Live Broadcast Production Switcher
Preditor™ Comprehensive Real-Time NLE
Warp Engine™ Breakthrough Real-Time 3D DVE
TitleWave™ Sub-Nanosecond On-Air CG
Panamation™ Paint, Animation and Compositing
Deep Freeze™ Instant-Access Still & Clip Store

The Complete Broadcast Production Studio-In-A-Box
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
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.
leading stations to digital integration takes us down a lot of roads.

We understand that the road to digital transition and integration for one station may be very different from that of another. Having been down a lot of roads in large markets and small, we bring a wealth of experience planning and managing the digital transition process, addressing the specific needs of the stations we work for and the unique markets they serve.

We have the resources: financial, technical and human. We have the experience. We have the relationships: architects, contractors, manufacturers. And we have the training systems to get your people up to speed in a hurry.

So whether you're managing in Mayberry or maneuvering in Megalopolos, we can make the road to digital transition and integration straight and smooth. Give us a call before you begin your journey.
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 video. IMMAD ECVS had developed multichannel 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, 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
Extron's VSC 150 high resolution computer-to-video scan converter includes the most popular features of our VSC 100 plus variable H&V sizing, genlock capability, encoder filters, IR & RS-232 control, and a rack-mountable enclosure. The VSC 150 is the ideal solution for computer-video, such as graphics, backgrounds, or text, to be converted to video for editing and recording. The VSC 150 uses advanced digital processing to deliver high quality video and offers the following advantages:

- Converts computer images from as high as 1280 x 1024 @ 60 Hz down to NTSC or PAL video
- Horizontal & vertical sizing, zoom, and horizontal & vertical centering/pan controls
- Three vertical filters to reduce flicker
- Two horizontal filters to minimize detail loss
- Three encoder filters that control encoder sharpness performance
- IR remote control with three memory preset locations for easy operation
- 60 factory/user memory presets for picture settings with autosave and auto-recall for one-time setup of a signal type
- Genlock capability for integration into a synchronous, timed system
- Extron's Simple Instruction Set (SISTM) for simplifying RS-232 control

The VSC 150 part number is 60-312-01.
1U rack shelf part number is 60-190-01.

For complete details, visit Extron's website at www.extron.com/d/vsc150

Extron Electronics
800.633.9876 • www.extron.com

New features include:
- Two user-selectable levels of horizontal filtering
- Three user-selectable levels of vertical filtering
- EXTRON IR controllable
- New rack-mountable enclosure
- Composite video, S-video, component video, or RGBHV outputs
- New H&V centering/pan/size with variable zoom and memory
- New encoder filters
- New Rack-mountable enclosure
- New Genlock capability
- New Internal power supply
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
- New Mac or VGA input with loop-out
- New Composite video, S-video, component video, or RGBHV outputs
- New RS-232 control with Extron's SISTM
With digital systems delivering a higher level of product quality and new services to the audience, the clamor to take advantage of this new technology has begun. However, the implementation of these technologies requires an end-to-end understanding of system architecture. We have acquired this understanding—and we call it DTV Science.

ADC enables you to take full advantage of DTV Science by providing broadcast products designed to ensure system integrity. Interfaces can be guaranteed, regardless of data rates. From input to output, signal paths can be maintained. No longer is it necessary to worry about the quality of a BNC connector, the data rates a router can handle, compatibility with compressed signals, the reliability of an STL, or the implementation of a digital transmitter. ADC now provides it all. Find out more by calling 1-800-726-4266, or visit us at www.adc.com/broadcast.
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 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 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 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
"Angenieux provides us with the best of the best — in performance, features and support."

When Dana and Michael Liman of Liman Video Rental, Co. — the premier source for digital and HD video rentals in the East — decided to build the industry's first digital production, post production and uplink truck, they already knew which lenses they wanted — Angenieux High Definition (HD) and High Resolution (HR) Series lenses. That's because Liman Video has received nothing but rave reviews on Angenieux lenses from their industry renowned clientele.

'Angenieux lenses deliver the sharpness and chromatic performance that meet all our technical requirements — and they work well with every camera we've tested,' said Dana Liman. 'With Angenieux lenses, we're confident in providing the best image quality and ergonomics available.'

'Angenieux is taking high definition to the extreme,' according to Michael Liman. 'Our broadcast, documentary and feature film clients converting to HDTV recognize Angenieux's extensive experience in film optics and insist on using their HD and broadcast lenses.'

For more information on Angenieux lenses, call 973-812-3858 · www.angenieux.com · e-mail: angenieux@ctusa.com

Dana & Michael Liman
Liman Video Rental, Co.
New York, USA
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 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 though the channel changes associated with DTV.

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 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 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 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

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

Tuning is important in systems used for multiple channels. Placing elbows too close to each other can increase the complexity of tuning the system.
If you want to build the best headend, start with the best modulators.

Standard’s got you covered. Maximize your modulator choices without increasing your costs. Standard agile modulators give you the performance of fixed-channel systems, but with a lot more flexibility.

For example, our STRATUM System takes up less headend space per channel than any other system, but still offers advanced features such as remote control and automatic backup for lost signal or power. Or take our new TVM1000. It covers the entire spectrum from 54 to 1000 MHz, and lets you combine up to 158 channels while still holding out-of-band noise to less than 60 dBc.

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.

When you upgrade the headend, remember nothing delivers the signal like a Standard modulator.

Standard Communications
Meeting tomorrow’s standards today.

www.standardcomm.com
U.S.: (800) 745-2445 • Canada: (800) 638-4741 • Europe: 44 1923 800 510 • Latin America: 55 11 3887 6598
Digital 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 material 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. 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 compositing 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 workstations, 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.
Performance & Support

When you really get down to business, it makes sense to talk to Calrec.

Calrec produce DIGITAL and ANALOGUE BROADCAST CONSOLES for the 21st century. Through Network Operations, Local Stations and Independent Remote production companies, America listens to Calrec every day. In our 35 years of experience in Broadcasting, we have continuously pushed the boundaries. Our craftsmanship and cutting edge technology produce the highest quality products, backed by an unrivalled support team. A growing number of Broadcasters are choosing Calrec based on the performance of our products and our people.

WHEN YOU REALLY GET DOWN TO BUSINESS, IT MAKES SENSE TO TALK TO CALREC.

FOR FURTHER INFORMATION CONTACT

Studio Consultants (New York) Tel: (212) 582 7376 Fax: (212) 582 2166 e-mail: scidoug@isp.com

Redwood (LA & Nashville) Tel: (615) 871 0094 Fax: (615) 872 7800 e-mail: redwood@isdn.com

CALREC AUDIO LIMITED
Nutclough Mill, Hebdon Bridge, West Yorkshire, HX7 8EJ, UK
Telephone: +44 (0) 1422 842159, Fax: +44 (0) 1422 845244 E-mail: enquiries@calrec.com Website: www.calrec.com
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 sitting and lighting to at least the same standards as other color-correction gear. One 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 difference. 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.

---

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), is available through major booksellers. You can contact him through his website at www.megalink.net/~dakelly/.
WE’VE PUT MORE THAN 100 YEARS OF BROADCAST TRANSMISSION EXPERTISE UNDER ONE BANNER.
NAB 2000

Pick Hits .................. 74
NAB Replay .................. 84
Product Jackpot ............. 86
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 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 601. 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 onboard 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  
Circle (257) on Free Info Card

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  
Circle (267) on Free Info Card
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

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

Circle (258) on Free Info Card

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

Circle (264) on Free Info Card

76 Broadcast Engineering June 2000
Miranda VTR-100 A/D Audio/Video I/O Converter

The VTR-100 converts 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
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 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
Circle (268) on Free Info Card

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
Circle (269) on Free Info Card
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-5 HD 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

Circle (261) on Free Info Card

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

Circle (251) on Free Info Card

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 busses 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

Circle (263) on Free Info Card
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 250 ft 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
Circle (270) on Free Info Card

Sony MSW-M2000 MPEG IMX Recorder

The latest VTR from Sony can record MPEG-2 4:2:2P@ML at up to 50Mbps. 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/professional
Circle (256) on Free Info Card
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

Circle (255) on Free Info Card

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 Digital Tether 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

Circle (262) on Free Info Card

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

Circle (254) on Free Info Card
**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

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 BF-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

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
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
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.
Stephen Damas
Technical Design Supervisor
WGBH
Boston, MA

Greg Doyle
President
Doyle Technology Consultants
Redmond, WA

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

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
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
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 note 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.
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 playout, compile, caching, etc., all interfacing 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 CacheBox, 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-
Perfection is a word used to describe Ikegami's HK-388 which consistently performs beyond expectations, holding resolution and colorimetry even in very low and "colorful" lighting conditions.

Featuring Skin Detail (an Emmy Award winner), the Ultra-wideband HK-388 and HK-388P hand-held companion are full digital cameras that combine Ikegami's vast studio experience with today's digital technology. Wide screen models, HK388W and the portable HK-388PW, offer instant switching between 16:9 and 4:3 aspect ratios. These cameras feature New Generation ASICs for Ultra-High Density 640,000 pixel, 2/3" FIT CCDs; Skin, Slim and Diagonal Detail; Ultra-Wideband Component Triax or Optional Digital Fiber Transmission Systems;

Analog and Serial Digital Component Outputs; Modulation Depth of 80% at 5mHz; Sensitivity of f8 at 2000Lux; S/N ratio of 62dB; and now with 12-Bit A to D conversion.

We invite you to take a closer look at a camera that will bring you to new heights of perfection: Ikegami's HK-388.

For more information, contact your Regional Sales Office or the Ikegami dealer nearest you.
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 cut-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 (396) 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 (439) 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 Brieve 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 EGG, 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 Valley, 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 “middle-ware” 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.
Rocket Network takes audio production beyond the boundaries of studio walls, making connections that let you work with anyone, anywhere, anytime. It’s like a global multi-track.

**On-line Flexibility.**

Rocket Network uses the Internet to allow professionals to work together on audio productions without having to be in the same physical space. Instead of shipping tapes from place to place or renting high-capacity phone lines, you log into your Internet Recording Studio, where Rocket Network handles the details of passing your parts to others and vice versa. That leaves you free to concentrate on capturing the perfect take, using your own local system to record and edit. Whenever you’re ready for others to hear your audio or MIDI parts, you simply post your work to the Internet Recording Studio, automatically updating everyone else’s session.

**Professional Tools.**

Through partnerships with leading audio developers, Rocket Network is bringing RocketPower™ to the professional tools you already use, starting with Steinberg Cubase VST and Emagic Logic Audio. A multi-level permission system lets you control access to your Internet Recording Studio. And our RocketControl™ client offers built-in chat capabilities, so everyone in the session can chime in with feedback as the project takes shape. The Rocket Network Web site offers additional resources and services for audio collaboration.

**Full Audio Fidelity.**

With Rocket Network, there’s no compromise in audio quality—the system handles files in a vast range of formats and compression levels, all the way up to uncompressed 24 bit/96kHz. And you don’t need access to a super-fast connection; DSL or T1 is great, but you can also work productively over a humble 28.8 dial-up. The system supports multiple user-defined presets for posting and receiving, and handles all conversions, letting everyone participate in their own preferred format. That means you can conduct a session in a speedy, low bit-rate “draft” mode, then move on while the final parts are posted in the background at full-fidelity.

**A Powerful Connection.**

Rocket Network adds a new level of freedom to creative collaboration, allowing you to choose your team—singers, musicians, voice-talent, composers, engineers, producers—based on who’s right for the project, wherever they happen to be. With full fidelity, plus anytime, anywhere productivity, Rocket Network is a powerful new connection to the world of audio production.

Escape the boundaries of your studio walls. Register at [www.rocketnetwork.com](http://www.rocketnetwork.com)

source code: RN21

All rights reserved © Rocket Network, Inc. 2000. All other product and company names are ™ or ® of their respective holders.
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 switches 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 7236, that uses time division multiplexing (TDM). The TDM architecture provides considerable flexibility and size reduction. For

The Broadcast Fiber Optic System That Does Just About Everything

VIPER II™

The most widely used fiber optic system for television production and distribution just got better. With the most advanced electronics, electro-optics and packaging, the VIPER II meets all challenges in your facility’s video, audio and auxiliary communications. Name your fiber application—pre-fibered facilities, STLs, remote broadcasts, mobile field production, video backhaul, metropolitan video links—the VIPER II handles the job.

- Multichannel video & audio
- MDTV serial digital video; 19.4 Mbps to 1.5 Gbps
- 801 serial digital video
- Wideband NTSC/PAL video
- 24-bit digitized audio or AES/EBU
- Intercom, 2-wire or 4-wire
- Data, including RS232, RS422, CCU
- Universal 16-slot card cage
- Rack mount or “throw down” modules

It’s not just a broadcast system; it’s a multifaceted tool that’s flexible, affordable, and easy to use. It’s the reason why more facilities that choose fiber, choose Telecast.

Telecast Fiber Systems, Inc.
The world leader in fiber optics for broadcast production
(508) 754-4858 • www.telecast-fiber.com

Circle (137) on the Free Info Card
Experience Total Rejection

AT895 Adaptive-array Microphone System

Most people don’t like rejection.

But if you’re a sound engineer in a challenging audio environment, off-axis rejection is exactly what you need.

Enter the AT895 Adaptive-array Microphone System.

Utilizing Audio-Technica’s proprietary DeltaBeam™ technology, the AT895 System manipulates the amplitude and phase of its 5-element array by acoustical, analog and digital means, providing off-axis cancellation of up to 80 dB. The system continuously adapts to a changing soundscape, and is especially effective at suppressing wind noise, rumble and other unwanted low-frequency information. So you get the audio you want, without all the clutter.

Want more information on the amazing capabilities of the AT895? Call, write or fax today. Or check it out on the Web at www.audio-technica.com. After all, if you’re like most audio professionals, you could probably use a little more rejection in your life.

Audio-Technica U.S., Inc.
1221 Commerce Drive, Stow, Ohio 44224
330/686-2600 Fax: 330/686-0719
E-mail: pro@atus.com www.audio-technica.com
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 same 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 50 levels can be created by adding different boxes together. While primarily designed to house stand-alone modules, such as DAs and converters, the Omnimode 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 (12OMHz), 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 14x414 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 BZT-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
Leader...
Anytime, Anyplace, Anywhere

HDTV TEST SOLUTIONS

- ABC
- AT&T/TCI
- Belo
- Bexel • CBS
- Crawford Corp
- Ethnic B’cast
- DaVinci • Foto-Kem
- HBO • HD-Vision
- Laser Pacific
- Lighthouse Digital
- Limen Video Rental • MSG
- MCI • Museum Of Natural History
- NASDAQ • NBC • National Mobile Trucks
- N-Vision • Pacific Video • PESA
- Philips Digital • Quvis
- Sony Pictures (HD) • Synergistic
- Tapehouse Editorial
- Texas Video & Post • Thomcast
- TXCN • Universal Studios • UPN
- Utah Scientific • Viacom
- Walt Disney • Warner Bros.
- WBNS • WFAA • WRAL

FOR PROFESSIONALS WHO KNOW THE DIFFERENCE

1 (800) 645-5104
www.leaderusa.com
e-mail: sales@leaderusa.com

EFP/ENG, video broadcast, post production or materials acquisition...video professionals worldwide choose Leader Instruments for excellent performance, total dependability and cost-effective versatility. And, customer support is unsurpassed. Are you ready for Leader? Call us.

Circle (138) for Product Info Only • Circle (139) for Product Info & Demonstration

www.americanradiohistory.com
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.

Circle (232) on the Free Info Card

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.
Producing Dolby Surround in digital production facilities just got easier. Introducing the DP563 Dolby Surround Encoder, a digital implementation of the industry standard SEU4 Dolby Surround Encoder. The DP563 is ideal for encoding Dolby Surround audio in the digital domain for broadcasts. Discrete 5.1-channel material can also be input and premixed to four channels for Dolby Surround encoding. The DP563, paired with the Dolby DP562 Multichannel Reference Decoder, completes the digital system for Dolby Surround production and monitoring. Want to know more? Visit our website or call us for the name of your nearest dealer.
THE ROSWELL SYSTEM IS MAKING IMPRESSIONS IN UNEXPECTED PLACES.
ROSWELL FACILITY MANAGEMENT SYSTEM

Content Management & Delivery in an Internet World

How many impressions can you create for your advertisers? Countless more when you use the Roswell Facility Management System from Odetics. Whether your business plans call for multi-casting, data-casting or web-casting, Roswell easily plugs into your existing facility and immediately offers you the scalability required to meet the digital demands of a changing business.

Leveraging the latest systems technology and Odetics’ proven asset management expertise, Roswell is ready now for prime time. Contact us for a demonstration of Roswell and discover how affordable the digital future can be. We’re sure it will make a lasting impression on you.

Odetics
Wired for the future

www.odetics.com/broadcast/ Phone: 714-774-2200

Circle (142) on Free Info Card
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 letterbox 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 P2 DA1 video line driver that sends computer monitor signals over cables up to 250 feet. For more information, see Pick Hits, p. 74.
FREE! The Industry’s Hottest Newsletters

NEWS
VIDEO
REVIEWS
FEATURES
WHITE PAPERS
TUTORIALS
RESEARCH
CONTESTS

WIN a Canon Optura Pi DV camcorder!
Sign up for one of our FREE e-mail newsletters by July 28, 2000 to be entered in the drawing.

Sign up at www.DigitalMediaNet.com/register.htm
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 embedded 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 nonproprietary 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.
Technology without value is merely talk...and talk is cheap. To be useful, real technology is designed into a product with practical features and benefits.

Our Lifesaver charging mode eliminated battery-killing trickle charging and made “memory” a myth. ACS (all cell sensing) temperature protection eliminated safety hazards and improved battery life. Impac case construction protects cells from the rigors of professional use. Our InterActive system design, with its battery-to-charger communication, employing up to 6 different charging methods simultaneously, improved battery performance and service life. Our PowerChargers double as a universal AC mains adaptor. And our Interactive Digital Battery, a world first, provided the confidence and accuracy of a fuel gauge directly in the viewfinder of every camcorder introduced in the past five years.

Now the advanced technology of Anton/Bauer InterActive battery systems is backed by the most advanced warranty ever. Every PowerCharger, every ProPac, TrimPac and ProFormer battery are covered by our new three year Maxx™ warranty.

8200 Series Rackmount Frames and Cards
The strategic modular solution for distribution and conversion of digital and analog audio and video signals. Models allow for up to 10 or 12 cards plus two power supplies. Interchangeable I/O terminations suit most applications.
Reader Service Card # 145

SMS4 4-Channel Stereo Metering System
Display the levels of any combination of four digital (AES/EBU) and/or analog audio signals simultaneously. Each stereo meter pair comprises two 18 segment LED level displays and a digital audio LOCK indicator. Automatic digital input recognition and circuit selection. Integral power supply.
Reader Service Card # 146

POD11 Digital Audio Meter
This unit features a dual channel, 20 segment LED level display along with 8 signal status LED indicators. Aural monitor outputs, headphone or speaker, are provided. Available with 110Ω balanced input on an XLR3(F) connector, or 75Ω unbalanced input on a BNC connector.
Reader Service Card # 147

ABB-1 Audio Bit Buddy™
Portable, battery powered system for monitoring both digital (AES/EBU, S/PDIF) and analog signals. Digital input monitors sampling frequencies from 30kHz to 50kHz automatically.
Reader Service Card # 148

ABS-1 Audio Bit Spitter
This ABB-1 companion product generates an AES/EBU or stereo analog test tone (400kHz 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.
Reader Service Card # 149

AMS4 Audio Monitor System
High performance made affordable. Four selectable inputs may be balanced analog stereo, balanced AES or unbalanced AES3-I. Digital signals are automatically identified. Integral power supply.
Reader Service Card # 144

Ward-Beck Systems
STANDS ALONE
legendary design
legendary quality
legendary construction

By Philip Hejtmantek

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
Our experience spans more than 65 years, and our engineering still makes it simple.

Plug it in!
Ask anyone and they'll tell you the same thing. The K2 Digital IOT sets the standard by which other IOTs are made. Why? It's simple. Years of experience have produced the best IOT. Our unique, field-proven design features simple, user-friendly tuning right on the front of the subsystem. Engineered for long life and broadcasting's highest efficiency, you don't even have to disconnect the power or cooling water to replace it. Sure we're an Emmy winner for technical achievement. But we've kept our focus on engineering the simplest and most reliable tools in the industry—so you can focus on the more important things in life. Plug it in!
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.

Circle (436) on Free Info Card

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.

Circle (292) on Free Info Card

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

Circle (372) on Free Info Card

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.

Circle (349) on Free Info Card

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.

Circle (307) on Free Info Card

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) 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) 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 Teleglobes’s global backbone. Teleglobes 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 Teleglobes’s global backbone, Digital Island will use Teleglobes’s global network of Inktomi caches to quickly extend the reach of its Footprint service. Digital Island will house their servers in Teleglobes’s global Internet access nodes and receive a direct connection to Teleglobes’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) 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) 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
News is made in an instant.

Producing the story should be just as fast.

Chances are, you’ve heard that digital technology can help produce news faster and easier. With an SGI Media Server, the evolution to digital can happen just as fast. Our new video server distributes media as data for browsing and sharing content over standard data networks, allowing you to leverage your existing infrastructure for repurposing content. Plus, our multi-format, resolution-independent solution delivers simultaneous input, serving, and play-out of video, eliminating the need for independent devices. These advantages—as well as 24x7 service and support—help make your transition to digital quick and easy. To learn more about SGI Media Commerce solutions, go to www.sgi.com/go/broadband/ or call 1-800-800-7441.

The new SGI Media Server
Up to 16 video channels • Video file transfers • Multi-format video I/O support
gestion, this infrastructure provides a higher quality of service over typical terrestrial transit, is scalable, and is well suited for very large live events. l-Beam (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) 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) has recently purchased the Spacenet assets from GE. These were the original GTE Spacenet satellites. They are now offering SkySurfer VSAT with terrestrial return (2Mbit/s to 35Mbit/s) and SkyBlaster with satellite return.

SkySurfer VSAT delivers broadband video and data directly to the LAN or desktop. SkySurferprovides 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 2Mbit/s to 35Mbit/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) 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) 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) 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) is an end-to-end post to stream shop. They claim to be different because they also create down 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) 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
Actually, the corner we rounded belongs to our patchbay's revolutionary new Professional Punchdown Terminal (PPT), making it perfectly compatible with the industry standard. We realized that achieving a new industry standard meant we couldn't cut any corners to get there.

Our new PPT is a split-barrel design that incorporates a more rugged, thicker housing to minimize the impact of repeated punchdowns. This design eliminates the problems associated with the old “V-shaped” terminals by distributing pressure evenly across both sides of the terminated wire, causing improved wire retention and more reliable connections. The serrated teeth in the plastic housing also improve wire retention by firmly gripping the wires. With the PPT, multiple wires can be terminated to a single contact, and a wide range of wire gauges can be used.

Look for Switchcraft's new PPT in our APP and Front Access Series of audio patchbays, and in our new Backpanel Series. All Switchcraft audio patchbays incorporate heavy gauge materials and come standard with our high quality nickel-plated, steel framed jacks, and gold-plated crossbar contacts!
age. Their strategy of growth and quality has made them the choice for critical encoding jobs.

Activate.net (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) 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) 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 digital video networking products include a range of DVB-compliant tools that form the basis of standard 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) 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) offers an easy to use media creation and distribution hardware meant for a LAN environment to move streams around efficiently.

Eloquent (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) 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), 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.

Circle (235) on the Free Info Card

Steven Blumenfeld is chief technology officer for Winamp/Spunner-AOL, San Francisco.
Have you ever felt your MPEG-2 DVB system lacks performance?

Ours Don't!

As a professional broadcaster you must be certain that at any moment, your MPEG-2 DVB system performs perfectly.

That's precisely the reason to choose Tadiran Scopus with the comprehensive end-to-end MPEG-2 DVB solution, especially designed for the professional broadcaster. We embrace standards and don't create new non-standards, ensuring an open architecture and proven full interoperability. Achieve the highest quality and performance. Get the most cost-effective solution on the market for the distribution of digital video, audio and data.

CBS Newspath, Cablecom, TCI/Pramer, Telespazio and other leading broadcasters already made their choice. What about you?

www.tadiranscopus.com
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 multiformat HD cameras. The series can operate in 1080/60i, 1080/24p, and 720/60p high-definition formats, as well as standard-definition 480i/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.

VSB
tech

HD uncompressed signal processing connection to

correction baseband data, and corrects multipath errors by forward error correction and equalization techniques and remodulates it into a new VSB signal.

CPI Elmac 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.

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.

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 24fps. 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 multiformat 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 1080/60i, 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 fiber-optic 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 ITT CCDs in 1080i/60. Audio is eight channel with
THE AZDEN 400UDR
BROADCAST UHF WITH ALL THE OPTIONS!

- 63 User-selectable Frequencies (794-806Mhz)
- Crystal-controlled and PLL-Synthesized
- Tone code squelch
- Dual antennas with BNC connectors
- XLR output with volume control
- Headphone Output with volume control
- Operates on 4 AA or 12V DC
- LED indicators for A or B antenna status, AF peak, Power On/Reception status

41XT Plug-in transmitter to use with your favorite low impedance wired microphone.

41BT Available with omni (EX-503H), uni-directional (EX-503UH) or SONY ECM-44H.

41HT Uni-directional handheld. Also available with AUDIX OM-3 capsule.

AZDEN®

147 New Hyde Park Road, Franklin Square, NY 11010
(516) 328-7500 • FAX (516) 328-7506
E-Mail – AZDENUS@AOL.COM
Azden Home Page: www.azdencorp.com
Circle (160) on Free Info Card

www.americanradiohistory.com
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 configurations, 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 HDV 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 SSFD 8MB memory card, autotune 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 1/3-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 525/625 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 multiformat 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/
Wavetek Wandel Goltermann Test Solutions
In the heart of Digital Broadcast

MPEG-2 ATSC/DVB

Simulation
Development
Validation

Installation
Troubleshooting
Monitoring
Supervision

Wavetek Wandel Goltermann offers a full range of innovative test and supervision solutions for world-class support of all the players in digital TV provision. Our objective... to provide our customers with complete control over all MPEG multiplex parameters and components.

Our Digital Broadcast Test Solutions enable faster time-to-market for developers, quicker troubleshooting in the field, easier system integration and maximum uptime of Digital Broadcast services, to the benefit of the end-customers.

Employing 2600 people worldwide, Wavetek Wandel Goltermann is a leading provider of a global range of communications test equipment and systems for Telecom, Datacom, Cable and Digital Broadcast infrastructures.

For more information or the free evaluation software, contact us at:
(800) 851-1202
visit our Web site at:
mpeg.wwgsolutions.com
Also you can contact us at:
mpeg@wwgsolutions.com

Wavetek Wandel Goltermann
Communications Test Solutions
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 iLink terminal, a series of detail functions, and has an S/N ratio of 53dB. 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 CCD 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/ft. Ikegami further introduced two new Edictcam-2 hard disk based dual aspect ratio camcorders. The DVS 2011W contains 520,000-pixel IT CCDs, and the DVS 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...
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.

**Stream Playout And Recording**
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/PSI/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.

**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”**

---

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

3200 Sencore Drive, Sioux Falls, SD 57107 • 1 800 SENCORE • www.sencore.com

1999 NAB Pick Hit Product!
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 prompters 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 ½-inch IT CCDs. The DY-70's sensitivity is f1.1@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, ½-inch component digital D-9. JVC has also introduced the GY-DV550 camcorder as a companion to the very popular GY-DV500 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 ½-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 3600K 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 recording with 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 Fujion 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...
TRY DOING THIS WITH ANY OTHER TRIPOD.

Only Vinten's Vision Heads Are Perfectly Balanced From Any Position Throughout The Entire Range Of Motion.

Vinten's patented technology lets you set your camera at any angle and leave it (without brakes), to capture that hard-to-get shot. Smooth movement throughout the tilt range is a result of Vinten's consistent counterbalance for any sized payload.
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.

Circle (429) on Free Info Card

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.

Circle (311) on Free Info Card

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

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.

Circle (429) on Free Info Card

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.

Circle (311) on Free Info Card

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

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.

Circle (429) on Free Info Card

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.

Circle (311) on Free Info Card

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

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.

Circle (429) on Free Info Card

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.

Circle (311) on Free Info Card

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

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.

Circle (429) on Free Info Card

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.

Circle (311) on Free Info Card

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

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.

Circle (429) on Free Info Card

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.

Circle (311) on Free Info Card

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

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.

Circle (429) on Free Info Card

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.

Circle (311) on Free Info Card

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

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.

Circle (429) on Free Info Card

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.

Circle (311) on Free Info Card

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

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.

Circle (429) on Free Info Card

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.

Circle (311) on Free Info Card

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

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.

Circle (429) on Free Info Card

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.

Circle (311) on Free Info Card

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
World-Class Intercoms

All over the world, Matrix Plus® digital intercoms are working in today's most demanding communications environments. You'll find them linking news production teams from Argentina to Zimbabwe. Bringing you financial news from Wall Street, Olympics coverage from Nagano, and fast-breaking election coverage from Washington DC to Warsaw.

We're helping NASA track the Space Shuttle and Globalstar launch satellites. We're there, producing the worship service at Crystal Cathedral and in post production at Universal Studios.

Worldwide, production teams choose Matrix Plus digital intercoms for their performance, their flexibility, and their reliability. And for the support they receive – from a company that has pioneered intercommunications technology for 30 years.

To learn more about Matrix Plus and our broad range of communications products, please call or visit us on the web.
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.

Circle (342) on Free Info Card

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.

Circle (301) on Free Info Card

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 Angenieux 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 53mm 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 72 x AIF HR with a zoom range of 9.5mm to 684mm at f3.6.

Circle (236) on the Free Info Card

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

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 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 eStudioLIVE, 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
We’re evolving.

Watch the transformation at

www.mediacentral.com

You’ve been with us from the beginning, but we’ve only just begun.

mediacentral
an industry-link community

www.mediacentral.com

Your one-click resource for media tools, news and community.
inputs, a Pinnacle 3D DVE, an Inscriber 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 eStudio! Live 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 combines 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 Autobeats 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 Ultimate 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.
The performance and reliability of Maxell's professional media blows away Bill Thompson, Vice President-Post Production for Crawford Communications in Atlanta. "For me, it's all about performance and reliability. I depend on Maxell's Betacam SP to deliver the ultimate in audio and video reproduction." Maxell's media family also includes digital products like DVCPRO, D-5, Digital Betacam, D-2 and D-3. Can you depend on your professional media? You can reach Bill Thompson at bthompson@crawford.com

Take your professional media to the power of Maxell.
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 Millenium 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/E’s and 33 inputs/3.5 M/E’s 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/E’s, 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/E’s. 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/E’s.

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 layout 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.

---

*Ed Praticelli is director of engineering & post production for Production Masters, Inc. Pittsburgh, PA.*
MOST REVOLUTIONS ARE WON WITH WEAPONRY, ARMIES, EVEN BLOODSHED. WE’RE USING INTERACTIVE GAMESHOWS, ON-DEMAND REPLAYS, AND A REALLY COOL WAY TO ORDER PIZZA.

Funny, but dead serious. OpenTV, the worldwide leader in software that enables digital interactive television, is deployed in over 7.8 million digital set-top boxes — more than any other interactive TV platform. Major advertisers are buzzing. We’ve been chosen by 28 television network operators, including digital cable, satellite, and terrestrial. And, hundreds of content developers are using OpenTV authoring tools to create compelling interactive TV applications like sports, e-commerce, VOD, advertising, and more. Yes, the interactive revolution is being won without an army. But with over 7.8 million viewers worldwide, it seems like we’re building one.

www.opentv.com

THE NEW VISION FOR TELEVISION™

©2000 OpenTV, Inc. OpenTV and the OpenTV logo are trademarks of OpenTV, Inc., in the United States of America and other countries. All trademarks are the property of their respective owners.
LeCroy introduces the LA302/LA303, a series of analog oscilloscopes. The LA302 measures 2Hz to 100MHz and the LA303 operates up to 200MHz. The third channel provides three sensitivity levels for a wider range of measurements.

Circle (340) on Free Info Card

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.

Circle (348) on Free Info Card

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

Circle (329) on Free Info Card

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.

Circle (385) on Free Info Card

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.

Circle (283) on Free Info Card

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 QuickTime 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 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 won't replace all other formats anytime soon. That's why the PESA Alliance Master Control Switcher makes so much sense. The Alliance is designed for: 1) full-time SDTV; 2) full-time HDTV; or 3) mixed SDTV and HDTV broadcasting. Multi-format technology allows SDTV systems to be upgraded to HDTV, preserving your investment. The PESA Alliance also supports multi-channel capability, so you're ready to handle any programming strategy.

PESA’s lineup of HDTV routers is right for today's needs. For maximum flexibility take a look at the Cougar HD. You can start as small as 4x4 and expand to 32x32 with plug-in cards. The Ocelot HD delivers a 16x8 or 16x16 matrix in only 1RU, making it great for field or studio use. The LNS-8 HD 8x2 switcher is perfect for monitoring, editing, telecine, and automated applications.

Ask about PESA's all-new HDTV distribution Amplifiers!
Accom announced Abeekas HDevous, a new high definition effects system featuring RGBYUV color correction, target frame stores and Surface Pro 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 ScreenPro 8 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, GPl 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 motion 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. Da- rim 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 Quatro4X provide a range of capabilities. The Quatro4X 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-51200, the Pinnacle Vortex and the new Lightworks VOX [populi].

Accom's Affinity is a real-time system incorporating the Abeekas 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 switches, 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 switches 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
You already have enough to think about when choosing a video server system. So here's some straight talk. The SeaChange Broadcast MediaCluster™ is the most reliable in the industry. Without costly mirroring. That's the better thinking engineered into SeaChange's entire family of MediaCluster servers, delivering MPEG-2, 4:2:2 video at bit rates up to 30Mb/sec. With rock-solid solutions starting well under $100K, you can buy into open standards and networked solutions that offer real opportunities for streamlining your single or multichannel operation. We won't dazzle you with the configuration diagrams here. Visit www.seachangeinternational.com. And see why we're playing on 27,000 channels worldwide.

SeaChange International, Inc. 124 Acton Street, Maynard, MA 01754 phone: 978-897-0100 fax: 978-897-0132 ©2000 SeaChange International, Inc. All rights reserved. MediaCluster is patented, and a trademark of SeaChange International, Inc.
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 nonlinear 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 material to be edited before the entire clip is captured. It also contains a character generator, still store and two DVEs. With the MontageV NLE, the system offers real-time motion effects and 3D effects packages.

The new Lightworks VOX [popull] 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 at $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.
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.

Of course, sophisticated graphics require more than just a great CG, and that's why Trinity includes a powerful video paint, animation and compositing system. In fact, Trinity delivers all the tools of live and post production in one integrated, easy-to-use system at a fraction of the cost of comparable gear. Visit our web site today to see for yourself just how far Trinity can take your productions.

For more information or a demonstration from a Play authorized dealer near you, visit our web site or call today:

play.com/cg
Toll-Free 1-877-752-9592
**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

---

**Audio for video**

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-F20Kt 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 64kbps. Mic inputs benefit from switchable low-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 shielded 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 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
Yippee. Digital is here.
And so are four times the number of channels to monitor.

Video Quality of Service  Still relying on your eyes for monitoring? Good luck. Imagine a world with multichannel, real-time monitoring of picture quality and MPEG protocol. Centralized remote monitoring via SNMP and TCP/IP. And automatic alarm reporting, program history, error logging, and lip-synch error correction. It's all here. Already. Call 800-426-2200 x3055 or visit www.tektronix.com/VQoS

© 2000 Tektronix, Inc. All rights reserved. Tektronix and the Tektronix logo are registered trademarks of Tektronix, Inc. All others are properties of their holders.
"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 hardware facilitates easy use with NPM-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 timecode (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...
Compel™ Your Network To Jump Through Hoops

With Wegener's DSNG solutions, you can manage your network the way you want, when you want.

**Compel™ Bandwidth on Demand**
- Manage your network assets
- Enable regional advertising
- Reduce transponder costs

**envoy™ Digital Video Courier**
- Integrated encoder and modulator
- Supports QPSK, 8PSK, 16 QAM
- Compact design

**UNITY™ 4422 Broadcast Receiver**
- Studio profile decoding
- Enhanced VBI support
- Supports Teletext and data services

WEGENER® COMMUNICATIONS
11350 Technology Circle, Duluth, GA 30097 • 770-814-4000
www.wegener.com COMPEL is a trademark of Wegener Communications.
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

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 function 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 F 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 F 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 L/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.
Spotting the best Scan Converter should always be this easy.

You're looking at the best autosync video scan converter available anywhere. The CGC-4000 can turn your high-resolution desktop workstation, PC or Mac presentations into broadcast-quality videos.

CGC-4000 features:
- Broadcast-Quality NTSC/PAL Output
- Full 24-bit Digital Signal Processing
- True Autosync Operation
- Dynamic Pan & Zoom
- Optional SDI Output (4:2:2)
- Betacam, S-Video (Y/C) Outputs
- Auto & User-Selectable Filtering
- RS-232 Interface
- 15-pin Connector for PC Applications
- Full 3-year Warranty

Enhance your image, put a Folsom Video Scan Converter to work for your next application.

©2000 Folsom Research, Inc. All rights reserved.
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


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

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 SMPTE310 video stream 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 that 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.

By Paul Black

www.americanradiohistory.com

144	Broadcast Engineering	June 2000
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. Biterror 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 or call (800) 215-2614.
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 is easy to use and can go a long way towards assisting the harried engineer trying to figure out why the DTV picture is pixelated 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 Free Info Card

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

Digital Cables Designed for Divine Performance.

Quantum™

www.commscope.com

P.O. Box 1729
Hickory, NC 28603-1729
1.800.982.1708 • 828.324.2200
Fax 828.328.3400

CommScope
How Intelligence Travels.

©2000 CommScope, Inc. of North Carolina

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 systems 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 standalone product.

Circle (350) on Free Info Card

Videotek and Miranda teamed up to integrate Videotek's VTM-300 multiformat, on-screen monitor into Miranda's new Kaleido-OC 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

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 the web page, then stores the information, then retrieves 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-
LeBLANC built the KXTV 2000 ft. tower in 1986, strengthened it in 1999 and installed antennas for DTV Channels 35, 53 and 61.

Ray Camovale, President 905.844.1242  •  LBI Denver, Sheryl Richmond 303.665.5016
•  West: Dave Hill 650.574.4600 •  Bob Palmer 360.403.1960
•  Central: Tony Guess 940.682.4147 •  East: Frank Davis 281.296.8132

www.leblanc-group.com/lbi    www.larcan.com
Circle (178) on Free Info Card
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

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 14 Mb/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 12 Mb/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 hand 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 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...
Toshiba Introduces The World’s First...

3 Chip, 10-Bit, Remote Head, Video Camera.

The IK-TU40A Makes All Other Cameras Obsolete!

Toshiba’s new IK-TU40A is 3 chips off the old block. It makes any other camera obsolete by utilizing Toshiba’s revolutionary ten-bit DSP architecture, combined with three 410,000-pixel CCDs. The result is a breathtaking 750 horizontal lines of resolution and 62dB signal-to-noise ratio for the brightest, sharpest color video in the industry.

This ice-cube size camera head delivers quality performance in a lightweight, compact package. Plus, its remote head design allows it to be mounted virtually anywhere for an entirely new perspective.

The IK-TU40A camera accepts C-mount lenses and has video outputs for NTSC, S-VHS, R-Y/B-Y and RGB. A 10, 20, or 30 ft. detachable cable, RS-232C personal computer interface for total control of all camera functions. To get the whole picture, call Toshiba at (949) 461-4986.

In Touch with Tomorrow

TOSHIBA

Toshiba America Information Systems, Inc
Imaging Systems Division • Imaging Video Products Group
9740 Irvine Boulevard • Irvine, CA 92618-1697 • (949) 461-4986
http://www.toshiba.com/taisisd/indmed

Circle (179) on Free Info Card
www.americanradiohistory.com
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.

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 1.5kW 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 diode 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
Time to go digital...

Time to plan a strategy...

Time to call THOMCAST.

- DTV Transmission
- MPEG-2 Management
- Data Broadcasting

Faced with the urgent challenge of going digital? Are you struggling with how to optimize your available bits? Look no further. Thomcast can help you plan your digital architecture to realize additional revenue streams. We educate, integrate and offer the industry's most versatile portfolio of digital products, technology and services. From DTV transmission and Data Broadcasting to Encoding systems and MPEG Management solutions for Video, Data, and IP, we'll show you how to maximize every part of your bandwidth.

Backed by the worldwide resources of the Thomcast family, our experience and customer-centric solutions will open new doors of opportunity so that your data streams become dollar streams.

Put time on your side . . . call Thomcast today.

THOMCAST
Converting Data Streams to Dollar Streams

104 Feeding Hills Road
Southwick, MA 01077
(888) 872-8505
www.THOMCAST.com
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 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 PVTV 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 256OAM 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, Larcan 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 encoder) 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 Larcan/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-transmitting 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 manufacturers, 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.

Circle (243) on the Free Info Card

Don Markley is president and Jeremy Ruck is senior engineer with Markley and Associates.
When choosing a High Definition studio lens, there are three things to consider... Quality, Performance and Price.

Fujinon's HA26x6.7 ESM DIGI POWER LENS meets and even exceeds these demanding requirements. That's why the HA26 has been purchased by the networks and major TV stations and was the lens of choice for the first HD news broadcast on KOMO-TV, Seattle, WA.

The HA26x6.7 ESM combines 6.7mm wide angle and 175mm telephoto capabilities in a single lens and outperforms all other lenses in its class.

With today's demand for technological advancements, Fujinon remains dedicated to delivering the most powerful and versatile lenses available. Smooth responsiveness, crystal clear quality and truly affordable pricing make the Fujinon HA26x6.7 ESM the clear choice for HDTV.
Light Compression for Transporting Contribution-Quality HDTV

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
Performance and Price in a Triax Connector

You'll like what you see in the new Series 1052 Video Triax System from Fischer connectors. These high-quality connectors are specifically engineered for the American broadcast industry and provide the performance and availability you need, at the price you want.

Count on the Series 1052 Video Triax System:
- In stock for rapid delivery.
- Fully compatible with the American Triax Standard.
- Gold-plated signal and power paths.
- Unparalleled reliability.
- Robust design and integral sealing – ideal for indoor and outdoor use.

The Fischer Video Triax Connector System includes plugs and receptacles for cable or panel mounting, as well as accessories and assembly tools. When you need performance and price in a video triax package, picture the Series 1052—the new American standard.

For more information about the extensive line of Fischer connectors, please contact us at:

800.551.0121
Fax 770.352.0992
mail@fischercnectors.com

Or visit our website at:
www.fischercnectors.com

Circle (182) on Free Info Card
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, recompressed 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.](image-url)
Total DTV

On the Air with Just ONE Box.

With AgileVision’s AGV-1000 you’ll be ready to broadcast fast, with lots of rack space to spare.

The AGV-1000 is a multifunction platform for the new age of television. It does station IDs and logo insertion, compressed content storage, emergency warning insertion, even seamless splicing of compressed program materials, all controlled by your station automation system.

Start with the cost-effective standard package. As your DTV operation expands you can add modules for more capacity or additional functions such as local content origination. You’ll still have room to hang your coat or display that prized plant.

The AGV-1000 works with existing equipment, and runs with mission-critical reliability.
The selection of compression ratios is also influenced by the cost of storage and switching.

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 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 satellite. HDTV 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 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.

William Zou is an industry consultant based in San Diego.
Specifically designed for virtual studio applications, the Ultimatte 9 offers features that produce a polished virtual production where visual improvements can be seen on the screen while bottom line production costs are reduced.

DEPTH OF FIELD with BACKGROUND DE-FOCUS
Automatic background defocusing that requires no software programming or physical hookup to the camera or computer.

AMBIENCE and COLOR CONFORMANCE
Analyzes the background and automatically adjusts the foreground color in real-time.

EDGE CONTROL with AdvantEdge
Produces a flawless edge and can be used alone or in conjunction with sub-pixel matte sizing and positioning controls.

OVER EXPOSURE CONTROL
Corrects problems with over exposed blue screens with no loss in detail.

EIGHT-INPUT ROUTER
Configurable so that any of the inputs can be used for Foreground, Background or Matte signals, providing enhanced versatility.

The new Ultimatte 9 and Ultimatte 400 are part of the third generation of Ultimatte's all digital compositing devices. They feature the Emmy and Oscar winning technology that has gained Ultimatte Corp. a reputation for the best blue- and green-screen compositing in the world. Both are fully linear matting systems, producing totally realistic composites even when the foreground contains smoke, shadows, soft edges, and other translucent and transparent qualities.

PROGRAMMABLE REMOTE CONTROLS
Both the Ultimatte 9 and the Ultimatte 400 feature advanced remote controls which can control up to 4 Ultimatte main units. "On Air" tally lights, reduced menu layers and programmable menus give you easy access and control.

ULTIMATTE 400
The new, low cost all-digital compsoiting hardware featuring matte controls, foreground & background colorizing controls, internal windowing controls, programmable remote, and non-volatile memory.

20554 Plummer Street
Chatsworth, CA 91311
USA
Ph: +1.818.993.8007
Fax: +1.818.993.3762
E-Mail: sales@ultimatte.com

Ultimatte Europe
Zijdstraat 72
1431 EE Aalsmeer
The Netherlands
Ph: +31.297.380.935
Fax: +31.297.380.939

www.ultimatte.com
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 (36 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 clickless 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
MRX™ by Sigma. 32 x 32 = 1 RU, the formula for compact routing.

Sigma Electronics has done it again. Introducing the new MRX Series™ of compact routing switchers. Only one rack unit high – perfect when space is at a premium. And, with specifications that meet the most critical applications.

Add levels and functions as required. Need a channel of audio? ...add a 1 RU, 32 x 32 frame. The MRX™ can switch eight control levels.

A variety of control panels including alphanumeric are available. For computer control via RS232/RS-422, check out our new SigMatrix™ software.

MRX™, the new formula for midsize compact routing switchers. As an added benefit, all components are covered by Sigma’s 5-Year Parts & Labor Warranty.

Contact us now for product information or to locate your nearest Sigma dealer.
and simpler frame requirements, less power consumption, one DSP module per system and simple expansion. Since crosspoint 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.
Step up to Datatek

The Datatek D-2800 Router reflects the experience of Datatek’s 30 years in the design and manufacture of broadcast-quality routing switchers.

With a large number of systems in use worldwide, the D-2800 is available for:

- Serial Digital Video
- Synchronous Digital Audio
- Asynchronous Digital Audio
- Analog Video
- Stereo Analog Audio with mode switching
- RS-422 Bi-Directional Data
- Time Code

For additional information:
Datatek Corporation
1121 Bristol Road,
Mountainside, NJ 07092
Tel: 908-654-8100 • 800-882-9100
Fax: 908-232-6381

Circle (190) on Free Info Card
www.americanradiohistory.com
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 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 Digital S recorders. Their size makes them easier to handle, and their cost keeps them accessible to a broad market, including education and in-

One manufacturer has introduced a camera that uses a six million pixel CCD that is used to output either 1080i or 720p native.
Broadcast Supply Worldwide stocks the widest range of professional audio products suitable for the TV/Video industry. From the newest digital audio editing equipment to the tiniest lavaliere microphone, you'll find it at BSW at a great low price.

We've been serving radio and TV broadcasters for over 26 years. Let our knowledgeable sales staff help you find the right equipment for the job, with quick delivery. Call us today.

Let BSW work to your advantage!

We offer a best advertised price guarantee, same day shipping of in-stock items, sales professionals with real-world experience, and sales hours from 9:00 am to 9:00 pm Eastern Standard Time.

FREE Pro Audio Catalog
Call BSW 800 426 8434

To Order Call BSW 1 800 426 8434
or Visit www.bswusa.com

* Call or see www.bswusa.com for details.
moving up in cost and performance you encounter the "broadcast range."
Introducing Scan Do Studio. The integrated scan converter and chroma keyer with all-star features and performance.

It's a whole new ball game with Scan Do Studio on your team! It's the all-in-one, professional level video scan converter and chroma keyer with major league features and performance — at a price the front office will cheer.

With the explosive growth of computer/video applications, Scan Do Studio gives you unmatched versatility, flexibility and performance to handle anything they throw at you. Check out the stats:

**Scan converter**
- Works with all computer platforms supporting resolutions up to 1280 x 1024 with sync rates ranging from 31 to 71 kHz
- Composite, S-Video, RGB, component and SDI inputs and outputs
- Genlock with full studio timing
- Five-step zoom with horizontal and vertical positioning
- Advanced three-line flicker filter
- RS-232 remote control

**Chroma keyer**
- Use it as a fully capable upstream chroma keyer or as part of your downstream video studio chain
- Variable size key window for maximum flexibility
- Soft key/hard key control
- User-defined key color

**A switch-hitter with power both ways**
With the explosive growth of computer/video applications, Scan Do Studio gives you unmatched versatility, flexibility and performance to handle anything they throw at you. Check out the stats:

**Scan converter**
- Works with all computer platforms supporting resolutions up to 1280 x 1024 with sync rates ranging from 31 to 71 kHz
- Composite, S-Video, RGB, component and SDI inputs and outputs
- Genlock with full studio timing
- Five-step zoom with horizontal and vertical positioning
- Advanced three-line flicker filter
- RS-232 remote control

**Chroma keyer**
- Use it as a fully capable upstream chroma keyer or as part of your downstream video studio chain
- Variable size key window for maximum flexibility
- Soft key/hard key control
- User-defined key color

**Designed to score with studio pros**
Scan Do Studio has all the big league features and usability to make fans of video professionals. Key on/off lets you switch between operating Scan Do Studio solely as a scan converter or integrated with the chroma keying functions. Front panel controls and RS-232 remote offer full control giving you easy access to all operating features. And Scan Do Studio fits right into your line-up. It's compact and rackmountable — just one rack unit high.

Give your studio the best double play combination since Tinker to Evers to Chance. For full details on Scan Do Studio, call us or visit us on the web at www.commspecial.com.

Scan Do is a registered trademark of Communications Specialties, Inc. ©2000 Communications Specialties, Inc.
Granite 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.

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 video interface device provides a bidirectional 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...
DTV.
Time waits for no man... neither does the FCC.

With so many decisions to make in the fast approaching conversion to DTV, you need to begin the process early. By starting now, you assure your station a seamless transition with custom-engineered choices. Our design engineers are ready to create the Antenna System that works specifically for your unique situation. Let's get started!

1-800-341-9678 • email: dcsales@dielectric.com • www.dielectric.com
Dielectric Communications • 22 Tower Road • Raymond, Maine 04071

Note: In the first two years of the digital television changeover, 115 stations went on air with DTV. In the next three years, the remaining 1,485 must be on air.

Dielectric
Communications
Engineering Excellence Since 1942

Start the process now. Call 800-341-9678.
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.

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.
We’re Back, Better Than Ever

What’s in a name? Quite a lot when the name is Utah Scientific.

That’s right, we’re back... with the same quality products, the same expert customer service and the people who started the Utah legacy more than 20 years ago.

Call us to discuss your system requirements:
801 524 9999 or www.utahscientific.com
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.

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 shoot-out,” 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
Nothing beats a new technology analog scope to get you ready for PRIMETIME.

ANALOG SCOPES PROVIDE AN OPTIMUM DISPLAY OF VIDEO WAVEFORMS WITH SUPER-FAST RESPONSE TIME AND NO ALIASING. THAT MAKES THEM THE IDEAL CHOICE WHEN MAKING CRITICAL VIDEO MEASUREMENTS.

- Triggers for PAL/SECAM, NTSC, HDTV
- Video Pedestal (Back Porch) Clamping
- Field and Line Triggers
- Simultaneous Dual Cursor Measurements
- Delayed Timebase Sweeps

Only LeCroy offers new technology analog scopes. They are ideally suited for today's high-speed, complex signals. Visit our website for details and specifications.

LeCroy

www.lecroy.com/tm/products/analog

www.americanradiohistory.com
newscast, as well as FOX 59 a.m., a three-hour daily live morning show and entertainment show.

HBO Studios also purchased AMS Neve equipment. The
studio chose the Libra Live Series II digital broadcast con-
sole for use in Studio A. This purchase was the first purchase of the Libra Live Series II.

The CJDS DAL system from Col-
 umbine JDS Systems was installed in the new DIRECTV Los Angeles Broadcast Center in order to aut-
omate more than 500 DIRECTV can-
nels. Equipment installed included the new D-MAS A8000 Multichan-
nel 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 Informa-
tion Systems and Weigel broadcasting company which creates and de-
livers 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 news-
cast 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 defini-
tion, as well as the fact that it
integrated seamlessly with their ex-
sisting equipment.

Acrodyne recently announced or-
ders for products shown at NAB2000,
including orders for the high power
Diacrode water-cooled transmitter, the medium power Diacrode trans-
mitter and their solid state transmitter, as well as low power UHF and
VHF transmitters.

Acrodyne also sold eight trans-
mitters from their IOT-based Quantum
line before NAB2000.

Quantel has partnered with Crisp-
in Corp. to allow customers to use
Quantel’s Cachebox server in con-
junction 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, Jeff-
erson-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 pro-
gramming playback operations. The
stations will also be using Crispin
equipment for asset management
and playback.

A new game show on the Fox Fam-
ily 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 stu-
dio system is used to provide a
studio setting for at-home particip-
ants. Excite will serve as the Inter-
net portal for the project.

ADC Telecommunications trans-
mitters were recently purchased by
three public broadcasting stations
**Video Demodulator**

<table>
<thead>
<tr>
<th></th>
<th>msi 320</th>
<th>Tek/Rohde¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differential Phase</td>
<td>1.2°</td>
<td>2°</td>
</tr>
<tr>
<td>Differential Gain</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>ICPM Accuracy</td>
<td>±2° from 75° to 105°</td>
<td>not specified</td>
</tr>
<tr>
<td>Aural Signal</td>
<td>Visual carrier not required</td>
<td>Requires a sync modulated visual</td>
</tr>
<tr>
<td>Demodulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero Carrier</td>
<td>User selectable between 11 and 36</td>
<td>Must be factory set</td>
</tr>
<tr>
<td>Reference Line</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Here's what you'll find when you compare the **msi 320** with the **Tektronix/Rohde demodulator**:

---

But don't just take our word for it. Put the **msi 320** side by side with the demodulator you're using now. If it's a legendary 1450¹, you'll find the performance of the **msi 320** nearly identical. If it is anything else, you'll find there's no comparison.

Don't wait. Just tell us you want to try the **msi 320** with absolutely no obligation. We'll send you a demo request form. Fill it out and return it, and we'll send you a demo unit that you can test and evaluate. It's that easy. If you have any questions, we'll even help you set up a valid comparison test.

Make the comparison. Call us today. You'll be glad you did.

---

1. Tektronix is a registered trademark of Tektronix, Inc. Rohde is trademark of Rohde & Schwarz GmbH & Co, KG, Germany
2. 1450 is a mark of Tektronix, Inc.

---

1. Modulation Sciences Inc.  
12A Worlds Fair Drive  
Somerset, NJ 08873  
Toll Free: (800) 826-2603  
Fax: (732) 302-0206  
E-mail: sales@modsci.com  
www.modsci.com
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 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.

Agilevision named Jerry Berger vice president of marketing.

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 Jaspar was recently promoted to vice president of technical and engineering operations for the Cisneros Television Group.
Clear Choice
HDTV and DTV Monitoring.

Multiple format display needs? BARCO has your monitoring solution.

HDM rack mountable, multi-format, high-definition monitor

BARCO Communication Systems • Argentina tel. +54 1 855 3357 • Australia tel. +61 3 9646 5833 • Belgium tel. +32 56 23 32 11
Brazil tel. +55 11 822 16 56 • China (Beijing) tel. +86 10 6526 8002 • Israel tel. +972 9 955 6444 • Japan tel. +81 3 5950 8100 • Malaysia tel. +60 3 7156 788
Mexico tel. +52 5 211 64 92 • Russia tel. +7 095 785 52 63 • The Netherlands tel. +31 30 634 0422 • United Kingdom tel. +44 118 926 4091
USA tel. +1 770 590 3600 / toll free 1 800 992 5016
Web site: http://www.barco.com • E-mail: sales.bcs@barco.com

Circle (199) on Free Info Card
www.americanradiohistory.com
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 Chimp 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

All in July Broadcast Engineering
Lead your local market today and tomorrow with Discreet’s advanced broadcast solutions. Discreet™ delivers powerful effects, 3D, real-time graphics, virtual studio, and workgroup editing tools to help build your station’s brand and gain a wider audience. And with improved workflow and productivity, artists and editors can create compelling content once, and use it in virtually any medium, from film to HDTV to the web. Make your move to Discreet. It could be the start of a beautiful relationship.

Visit www.discreet.com or call 1.800.869.3504
7530 HDTV Coax Cables
Achieve Low Loss and Low Cost Results

The 7530 Digital Series is suited for larger facilities where longer and uncompressed transmission capability is required.

- Transmits up to 1.5 GBs of HDTV-quality signal at a distance of 400 feet (using SMPTE 292M standard)
- Smaller size and low attenuation allows 7530 to be specified in place of more expensive fiber optic or larger size coax cables
- Easy to connect and install

1-800-982-1708
or www.commscope.com
The "Soundcard Solution"

HENRY ENGINEERING
313 Key Vista Drive
Sierra Madre, CA 91024 USA
TEL (626) 355-3656 FAX (626) 355-0077
FAX on-Demand Unit #120 (626) 355-4210
http://www.henryeng.com

Matchbox II converts unbalanced computer soundcards to professional audio!
Eliminate the hum, buzz, noise, and distortion caused by mismatched levels and impedances. Matchbox II's direct-coupled circuitry will make your digital editor sound its best! It's also ideal for use with DAT, CD recorders, and tape decks. Over 30,000 units in use worldwide.

Circle (206) on Free Info Card

Design and Mix a Cable Channel with Revolutionary Multimedia Insertion Technology!

Design and Mix a Cable Channel with Revolutionary Multimedia Insertion Technology!

Current Temperatures

Berlin 28°
Cairo 36°
Dallas 32°
Geneva 24°
Johannesburg 25°
London 29°
Los Angeles 31°
Munich 28°
New York City 27°
Nice 26°
Paris 24°

Multiple scalable windows for MPEG-2 and analog video
Graphic overlay with transparency

- Concurrent display of analog video input and MPEG-2 video in scalable, movable windows
- Scalable, 24-bit graphics overlays with 256 levels of transparency
- Back-to-back MPEG audio/video playback with genlock for seamless ad insertion
- Hardware-assisted scrolling and crawling of multiple graphics windows
- NTSC/PAL composite video support, optional S-video support

Single-slot PCI card • Supports multiple boards in a single system • Windows NT 4.0 support

Circle (207) on Free Info Card
Monitor Lots For Less $$

Serial Digital Video & Audio Converter with...
Alarm, Status, & Audio Level Monitoring

- 601 to PAL/NTSC Conversion
- AES/EBU to Analog Audio
- Audio Level & Phase Keying
- On-Screen Alarms

Audio De-Embedder
GPI Alarms
Closed Caption Decoding
Logging of Errors

Up To 15 Modules in 3RU Frame
Order 7760AVM

Did you remember to RENEW your subscription?

Don’t miss a single issue of Broadcast Engineering magazine — The Journal of Digital Television.

For more than 41 years, Broadcast Engineering has shown readers how to successfully use new ideas and technology. Today, as the world begins to experience the benefits of digital technology, Broadcast Engineering is here to explain another new technology and explore the opportunities it presents to our readers today.

Don’t risk doing business without Broadcast Engineering — renew today! Just visit our web site at www.broadcastengineering.com and continue benefiting from informative features focusing on topics such as:

- DBS & Satellite Services
- Systems Design & Integration
- Production & Post-Production
- Cable & Telecoms
- Television Stations & Networks

Don’t miss a single issue!
RENEW TODAY!

Visit Broadcast Engineering online

www.broadcastengineering.com

Best Power
UNINTERRUPTIBLE
POWER SYSTEMS
From 250VA to 220kVA

&

NORTH STAR
TECHNICAL
SERVICES
Power Protection
Partners Serving
the Broadcast
Industry.
Sales, service and
battery replacement.
(800) 842-1671
www.nstpower.com

Someth ing BIG
is Happening
at UTAH
Find Out at NAB Booth #L2027

Prices For Less

Circle (201) on Free Info Card

Circle (211) on Free Info Card

Circle (214) on Free Info Card

June 2000

www.americanradiohistory.com
EnvoSy™
THE DIGITAL VIDEO COURIER

- Integrated encoder and modulator
- Supports QPSK, 8PSK, 16 QAM
- Compact design

Visit us at NAB, booth #L11051

WEGENER®
COMMUNICATIONS
11350 Technology Circle
Duluth, GA 30097 • 770-814-4000
www.wegener.com

Old-fashioned Perfection

State-of-the-Art Performance

The MicroFrame™
1RU High Chassis
Up to 16 Line Amps
Up to 12 Mic-Preamps
Redundant Power
Mix Amp Option
Connector I/O Options

The space saving MicroFrame™ houses up to 16 modules, and dual regulators. The LA-1 line amp is a one-in, two-out DA. The MP-1 is a one-in, two-out mic-pre with 48 V phantom power. All state-of-the-art performance and priced to fit most anyone's budget...from Benchmark, of course! Visit our web site today.

WEGENER®
COMMUNICATIONS
11350 Technology Circle
Duluth, GA 30097 • 770-814-4000
www.wegener.com

Circle (208) on Free Info Card

Circle (213) on Free Info Card

MULTIDYNE

www.multidyne.com info@multidyne.com

191 Forest Avenue, Locust Valley, NY 11560-2132 USA
1-800-488-8378 1-516-671-7278 Fax 1-516-671-3362

Please CALL or VISIT our WEB SITE for product information.

Circle (215) on Free Info Card

www.americanradiohistory.com
420 Ninth Ave.
Between 33rd & 34th Streets,
New York, N.Y. 10001

Store and Mail Order Hours:
Sun. 10-5, Mon. thru Thurs. 9-7
Fri. 9-2, Sat. Closed

For Orders Call:
800-947-9928
212-444-5028

or FAX (24 Hours):
800-947-9003
212-444-5001

On the Web:
www.bhphotovideo.com
We Ship Worldwide

OUR NEW EXPANDED LOCATION
DSR-200A 3-CCD Digital (DVcam) Camcorder

Combining a considerably high-resolution body with the latest picture quality of DSR-20/40 "R", bions continuous UIPO0 with Control editing for DVCAM playback.

1.20 Mpixel effective pixels that allow you to give a box size even of 110 dB (D538-20-100) allowing relatively high-bornigh subpicture as well. Even in darkness, Sony's dynamic Picture and audio are absolutely clear, quality.

- High-contrast and natural tones: shutters, gain and other balance. It is adjustable 12 levels from Fi to Fi6, 16 levels of dynamic range from 1 to 20.0 LU. It expands the light with the symbolizing the brightness of a 3-CCD.

- [Reproduction] Sharp Picture frame line, there are two exposure can be set with the DSR camcorder. When 3-channels are included, Sony can also playback. Under the condition of SD530. The picture is the picture's relative line, light and a white, etc. 3ch line to accurately match the black level. (See, D530 line)

- [Frame Temperature] Shutter to eliminate the backlight of the subject. The shutter does not have the typical 100% frame rate. NEW, DSR200A, the shutter speed can be changed. (1/20, 1/125, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/8000)

- [Digital Signal Processor]: for the very same line used by the DSR camcorder, has a high-basic-image of 22 dB (HR-100) or 30 dB (HR-90) images. DSR camcorder is also available on the digital image processor. Their performance is equivalent to the DSR camcorder.

- [High-speed Image Processor]: for the very same line used by the DSR camcorder, has a high-basic-image of 22 dB (HR-100) or 30 dB (HR-90) images. DSR camcorder is also available on the digital image processor. Their performance is equivalent to the DSR camcorder.

- [HDMI connection]: for the very same line used by the DSR camcorder, has a high-basic-image of 22 dB (HR-100) or 30 dB (HR-90) images. DSR camcorder is also available on the digital image processor. Their performance is equivalent to the DSR camcorder.

- [Format]: for the very same line used by the DSR camcorder, has a high-basic-image of 22 dB (HR-100) or 30 dB (HR-90) images. DSR camcorder is also available on the digital image processor. Their performance is equivalent to the DSR camcorder.

- [LSB]: for the very same line used by the DSR camcorder, has a high-basic-image of 22 dB (HR-100) or 30 dB (HR-90) images. DSR camcorder is also available on the digital image processor. Their performance is equivalent to the DSR camcorder.

- [Format]: for the very same line used by the DSR camcorder, has a high-basic-image of 22 dB (HR-100) or 30 dB (HR-90) images. DSR camcorder is also available on the digital image processor. Their performance is equivalent to the DSR camcorder.

- [USB]: for the very same line used by the DSR camcorder, has a high-basic-image of 22 dB (HR-100) or 30 dB (HR-90) images. DSR camcorder is also available on the digital image processor. Their performance is equivalent to the DSR camcorder.
**SONY**

**UVW-1200/UVW-1400A**

Betacam SP Player + Recorder

The UVW-1200 and UVW-1400A are new Betacam SP models that deliver Betacam SP quality and added Betacam features in a wide range of applications. The new Betacam SP format offers a wider dynamic range, improved mid-tone reproduction, and improved noise performance. This makes Betacam SP an excellent real-time VTR for real-time editing and dubbing. These models are designed specifically for broadcast studio use. They are equipped with the latest Betacam SP technology and are obsolete repairable.

**Features**

- Betacam SP signals
- Betacam SP recording
- Betacam SP playback
- Real-time signal processing
- Digital compositing
- Composite video signals

**Applications**

- Real-time editing
- Instant replay
- Instant review
- Delayed playback

**Compatibility**

- Betacam SP format
- Betacam SP signals
- Betacam SP recordings
- Betacam SP playback

**Technical Specifications**

- **Betacam SP**
  - Colorimetry: BNC
  - Analog outputs: Video, Audio, Control, Timecode
  - Digital outputs: SDI, RS-422, Composite
- **Real-time signal processing**
  - Delayed playback
  - Instant replay
  - Instant review
- **Digital compositing**
  - Betacam SP signals
  - Real-time signal processing
  - Composite video signals

**Conclusion**

The UVW-1200 and UVW-1400A are ideal solutions for professional broadcast studios looking for improved signal processing and enhanced performance. Their Betacam SP technology and added features make them excellent choices for real-time editing and real-time applications.
Avid Xpress DV on IntelliStation

Avid Xpress DV on Intellistation is a handy digital video solution designed to give professional content creators in corporations, education, and government institutions, the power to communicate in a rich artistic way. 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-performance and reliable SeeI Station M Pro and intuitive Xpress DV software, you’ll be creating professional-looking video and much extra 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 recognized IBM IntelliStation M Pro features a high-speed Intel 586 chip set, 640 MB Pentium II processor, 200 MB drive, a Canopus DV gator, and a Matrox display card. Designed with the Intellistation M Pro in mind, the Intellistation M Pro supports high-speed ATA-66 drive, as well as up to 16GB of ECC memory. The solution is pre-installed with the Matrox multiformat architecture (MFTA) 1 ( 회로 card slot and a 1GB p/s card) supplied with 16MB of onboard memory, and the Canopus DV Gator Adapter (IEE80). The Intellistation M Pro comes with two UltraSATA hard drives: a 10GB drive for the operating system and programs, and an 18GB drive for Grafiling.

The Software

Avid XpressDV software combines powerful video and audio editing tools, digital imaging, and artistic special effects. Xpress DV captures and edits DV video, adds effects, mixes audio, and outputs the finished results over IEEE1394 Firewire for impressive video. DV transcodes the content to any new media formats. MPEG-1 (2.9 Mbps) Quicktime or AVI for computer presentations or for output to the web. Avid’s XpressDV Plus supports both XpressDV and XpressFami. The XpressDV offers the Avid graphical user interface (GUI) based on the 3.1 version, offering power and video and audio editing.

4 tracks of video with single track transitions

5 tracks of audio with real-time editing

Real-time digital audio

1.5 GB disk drive

1.5 GB disk drive

2 GB disk drive

IBM IntelliStation M Pro (6666-91U)

560 MHz Pentium III processor

256MB Full Speed ECC memory

Matrox Millennium G4 AGP with 16MB of RAM. (1.1 GB of non-ECC RAM)

UltraSATA 3GB (73GB) x 2 operating system and programs. and an 18GB drive for Grafiling.

Windows NT 4.0 with Service Pack 5.

Complete system integration and testing.

All for the unbelievable price of:

$999.95

Add an IBM 21 monitor.

And $50 MPR, retail set.

For only an additional 1000.00.

$9999.95

Apple Computer

Final Cut Pro

Professional Editing, Compositing and Effects Software for Macintosh

A breakthrough in non-linear video. Final Cut Pro contains professional editing, compositing, and special effects in one powerful application - joining a Power Mac into a professional workstation. Designed specifically for the Macintosh, Final Cut Pro offers a complete suite of flexible tools, in a simple-to-use interface. Final Cut Pro’s unique look and feel are revolutionizing broadcast and post production. You’ll have the power and flexibility to do everything from professional editing to broadcast output. Final Cut Pro features a complete set of tools for professional video editing, including non-linear editing, audio editing, color correction, and effects. Final Cut Pro also includes a complete set of tools for broadcast output, including video and sound mixing, audio editing, and digital video recording. Final Cut Pro is the perfect tool for professional video editing, with a powerful and intuitive interface. Final Cut Pro also includes a complete set of tools for broadcast output, including video and sound mixing, audio editing, and digital video recording. Final Cut Pro is the perfect tool for professional video editing, with a powerful and intuitive interface. Final Cut Pro also includes a complete set of tools for broadcast output, including video and sound mixing, audio editing, and digital video recording. Final Cut Pro is the perfect tool for professional video editing, with a powerful and intuitive interface.
Providing solutions for change

When our readers tell us about Broadcast Engineering, they say it's the best place to get current and reliable information about the television, cable and production industries. Just ask Jonathan Perkes:

“I've been a reader of Broadcast Engineering for 10 years. It's an excellent source for information that cannot be found in textbooks yet.

“Our company is in the process of transforming our facility to digital, and Broadcast Engineering provides the in-depth technical information to help us make that transition.”

Jonathan Perkes, Director of Engineering, Group W Network Services
### Classifieds

**For Sale**

| Buy | S T U D I O  
EXCHANGE |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The New DVCAM Editing Deck!</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>On-line Store</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>818-840-1351</strong></td>
</tr>
<tr>
<td><a href="http://www.studio-exchange.com">www.studio-exchange.com</a></td>
</tr>
</tbody>
</table>

**Broadcast Video Equipment**
- NEW and USED -

<table>
<thead>
<tr>
<th>Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>SONY</td>
</tr>
</tbody>
</table>

**DSR-2000!**

Circle (220) on Free Info Card

---

**Shopping for Equipment?**
Before you pay too much... check www.digibid.com

**digibid.com**
Industry Auction Network

The Internet Auction Marketplace
Best Deals On the Planet!

Circle (221) on Free Info Card

---

**AcousticsFirst**
Toll-Free 888-765-2900
Full product line for sound control and noise elimination.
Web: http://www.acousticsfirst.com

---

**Broadcast Engineering**

Don't buy a snake until you talk to the pros!
1-800-939-1001
www.radialeng.com

---

**DIGITAL CABLE EQ**
Keep Your EYE on the DIGITAL SIGNAL
The CABLE-Q

**Broadcast Engineering**
195
For Sale

Broadcast Products

For Sale/BROADCAST PRODUCTS

BECK ASSOCIATES

16024 Central Commerce Dr.,
Austin, TX 78660
1-888-422-8600
FAX: (512) 670-4390

AESIO Digital/Audio Converter Panel
Provides simple conversion between 110 ohm and 75 ohm audio signals, transformer coupled. BNC connectors for 75 ohm coax connections. Removable terminal block connectors for 110 ohm paired audio cable. 32 positions. Two rack units. (3 ½") $1,245

TBC-RMT - TBC Remote Control Unit
Remote control up to 3 TBC's. For use with JVC, Panasonic and Sony. Purchased with 1, 2, or 3 modules. With 3 modules $960

SCR-4X8-Serial Machine Control Router
Input/Output twelve rear mounted DB9-F connectors (four controls, eight devices). ELA RS-422 send and receive. Controls: Twelve lighted pushbuttons for channel assignment. $1,080

SCP-10-Serial 422 Patch Panel 10 x 10 passive non-normalling serial data patch panel. Two rack units high. Legend strips and 10 patch cords included $400

Circle (224) on Free Info Card

Ground Facilities
Earth Stations
Towers
Civil Works
Testing/Inspections
Tail Towers

Structural Studies
Static/Dynamic Analyses
Failure Analyses
Risk Assessments
Location/Height Verification
Surveying/GIS

Engineers/Constructors
Design/Build

PROVIDING TURNKEY ENGINEERING AND CONSTRUCTION SERVICES TO THE COMMUNICATIONS INDUSTRY

28 North First Street, Suite 210
San Jose, CA 95113
(408)297-2700 FAX:(408)297-2766
web: www.tfanco.com

Circle (223) on Free Info Card

Because it works.

Reach over 35,000 professionals in the commercial television industry with the Broadcast Engineering direct mail list.

www.americanradiohistory.com
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., #K99885, 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-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, responsible 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

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, Satellite 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 909-605-7391 Or Via Email at 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

CHIEF TECHNOLOGY OFFICER

Central Pennsylvania, home to a new $52 million science & arts center, is the 46th-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 broadcast/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

The Home Shopping Network

The Company Everyone's Watching.

It's all happening at America's premier electronic retailer and you can be a part of it! Home Shopping Network can offer you more growth, opportunity, and all-out excitement in one of the most dynamic and exhilarating work environments at our headquarters in St. Petersburg, Florida. Come to where the action is and really go places!

UPLINK BROADCAST ENGINEER

The successful candidate will be responsible for the maintenance and repair of satellite transmission equipment, both C band and Ku band. The position also includes the related audio, video, fiber optic, and subcarrier equipment involved in transmitting to two full-time networks plus occasional feeds. Must have the ability to quickly problem solve, diagnose and resolve system problems during live broadcast operations.

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.

BROADCAST ENGINEER

The candidate will be responsible for installation, maintenance, and repair of state-of-the-art television equipment that supports four live broadcast studios. Engineering knowledge of routers, switchers, videotape machines, mixing consoles, and cameras are essential. The position requires that the candidate troubleshoots broadcast and studio equipment down to the component level.

Requirements include a minimum of 3 years experience troubleshooting Broadcast and Studio equipment, as well as experience with a blend of digital and analog equipment. SBE or FCC license a plus. Excellent problem solving skills in a fast-paced environment, flexibility to work different shifts, the ability to handle responsibility and work as a team player are also required.

Our employees enjoy an excellent benefits package which includes health/dental/Vision, 401K, and employee discounts. For consideration, please forward your resume, including salary history, to: Home Shopping Network, Attn: Human Resources, 1 HSN Drive, St. Petersburg, FL 33729; Fax: (727) 872-6556; E-mail: spenceraj@hsn.com. For additional information, please call (800) 688-7007. We are an equal opportunity employer.

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, Sound Automation, Digital Environmental, 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.

VIDEO/AUDIO ENGINEER: Innovative, a premier Indianapolis based production and design house has an opening for an energetic electronic engineer. This position entails facility-wide support and repair of professional video and audio equipment to component level including DigiBeta, D2, Beta SP, Digital component switchers, DDR's, CMX editors, Discreet Smoke, Jaleo, Avid Media Composer and Media 100. Mac OS and UNIX is preferred. Three years minimum experience. Excellent salary with full benefits. This is an opportunity for some enthusiastic person to help control the direction and future of a fast-growing facility and to work with a group of creative people that like to have fun! Contact Information Please send resume to: Innovative Attn: Personnel Department, 1435 North Meridian Street, Indianapolis, IN 46202 Phone: (317) 686-6086 Fax: (317) 686-6096 Email: betsy@innovativei.com
MAINTENANCE ENGINEER - WDEF-TV (CBS Affiliate), a Media General Broadcast Group station is currently seeking 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 currently seeking 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, store store, 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 area, 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.

Senior Systems Test Technician

Wolf Coach, Inc. supplies communications vehicles to the television industry. If you’re watching a live news shot on your local or national “evening news”, chances are one of our news vans or satellite trucks is behind the camera. We’re the clear innovative leader in this industry, setting the standard for quality, appearance and dependability in mobile broadcast systems, and our vehicles perform daily throughout the country and around the world. We are also a valued supplier of communications platforms to various government agencies.

If you’re interested in pretty much doing the same thing day in and day out, then this is NOT the company for you. We ARE different. Our business is extremely interesting, we have great customers and we have GREAT employees. If you want a dynamic, challenging, exciting and fun place to work, and you have the qualifications we’re looking for, then we should talk.

Wolf Coach is looking to fill the position of Senior Systems Test Technician. Individuals applying should have a strong background in Broadcast Maintenance Engineering. Qualified applicants will need a working knowledge of Ku-Band satellite transmit and receive systems including amplifiers, converters, waveguide, satellite antennas and terrestrial 2 and 7 GHZ microwave equipment. Applicants should also have an extensive background in analog and digital video, audio and communications. Requirements include the ability to complete proof-of-performance testing on newly installed systems without supervision, including setup of all equipment including levels, timing, and phase. All applicants will need to show a working knowledge of test equipment such as a spectrum analyzer and TEK VM-700. Attention to detail in this position is a must. Knowledge of AutoCAD and a general FCC license is a plus.

This is not “just another company”, so if you’re a solid Broadcast professional, please don’t overlook this ad. If you’re not “just another employee”, then I’d very much like to hear from you. Please send information to: Jim Wolf, VP Operations, 7 “B” Street, Auburn, MA 01501 or email to: jwolf@wolfcoach.com.

Network Operations Supervisor

Network Operations Supervisor

Network Operations Coordinator

Fox Sports Net Regional News is currently seeking experienced professionals to join our team. The following positions are available:

NETWORK OPERATIONS SUPERVISOR

Individual will oversee all the Network Operations Center day-to-day activities including scheduling coordinators, reviewing daily status reports and monitoring network activity. Will also troubleshoot regional equipment problems and be a part of the support group for all regional users of the network. A Bachelor’s degree in Computer Science or broadcast background preferred. Requires knowledge of basic computer networks; strong organizational skills; ability to work in a fast-paced, live television, news environment. Broadcast news or traffic experience is a real plus. Individual should also have strong television technical skills in addition to familiarity with standard traffic procedures for reservations and scheduling broadcast transmissions on satellite and terrestrial networks.

(Code: JH/NOS)

NETWORK OPERATIONS COORDINATOR

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. Operations 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. NO PHONE CALLS, PLEASE. EOE.
**ENGINEERS**

Turner Broadcasting System has career opportunities for experienced television engineers. These career positions demand an extensive background in equipment maintenance, digital video and audio, and knowledge of computer systems and networks. Please mail or fax your resume and cover letter to:

Jim Brown  
Assistant Vice President of Engineering Services  
Turner Broadcasting System, Inc.  
One CNN Center  
P.O. Box 105366  
Atlanta, GA 30348-5366

Fax: 404-827-1835 • Phone: 404-827-1638  
TBS is an equal opportunity employer.

**Position Available at the Hayden Planetarium NYC**

We are seeking Senior and Assistant level engineering staff to perform maintenance in the Hayden Planetarium in New York City. This is the world's largest flight simulator and display device. If you like Astronomy, HD hardware & computers, this is the place.

Candidates must be computer literate, have wiring and construction skills, be comfortable with the use of bench scopes and test equipment. Broadcast, video post production or audio experience essential.

Please fax resumes to Director of Engineering RCES (212) 496-3555 or email to sorem@amnh.org

**WE PLACE ENGINEERS and Mfg. Sales/Marketing**

Employer Paid Fees.  
20 Years personalized & confidential service.  
All USA States & Canada

MAIL & FAX:  
KEYSTONE INT'L., INC.  
Dime Bank, 49 S. Main St., Pittston, PA 18640 USA  
Phone (570) 655-7143 • Fax (570) 654-5765  
website: keystoneint.com

We respond to all Employee & Employer Inquiries  
ALAN CORNISH / MARK KELLY

**MAINTENANCE ENGINEER**  
Telemundo/KSTS-TV, San Jose, California, is seeking qualified applicants for the position of Maintenance Engineer. Applicant should possess strong broadcast equipment maintenance. RF/UHF transmitter experience a plus. We are seeking a strong team player who requires minimal supervision, possesses good communication skills, and displays the ability to grow and learn new technologies. Telemundo offers a competitive salary and excellent benefits. Submit a detailed resume to: Carlos Quevedo, Chief Engineer, Telemundo of Northern California, Inc., 2319 Bering Drive, San Jose, California 95131. Telemundo is an Equal Opportunity Employer.

**BROADCAST MAINTENANCE ENGINEER:**  
Digital Generation Systems is currently interviewing Broadcast Engineers for the companies NYC and Louisville, KY facilities. Position requires experience with multiple tape formats and must be capable of troubleshooting to component level. Engineering degree or related experience necessary. For immediate consideration, please mail, fax or e-mail your resume along with salary requirements to: Digital Generation Systems 219 East 44th Street, New York, NY 10017 Att: Joseph Ashton, Fax 212-347-3987, e-mail jashton@dasystems.com

**WMDN/WGBC** is seeking a hands-on Assistant Chief Engineer, 3 years experience in broadcast maintenance, including systems troubleshooting and repair of studio equipment to the component level. Hands-on knowledge of UHF transmitters move you to head of line. Computer and networking knowledge a plus. This is a full-time, hands-on position. FCC and/or SBE certification desired. Salary commensurate with experience. EOE. Send resume to: Chief Engineer, WMDN/WGBC, 1151 Crestview Circle, Meridian, MS 33930. engineering@tv2430.com, fax 601-693-7126
The 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-upsmanhips 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 industry 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 versions 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.

Send questions and comments to: paul_mcgoldrick@interc.com
In your fight for clear transmission and reception, any of Videotek's 601 processing solutions or combinations will win the day for you.

Videotek's VDP-8601 frame synchronizers, DPA-90/100 proc amps and DL-800/810 digital legalizers manage serial digital in production, satellite uplink, cable or broadcast environments. When space is at a premium, these products offer the perfect solution, whether racked side-by-side or as standalone units.

The powerful DPA-90/100 proc amp makes it easy to adjust hue, video, chroma, luminance, pedestal and Y/C delay from dedicated front panel controls. Automatically adjust color and luminance levels to comply with NTSC or PAL legal limits with the DPA-100's unique "Broadcast Legal" button. One of the hottest topics in 601 video is color space legalization. The DL-800 and DL-810 offer the ultimate in legalization to broadcasters and post-production facilities alike.

The powerful VDP-8601 frame synchronizer also offers unique front panel buttons to store and display incoming 601 signals. Achieve stable, jitter-free synchronization of noisy or non-sync signals. Front panel LED indicators; monitor system status and signal equalization. Optional remote controls are available.

For more information on our products and application notes, visit our website at www.videotek.com or call us at 1-800-800-5719 to talk to one of our expert sales engineers.

Premium Quality, Intelligent Design, Total Value... That's Videotek.
think video, think Leitch

think IP @ Leitch
Video over IP applications are exploding. Leitch is lighting the fuse using our VR servers which already run on a fiber channel video storage area network and will now be IP capable for downloading videos and news to the Internet and transporting video content over wide-area networks.

think HDTV @ Leitch
Leitch has stayed the course to bring HDTV within reach of mainstream post and broadcast facilities. We have accelerated our lead by providing the industry with the most complete HDTV infrastructure solutions and expanding our already extensive range of products.

think MPEG @ Leitch
Digital is increasing the use of MPEG-2 technology and Leitch responds with MPEG-2 transport solutions with control, pre-processors, encoders and decoders, including multiplexing and de-multiplexing. Leitch has also expanded the VR MPEG-2 video server line to 4 channels and added 50 gig drives to lower overall storage costs.

think silicon @ Leitch
Leitch is applying video to silicon by taking its current technology assets and selected new video applications into silicon chips using Leitch chip design expertise. By making this silicon available to everyone, Leitch will expand the range and reach of high-quality video.

think news @ Leitch
Leitch dominates the digital newsroom with its NEWSFlash non-linear editor built into the VR video servers allowing each editor simultaneous access to all media. By combining edit stations with acquisition and playback channels, we build an integrated all-digital system to meet your time critical needs with streamlined newsroom workflow.

think servers @ Leitch
The Leitch VR video servers offer exceptional reliability and scalability using our VR technology. MPEG versions feature four bi-directional I/O channels in a 4RU frame and can be configurable to more than 40 channels—all with simultaneous access to the video storage area network with a capacity from 250 gigabytes to more than three terabytes.

think video @

www.leitch.com

International/Canada +1 (416) 445-9640, (800) 387-0233 • USA. East +1 (757) 548-2300, (800) 221-9573, USA. West +1 (818/888) 843-7004 • Europe +44 (0) 1483-501000
Hong Kong +(852) 2776-0628 • Japan +81 (3) 5423-3631 • Australia +61 (2) 9539-3355 • Latin America +1 (305) 591-0611 • Brazil +55 (11) 3151-5010

Circle (103) on Free Info Card

www.americanradiohistory.com